



PAUL R. LEPAGE  
GOVERNOR

STATE OF MAINE  
MAINE DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY  
BOARD OF PESTICIDES CONTROL  
28 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0028

WALTER E. WHITCOMB  
COMMISSIONER  
HENRY S. JENNINGS  
DIRECTOR

**BOARD OF PESTICIDES CONTROL**

**March 25, 2016**

**AMHI Complex, 90 Blossom Lane, Deering Building, Room 319, Augusta, Maine**

**AGENDA**

**8:30 AM**

1. Introductions of Board and Staff

2. Minutes of the February 19, 2016 Board Meeting

Presentation By: Henry Jennings  
Director

Action Needed: Amend and/or Approve

3. Consideration of the EPA Special Local Need [FIFRA Section 24(c)], EPA Reg. 81880-18, and State Supplemental Special Local Need [FIFRA Section 24(c)], EPA Reg. 81880-18-10163, Registration Request for Sandea Herbicide to control broadleaf weeds in lowbush blueberries in the non-bearing year

Jasper Wyman and Son is requesting an SLN for Sandea Herbicide to control perennial broadleaf weeds in lowbush blueberry in the nonbearing year. Canyon Group/Gowan Company has supported a supplemental label for use in Maine for the past few years, but rescinded support due to phytotoxicity concerns. Gowan is proposing an SLN with more stringent language to reduce risk of phytotoxicity and to place the burden of risk on the grower. The EPA only permits and approves issuance of an SLN on a primary product registration. However, states are permitted to issue a state supplemental SLN for a distributor product as long as an SLN for the primary product is first issued by the state and the basic registrant has approved the distributor's request for an SLN. Canyon Group has approved the supplemental SLN request by Gowan Company. Both the primary SLN and the state supplemental SLN for Sandea Herbicide are hereby submitted for the Board's approval.

Presentation By: Mary Tomlinson  
Pesticide Registrar

Action Needed: Provide Guidance to the Staff

4. Update on Actionable Strategies Developed by Board Staff for Promoting Integrated Pest Management with Homeowners

For the last several meetings, the Board has discussed homeowner pesticide use and ideas for promoting Integrated Pest Management (IPM) to this audience. The staff has been working on several actions and will now update the Board on its progress.

Presentation By: Megan Patterson  
Licensing and Certification Specialist

Action Needed: None Needed, Feedback Welcome

5. Legislative Update

There are currently two bills in the Legislature concerning pesticides. LD 1099 An Act To Establish a Fund for the Operations and Outreach Activities of the University of Maine Cooperative Extension Animal and Plant Disease and Insect Control Laboratory, would fund pest management education and laboratory operations, mainly testing ticks. As currently amended, \$400,000 from the BPC fund would be transferred in 2015-16 and \$400,000 per year from unspecified Department accounts thereafter. The amended version was voted OTP by the Committee on Agriculture, Conservation and Forestry and is making its way through the process. LD 1543 An Act To Create Stability in the Control of Pesticides proposed changes to rules governing municipal pesticide ordinances; it was referred to the Committee on State and Local Government and is currently tabled.

Presentation By: Henry Jennings  
Director

Action Needed: Informational Only

6. Election of Officers

The Board's statute requires an annual election of officers. The members will choose a chair and vice-chair to serve for the coming year.

Presentation By: Henry Jennings  
Director

Action Needed: Nominations and Election of Officers

7. Other Old or New Business

- a. Acadia National Park Chapter 29 variance permit for control of invasive plants
- b. Woodlands Club, Falmouth, Chapter 29 variance permit
- c. Other?

8. Schedule of Future Meetings

May 13, July 1, and August 19, 2016 are tentative Board meeting dates. The August 19 meeting is tentatively a field trip. The Board will decide whether to change and/or add dates.

Adjustments and/or Additional Dates?

9. Adjourn

**NOTES**

- The Board Meeting Agenda and most supporting documents are posted one week before the meeting on the Board website at [www.thinkfirstspraylast.org](http://www.thinkfirstspraylast.org).
- Any person wishing to receive notices and agendas for meetings of the Board, Medical Advisory Committee, or Environmental Risk Advisory Committee must submit a request in writing to the Board's office. Any person with technical expertise who would like to volunteer for service on either committee is invited to submit their resume for future consideration.
- On November 16, 2007, the Board adopted the following policy for submission and distribution of comments and information when conducting routine business (product registration, variances, enforcement actions, etc.):
  - *For regular, non-rulemaking business*, the Board will accept pesticide-related letters, reports, and articles. Reports and articles must be from peer-reviewed journals. E-mail, hard copy, or fax should be sent to the attention of Anne Chamberlain, at the Board's office or [anne.chamberlain@maine.gov](mailto:anne.chamberlain@maine.gov). In order for the Board to receive this information in time for distribution and consideration at its next meeting, all communications must be received by 8:00 AM, three days prior to the Board meeting date (e.g., if the meeting is on a Friday, the deadline would be Tuesday at 8:00 AM). Any information received after the deadline will be held over for the next meeting.
- During rulemaking, when proposing new or amending old regulations, the Board is subject to the requirements of the APA (Administrative Procedures Act), and comments must be taken according to the rules established by the Legislature.



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**BOARD OF PESTICIDES CONTROL**

**February 19, 2016**

**AMHI Complex, 90 Blossom Lane, Deering Building, Room 319, Augusta, Maine**

**MINUTES**

**8:30 AM**

Present: Eckert, Flewelling, Granger, Jemison, Morrill, Stevenson

1. Introductions of Board and Staff

- The Board, Staff, and AAG Mark Randlett introduced themselves
- Staff Present: Chamberlain, Connors, Couture, Fish, Hicks, Patterson, Tomlinson

2. Minutes of the January 13, 2016 Board Meeting

Presentation By: Henry Jennings  
Director

Action Needed: Amend and/or Approve

- Jemison suggested that in item 3, “provide training to one health-and-safety outreach worker” be changed to “provide training using one health-and-safety outreach worker”.
- Mark Randlett pointed out three typos on item 4.
  - **Granger/Stevenson: Moved and seconded to adopt as amended**
  - **In Favor: Unanimous**

3. Discussion of the Key Messages for Homeowner Outreach

At the last three meetings, the Board discussed public concerns about homeowner pesticide use and explored ideas for promoting Integrated Pest Management (IPM) to this audience. Before embarking on an outreach campaign the Board needs to clarify exactly which messages are to be promoted so that there is consistency between co-operators. The staff has drafted a memo for the Board’s consideration.

Presentation By: Megan Patterson  
Pesticide Safety Educator

Action Needed: Provide Guidance to the Staff

- Patterson explained that the staff had been brainstorming, based on recent Board discussions, on what should be included in presentations, public meetings, etc. They came up with ideas that are fairly neutral around education for homeowners. Would like input from the Board on what we should be focusing on.
- Eckert said to emphasize the non-pesticide first and use the most effective combination. She asked for the context, noting the list looked like a good agenda for a talk. Patterson explained that this is the list of messages that could be included in talks, outreach materials, training to stores; what homeowners should know. Eckert noted that if using in a public service announcement it should be broken into pieces; no one would read this much.
- Hicks said it was implied, but should focus on the combination of toxicity and exposure—minimize risk. Also the risk from mechanical control—immediate risk vs. chronic risk.
- Jennings noted that the staff emphasizes the lowest risk pest management strategy which sometimes involves use of a pesticide. For example with poison ivy, you can pull it out, but for most people, that is not the lowest risk strategy. Using herbicides may be the lowest risk strategy if done properly. Granger noted that this can be the most effective as well.
- Hicks noted that we should look at the first four as defining the issue; answer those before determining risk and the risk of any strategy.
- Eckert noted that IPM is not mentioned. Jennings replied that that was by design. We don't want to talk over people's heads. The staff is trying to use words at a level where people don't need an entomology degree to understand the information.
- Kathy Murray commented that there's nothing on the list about biologicals—there are lots of natural things that work if pesticides aren't used. People are looking at a specific problem when they reach for pesticides. In Maryland they focused on mowing lawns high to reduce the use of herbicides and fertilizers. Educators advise conveying a simple, positive message of something they can do to reduce risks.
- Jemison noted that we know through surveys that weed and feed products are among the most used. Are there alternative approaches the Board can suggest that are more sustainable?
- Eckert suggested “weed not feed”. Fish said in the past we've used “Weed and seed”. Fill in open areas.
- Jemison asked if there are other issues that we know are going to have homeowners reaching for pesticides. Carpenter ants? Yellowjackets? Jennings noted that there was a very extensive survey done at the time GotPests was created and that's how the pests were chosen for that.
- Eckert noted that it would make a great newspaper series along with the garden section.
- Morrill asked if the staff was asking the Board to pare down the list. Patterson replied that they are trying to develop an overarching theme. Jennings said that we don't need to pare them. We would only use some of them as appropriate. Want to have a central message that everyone can support. The staff would pick and choose from this list. If the staff can get Tom Mather to come back and present a tick talk for the public, the message would be tailored around ticks. The staff needs to identify a series of messages that everyone can buy into that neither endorse nor discourage pesticide use.
- Granger said that we don't want to say don't use pesticides. Our job is to minimize reliance on pesticides and to regulate them. We don't want to send a message that we are opposed to using pesticides. We don't want to be perceived as not allowing their use. Agriculture and forestry need pesticides.
- Morrill suggested we target seasonal issues, while homeowners are dealing with those issues. A conversation around lawn care should be timed to homeowners when they're thinking about it.
- Stevenson asked what the original goal was. The list is good. There were a couple of things we wanted to accomplish. What sparked the conversation is what local towns are doing. The Board needs to do outreach so folks know this isn't the wild, wild west around lawn care. The goal is for homeowners to use products correctly. The Board also wants lawn care companies

to do the job right. The licensing and training process is designed to ensure that. What can we add so that folks know there are resources, the Board is there, directions about use of products, what rules/regulations are there. Is there more that we need to do? Is this list going to solve those things?

- Hicks replied that when dealing with the public, if somebody has their mind made up, they're not going to take in any information; people can be resistant to someone trying to modify their behavior. The people in the middle of it are the ones asking the questions. People ask what do they need to know to solve their problem. Answer: read the labels, don't buy anything you don't understand; don't buy anything you don't have the PPE for. I can do this one at a time, don't know how to do on a larger scale. If people are scared of the pest, they look for the chemical; if they are scared of the chemical, they look for other means of control.
- Jemison noted that Griffin Dill has been working with homeowner issues at the Pest Management Office. Collaboration could broaden some reach.
- Morrill said that part of the discussion that got us here is where do we spend our resources. Answer: on the regulated community. The Board should target its message to homeowners and homeowner uses and the products they're going to apply. People are going to use pesticides, maybe it's our job to show them how to do it properly. The Board should provide more broad outreach to those homeowners so they choose the right products, use them properly, understand that we're here and that there are resources available.
- Following up on comments by Stevenson, Katy Green, MOFGA, asked, what is the purpose of this discussion? Is it in response to ordinances being discussed in South Portland and Portland?
- Stevenson said that was partly true. A lot of times there is a gap of information. He has been to some council meetings where it's clear people don't have the information to fill in those gaps. People don't realize the Board exists. There is a huge gap between the Board and homeowners. They don't understand labels.
- Katy Green said she thought the discussion was in response to the multitude of letters the Board received.
- Murray agreed with Stevenson that we need to be able to get information out to people that the resources exist. How do you reach people? Social media; starting to see the value of that. Once we decide on the message have to work on different platforms to get it out.
- Flewelling noted that the trouble with social media is the credibility. How do you get a credible message out? Murray replied that because it's from us it will be credible. There will be a proportion of people that disregard it.
- Jennings noted that the conversation had transitioned from item 3 to item 4.
- Katy Green asked for examples of "reputable sources" referenced in bullet 4. Jennings replied that it has to be University or Governmental because so much information available on the internet is editorial in nature. It has to have a scientific basis and come from a source that has no particular agenda. Green noted that it should not be science paid for by chemical companies.
- Granger asked whether the local interest in municipal ordinances is an indictment of the Board's effectiveness. Is the Board missing something, not doing something? Is there no confidence in the Board's ability to regulate? What can be done to gain their confidence? Is there something missing from the list that they need to know? What is causing the feeling of need that is pushing concerned parties, is it some need that we are not meeting?
- Fish replied that everything on the list has already been done. The key is to have a concerted effort and do it over and over. People don't know who we are and what we do. Unless you put a lot of time and money into that, you won't reach them all. There are so many things for people to do, it takes a lot of effort and a lot of creativity to come up with ways to reach them and capture their attention. As Murray said, with social media you can reach a lot of people without spending a lot of money, but it must be done consistently; it's a very difficult place to get into effectively.

- Hicks said that we need to verify that the message is being effective, that we're not wasting money; focus groups, surveys. Fish replied that the staff had been doing that. There were focus groups looking at which messages were most effective. Social marketing techniques were also researched. As a government agency it's hard to develop a set of messages that everyone can buy into. Hicks said that we can't do risk communication en masse, only individually or in groups.
- Morrill suggested going back to what Granger had said about focusing on what we're trying to do. Over time, the message will change. New messages and ideas will emerge. The municipal ordinance issue does create concerns. Does the average homeowner in the state know we exist? The Board needs to get that message out.

4. Update on Actionable Strategies Developed by Board Staff for Promoting Integrated Pest Management with Homeowners

At the November 13, 2015 meeting, the Board discussed public concerns about homeowner pesticide use and explored ideas for promoting Integrated Pest Management (IPM) to this audience. At the December 18, 2015 meeting, the Board heard from invited recipients of pesticide registration revenues as they discussed their current activities related to homeowner IPM and whether there may be opportunities to expand their roles. At the January 13, 2016 meeting, the staff presented the actionable strategies list they created for promoting IPM to homeowners. The Board directed the staff to begin work on these strategies, to measure participation/success and give a progress update at the next Board meeting.

Presentation By: Megan Patterson  
Pesticide Safety Educator

Action Needed: None

- Patterson summarized the staff's activities so far. The staff has started drafting an article on ticks and started work on public presentations. The list of messages will be the foundation for everything. Having Tom Mather give a tick talk to homeowners in the Portland area is another idea the staff is pursuing. How many people will come to an event like that? Hopefully collaborators will help advertise events. The staff is pursuing a new domain name which is awaiting approval from the state. Healthymainelawns.org, will go under the GotPests site. The Staff has been reaching out to collaborators, brainstorming who should be included and what topics should be discussed. There have been discussions about use of their social media outlets and getting help through established outlets. The staff is trying to get approval to talk to municipalities. Rockport and Kennebunkport have asked us to talk about lawn care. The staff is working on a presentation. An outline for a presentation at garden centers is in the works also.
- Flewelling asked what the challenges are around municipalities. Jennings replied that the first job is to help them understand how and to what extent pesticides are regulated. Municipalities should be aware there is a Board, and there are state and federal regulations. The law around adopting municipal ordinances would be useful information. One of the key messages is, "what is a pesticide." Municipalities don't get that and tend to write ordinances that prohibit the use of any pesticides. They don't realize they've just outlawed repellents, pool chemicals and paints and stains, etc. Rockport wants a presentation on how to deal with lawn pests similar to the turf BMPs and school ground BMPs that we already have. The Board's role is primarily educational in nature. The staff does not take any kind of position on whether municipalities should have an ordinance, or if they do, what should be in it.

- Flewelling asked whether this has to be approved by the administration. Jennings replied that they are concerned about the policy area. As long as the staff steers clear of policy, it's okay. But it is a difficult balancing act because what happens is once a municipality consults the Board about an ordinance, over time it is sometimes construed as the BPC has approved and endorsed it. The staff is trying to be diligent about only providing education.
- Eckert suggested using collaborators to get more publicity for the Board's role as well as the collaborator's role. What government/state agencies already exist that are already thinking about this. People think there is no regulation of pesticides. With toxics reduction, they used the government agency as an example. If the town does a good job with IPM, then they are the leader and set the example. The state looked at reducing toxic chemicals for cleaning before asking other groups to do it.
- Jennings said the staff is trying to have all the activities coordinated and have some synergy between them. Every talk, article, advertisement, PSA, etc. will promote the resources that are already there. There is already a huge list of control recommendation sheets from government and universities, all selected based on use of IPM and a balanced viewpoint. If we can lure people into the websites, the information is all there. The staff is thinking about the garden insert in the Portland Press Herald in the spring and The Source. The Board staff openly invites other suggestions.
- Eckert noted that how people receive information is generational. Some are more comfortable with presentations, articles, magazines, but what Murray is saying is that there is a whole age-class that is more comfortable with other media. The Board should do both. Garden centers have presentations to draw people in and the Board should work with them.
- Patterson said that the plan is to link everything together. First have an article about ticks and the Tom Mather presentation, and all the collaborators could help promote the events and the websites.. May is Lyme Disease Prevention Month, so the staff hopes to piggyback on CDC's media outreach.
- Eckert asked whether Tom Mather could be featured on Maine Calling on MPR.
- Jemison wondered if there are any really short—30 to 90 seconds—videos around ticks or other hot issues that are entertaining but really to the point. Patterson replied that she found some short ones, but she's not sure how entertaining they are. Jemison noted that you only have a short time to grab someone's attention.

5. Consideration of a Consent Agreement with Jacob Boyington of Appleton Ridge Construction of Appleton, ME

On June 3, 1998, the Board amended its Enforcement Protocol to authorize staff to work with the Attorney General and negotiate consent agreements in advance on matters not involving substantial threats to the environment or public health. This procedure was designed for cases where there is no dispute of material facts or law, and the violator admits to the violation and acknowledges a willingness to pay a fine to resolve the matter. This case involves a lab-confirmed drift of Malathion to residential property during an application made to a blueberry field in Palermo.

Presentation By: Raymond Connors  
Manager of Compliance

Action Needed: Approve/Disapprove the Consent Agreement Negotiated by Staff

- Connors explained that this was a drift incident when an insecticide was applied in Palermo. The owner across the street receives notification and leaves the premises when applications



take place. A neighbor saw pesticides going across the road. Samples on the residential property and on the untreated buffer tested positive as detailed in the Consent Agreement.

- Eckert asked why the residue was higher at the house than in the buffer. Jennings replied that the way very small droplets deposit is dependent on a lot of variables. Oftentimes, there is not going to be a clean residue gradient.
- Jemison noted that this is a classic example of what the Board was trying to achieve when the Drift Rule was developed. The wind was blowing the wrong way. Fine seems reasonable
  - **Jemison/Flewelling: Moved and seconded to approve the consent agreement negotiated by staff**
  - **In Favor: Unanimous**

6. Consideration of a Consent Agreement with Priority Real Estate Group, LLC of Topsham, ME

On June 3, 1998, the Board amended its Enforcement Protocol to authorize staff to work with the Attorney General and negotiate consent agreements in advance on matters not involving substantial threats to the environment or public health. This procedure was designed for cases where there is no dispute of material facts or law, and the violator admits to the violation and acknowledges a willingness to pay a fine to resolve the matter. This case involves an employee of Priority Real Estate Group who made an unlicensed application of Roundup Weed and Grass Killer herbicide to curbs and sidewalks of a school in Brunswick while the school was in session.

Presentation By: Raymond Connors  
Manager of Compliance

Action Needed: Approve/Disapprove the Consent Agreement Negotiated by Staff

- Connors explained that this violation concerned a property that is rented to an accredited school and is managed by a management company. The school's IPM Coordinator called Kathy Murray because she noticed a person using a hand can to apply pesticides to the curb and sidewalk while school was in session. The inspector found the person was an employee of the maintenance company and he acknowledged he was applying Roundup. The IPM Coordinator had spoken to him on previous occasions and told him that a commercial applicator's license was required for any application at a school and that he had to give her advance notice. When the inspector talked to him he said he didn't realize Roundup was a pesticide.
- Morrill noted that both the employee and the company are not licensed; Connors said that is correct.
- Eckert pointed out that the IPM Coordinator did a great job.
  - **Eckert/Stevenson: Moved and seconded to approve the consent agreement negotiated by staff**
  - **In Favor: Unanimous**

7. Consideration of a Consent Agreement with Joseph Lemar of Dresden, ME

On June 3, 1998, the Board amended its Enforcement Protocol to authorize staff to work with the Attorney General and negotiate consent agreements in advance on matters not involving substantial threats to the environment or public health. This procedure was designed for cases where there is no dispute of material facts or law, and the violator admits to the violation and

acknowledges a willingness to pay a fine to resolve the matter. This case involves an unlicensed application of Roundup Herbicide made to a blueberry field.

Presentation By: Raymond Connors  
Manager of Compliance

Action Needed: Approve/Disapprove the Consent Agreement Negotiated by Staff

- Connors explained that this homeowner asked an adjoining landowner to manager her property. The itemized bill she received including a line for “poison”, so she called BPC. Lemar admitted to the inspector that he had used Roundup on the field.
- Flewelling asked if it was active agricultural land. Connors replied that it was a blueberry field that had been subdivided into lots. Something happened which prevented most of the lots from being built on and they reverted back to Lemar, but this lady still owned her lot and it has a well on it.
  - **Flewelling/Stevenson: Moved and seconded to approve the consent agreement negotiated by staff**
  - **In Favor: Unanimous**

## 8. Other Old or New Business

- a. Central Maine Power Company’s Transmission Right-of-Way Drift Plan for 2016
  - Nicholas Hahn from CMP said the plan was basically the same as last year. Using the standard foliar mix that they use every year.
  - Jennings noted that CMP sends it voluntarily; it’s good for the Board to understand what they’re doing to try to be good stewards of transmission lines.
  - Hahn said they started using pre-mixed products a couple of years ago and in 2016 they are starting a closed chain of custody process to track containers for recycling.
- b. Email from Nancy Oden
- c. Email from Carol Laboissonniere
  - Eckert noted that it’s probably the fact that grass is Roundup ready that concerns her. The other features of the grass look good.
  - Flewelling asked Hicks if Roundup is less toxic than other products. Hicks said it depends. She would have to review the toxicity database of both compounds.
  - Granger pointed out that all pesticides have pluses and minuses. One of the nice things about Roundup is that it doesn’t get into other plants; breaks down almost immediately on contact with most soils. If you single out one chemical you just reduce choice. The Board shouldn’t take a position for or against this particular use. Instead, the Board should try to get people to use the one that is most suitable.
  - Jemison said you would have to consider when developing a Roundup ready grass whether it would cross-pollinate into other annual bluegrasses. If the trait crosses it will make other grasses more difficult to control.
  - Katy Green asked if this would come before the Board if it came on the market. Hicks replied that it would not, because Roundup ready means they’ve taken a gene from a Roundup resistant plant and inserted it into the turf grass. It is not a pesticide because it does not produce a pesticidal compound.
- d. Letter from Physicians for Social Responsibility Maine Chapter
  - Eckert noted that this is a fairly liberal group that she respects although she is not a member. She asked why they say glyphosate is probably carcinogenic. Hicks said that she would share the article from the IRAC website.

9. Schedule of Future Meetings

March 25, and May 6, 2016 are tentative Board meeting dates. The Board will decide whether to change and/or add dates.

Adjustments and/or Additional Dates?

- The Board agreed to change the May date from the 6<sup>th</sup> to the 13<sup>th</sup>. The Board also added July 1 as a meeting date, and August 19 as the date for a field trip, perhaps looking at a turf farm, greenhouse, or apple orchard.

10. Adjourn

- **Granger/Jemison: Moved and seconded to adjourn at 10:07 am**
- **In Favor: Unanimous**



**STATE OF MAINE**  
**DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY**  
**BOARD OF PESTICIDES CONTROL**  
 28 STATE HOUSE STATION  
 AUGUSTA, MAINE 04333

**PAUL R. LEPAGE**  
 GOVERNOR

To: Board of Pesticides Control Members  
 From: Mary Tomlinson, Pesticides Registrar/Water Quality Specialist  
 RE: EPA Special Local Need (SLN) [FIFRA, Section 24(c)] application to approve the use of Sandea Herbicide, EPA Reg. No. 81880-18, to control perennial broadleaf weeds in lowbush blueberries in the non-bearing year

State Supplemental Special Local Need (SLN) [FIFRA, Section 24(c)] application to approve the use of Sandea Herbicide, EPA Reg. No. 81880-18-10163, to control broadleaf weeds in lowbush blueberries in the non-bearing year

Date: March 15, 2016

\*\*\*\*\*

Enclosed are the above referenced Special Local Needs (SLN) [FIFRA, Section 24(c)] application and supporting documents for your consideration.

Jasper Wyman and Son is requesting an SLN for Sandea Herbicide to control perennial broadleaf weeds in lowbush blueberry in the nonbearing year. Canyon Group/Gowan Company has supported a supplemental label for use in Maine for the past few years, but rescinded support due to phytotoxicity concerns. Gowan is proposing an SLN with more stringent language to reduce risk of phytotoxicity and to place the burden of risk on the grower.

The EPA only permits and approves issuance of an SLN on a primary product registration. However, states are permitted to issue a state supplemental SLN for a distributor product as long as an SLN for the primary product is first issued by the state and the basic registrant has approved the distributor's request for an SLN. Canyon Group has approved the supplemental SLN request by Gowan Company. Both the primary SLN and the state supplemental SLN for Sandea Herbicide are hereby submitted for the Board's approval.

Please review the attached documents and let me know if you have any questions.

- FIFRA, Section 24(c) application
- Letter of support from Niki Yopez, Registration Specialist, Canyon Group/Gowan Company
- Letter of support from Darin Hammond, Jasper Wyman & Son
- Sandea draft Maine SLN labels
- Sandea EPA label
- Sandea Section 3 label
- Sandea MSDS

**HENRY JENNINGS, DIRECTOR**  
 90 BLOSSOM LANE, DEERING BUILDING



PHONE: (207) 287-2731  
 WWW.THINKFIRSTSPRAYLAST.ORG



United States Environmental Protection Agency  
Office of Pesticide Programs, Registration Division (7505C)  
Washington, DC 20460

**Application for/Notification of State Registration  
of a Pesticide To Meet a Special Local Need**  
*(Pursuant to section 24(c) of the Federal Insecticide,  
Fungicide, and Rodenticide Act, as Amended)*

For State Use Only  
Registration No. Assigned  
**ME-160001**  
Date Registration Issued

**1. Name and Address of Applicant for Registration**  
Canyon Group LLC  
C/O Gowan Company  
PO BOX 5569  
Yuma, AZ 85366-5569

**2. Product is (Check one)**  
 EPA-Registered  
 New (not EPA-registered)  
Attach EPA Form 8570-4, Confidential Statement of Formula for new products.

EPA Registration Number  
**81880-18**

EPA Company Number

**4. Product Name**  
Sanda Herbicide

**3. Active Ingredient(s) in Product**  
Halosulfuron

**5. If this is a food/feed use, a tolerance or other residue clearance is required. Cite appropriate regulations in 40 CFR Part 180, 185, and/or 186.**

**6. Type of Registration (Give details in Item 13 or on a separate page, properly identified and attached to this form):**

a. To permit use of a new product.

b. To amend EPA registrations for one or more of the following purposes:

(1) To permit use on additional crops or animals.  
 (2) To permit use at additional sites.  
 (3) To permit use against additional pests.  
 (4) To permit use of additional application techniques or equipment.  
 (5) To permit use at different application rates.  
 (6) Other (specify below)

**7. Nature of Special Local Need (check one)**

There is no pesticide product registered by EPA for such use.  
 There is no EPA-registered pesticide product which, under the conditions of use within the State, would be as safe and/or as efficacious for such use within the terms and conditions of EPA registration.  
 An appropriate EPA-registered pesticide product is not available.

**8. If this registration is an amendment to an EPA-registered product, is it for a "new use" as defined in 40 CFR 152.3?**  
 Yes (discuss in Item 13 below)  No

**10. Has FIFRA section 24(c) registration for this use of the product ever, by another State, been (check appropriate box(es), if known):**

Sought  Issued  Denied  Revoked

If any of the above are checked, list States in Item 13 below.

No FIFRA section 24(c) Action

**9. Has an EPA Registration or Experimental Use Permit for this chemical ever been (check applicable box(es), if known):**

Sought  Issued  Denied  Cancelled  Suspended

Registration  Experimental Use Permit  No Previous Permit Action

**Certification**  
I certify that the statements I have made on this form and all attachments thereto are true, accurate, and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

**11. Endangered Species Act: (Give details in Item 13 or on a separate page, properly identified and attached to this form)**

Identify the counties where this pesticide will be used. If Statewide, indicate "all." Provide a list of Federally protected endangered/threatened species which occur in the areas of proposed use.

**Signature of Applicant or Authorized Representative**  
*Nikki Yegan*

**Title**  
Registration Specialist

**Telephone Number**  
928-819-1516

**Date**  
2-12-2016

**12. Indicate use status of Special Local Need, i.e., planned dates of use:**  
From: 03-01-2016 To: 12-31-2020

**13. Comments (attach additional sheet, if needed)**

**Determination by State Agency**  
This registration is for a Special Local Need and is being issued in accordance with section 24(c) of FIFRA, as amended. To the best of our knowledge, the information above is correct, except as noted in "Comments" below or in attachments.

**Name, Title, and Address of State Agency Official**  
Mary E. Tomlinson  
Maine Board of Pesticides Control  
28 State House Station  
Augusta, ME 04333

**Title**  
Pesticides Registrar/Water Quality Specialist

**Telephone Number**  
207-287-7544

**Date**

**Comments (by State Agency Only)**  
Expires December 31, 2020

**Received by EPA**



The Go To Company

P.O. Box 5569 • Yuma, AZ 85366 • Toll Free: 800.883.1844 ext. 2 • [www.gowanco.com](http://www.gowanco.com)

February 16, 2016

Attention: Mary E. Tomlinson  
Department of Agriculture  
Maine Board of Pesticides Control  
28 State House Station  
Augusta, ME 04333

RE: Sandea Herbicide, EPA Reg. No. 81880-18, SLN Application ME-16XXXX for Blueberries.

Dear Mrs. Tomlinson:

Canyon Group is requesting a Special Local Need (SLN) ME-16XXXX, for use of Sandea (active ingredient Halosulfuron) on blueberries.

Wyman's of Maine supports this SLN. Sandea (a supplementally distributed product) is necessary to control many perennial broadleaf weeds which are not controlled by other herbicides on the market for the blueberry industry.

Canyon Group gives permission to Gowan Company to issue a supplemental SLN for Sandea, EPA Registration number 81880-18-1163, and to distribute the product to growers.

In support of this application, I have enclosed the following:

- Application for/Notification of State Registration of a Pesticide To Meet a Special Local Need (EPA Form 8570-25)
- Proposed SLN no. ME-16XXXX Canyon
- Proposed SLN no. ME-16XXXX Gowan Company

If I can provide further information or documentation please contact me at (928) 819-1516 or [nryan@gowanco.com](mailto:nryan@gowanco.com).

Kind regards,

Nikki Yopez  
Regulatory Specialist



RECOMMENDED BY FUTURE GENERATIONS.

2/16/2016

Maine Board of Pesticide  
28 State House Station  
Augusta, Maine 04333-0028

Jasper Wyman & Son is pleased to support Sandea (Halosulfuron-methyl) as a 24 C registration for use on wild blueberries in Maine. We have been using this product for a number of years with great success to control perennial broadleaf weeds that are not controlled with the other herbicides available for use in our industry. We feel that this material is an essential tool to control these weeds, and also to help combat any resistance issues associated with other materials registered that have been used for many years. We have seen increases in our yield, and quality in fields treated with Sandea when the material is used properly. We would appreciate your support of this material as a tool to ensure that we can grow a safe sustainable and profitable crop in the future. Please feel free to contact me if you have any questions concerning Sandea.

Sincerely,

A handwritten signature in black ink that reads "Darin Hammond". The signature is fluid and cursive, with a long horizontal stroke extending to the left.

Darin Hammond

Senior Manager of Farm Operations  
Jasper Wyman & Son

601 Route 193  
Deblois, Maine 04622  
Office 207-638-2201



**Jasper Wyman & Son**

P.O. Box 100, Milbridge, ME 04658 Finance: 207.546.3800 Sales & Traffic: 207.546.2311  
[www.wymans.com](http://www.wymans.com)





# Section 24(c) Special Local Need Label

## FOR DISTRIBUTION AND USE ONLY IN THE STATE OF MAINE

This label for SANDEA herbicide expires and must not be distributed or used in accordance with this SLN registration after December 31, 2020.

GROUP 2 HERBICIDE



EPA Reg. No 81880-18 EPA SLN NO. ME-16XXXX

<b>ACTIVE INGREDIENT:</b>	<b>% BY WT.</b>
Halosulfuron-methyl, methyl 3-chloro-5-(4,6-dimethoxyimidin-2-ylcarbamoylsulfamoyl)	
-1-methylpyrazole-4-carboxylate.....	75.0%
<b>OTHER INGREDIENTS</b> .....	<b>25.0%</b>
	<b>TOTAL 100.0%</b>

### KEEP OUT OF REACH OF CHILDREN

### CAUTION

#### DIRECTIONS FOR USE

- It is a violation of federal law to use this product in a manner inconsistent with its labeling.
- This labeling must be in the possession of the user at the time of application.
- Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the EPA registered label.

#### DIRECTIONS FOR USE

#### PREHARVEST INTERVAL

The required days between last application and harvest are given in ( ) after each crop name.

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>13-07B LOWBUSH BLUEBERRIES (14)</b>	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. SANDEA should be tank mixed with products such as Velpar® Velossa (hexazinone ai's), or Sinbar® to broaden the spectrum of weeds controlled.</p> <ul style="list-style-type: none"> <li>• <b>Vegetative (Non-Crop) Year</b></li> <li>• <b>Broadcast application prior to breaking dormancy in the Spring, or after blueberries are completely dormant in the Fall for control of labeled weeds.</b></li> </ul> <p>Apply SANDEA as a single broadcast spray application. Applications applied 1 to 2 months prior to breaking dormancy will allow for better weed control.</p>
<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Overlapping boom swaths increases the potential for phytotoxicity including leaf yellowing, reddening, and/or stunting</li> <li>• Consult "Use Precautions" and "For Optimum Results" of label for important usage information.</li> <li>• Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply when frost is in the ground.</li> <li>• Do not apply to water saturated soils.</li> <li>• Do not apply to blueberries after vegetative bud break.</li> <li>• Do not apply to bushes established less than one year or to plants under stress.</li> <li>• Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>• Do not apply SANDEA after the crop has progressed into budbreak or significant injury will occur.</li> <li>• Do not apply more than 1 application or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period.</li> </ul>		

24(c) Registrant: Canyon Group Company  
P.O. Box 5569  
Yuma, AZ 85366-5569



# Section 24(c) Special Local Need Label

## FOR DISTRIBUTION AND USE ONLY IN THE STATE OF MAINE

This label for SANDEA herbicide expires and must not be distributed or used in accordance with this SLN registration after December 31, 2020.

GROUP 2 HERBICIDE



EPA Reg. No 81880-18-10163 EPA SLN NO. ME-16XXXX

<b>ACTIVE INGREDIENT:</b>	<b>% BY WT.</b>
Halosulfuron-methyl, methyl 3-chloro-5-(4,6-dimethoxyimidin-2-ylcarbamoylsulfamoyl)-1-methylpyrazole-4-carboxylate.....	75.0%
<b>OTHER INGREDIENTS</b> .....	<b>25.0%</b>
	<b>TOTAL 100.0%</b>

### KEEP OUT OF REACH OF CHILDREN

### CAUTION

#### DIRECTIONS FOR USE

- It is a violation of federal law to use this product in a manner inconsistent with its labeling.
- This labeling must be in the possession of the user at the time of application.
- Follow all applicable directions, restrictions, Worker Protection Standard requirements, and precautions on the EPA registered label.

#### DIRECTIONS FOR USE

#### PREHARVEST INTERVAL

The required days between last application and harvest are given in ( ) after each crop name.

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>13-07B LOWBUSH BLUEBERRIES (14)</b>	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. SANDEA should be tank mixed with products such as Velpar® Velossa (hexazinone ai's), or Sinbar® to broaden the spectrum of weeds controlled.</p> <ul style="list-style-type: none"> <li>• <b>Vegetative (Non-Crop) Year</b></li> <li>• <b>Broadcast application prior to breaking dormancy in the Spring, or after blueberries are completely dormant in the Fall for control of labeled weeds.</b></li> </ul> <p>Apply SANDEA as a single broadcast spray application. Applications applied 1 to 2 months prior to breaking dormancy will allow for better weed control.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Overlapping boom swaths increases the potential for phytotoxicity including leaf yellowing, reddening, and/or stunting</li> <li>• Consult "Use Precautions" and "For Optimum Results" of label for important usage information.</li> <li>• Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply when frost is in the ground.</li> <li>• Do not apply to water saturated soils.</li> <li>• Do not apply to blueberries after vegetative bud break.</li> <li>• Do not apply to bushes established less than one year or to plants under stress.</li> <li>• Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>• Do not apply SANDEA after the crop has progressed into budbreak or significant injury will occur.</li> <li>• Do not apply more than 1 application or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period.</li> </ul>

24(c) Registrant: Gowan Company  
P.O. Box 5569  
Yuma, AZ 85366-5569



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, DC 20460

OFFICE OF CHEMICAL SAFETY  
AND POLLUTION PREVENTION

October 27, 2015

Nikki Yepez  
Domestic Regulatory Specialist  
Canyon Group, LLC  
c/o Gowan Company  
P.O. Box 5569  
Yuma, AZ 85366-5569

Subject: PRIA Label Amendment – Adding Pome Fruit Group 11-10 and Small Fruit Vine Climbing Subgroup 13-07F to Halosulfon-methyl  
Product Name: Sandea Herbicide  
EPA Registration Number: 81880-18  
Application Date: July 18, 2015  
Decision Number: 493337

Dear Ms. Yepez:

The application referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide and Rodenticide Act, as amended, is acceptable under FIFRA Section 3(c)(7)(A), subject to the following conditions:

1. You must submit and/or cite all data required for registration/reregistration/registration review of your product under FIFRA when the Agency requires all registrants of similar products to submit such data.
2. You are required to comply with the data requirements within the established deadlines described in the DCI identified below:

Haolsulfuron-methyl- GDCI-128721-1213

If you have questions about the Generic DCI listed above, you may contact the Chemical Review Manager in the Pesticide Reevaluation  
Division: [http://www.epa.gov/oppsrrd1/contacts\\_prd.htm](http://www.epa.gov/oppsrrd1/contacts_prd.htm)

A stamped copy of your labeling is enclosed for your records. This labeling supersedes all previously accepted labeling. You must submit one (1) copy of the final printed labeling before you release the product for shipment with the new labeling. In accordance with 40 CFR 152.130(c), you may distribute or sell this product under the previously approved labeling for 18 months from the date of this letter. After 18 months, you may only distribute or sell this product if it bears this new revised labeling or subsequently approved labeling. "To distribute or sell" is defined under FIFRA section 2(gg) and its implementing regulation at 40 CFR 152.3.

Should you wish to add/retain a reference to the company's website on your label, then please be aware that the website becomes labeling under the Federal Insecticide Fungicide and Rodenticide Act and is subject to review by the Agency. If the website is false or misleading, the product would be misbranded and unlawful to sell or distribute under FIFRA section 12(a)(1)(E). 40 CFR 156.10(a)(5) list examples of statements EPA may consider false or misleading. In addition, regardless of whether a website is referenced on your product's label, claims made on the website may not substantially differ from those claims approved through the registration process. Therefore, should the Agency find or if it is brought to our attention that a website contains false or misleading statements or claims substantially differing from the EPA approved registration, the website will be referred to the EPA's Office of Enforcement and Compliance.

Your release for shipment of the product constitutes acceptance of these conditions. If you fail to satisfy these data requirements, EPA will consider appropriate regulatory action including, among other things, cancellation under FIFRA section 6(e). If you have any questions, please contact Shanta Adeeb by phone at 703-347-0502, or via email at [adeeb.shanta@epa.gov](mailto:adeeb.shanta@epa.gov).

Sincerely,

A handwritten signature in blue ink that reads "Dan Kenny" with a stylized flourish at the end.

Daniel Kenny, Chief  
Herbicide Branch  
Registration Division (7505P)  
Office of Pesticide Programs

Enclosure

# Sandeia

## Herbicide

**SANDEA® is a selective herbicide for control of listed broadleaf weeds and nutsedge**

<b>ACTIVE INGREDIENT:</b>	<b>% BY WT.</b>
Halosulfuron-methyl, methyl 3-chloro-5-(4,6-dimethoxypyrimidin-2-ylcarbamoyl)sulfamoyl)	
-1-methylpyrazole-4-carboxylate.....	75.0%
<b>OTHER INGREDIENTS</b> .....	<b>25.0%</b>
	<b>TOTAL 100.0%</b>

### KEEP OUT OF REACH OF CHILDREN CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se las explique a usted en detalle.  
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID	
IF IN EYES	<ul style="list-style-type: none"> <li>Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>Remove contact lenses, if present, after 5 minutes, then continue rinsing eye.</li> <li>Call poison control center or doctor for treatment advice.</li> </ul>
IF SWALLOWED	<ul style="list-style-type: none"> <li>Call poison control center or doctor immediately for treatment advice.</li> <li>Have person sip a glass of water if able to swallow.</li> <li>Do not induce vomiting unless told to do so by the poison control center or doctor.</li> <li>Do not give anything to an unconscious person.</li> </ul>
HOT LINE NUMBER	
Have the product container or label with you when calling poison control center, doctor or going for treatment. For emergency information concerning this product, call toll free 1-888-478-0798.	

#### PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS CAUTION

Causes moderate eye irritation. Harmful if swallowed. Avoid contact with eyes or clothing.

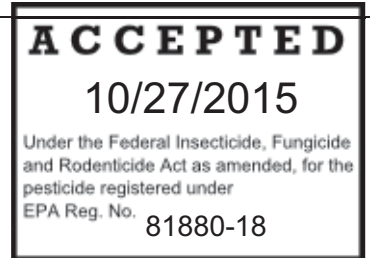
#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

**Applicators and other handlers must wear:**

- Long-sleeved shirt and long pants
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

**ENGINEERING CONTROLS STATEMENTS:** When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.



#### USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

#### ENVIRONMENTAL HAZARDS

This product is toxic to non-target vascular plants. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

Halosulfuron-methyl is known to leach through soil into ground water under certain conditions as a result of label use. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

NET CONTENTS \_\_\_\_\_ OUNCES



EPA Reg. No. 81880-18  
EPA Est. No.

Produced For:  
Canyon Group LLC.  
C/O Gowan Company  
PO Box 5569  
Yuma, Arizona 85364

## DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

### AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard. Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls
- Chemical-resistant gloves made of any waterproof material
- Shoes plus socks

### PRODUCT INFORMATION

SANDEA is a dry flowable formulation that selectively controls certain broadleaf weeds and nutsedges in selected crops. SANDEA is effective both preemergence and postemergence. SANDEA can be absorbed through roots, shoots and foliage and is translocated within the plant.

### WEED RESISTANCE STATEMENT

Weeds can develop resistance to herbicides. Some weed biotypes have inherent resistance to certain herbicides. Also, repeated use of herbicides with similar modes of action can result in the development of resistance in weed populations. SANDEA, a member of the sulfonylurea family, is an ALS enzyme inhibiting herbicide. To minimize the potential for resistance development and/or to control resistant weed biotypes, use a variety of cultural, mechanical, and chemical weed control tactics. Rotate with herbicides having different modes of action (e.g. non-ALS/AHAS materials). Contact your professional crop advisor, local cooperative extension specialist, or Canyon Group representative for additional information.

### APPLICATION EQUIPMENT AND INSTRUCTIONS

#### **Ground Applications:**

SANDEA can be applied as a broadcast or band application. For band applications, use proportionally less spray mixture based on the area actually sprayed. Do not concentrate the band. Consult the "APPLICATION INSTRUCTIONS" section of this label for the rates and procedures that are appropriate for your growing region.

Apply SANDEA in a spray volume that ensures thorough and uniform coverage. Use of 15 or more gal of water per acre is recommended unless otherwise directed in the "APPLICATION INSTRUCTIONS" section. Choose nozzles that provide optimum spray distribution and coverage to the target weed at the appropriate pressure (psi). Avoid streaking, skips, overlaps, and spray drift during application. Thoroughly clean equipment prior to mixing spray solution. Follow the clean-up procedures on the labels of applied products. If no directions are provided, follow the 6 steps outlined in the "Sprayer Tank Cleanout" section .

#### **Rope-wick or Wiper Applications:**

Apply by wiping SANDEA to the weeds using an absorbent material made of burlap, canvas, rope, or sponge plumbed into a pipe reservoir filled with SANDEA. The applicator device will physically wipe this product directly onto the weed in between rows of crop plants (row middles) or over the top of crops for selectively controlling weeds. Selected equipment must be capable of preventing all contact of the herbicide solution with the crop.

Prior to all rope wick applications each individual unit/equipment must be calibrated with the specific material to be applied to ensure accurate application.

For rope and sponge wick applicators use approximately 4 – 6 grams of SANDEA per acre in 2 1/2 gal of water.

Adjust the height of the wiper applicator to ensure adequate contact with the weeds and so that no wiper contact point is at least 2 inches above the desirable vegetation. Optimum performance can be obtained when more of the weed is exposed to the herbicide solution and weeds are a minimum of 6 inches above the desirable vegetation. Weeds that do not come in contact with SANDEA will not be affected. Poor contact occurs when weeds are growing in dense clumps, in areas of severe weed infestation, when weed height varies dramatically or when operator speeds are too great. Terrain must be considered when making wiper applications. Sloping ground can cause herbicide solution to migrate to one side, causing dripping on the lower end and drying of the wiper on the upper end of the applicator. Due to decreased efficacy do not apply this product when weeds are wet.

Operate wiper applicators at a ground speed of no greater than 5 miles per hour. To maintain performance applicator should control chemical application rate by adjusting travel speed to match weed density. In areas of dense weeds better results can be obtained when two applications are made in opposite directions.

Mix only the amount of product that will be used during a 1-day application, as reduced product performance can occur from solutions held longer than 24 hours. Avoid spray mist escape, leaks, or dripping of the herbicide solution onto the crop as contact of this product to desirable vegetation could result in plant injury or destruction. Keep wiper surfaces clean. Clean wiper parts promptly after using SANDEA by thoroughly flushing with water.

When using a surfactant refer to the adjuvants section of this label.

#### **Aerial Applications:**

Apply this product or approved tank mixtures with properly calibrated equipment in 3 to 15 gal of water per acre. Thoroughly clean equipment prior to mixing spray solution. Avoid streaking, skips, overlaps, and spray drift during applications.

#### **Spray Drift Management:**

AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR. Do not allow this product to drift onto neighboring crops or non-crop area or use in a manner or at a time other than in accordance with label directions because animal, plant or crop injury, illegal residues or other undesirable results may occur. The interaction of many equipment – and weather – related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions. Where states have more stringent regulations, they must be observed. The following drift management directions minimize off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications or to applications using dry formulations.

1. The distance of the outer most nozzles on the boom should not exceed 3/4 the length of the wingspan or rotor.
2. Point nozzles backward parallel with the air stream, never point downwards more than 45 degrees. Where states have more stringent regulations, they must be observed.

#### The importance of spray droplet size:

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential but may not prevent drift if applications are made improperly or under unfavorable environmental conditions (see the following "Wind", "Temperature and Humidity", and "Temperature Inversion" sections of this advisory).

#### Controlling initial droplet size:

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher flow rates produce larger droplets.
- **Pressure** - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle orientation** - Orienting nozzles so the spray stream is released backwards, parallel to the air stream will produce larger droplets than other orientations. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- **Nozzle type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce larger droplets than other nozzle types.

#### Controlling placement of spray droplets:

- **Boom length** - For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.
- **Application height** - Applications should not be greater than 10 feet above the top of the tallest plants unless a greater height is required for aircraft safety. Greater application heights result in greater droplet size reduction through evaporation and greater movement in air currents. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.
- **Application speed** - Slower aircraft speeds within a safe range will produce less air turbulence and fewer small droplets.
- **Swath adjustment** - When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distances should increase with increasing drift potential (wind speed, droplet size, etc.).

#### Key environmental factors:

- **Wind** - Drift potential is the lowest between wind speeds of 2 to 10 mph. However, many factors including droplet size and equipment type determine drift potential at any given speed. Application should be avoided when wind speeds are below 2 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Applicators should be familiar with local wind patterns and how they affect drift.
- **Temperature and humidity** - When making applications in low relative humidity set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.
- **Temperature inversions** - Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable air currents that are common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke detector. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

#### Sensitive areas:

Pesticides should only be applied when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).

Thoroughly clean application equipment immediately after the use of SANDEA. Prepare a tank cleaning solution that consists of a 1% solution of household ammonia (one quart of ammonia for every 25 gal of water). Use sufficient cleaning solution to thoroughly rinse all surfaces and to flush all hoses. Repeat the procedure with the ammonia solution. Complete the cleaning process by rinsing with clean water.

### **MIXING INSTRUCTIONS**

Fill the spray tank to about three-fourths of the desired volume and begin agitation. Add the labeled amount of SANDEA. Complete the filling process while maintaining agitation. Remove the hose from the mixing tank immediately after filling to avoid siphoning back into the carrier source. Add nonionic surfactant (NIS) and other adjuvants as the last ingredients in the tank. Spray solutions should be applied within 24 hours after mixing.

### **ADJUVANTS**

Unless otherwise stated, a NIS is recommended in the spray solution for postemergence applications or for preemergence applications where susceptible weeds are present prior to crop emergence. Use only nonionic-type surfactants that are approved for use on food crops and contain at least 80% active ingredients. Use 0.25 to 0.50% nonionic-type surfactant concentration (1 to 2 quarts per 100 gal of spray solution). Use of SANDEA without an adjuvant when weeds are present may result in reduced efficacy. Use of crop oil concentrate (COC) or silicone-based adjuvants can result in increased crop injury and reduced yields and are not recommended for postemergence applications over the crop, unless stated otherwise.

### **TANK MIXES**

Unless stated in the "Application Instructions" section or allowed by supplemental labeling, tank mix combinations have not been evaluated and are the user's responsibility. It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use (For Example: first aid from one product, spray drift management from another). Users must follow the most restrictive directions and precautionary language of the products in the mixture. It is recommended that tank mixtures should be evaluated for miscibility and crop safety on a small test area prior to use. Tank mixtures should not be applied when the plants are under stress due to drought, water saturated soils, low fertility (especially low nitrogen levels) or other poor growing conditions.

### **SPRAYER TANK CLEANOUT**

To avoid injury to desirable crops, clean all mixing and spray equipment before and immediately following applications of SANDEA as follows:

1. Drain tank; thoroughly rinse spray tank, boom, and hoses with clean water. Remove the nozzles and screens and clean separately in a bucket containing agent and water. Loosen and physically remove any visible deposits.
2. Fill the tank with clean water and 1 gal of household ammonia (containing 3% ammonia) for every 100 gal of water. Flush the hoses, boom, and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 minutes. Again flush the hoses, boom, and nozzles with the cleaning solution and then drain the tank.
3. Remove the nozzles and screens and clean separately in a bucket containing agent and water.

4. Repeat step 2.
5. Rinse the tank, boom, and hoses with clean water.
6. The rinsate may be disposed of on-site or at an approved disposal facility.

\* Equivalent amount of an alternate strength ammonia solution can be used in the clean out procedure. Carefully read and follow the individual cleaner instructions.

#### **USE PRECAUTIONS**

- Excessive amounts of water (greater than 1 inch) from rainfall or sprinkler irrigation soon after a preemergent application may cause crop injury. This potential injury can be enhanced if seeding depth is too shallow.
- Within 4 hours of a SANDEA application, avoid using overhead sprinkler irrigations or making applications when conditions favor rainfall.
- Properly crowned beds may minimize the potential for injury when broadcast applications of SANDEA are made over plastic mulch. Significant crop injury could result when spray residue is concentrated in the plant hole by irrigation or rainfall.
- SANDEA can cause injury or crop failure under cool and wet growing conditions that delay early seedling emergence, vigor or growth. Be especially cautious during the first planting of the season when these conditions are likely to occur.
- SANDEA may delay maturity of treated crops.
- SANDEA should not be applied if the crop or target weeds are under stress due to drought, water saturated soils, low fertility (especially low nitrogen levels) or other poor growing conditions.
- Use of soil or foliar-applied organophosphate insecticides on SANDEA treated crops may increase the potential for crop injury and/or the severity of the crop injury.
- Avoid spray drift outside of targeted area.
- SANDEA may be applied to labeled crops (including cultivars and/or hybrids of these) and used according to labeled directions. Not all hybrids/varieties have been tested for sensitivity to SANDEA. For untested varieties, a small amount of the field should be sprayed to determine potential sensitivity to its use.
- Thoroughly clean application equipment immediately after SANDEA use and prior to spraying another crop.
- Temporary yellowing or stunting of the crop may occur following SANDEA applications.
- Crop rotation intervals may need to be extended on drip irrigated crops in CA and AZ due to environmental conditions.
- Under certain environmental conditions, SANDEA applied over the top of a blooming crop may result in some bloom loss.
- Use of SANDEA without an adjuvant can result in reduced efficacy.

#### **USE RESTRICTIONS**

- Do not apply SANDEA using air assisted (air blast) field crop sprayers.
- Do not apply this product through any type of irrigation system.
- Do not apply more than 2 oz of SANDEA per acre per 12 month period (includes applications to the crop and to row middles/furrows).
- Do not make more than the maximum number of applications per year for each crop.
- CALIFORNIA ONLY SENSITIVE CROP:

##### **PRUNES**

##### **Buffer Zones:**

1. Aerial applications shall not be made closer than 4 miles.
2. Ground applications shall not be made closer than 1 mile from prunes unless wind direction during the application is away from prunes. When wind direction during the ground application is away from prunes, ground applications shall not be made closer than 1/2 mile from prunes.

##### **COTTON**

##### **Buffer Zones:**

1. Aerial applications shall not be made closer than 1 mile from cotton.
2. Ground applications shall not be made closer than 1 mile from cotton unless wind direction during the application is away from cotton. When wind direction during the ground application is away from cotton, ground applications shall not be made closer than 1/2 mile from cotton.

#### **FOR OPTIMUM RESULTS**

Control typically occurs within 7 to 14 days depending on the weed size, species and growing conditions. Heavy weed infestations should be treated early before the weeds become too competitive with the crop. Good coverage with SANDEA is essential. When applying SANDEA follow "Weed Controlled Chart" and "Application Timing" sections of the label for improved control. When adding approved adjuvant follow mixing instructions regarding adjuvant.

- For best results, wait to cultivate treated soil area for 7 to 10 days after a postemergence application of SANDEA unless otherwise specified. (Cultivation may be necessary to control suppressed weeds, weeds that were bigger than the maximum recommended size at application, weeds that emerge after an application, or weed species not on the SANDEA label).
- To maximize control of annual weeds, it may be necessary to use sequential applications of SANDEA, but do not make more than the maximum number of applications per year for each crop. (Multiple flushes of seedlings, or treated perennials may sometimes re-grow from underground stems or roots).

##### **For preemergence applications:**

- use a surfactant as directed in the "Adjuvants" section of this label to control susceptible weeds prior to crop emergence,
- Preemergent weed control may be improved by incorporating SANDEA with irrigation (1/4 to 1/2 inch maximum).
- Preemergence applications of SANDEA when weed coverage prevents contact with the soil will result in reduced or no residual activity.

##### **For postemergence applications:**

- Treat young actively growing broadleaf weeds 1 to 3 inches in height.
- Treat actively growing nutsedge plants at the 3 to 5 leaf stage.
- Wait 2 - 3 days after postemergent applications for to overhead irrigation.
- Avoid applications when crops are under drought, stress, disease, or insect damage.



**WEEDS CONTROLLED BY SANDEA ALONE**

C = Control, S = Suppression, NA = No Activity

WEED SPECIES	PREEMERGENT ACTIVITY	POSTEMERGENT ACTIVITY
Amaranth, spiny <sup>2</sup> <i>Amaranth spinosus</i>	C <sup>2</sup>	C <sup>2</sup>
Bindweed <i>Calystegia sepium</i>	NA	S
Burcucumber <i>Sicyos angulatus</i>	NA	S
California arrowhead <sup>3</sup> <i>Sagittaria montevidensis</i>	NA	C <sup>3</sup>
Chickweed, common <i>Stellaria media</i>	C	NA
Cocklebur, common <i>Xanthium strumarium</i>	C	C
Corn spurry <i>Spergula arvensis</i>	C	C
Dayflower* <i>Commelina erecta</i>	C	S
Deadnettle, purple <i>Lamium purpureum</i>	C	NA
Devils Claw <i>Proboscidea louisianica</i>	NA	C
Eclipta* <i>Ecilpta prostrata</i>	C	S
Flatsedge, rice* <sup>2</sup> <i>Cyperus iria</i>	S <sup>2</sup>	C <sup>2</sup>
Fleabane, Philadelphia <i>Erigeron philadelphicus</i>	NA	C
Galinsoga <i>Galinsoga</i>	C	C
Golden crownbeard* <i>Verbesina encelioides</i>	NA	C
Goosefoot <i>Chenopodium californicum</i>	C	C
Groundsel, common <i>Senecio vulgaris</i>	C	NA
Horseweed/Marestail <sup>2</sup> <i>Erigeron canadensis</i>	C <sup>2</sup>	NA
Horsetail <i>Equisetum arvense</i>	NA	S
Jimsonweed <i>Datura stramonium</i>	C	NA
Jointvetch <i>Aeschynomene virginica</i>	NA	C
Kochia <sup>2</sup> <i>Kochia scoparia</i>	C <sup>2</sup>	S <sup>2</sup>
Ladysthumb <i>Polygonum persicaria</i>	C	C
Lambsquarter, common <i>Chenopodium album</i>	C	NA
Lettuce, prickly <i>Lactuca serriola</i>	C	NA
Mallow, common <i>Malva neglecta</i>	C	NA
Mallow, Venice <i>Hibiscus trionum</i>	C	C
Mayweed chamomile (dog fennel) <i>Anthemis cotula</i>	C	NA
Milkweed, common <i>Asclepias syriaca</i>	NA	S

WEED SPECIES	PREEMERGENT ACTIVITY	POSTEMERGENT ACTIVITY
Milkweed, honeyvine <i>Ampelamus albidus</i>	NA	S
Morningglory, ivyleaf <sup>3</sup> <i>Ipomoea hederacea</i>	NA	S <sup>3</sup>
Morningglory, tall <sup>3</sup> <i>Ipomoea purpurea</i>	NA	S <sup>3</sup>
Mustard, wild <i>Sinapis arevensis</i>	C	C
Nutsedge, yellow <sup>1</sup> <i>Cyperus exculentus</i>	S	C <sup>1</sup>
Nutsedge, purple <sup>1</sup> <i>Cyperus rotundus</i>	S	C <sup>1</sup>
Passionflower, maypop <i>Passiflora incarnata</i>	NA	C
Pigweed, redroot <sup>2</sup> <i>Amarunthus retrofiexus</i>	C <sup>2</sup>	C <sup>2</sup>
Pigweed, smooth <sup>2</sup> <i>Amaranthus hybridus</i>	C <sup>2</sup>	C <sup>2</sup>
Plantain <i>Plantago major</i>	C	NA
Pokeweed, common <i>Phytolacca Americana</i>	NA	C
Purslane <i>Portulaca oleracea</i>	S	NA
Radish, wild <i>Raphanus raphanistrum</i>	C	C
Ragweed, common <sup>2</sup> <i>Ambrosia artemisiifolia</i>	C <sup>2</sup>	C <sup>2</sup>
Ragweed, giant <sup>2</sup> <i>Ambrosia trifida</i>	NA	C <sup>2</sup>
Redstem <sup>3</sup> <i>Ammania auriculata</i>	NA	C <sup>3</sup>
Ricefield Bulrush <sup>2</sup> <i>Scirpus mucronatus</i>	NA	C <sup>2</sup>
Sesbania, hemp <i>Sesbania exaltata</i>	S	C
Shepherdspurse <i>Capsella bursa-pastoris</i>	C	S
Sida, prickly* <i>Sida spinosa</i>	NA	S
Smallflower umbrella sedge <sup>2</sup> <i>Cyperus difformis</i>	NA	C <sup>2</sup>
Smartweed, Pennsylvania <i>Polyfonom pennsylvanicum</i>	C	S
Sunflower <i>Helianthus annuus</i>	C	C
Velvetleaf <i>Abutilan theophrasti</i>	C	C
Willowherb <i>Epilobium ciliatum</i>	C	NA
Yellowcress, creeping <i>Rorippa sylvestris</i>	C	C

\* Except California

1. Heavy infestations of nutsedge may require sequential applications. An earlier treatment may be required to prevent nutsedge from competing with the crop.
2. Certain biotypes of this weed species are known to be resistant to ALS herbicides. Where these ALS-resistant biotypes are known to exist, an appropriate registered herbicide, active against the weed and with another mode of action, should be used alone or in tank mixtures with SANDEA to control these biotypes.
3. Use maximum label rates for best results.

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**APPLICATION INSTRUCTIONS  
PREHARVEST INTERVAL**

The required days between last application and harvest (PHI) are given in ( ) after each crop name.

**CUCURBIT CROPS**

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>CUCUMBERS (30)</b> <i>(including pickles)</i> <b>CANTALOUPE (57), HONEYDEWS (57), AND CRENSHAW MELONS (57)</b>	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 15 gal of water per acre.</p> <p><b>Direct-seeded: Bare ground (no mulch)</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has reached at least 3 to 5 true leaves but before first female flowers appear. SANDEA can be applied as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop.</li> </ul> <p><b>Direct-seeded: Plastic mulch</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-seeding</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Crop may be seeded into this treated area no sooner than 7 days after application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has at least 3 to 5 true leaves but before first female flowers appear. SANDEA can be applied as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop. Additional phytotoxicity may occur when applications are made over plastic due to concentration of product in the planting hole. Note: Over-the-top applications on plastic are not allowed in Northeastern and Midwestern states.</li> </ul> <p><b>Transplanted: Bare ground (no mulch)</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA as a pre-transplant application. Crop may be transplanted into this treated area no sooner than 7 days after application unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA-treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> <li>• <b>Post-transplant</b> - Apply SANDEA to transplants that are established and actively growing. Applications should not be made until plants are actively growing and in the 3 to 5 true leaf stage or no sooner than 14 days after transplanting unless local conditions demonstrate safety at an earlier interval, but before first female flowers appear. SANDEA may be applied as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop.</li> </ul> <p><b>Transplanted: Plastic mulch</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Crop may be transplanted into this treated area no sooner than 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA-treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> <li>• <b>Post-transplant</b> - Apply SANDEA to transplants that are established, actively growing and in the 3 to 5 true leaf stage or no sooner than 14 days after transplanting unless local conditions demonstrate safety at an earlier interval, but before first female flowers appear. Apply SANDEA as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop. Additional phytotoxicity can occur when applications are made over plastic due to concentration of product in the transplant hole. Note: Over-the-top applications on plastic are not allowed in Northeastern and Midwestern states.</li> </ul> <p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted crop. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul> <p><b>Split Applications for Nutsedge:</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence followed by postemergence for nutsedge control</b> To maximize control of nutsedge, it may be necessary to use a postemergence application to those areas where the nutsedge has emerged later following a preemergence application. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate should not exceed 1.0 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. Avoid contact of the herbicide with the planted crop.</li> <li>• <b>Postemergence followed by postemergence for nutsedge control</b> To maximize control of nutsedge, it may be necessary to use a second postemergence spot application to those areas where the nutsedge has emerged or re-grown. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Allow a minimum of 21 days between applications. Application rate should not exceed 1.0 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. Avoid contact of the herbicide with the planted crop.</li> </ul> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Runners that come in contact with the plastic can pick up residual SANDEA and may exhibit a visual crop response.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period. (includes applications to the crop and to row middle/furrows)</li> </ul>

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>PUMPKINS and WINTER SQUASH(30)</b>	1/2 - 3/4	Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. For all applications where possible, apply 1/2 to 3/4 inch of sprinkler irrigation to settle the soil after planting and prior to application. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rates on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has reached the 2 to 5 true leaf stage, preferably 4 to 5 true leaves, but before first female flowers appear. Use lower rates on lighter textured soils with low organic matter.</li> </ul> <b>Transplanted:</b> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA prior to transplant. Crop may be transplanted into this treated area no sooner than 7 days after application unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA-treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> <li>• <b>Post-transplant</b> - Apply SANDEA to transplants that are established, actively growing and in the 3 to 5 true leaf stage or no sooner than 14 days after transplanting unless local conditions demonstrate safety at an earlier interval, but before first female flowers appear. SANDEA can be applied as an over-the-top application, a directed spray application or with crop shields to minimize contact of the herbicide with the crop.</li> </ul>
	1/2 - 1	Apply uniformly as a broadcast spray with ground equipment in a minimum of 15 gal of water per acre. <b>FOR PROCESSING ONLY - Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rates on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has reached the 2 to 5 true leaf stage, but before first female flowers appear. Use lower rates on lighter textured soils with low organic matter.</li> </ul>
	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted crop while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>• When rainfall or irrigation in excess of 3/4 inch occurs following a preemergence application and the crop is in the germination to early-seedling stage, there is the potential for significant plant stunting to occur.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications of 1 oz/A or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period. (includes applications to the crop and to row middles).</li> </ul>	
<b>SUMMER SQUASH FOR PROCESSING (30)</b>  <b>(AR, OK and MO only)</b>	2/3 - 1	Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to cracking. Use the lower rate on lighter textured soils with low organic matter.</li> </ul>
	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted summer squash. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed. Avoid contact of the herbicide with the planted crop.</li> </ul>
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage Information.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications of 1 oz/A or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period. (includes applications to the crop and to Row Middle/Furrows)</li> </ul>	
<b>WATERMELONS (57)</b>  <b>Only: AL, AR, AZ, CA, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, NH, NJ, NY, OH, OK, OR, PA, RI, SC, TN, TX, VA, VT, WA, WV, WI</b>	1/2 - 3/4	Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. <b>Direct-seeded: Bare ground</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter. Where soil is fumigated prior to planting, allow at least five days after soil fumigation before an application of SANDEA.</li> </ul> <b>Direct Seeded: Plastic mulch</b> <ul style="list-style-type: none"> <li>• <b>Pre-seeding</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Watermelons should be seeded into this treated area no sooner than 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. SANDEA treated soil from the soil surface into the planting hole can result in crop injury. Care should be taken to limit movement of SANDEA treated surface soil during the transplant process.</li> </ul> <b>Transplanted: Bare ground</b> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA pre-transplant. Watermelons should be transplanted into this treated area no sooner than 7 days after application unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA-treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> </ul>

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>WATERMELONS (57)</b>  <b>Only: AL, AR, AZ, CA, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, NH, NJ, NY, OH, OK, OR, PA, RI, SC, TN, TX, VA, VT, WA, WV, WI</b> (continued)	1/2 - 3/4	<b>Transplanted: Plastic mulch</b> <ul style="list-style-type: none"> <li><b>Pre-transplant</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Watermelons should be transplanted into this treated area no sooner than 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> </ul>
	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li><b>Row Middle Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted crop, while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>Runners that come in contact with the plastic can pick up residual SANDEA and may exhibit a visual crop response.</li> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period. (includes applications to the crop and to row middle)</li> </ul>	
<b>OTHER COMMODITIES IN THE CUCURBIT VEGETABLES GROUP</b> <i>Including but not limited to summer squash, gourd, watermelon (See text for PHI)</i>	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li><b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted cucurbit vegetables while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>Do not apply within 30 days of harvest for squash/cucumber subgroup.</li> <li>Do not apply within 57 days of harvest for melon subgroup.</li> <li>Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>	
<b>FRUITING VEGETABLE CROPS</b>		
CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>PEPPERS, BELL/CHILE (30)</b>  <b>AZ, CA, NM, TX and OK Only</b>	1/2 - 1	Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li><b>Postemergence</b> - Apply SANDEA as a directed spray 28 days after planting or when the plants have reached a minimum of six inches in height, but prior to flowering. Use lower rates on lighter textured soils with low organic matter.</li> </ul> <b>Transplanted:</b> <ul style="list-style-type: none"> <li><b>Post-transplant</b> - Apply SANDEA as a directed spray 21 days after transplanting or when the plants have reached a minimum of six inches in height, but prior to flowering.</li> </ul>
	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li><b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted peppers while avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>Not all pepper varieties have been tested.</li> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period. (includes applications to the crop and to row middle/furrows).</li> </ul>	
<b>TOMATOES (30)</b>	1/2 - 1	Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li><b>Postemergence</b> - Apply SANDEA over-the-top once tomatoes have reached the 4 leaf stage through 30 days prior to harvest. Applications following bloom could cause some bloom drop under certain environmental conditions. Apply as a directed spray or with crop shield when these conditions are present.</li> </ul> <b>Transplanted:</b> <ul style="list-style-type: none"> <li><b>Pre-transplant on Bareground</b> - Apply SANDEA as a pre-plant application to bareground. Tomatoes can be transplanted into this treated area 7 days after the application unless local conditions demonstrate safety at an earlier interval. Use lower rate on lighter textured soils with low organic matter. SANDEA treated soil from the soil surface into the transplant hole can result in crop injury. Care should be taken to limit the movement of treated surface soil during the transplant process.</li> <li><b>Pre-transplant Under Plastic Mulch Applications</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Tomatoes can be transplanted into this treated area 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. SANDEA treated soil from the soil surface into the transplant hole can result in crop injury. Care should be taken to limit movement of SANDEA treated surface soil during the transplant process.</li> </ul>

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>TOMATOES (30)</b> <b>(continued)</b>	1/2 - 1	<ul style="list-style-type: none"> <li>• <b>Post-transplant</b> - Apply SANDEA over-the-top, post directed or with crop shields to tomato transplants that are established, actively growing and a minimum of 14 days after transplanting unless local conditions demonstrate safety at an earlier interval. Applications following bloom could cause some bloom drop under certain environmental conditions. Application as a directed spray or with crop shields should be considered when conditions are present.</li> </ul> <p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows for the control of nutsedge and listed broadleaf weeds. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul> <p><b>Split Applications for Nutsedge</b></p> <p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant followed by postemergence for nutsedge control</b> To maximize control of nutsedge, it may be necessary to use a postemergence application to those areas where the nutsedge has broken through the plastic mulch. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. SANDEA treated soil in the transplant hole may result in crop injury. If transplanting after herbicide application, care should be taken to limit movement of SANDEA treated soil during the transplant process.</li> <li>• <b>Postemergence followed by postemergence for nutsedge control</b> To maximize control of nutsedge, it may be necessary to use a postemergence spot application to those areas where the nutsedge has germinated or regrown. Allow a minimum of 21 days between applications. Application rate should not exceed 1 oz product per treated acre in these areas.</li> </ul>
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period. (Includes applications to the crop and to row middles/furrows).</li> </ul>
<b>FRUITING VEGETABLES GROUP (30)</b> <i>Including but not limited to eggplant, peppers, tomatoes</i>	1/2 - 1	<p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted fruiting vegetables while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>

#### PERMANENT CROPS

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>13-07B BUSHBERRY SUBGROUP (14)</b> (excluding lowbush blueberries)	1/2 - 2/3 1 - 4 year bushes	Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. Apply as a directed spray application to the ground on either side of the row. <ul style="list-style-type: none"> <li>• <b>Preemergence and Postemergence directed application for control of labeled weeds:</b> Apply SANDEA as a single or sequential directed spray application. If small weeds are present tank mix with a postemergence broad-spectrum type herbicide to maximize and enhance the spectrum of broadleaf and grass control. Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity</li> <li>• <b>Postemergence directed application for control of nutsedge:</b> Apply SANDEA as a single directed spray application when nutsedge is fully emerged. Alternatively, two directed spray applications can be made. Apply first directed spray application to the initial nutsedge flush when it has reached the 3 to 5 leaf stage. If a second treatment is needed, it may be applied later in the season directed to secondary nutsedge emergence. To maximize control, apply SANDEA when nutsedge plants are in the 3 to 5 leaf stage. For best results, use a minimum of 0.75 oz/A of SANDEA. SANDEA may not control ALS resistant weeds.</li> </ul>
	1/2 - 1 >4 year bushes	
<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Contact of SANDEA with the blueberry bushes should be avoided. Contact will result in temporary chlorosis of treated leaves.</li> <li>• Use of a shielded boom is recommended.</li> <li>• Consult "Use Precautions" and "For Optimum Results" of label for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Minimum of 45 days between applications.</li> <li>• Do not concentrate the application rate into the treated swath.</li> <li>• Do not apply to bushes established less than one year or to plants under stress.</li> <li>• Do not apply to 'Elliott' variety bushes established less than four years.</li> <li>• Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>• Do not contact foliage or green wood renewal canes with SANDEA. Herbicide uptake via contacted foliage or green canes will result in plant injury.</li> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>		

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>13-07B LOWBUSH BLUEBERRIES (14)</b>	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. SANDEA should be tank mixed with products such as Velpar<sup>®</sup> or Sinbar<sup>®</sup> to broaden the spectrum of weeds controlled.</p> <ul style="list-style-type: none"> <li>• <b>Vegetative (Non-Crop) Year</b></li> <li>• <b>Broadcast application prior to breaking dormancy for control of labeled weeds</b></li> </ul> <p>Apply SANDEA as a single broadcast spray application. If small weeds are present tank mix with a postemergence herbicide to maximize and enhance the spectrum of broadleaf and grass control. Applications applied 1 to 2 months prior to breaking dormancy will allow for better weed control.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Overlapping boom swaths increases the potential for phytotoxicity including leaf yellowing, reddening, and/or stunting</li> <li>• Consult "Use Precautions" and "For Optimum Results" of label for important usage information.</li> <li>• Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply to bushes established less than one year or to plants under stress.</li> <li>• Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>• Do not apply SANDEA after the crop has progressed into budbreak or significant injury will occur.</li> <li>• Do not apply more than 1 application or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period.</li> </ul>
<b>13-07A CANE BERRY SUBGROUP (14)</b> (Blackberry; loganberry; raspberry, black and red; wild raspberry; cultivars, varieties and/or hybrids of these)	1/2 - 1 (East of the Rockies)  3/4 - 2 (West of the Rockies)	<p>Apply SANDEA uniformly with ground equipment in a minimum of 15 gal of water per acre.</p> <p>Apply as a broadcast application to the ground on either side of the row. Applications of SANDEA should be made prior to primocane emergence or after cane burning.</p> <ul style="list-style-type: none"> <li>• <b>Pre Emergence and Post Emergence directed application for control of labeled weeds:</b> Apply a single or sequential application based on weed pressure. If small weeds are present tank mix with a postemergence broad-spectrum type herbicide to maximize and enhance the spectrum of broadleaf and grass control.</li> </ul> <p>For pre-emergence control, do not apply SANDEA if excessive weed growth prevents contact with the ground.</p> <ul style="list-style-type: none"> <li>• <b>Post Emergence directed application for control of nutsedge:</b> Apply SANDEA as a single directed spray application when nutsedge is fully emerged. Alternatively, two directed spray applications can be made. Apply first directed spray application to the initial nutsedge flush when it has reached the 3 to 5 leaf stage. If a second treatment is needed, it may be applied later in the season directed to secondary nutsedge emergence. To maximize control, apply SANDEA when nutsedge plants are in the 3 to 5 leaf stage. For best results, use a minimum of 0.75 oz/A of SANDEA.</li> </ul> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• For best results, use a non-ionic surfactant (NIS) with applications.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>• Contact of SANDEA with the caneberry bushes should be avoided. Contact will result in temporary chlorosis of treated leaves.</li> <li>• Use of a shielded boom is recommended.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Minimum of 45 days between applications.</li> <li>• Do not concentrate the application rate into the treated swath.</li> <li>• Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>• Do not apply to bushes established less than one year or to plants under stress.</li> <li>• Do not contact foliage or green wood renewal canes with SANDEA. Herbicide uptake via contacted foliage or green canes will result in plant injury.</li> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> <li>• Do not apply by air.</li> </ul>
<b>13-07F SMALL FRUIT VINE CLIMBING SUBGROUP EXCEPT FUZZY KIWIFRUIT (14) (East of the Rockies)</b> Amur river grape; gooseberry; grape; kiwifruit, hardy; maypop; schisandra berry; cultivars, varieties, and/or hybrids of these	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 15 gal of water per acre.</p> <ul style="list-style-type: none"> <li>• <b>Preemergence and Postemergence directed application for control of labeled weeds:</b> Apply SANDEA as a single or sequential directed spray application to the ground on either side of the row. If small weeds are present, tank mix with a postemergence broad-spectrum type herbicide to maximize and enhance the spectrum of broadleaf and grass control.</li> </ul> <p>Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity.</p> <ul style="list-style-type: none"> <li>• <b>Postemergence directed application for control of nutsedge:</b> Apply SANDEA as a single directed spray application to the ground on either side of the row when nutsedge is fully emerged. Alternatively, two directed spray applications can be made. Apply first directed spray application to the initial nutsedge flush when it has reached the 3-5 leaf stage. If a second treatment is needed, it may be applied later in the season directed to secondary nutsedge emergence. To maximize control, apply SANDEA when nutsedge plants are in the 3-5 leaf stage. For best results, use a minimum of 0.75 ounces per acre of SANDEA.</li> </ul>

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>13-07F</b> <b>SMALL FRUIT</b> <b>VINE CLIMBING</b> <b>SUBGROUP</b> <b>EXCEPT FUZZY</b> <b>KIWIFRUIT</b> <b>(14)</b> <b>(East of the</b> <b>Rockies)</b> <b>(continued)</b>		<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>For best results, use a NIS with postemergence applications.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections of label for important usage information.</li> <li>Contact of SANDEA with the grape vines should be avoided. Contact will result in leaf chlorosis and distortion with possible shortening of shoot internodes.</li> <li>Use of a shielded boom is recommended.</li> <li>SANDEA may not control ALS-resistant weeds.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>Minimum of 45 days between applications.</li> <li>Do not concentrate the application rate into the treated swath.</li> <li>Do not apply to vines established in a permanent vineyard for less than one year or to plants under stress.</li> <li>Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>Do not contact foliage with SANDEA Herbicide. Uptake via contacted foliage will result in plant injury.</li> <li>Do not apply to nursery stock.</li> <li>Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>
<b>11-10</b> <b>POME FRUIT</b> <b>GROUP</b> <b>(14)</b> <b>(West of the</b> <b>Rockies)</b> Apple; azarole; crabapple; loquat; mayhaw; medlar; pear; pear, Asian; quince; quince, Chinese; quince, Japanese; tejocote; cultivars, varieties, and/or hybrids of these	3/4 - 2	Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. <ul style="list-style-type: none"> <li><b>Postemergence application for control of nutsedge:</b> Apply SANDEA as a single broadcast application to orchard floor on either side of the row when nutsedge is fully emerged (early – midsummer). Alternatively, two applications can be made. Apply first application to the initial nutsedge flush when it has reached the 3-5 leaf stage. If a second treatment is needed, apply SANDEA later in the season directed to secondary nutsedge emergence. To maximize nutsedge control, do not apply if nutsedge has exceeded 12 inches in height.</li> <li><b>Preemergence and Postemergence application for control of labeled broadleaf weeds:</b> Apply SANDEA as a single or sequential broadcast application to orchard floor on either side of the row based on weed pressure. If small weeds are present, to maximize and enhance the spectrum of broadleaf control tank mix with a postemergence broad spectrum type herbicide.</li> </ul> Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity. <b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>For best results, use a NIS or penetrating type surfactant.</li> <li>Avoid spray contact with tree foliage and fruit with spray or drift.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>SANDEA may not control ALS resistant weeds.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>Do not apply when orchard temperatures exceed 85°F at the time of application.</li> <li>Do not concentrate the application rate into the treated swath.</li> <li>Do not apply to trees established in a permanent orchard less than one calendar year.</li> <li>Do not apply to nursery stock.</li> <li>Minimum of 45 days between applications..</li> <li>Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>
<b>11-10</b> <b>POME FRUIT</b> <b>GROUP</b> <b>(14)</b> <b>(East of the</b> <b>Rockies)</b> (Apple; azarole; crabapple; loquat; mayhaw; medlar; pear; pear, Asian; quince; quince, Chinese; quince, Japanese; tejocote; cultivars, varieties, and/or hybrids of these)	1/2 - 1	Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. <ul style="list-style-type: none"> <li><b>Postemergence application for control of nutsedge:</b> Apply SANDEA as a single broadcast application to orchard floor on either side of the row when nutsedge is fully emerged. Alternatively, two applications can be made. Apply first application to the initial nutsedge flush when it has reached the 3-5 leaf stage. If a second treatment is needed, it may be applied later in the season directed to secondary nutsedge emergence. To maximize nutsedge control, apply SANDEA when nutsedge plants are in the 3-5 leaf stage. For best results, use a minimum of 0.75 oz/A of SANDEA.</li> <li><b>Preemergence and Postemergence application for control of labeled broadleaf weeds:</b> Apply SANDEA as a single or sequential broadcast application to orchard floor on either side of the row based on weed pressure. For best results, apply to bare ground. If small weeds are present, to maximize and enhance the spectrum of broadleaf control tank when ground cover prevents contact with the soil will result in reduced or no residual activity. Mix with a postemergence broad-spectrum type herbicide.</li> </ul> Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity. <b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>For best results, use a NIS with postemergence applications.</li> <li>Avoid spray or drift contact with tree foliage and fruit.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>SANDEA may not control ALS resistant weeds.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>Do not apply when orchard temperatures exceed 85°F at the time of application.</li> <li>Do not concentrate the application rate into the treated swath.</li> <li>Do not apply to trees established in a permanent orchard less than one calendar year.</li> <li>Do not apply to nursery stock.</li> <li>Minimum of 45 days between applications.</li> <li>Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>



CROP	OZ/ACRE	DIRECTIONS FOR USE
TREE NUT CROP GROUP 14 (1)	2/3 - 1 1/3	<p>Apply SANDEA as a directed spray to established tree nut crops. Established tree nut crops are defined as those that have been transplanted into their final growing location for a period of at least 12 months, and where the soil has firmly settled around the roots from packing and rainfall or irrigation.</p> <ul style="list-style-type: none"> <li>• Extreme care must be exercised to avoid contact of spray containing SANDEA with trunk, stems, roots, or foliage of tree nut crops, or severe damage or death may result.</li> <li>• Labeled rates are based on broadcast treatment. For band applications reduce the broadcast rate of SANDEA in proportion to the area actually sprayed. For all applications, adjust the rate of SANDEA to account for high volume output nozzles, such as off-center nozzles, and overlaps in the spray pattern. Use of controlled droplet application, spot application, irrigation, or chemigation equipment for application of this product is not recommended due to variations in the actual application rate. Excessive application rates can result in severe tree injury or death.</li> <li>• Use a maximum of 1 oz by weight (0.047 lb active ingredient) SANDEA per acre on coarse textured soils classified as sands, loamy sands, and sandy loams with less than 18% clay and more than 65% sand, or on soils with less than 1% organic matter. Do not apply to gravelly soils. For the best results apply SANDEA in the spring when nutsedge is not drought stressed and maximize the interval between application and subsequent irrigation.</li> <li>• Mechanical cultivation or mowing may be required to control weed species not on the SANDEA label. If so, a sequential treatment may be required to control weeds in areas of disturbed soil.</li> <li>• If SANDEA is applied to trees that have been weakened by or recovering from stress caused by, but not limited to, excessive fertilizer or soil salts, disease, nematodes, frost, wind injury, drought, flooding, previously applied pesticides, insects, winter injury, soil pan of any type, nutrient deficiency, or mechanical damage, severe injury or death may result. Application of SANDEA to weakened or stressed trees as described, especially in soils with less than 1% organic matter, significantly increases the probability of severe injury or death.</li> <li>• SANDEA may be applied at 2/3 to 1 1/3 oz by weight per acre in combination with glyphosate agricultural herbicides for control of emerged annual grasses, broadleaf weeds and nutsedge.</li> </ul>
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Refer to the "Rotational Crop Restrictions" for applicable rotational crop information.</li> <li>• Do not apply more than 2 applications or 2 2/3 oz/A of product by weight (0.125 lb active ingredient) per 12 month period. On coarse textured soils classified as sand, loamy sand, and sandy loam with less than 18% clay and more than 65% sand, or on soils with less than 1% organic matter, do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb ai/acre) per 12 month period.</li> </ul>

**FIELD CROPS**

CROP	OZ/ACRE	DIRECTIONS FOR USE
BEANS, DRY (30)	1/2 - 2/3	<p>Apply uniformly with ground equipment in a minimum of 15 gal of water per acre.</p> <p><b>Direct-seeded:</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA when plants have 1 to 3 trifoliolate leaves, but before flowering. Applications with a weed size of 6 inches or below will allow for the greatest control. Make only one broadcast application per season.</li> <li>• Only apply as a post directed row middle or furrow application in the state of California.</li> </ul> <p style="text-align: center;"><b><u>Tank Mixtures for Dry Beans:</u></b></p> <ul style="list-style-type: none"> <li>• It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</li> <li>• Tank mixtures for additional broadleaf weed control can be added.</li> <li>• Tank mixtures for postemergent grass control, including but not limited to TARGA® or other graminicides can be added.</li> </ul>
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>• Not all varieties have been tested for tolerance. Under adverse growing conditions (dry or excessive moisture, cool weather, etc.), maturity of the treated crop may be delayed which can influence harvest date, yield, and quality.</li> <li>• Use of COC or MSO adjuvant may cause temporary crop response when plants are under stress.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• COC or MSO adjuvants can only be used in the states of CO, MN, NE, ND, and SD.</li> <li>• Do not apply more than 2 applications of 2/3 OZ/A per crop cycle, not to exceed 2 OZ/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>
	1/2 -1	<ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications for Dry Beans</b> - Apply SANDEA between crop rows while avoiding contact of the herbicide with the planted crop. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 1 oz/A of product by weight (0.047 lb a.i./acre) per crop-cycle, not to exceed 2 oz/A (0.094 lb a.i./acre) per 12 month period (includes applications to the crop and to row middles/furrows).</li> </ul>	

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>BEANS, SUCCULENT SNAP (30)</b> <i>(including lima beans)</i>	1/2 - 1	<b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• Apply uniformly with ground equipment in a minimum of 15 gal of water per acre.</li> </ul>
	1/2 - 2/3	<b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Postemergence</b> - Apply SANDEA over-the-top after the crop has reached the 2 to 4 trifoliolate leaf stage, but before flowering. Use the lower rate on lighter textured soils with low organic matter. Directed sprays may limit crop injury.</li> </ul>
	1/2 - 1	<ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between crop rows while avoiding contact of the herbicide with the planted crop. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>• Application of SANDEA may cause temporary stunting.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 1 oz/A of product by weight (0.047 lb a.i./acre) per crop-cycle, not to exceed 2 oz/A (0.094 lb a.i./acre) per 12 month period (includes applications to the crop and to row middles/furrows).</li> </ul>	
<b>6B SUCCULENT SHELLED PEA AND BEAN SUBGROUP (30)</b> <i>(Any succulent shelled cultivar of bean (Phaseolus) including lima bean, green; broad bean, succulent; (vigna) including blackeyed pea, cowpea, southern pea, (Pisum) including English pea, garden pea, green pea, and pigeon pea)</i>	1/2 - 1	<b>Preplant or At Planting:</b> Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. <ul style="list-style-type: none"> <li>• <b>Incorporation:</b> Apply and incorporate 1/2 to 1 oz SANDEA with EPTAM 7-E at a depth of approximately 2 inches just before planting. Use lower rate on lighter textured soils with low organic matter. Refer to EPTAM 7-E label for specific incorporation directions. Rotary hoe lightly during or shortly after emergence of the beans to break any crust that occurs.</li> </ul>
	1/2	<b>Preemergence application for control of labeled broadleaf weeds</b> - Apply SANDEA as a single broadcast application after planting but before crop emergence.  Application of SANDEA may cause significant, temporary stunting and delay maturity of peas resulting in delayed harvest. This product is available to the end-user /grower solely to the extent that the benefit and utility, in the sole opinion of the end-user/grower, outweigh the extent of potential injury associated with the use of this product.
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>• Do not apply more than 1 application or 1/2 oz/A of product by weight (0.023 lb a.i./acre) per 12 month period.</li> <li>• Do not feed to livestock.</li> </ul>	
<b>6B SUCCULENT SHELLED PEA AND BEAN SUBGROUP (30)</b> <i>(Any succulent shelled cultivar of bean (Phaseolus) including lima bean, green; broad bean, succulent; (vigna) including blackeyed pea, cowpea, southern pea, (Pisum) including English pea, garden pea, green pea, and pigeon pea)</i>	1/2 - 1	<b>Postemergence</b> – Apply SANDEA uniformly with ground equipment in a minimum of 15 gal of water per acre. Apply as a directed spray when plants have 2 to 4 trifoliolate leaves and before flowering. Make one broadcast application. Directed sprays are recommended to limit crop injury.  Not all varieties have been tested for tolerance. Under adverse growing conditions (dry or excessive moisture, cool weather, etc.), maturity of the treated crop may be delayed which can influence harvest date, yield, and quality. For untested varieties, a small area of the field should be sprayed to determine potential sensitivity to its use.
	<b>PRECAUTIONS:</b> <ul style="list-style-type: none"> <li>• For best results, use a NIS with applications.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <b>RESTRICTIONS:</b> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 1 oz/A of product by weight (0.047 lb a.i./acre) per crop cycle, not to exceed 2 oz/A (0.094 lb a.i./acre) per 12 month period.</li> <li>• Do not feed to livestock.</li> </ul>	
<b>CORN, FIELD AND FIELD CORN GROWN FOR SEED (30)</b>	2/3 - 1 1/3	<b>Postemergence</b> - Apply SANDEA over-the-top or with drop nozzles from the spike-through layby stage of field corn.  <p style="text-align: center;"><b><u>Tank Mixtures for Corn Only</u></b></p> It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.  Ensure that spray equipment is set up to avoid applying an excessive rate directly over the rows and into the whorl of the cornstalk. To insure good spray coverage of weeds and to reduce the risk of spraying directly into the whorl, tank mix applications made after corn is 24 inches tall should be directed or semi-directed using drop nozzles.  <p style="text-align: center;"><b><u>SANDEA Post Field Corn Applications</u></b></p> It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>CORN, FIELD AND FIELD CORN GROWN FOR SEED (30)</b> (continued)	2/3 - 1 1/3	<p>Before mixing in the spray tank, it is recommended that compatibility be tested by mixing all components in a small container in proportionate quantities. For tank mixtures, add individual formulations to a spray tank in the following sequence: water soluble bags, dry flowables, emulsifiable concentrates, drift control additive, water soluble liquids followed by NIS or COC.</p> <p>Tank mixtures should not be applied if the crop is under severe stress due to drought, water-saturated soils, poor fertility (especially low nitrogen levels), hail, frost, insects or when the maximum daytime temperature is above 92° F at time of application. Tank mix applications under these conditions may cause temporary crop injury.</p> <p>Tank mixtures for additional broadleaf weed control, including but not limited to 2,4-D, Armezon™, atrazine, Buctril®, Callisto®, dicamba, Impact®, Laudis® or YUKON® can be added.</p> <p>Tank mixtures for postemergence grass control, including but not limited to Accent®, Beacon®, Option® or Steadfast® can be added.</p> <p>Tank mixtures for additional postemergence grass and broadleaf control, including but not limited to Roundup® brands or glyphosate (glyphosate-tolerant corn only) or Ignite® and Liberty® (LibertyLink® hybrids only) can be added.</p> <p style="text-align: center;"><b>SANDEA and SOIL RESIDUALS in emerged corn</b></p> <p>Alachlor, acetochlor, metolachlor and dimethenamid may be tank mixed with SANDEA for residual control of foxtails and other grass weeds in field corn.</p> <p style="text-align: center;"><b>SANDEA Soil Applications</b></p> <p>When used exclusively with <b>Pioneer IR field corn hybrids</b>, SANDEA may be soil applied at the rate of 1 1/3 to 2 oz per acre (0.062 to 0.094 lb of active ingredient per acre) for residual control of velvetleaf, common cocklebur, common lambsquarters, common ragweed, pigweed, smartweed, sunflower and other difficult to control weeds.</p> <p>This product is labeled as an early pre-plant surface-applied, pre-plant incorporated, or preemergence treatment. SANDEA offers effective broadleaf control across all tillage systems and is intended for use in tank mixtures with preemergence grass herbicides, including but not limited to: alachlor, acetochlor, metolachlor and dimethenamid active ingredient materials</p> <p>Refer to the labels for these products, or any other grass preemergence herbicide used for use instructions, weeds controlled, and application restrictions.</p>
<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Refer to "Mixing Instructions" and "Use Rate Guides" for detailed information on SANDEA application.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 2 2/3 oz/A of product by weight (0.125 lb a.i./acre) per 12 month period.</li> <li>Refer to the "Rotational Crop Restrictions" for applicable rotational crop information.</li> <li>Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> </ul>		
<b>CORN, SWEET AND POPCORN (30)</b>	2/3 - 1	<p>Apply SANDEA over-the-top or with drop nozzles from the spike through layby stage of the corn. If necessary, a sequential treatment of this product at 2/3 oz per acre may be applied only with drop nozzles semi-directed or directed to avoid application into the corn plant whorl.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications of SANDEA per 12 month period in sweet corn or popcorn.</li> <li>Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> <li>Do not use SANDEA on "Jubilee" sweet corn. All varieties have not been tested for sensitivity to SANDEA.</li> </ul>
<b>COTTON (28)</b>	2/3 - 1 1/3	<p>Apply SANDEA as a directed spray in hooded equipment for postemergent weed control in emerged cotton. Applications may be made anytime after cotton emergence until row closure inhibits use of hooded spray equipment. The applicator is responsible for maintaining proper spray speed and equipment position so spray mist does not contact cotton plants.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 1 1/3 oz/A of product by weight (0.062 lb a.i./acre) per 12 month period.</li> <li>Refer to the "Rotational Crop Information" for applicable rotational crop restrictions.</li> </ul>

CROP	OZ/ACRE	DIRECTIONS FOR USE																							
<b>MILLET, PROSO</b>  <b>(0 Millet Forage)</b>  <b>(50 Millet Grain and Straw)</b>  <b>(37 Millet Hay)</b>	1/2 - 2/3	<p>Millet Growth Stage: SANDEA, alone, can be applied from the 2 leaf through layby stage (before grain head emergence).</p> <p>Temporary stature reduction may occur to the crop following application of SANDEA if the proso millet is under stress. This effect will be most evident 7 to 10 days after application. The crop will quickly recover under normal growing conditions. Applications should be made after weed emergence and actively growing. If adding a tank mix, refer to the tank mix section of this label.</p> <p style="text-align: center;"><b>TANK MIXTURES</b></p> <p>It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</p> <p>Tank mixtures for additional broadleaf weed control, including but not limited to 2,4-D, and dicamba can be added.</p> <p>Insecticide and fungicide products can be tank mixed with SANDEA. Listed day intervals following an application of SANDEA.</p> <table border="1"> <thead> <tr> <th rowspan="2">Crop</th> <th colspan="3">All Animals (Lactating and Non-lactating)</th> </tr> <tr> <th>Pre-Grazing Interval (PGI)</th> <th>Pre-Harvest Interval (PHI)</th> <th>Pre-Slaughter Interval (PSI)</th> </tr> </thead> <tbody> <tr> <td>Millet Forage</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Millet Grain</td> <td>N/A</td> <td>50</td> <td>0</td> </tr> <tr> <td>Millet Straw</td> <td>N/A</td> <td>50</td> <td>0</td> </tr> <tr> <td>Millet Hay</td> <td>N/A</td> <td>37</td> <td>0</td> </tr> </tbody> </table> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>Refer to "Mixing Instructions" and "Use Rate Guides" for detailed information on SANDEA application.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do apply more than 1 application or 2/3 oz/A of product by weight (0.031 lb a.i./acre) per 12 month period.</li> <li>0 Day Pre grazing interval for grass forage for ALL animals (lactating and non-lactating).</li> </ul>	Crop	All Animals (Lactating and Non-lactating)			Pre-Grazing Interval (PGI)	Pre-Harvest Interval (PHI)	Pre-Slaughter Interval (PSI)	Millet Forage	0	0	0	Millet Grain	N/A	50	0	Millet Straw	N/A	50	0	Millet Hay	N/A	37	0
Crop	All Animals (Lactating and Non-lactating)																								
	Pre-Grazing Interval (PGI)	Pre-Harvest Interval (PHI)	Pre-Slaughter Interval (PSI)																						
Millet Forage	0	0	0																						
Millet Grain	N/A	50	0																						
Millet Straw	N/A	50	0																						
Millet Hay	N/A	37	0																						
<b>RICE (48, CA 69)</b>	2/3 - 1 1/3	<p><b>Pre-plant, at planting, preemergence and postemergence applications to rice</b></p> <ul style="list-style-type: none"> <li><b>Pre-plant:</b> Apply SANDEA at 2/3 oz per acre in combination with glyphosate or other suitable agricultural herbicides for burn down of emerged annual grasses, broadleaf weeds and nutsedge. If this product is applied pre-plant burn down, refer to "TIME INTERVAL BEFORE PLANTING" table in complete directions for use.</li> <li><b>Preemergence and Postemergence:</b> Apply SANDEA for postemergent weed control from prior to the emergence of rice until after permanent flood is established. Apply SANDEA at 2/3 to 1 1/3 oz/A, with the total application rate not to exceed 1 1/3 oz/A of product (0.062 lb a.i./acre) per 12 month period.</li> </ul> <p>SANDEA can be applied as a foliar spray or dry broadcast.</p> <p>SANDEA can be tank mixed with propanil containing rice herbicides (e.g. Stam and propanil 4E) at 2/3 to 1 1/3 oz per acre of this herbicide and labeled rates of the tank mix products.</p> <p>Foliar applications of SANDEA can be made at the 3 to 5 leaf stage of rice when weeds have 2 to 4 leaves. Dry broadcast applications can be made at the 1 to 2 leaf stage of rice when weeds have two leaves or less.</p> <p>SANDEA can also be applied post flood with dry broadcast applications of SANDEA at 2/3 to 1 1/3 oz with the total application rate not to exceed 1 1/3 oz/A of product (0.062 lb a.i./acre) per 12 month period.</p> <p>With all foliar applications of SANDEA use a minimum 3 to 15 gal of water per acre for aerial equipment and a minimum of 10 gal of water per acre for ground equipment. It is best to apply spray solutions the day they are mixed.</p> <p>Water levels in rice fields and checks should remain static (3 to 6 inch depth) following dry broadcast applications of SANDEA. Do not reintroduce water into rice fields or checks for at least five days following dry broadcast applications of SANDEA. Rice fields and checks may be irrigated to maintain water level, but this may reduce weed control.</p> <p>Control of emerged weeds with foliar applications is best when 70% to 80% of the weed foliage is exposed. Control of submerged weeds is best when weeds have 2 leaves or less. Do not reintroduce water into rice fields or checks for at least 24 hours following foliar applications of SANDEA.</p> <p style="text-align: center;"><b>SANDEA Tank Mixture Options in Rice</b></p> <p>It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</p>																							

CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>RICE</b> <b>(48, CA 69)</b> <b>(continued)</b>		<p>Before mixing in the spray tank, it is recommended that compatibility be tested by mixing all components in a small container in proportionate quantities. For tank mixtures, add individual formulations to a spray tank in the following sequence: water soluble bags, dry flowables, emulsifiable concentrates, drift control additive, water soluble liquids followed by NIS or COC.</p> <p>Tank mixtures should not be applied if the crop is under severe stress due to drought, poor fertility (especially low nitrogen levels), hail, frost and insects. Tank mix applications under these conditions may cause temporary crop injury.</p> <ul style="list-style-type: none"> <li>• <b>Preemergence &amp; Pre-Plant Applications:</b> Tank mixtures for additional preemergence weed control, including but not limited to Bolero<sup>®</sup>, Command<sup>®</sup> 3ME, glyphosate, pendimethalin or quinclorac can be added.</li> <li>• <b>Postemergence Applications:</b> Tank mixtures for additional broadleaf weed control, including but not limited to Grandstand<sup>®</sup>, propanil and propanil products, Aim<sup>®</sup>, Facet<sup>®</sup>, Basagran<sup>®</sup>, Londax<sup>®</sup>, Grasp<sup>®</sup>, Regiment<sup>®</sup>, NewPath<sup>®</sup>, Beyond<sup>®</sup> and 2-4-D can be added.</li> </ul> <p>Tank mixtures for postemergence grass control, including but not limited to Newpath<sup>®</sup>, Beyond<sup>®</sup>, propanil, Facet<sup>®</sup>, Grasp<sup>®</sup>, and Regiment<sup>®</sup> can be added.</p> <p>Insecticide and fungicide products can be tank mixed with SANDEA<sup>®</sup>.</p> <p>Sequential Applications - SANDEA can be applied sequentially with Ordram<sup>®</sup>, Bolero<sup>®</sup>, Clincher<sup>®</sup>, Regiment<sup>®</sup> and Shark<sup>®</sup>. Read the Ordram, Bolero, Clincher, Regiment and Shark labels for application information, restrictions and precautions.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Avoid using SANDEA on rice fields which have a history of weed biotypes resistant to ALS herbicides.</li> <li>• For best results, use 0.25 to 0.5% NIS which contains at least 80% active ingredient with foliar applications of SANDEA.</li> <li>• Refer to "Application Equipment and Instructions" for spray drift management techniques.</li> <li>• Refer to "Mixing Instructions" and "Use Rate Guides" sections of this label for detailed information on SANDEA application.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply within 48 days of harvest.</li> <li>• Do not apply within 69 days of harvest in California.</li> <li>• Do not exceed more than 2 applications per 12 month period.</li> </ul>
<b>SORGHUM,</b> <b>GRAIN (MILO)</b> <b>(30)</b>	2/3 - 1	<p><b>Postemergence</b> - Apply SANDEA from the 2 leaf through layby stage (before grain head emergence).</p> <p>Temporary stature reduction may occur to the crop following application of SANDEA if the grain sorghum is under stress. This effect will be most evident 7 to 10 days after application. The crop will quickly recover under normal growing conditions.</p> <p style="text-align: center;"><b><u>Tank Mixtures for Grain Sorghum</u></b></p> <p>Tank mixtures with SANDEA can include, but are not limited to atrazine, Buctril<sup>®</sup> or 2,4-D. It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply more than 1 application or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period.</li> <li>• Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> </ul>
<b>SUGARCANE</b> <b>(30)</b>	2/3 - 1 1/3	<p>When used alone, apply SANDEA prior to planting, prior to emergence or after the emergence of the sugarcane, and until row closure. Mechanical cultivation may be required to control weed species not on the label. If so, a <b>sequential treatment</b> may be required to control weeds in areas of disturbed soil.</p> <p>Apply SANDEA at 2/3 to 1 1/3 oz by weight per acre (0.031 to 0.062 lb active ingredient per acre) in combination with glyphosate agricultural herbicides for pre-plant burn down of emerged annual grasses, broadleaf weeds and nutsedge in sugarcane.</p> <p style="text-align: center;"><b><u>Tank Mixtures for Sugarcane</u></b></p> <p>Tank mixtures with SANDEA can include, but are not limited to Asulox<sup>®</sup>, atrazine, Callisto<sup>®</sup>, Envoke<sup>®</sup>, Evik<sup>®</sup>, glyphosate, or 2,4-D.</p> <p>It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Refer to the "Rotational Crop Restrictions" for applicable rotational crop information.</li> <li>• Do not apply more than 3 applications (including pre-plant applications) or 2 2/3 oz/A (0.125 lb a.i./acre) per 12 month period.</li> <li>• Following application to foliage allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> </ul>

**OTHER CROPS AND APPLICATIONS**

CROP	OZ/ACRE	DIRECTIONS FOR USE
<p><b>ALFALFA (14)</b> <b>AZ, CA, &amp; NM</b></p>	<p>2/3 - 1</p>	<p><b>Established Fields</b></p> <ul style="list-style-type: none"> <li>• <b>Postemergence Broadcast</b> - Apply SANDEA as a broadcast application to established alfalfa. Alfalfa should be well established in the field for a minimum of 6 months prior to application of SANDEA. Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. Use a water volume that will provide uniform coverage of plants. It is recommended to make an application as soon as possible after removal of hay from the field and prior to an irrigation to minimize crop injury. Wait for at least 48 hours after application before irrigation.</li> <li>• <b>Postemergence Spot Treatment</b> - Apply SANDEA as a spot treatment application to only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for</li> <li>• <b>Postemergence followed by Postemergence</b> - To maximize control of nutsedge, it may be necessary to use a second postemergence spot application to those areas where the nutsedge has emerged or re-grown. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate must not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. This use pattern will result in greater potential of growth and yield reduction.</li> </ul> <p>Research has shown that alfalfa growth and yields will be reduced for one or more cuttings after a SANDEA application. Application of SANDEA to alfalfa where re-growth exceeds 6" will result in greater yield reduction. Symptoms may be temporary. Follow all directions carefully to minimize potential reduced plant growth and yield. Apply uniformly with ground equipment in a minimum of 20 gal of water per acre. Use a water volume that will provide uniform coverage of plants.</p>
<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>		
<p><b>ARTICHOKE (5)</b></p>	<p>1 – 2</p>	<p>Apply SANDEA uniformly with ground equipment in a minimum of 15 gal of water per acre. Apply as a broadcast application to the ground on either side of the row and winter ditches while avoiding crop foliage.</p> <ul style="list-style-type: none"> <li>• <b>Row Middle</b> - Apply SANDEA between rows of perennial artichokes for the control of nutsedge and listed broadleaf weeds. Applications should be made when oxalis is in full bloom. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. To maximize nutsedge control, apply when plants are in the 3 to 5 leaf stage</li> </ul> <p>Application of SANDEA may cause significant, temporary stunting and delay maturity of artichokes if sprayed directly. This product is available to the end-user /grower solely to the extent that the benefit and utility, in the sole opinion of the end-user/grower, outweigh the extent of potential injury associated with the use of this product.</p>
<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• For best results, use a NIS with applications.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>• Use rates are broadcast per acre. Reduce rate and spray volume in proportion to area actually sprayed.</li> <li>• SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not apply by air.</li> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>		
<p><b>ASPARAGUS (1)</b></p>	<p>1/2 - 1 1/2</p>	<p>Apply uniformly with ground equipment in a minimum of 15 gal per acre.</p> <p><b>Nursery, Transplanted Crowns and Established Beds</b></p> <ul style="list-style-type: none"> <li>• <b>Postemergence/Post transplant</b> - Apply SANDEA to asparagus before or during the harvesting season. SANDEA may cause a temporary stunting or twisting of fern on certain asparagus varieties when applied during spear emergence. The addition of surfactants and postemergent grass herbicides may accentuate the crop response. Spectrum and degree of weed control may be reduced where SANDEA is used without a surfactant.</li> <li>• <b>Post-harvest</b> - Apply SANDEA at the end of the harvest season. Under heavy nutsedge pressure, split applications are recommended. Contact with the fern may cause temporary yellowing. A NIS or COC should be used with post-harvest applications. Crop injury will be minimized and weeds control will be more effective when applications are made with drop nozzles as a directed spray below the ferns to allow for more complete coverage of target weeds.</li> <li>• <b>Split application for enhanced control of nutsedge</b> - Apply a split application with 3/4 to 1 oz product per acre during the cutting/harvesting season when the first flush of nutsedge is in the 3 to 5 leaf stage, followed by a second application of 3/4 to 1 oz product per acre at least 21 to 30 days later up to lay-by to control later flushes of nutsedge. SANDEA can be applied post-harvest during the fern stage. Contact with the fern may cause temporary yellowing. Crop injury will be minimized and nutsedge more effectively controlled when applications are made with drop nozzles directing the spray below the ferns allowing for more complete coverage of nutsedge.</li> </ul>
<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>• For first year transplants, apply no sooner than six weeks after fern emergence.</li> <li>• NIS can be used east of the Rockies to enhance weed control.</li> <li>• Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>• Do not use NIS west of the Rockies.</li> <li>• Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>		

CROP	OZ/ACRE	DIRECTIONS FOR USE											
FALLOW GROUND	2/3 - 1 1/3	Applications of SANDEA to fallow ground.											
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Refer to the "Weeds Controlled" section of this label for weed control recommendations.</li> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 2 2/3 oz of product by weight (0.125 lb a.i./acre) per 12 month period.</li> <li>Refer to the "Rotational Crop Restrictions" for applicable rotational crop information.</li> </ul>											
OKRA (30)	1/2 - 1	<ul style="list-style-type: none"> <li><b>Direct-seeded and Transplant:</b> Row Middle/Furrow Applications/Shielded Spray - Apply SANDEA between rows of direct-seeded or transplanted okra, while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>											
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 2 oz/A of product by weight (0.094 lb a.i./acre) per 12 month period.</li> </ul>											
CROP GROUP 17 PASTURE, RANGELAND & CRP FORAGE GRASSES/HAY (37)	2/3 - 1 1/3	<p><b>Established Fields</b></p> <ul style="list-style-type: none"> <li><b>Postemergence Broadcast</b> – Apply SANDEA as a broadcast application to established Pasture &amp; Rangeland. Apply uniformly with ground equipment in a minimum of 10 gal of water per acre. Use a water volume that will provide uniform coverage of plants. It is recommended to make an application as soon as possible after removal of hay or before weeds exceed label height restriction. Wait for at least 48 hours after application before irrigation.</li> <li><b>Postemergence Spot Treatment</b> – Apply SANDEA as a spot treatment application to only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants.</li> <li><b>Postemergence followed by Postemergence</b> - To maximize control of nutsedge, it may be necessary to use a second postemergence spot application to those areas where the nutsedge has emerged or re-grown. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. This use pattern will result in greater potential of growth and yield reduction.</li> </ul> <p style="text-align: center;"><b>TANK MIXTURES</b></p> <p>It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</p> <p>Tank mixtures for additional broadleaf weed control, including but not limited to 2,4-D, dicamba and, Grazon® can be added.</p> <p>Labeled insecticides, including CONFIRM® and labeled fungicide products can be tank mixed with SANDEA.</p> <p>Listed day intervals following an application of SANDEA.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Crop</th> <th colspan="3">Lactating and Non-lactating Animals</th> </tr> <tr> <th>Pre-Grazing Interval (PGI)</th> <th>Pre-Harvest Interval (PHI)</th> <th>Pre-Slaughter Interval (PSI)</th> </tr> </thead> <tbody> <tr> <td>Pasture, Rangeland, CRP and Forage Grasses/Hay</td> <td style="text-align: center;">0</td> <td style="text-align: center;">37</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>	Crop	Lactating and Non-lactating Animals			Pre-Grazing Interval (PGI)	Pre-Harvest Interval (PHI)	Pre-Slaughter Interval (PSI)	Pasture, Rangeland, CRP and Forage Grasses/Hay	0	37	0
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		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>Refer to "Mixing Instructions" and "Use Rate Guides" for detailed information on SANDEA application.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 1 1/3 oz/A of product by weight (0.062 lb a.i./acre) per 12 month period.</li> <li>0 Day pre grazing interval for lactating and non-lactating animals.</li> </ul>											
RHUBARB (60)	1/2 - 1	Apply uniformly with ground equipment in a minimum of 15 gal of water per acre. Apply SANDEA as a single broadcast application to <u>dormant</u> rhubarb. The timing of the application should be as late as possible, or just prior to the breaking of rhubarb dormancy. Application of SANDEA may cause significant crop stunting. It is recommended that the user begin with a the lower rate to determine potential sensitivity to its use along with speed and degree of recovery.											
		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>For best results use a NIS if labeled weeds are emerged.</li> <li>SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period.</li> </ul>											

CROP	OZ/ACRE	DIRECTIONS FOR USE																					
<b>CROP GROUP 1C TUBEROUS AND CORM VEGETABLES SUBGROUP</b> (Arracacha; arrowroot; artichoke, Chinese; artichoke, Jerusalem; canna, edible; cassava, bitter and sweet; chayote (root); chufa; dasheen (taro); ginger; leren; potato; sweet potato; tanier; turmeric; yam bean; yam, true. (45)	1/2 - 1	<ul style="list-style-type: none"> <li><b>Preemergence and Postemergence applications for control of labeled broadleaf weeds and nutsedge:</b></li> </ul> <p>Apply a single broadcast application after planting but prior to crop emergence. If needed, make a second postemergence foliar application 45 days before harvest.</p> <p>Second application, add NIS (1 to 2 quarts) per 100 gal of spray solution.</p> <p>Application of SANDEA may cause significant, temporary stunting and delay maturity of potatoes resulting in delayed harvest. This product is available to the end-user/grower solely to the extent that the benefit and utility, in the sole opinion of the end-user/grower, outweigh the extent of potential injury associated with the use of this product.</p> <p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>Consult "Use Precautions" and "For Optimum Results" for important usage information.</li> <li>SANDEA may not control ALS resistant weeds.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply more than 2 applications or 1 oz/A of product by weight (0.047 lb a.i./acre) per 12 month period.</li> </ul>																					
<b>TURFGRASS SOD AND SEED FARMS</b>	2/3 - 1 1/3	<p>SANDEA is a selective herbicide for postemergence control of sedges such as purple and yellow nutsedge in sod or turf seed farms. This product will not injure nearby established ornamentals, trees, and shrubs when used according to label directions.</p> <p>For postemergence control of purple or yellow nutsedge found in established turfgrass, apply 2/3 to 1 1/3 oz by weight of this product per acre (0.031 to 0.062 lbs. a.i./acre) after nutsedge has reached the 3 to 5 leaf stage of growth. Use the lower rate in light infestations and the higher rate in heavy infestations.</p> <p>A second treatment may be required 6 to 10 weeks after the initial treatment. As a sequential treatment, when new purple or yellow nutsedge plants have reached the 3 to 5 leaf stage of growth, apply 2/3 to 1 1/3 oz by weight of this product per acre (0.031 to 0.062 lb a.i./acre). Use the lower rate in light infestations and the higher rate in heavy infestations.</p> <p>Use 0.25 to 0.5% NIS concentration (1 to 2 quarts per 100 gal of spray solution) for broadcast applications. For high volume applications, Do not exceed 1 quart of surfactant per acre. Use only NIS which contains at least 80% active material. Refer to the surfactant label and observe all precautions, mixing and application instructions.</p> <p>When applied as directed under the conditions described, the following established turfgrasses are tolerant to application of this product:</p> <table border="1"> <thead> <tr> <th colspan="3">Established Cool-Season Grasses</th> </tr> </thead> <tbody> <tr> <td>Bentgrass, creeping (<i>Agrostis stolonifera</i>)</td> <td>Fescue, fine (<i>Festuca rubra</i>)</td> <td>Ryegrass, perennial (<i>Lolium perenne</i>)</td> </tr> <tr> <td>Blue Grass, Kentucky (<i>Poa pratensis</i>)</td> <td>Fescue, tall (<i>Festuca arundinacea</i>)</td> <td></td> </tr> <tr> <th colspan="3">Established Warm-Season Grasses</th> </tr> <tr> <td>Bahigrass (<i>Paspalum notatum</i>)</td> <td>Centipedegrass (<i>Eremochloa ophiuroides</i>)</td> <td>Kikuyugrass (<i>Pennisetum clandestinum</i>)</td> </tr> <tr> <td>Bermudagrass (<i>Cynodun dactylon</i>)</td> <td>Seashore paspalum (<i>Paspalum vaginatum</i>)</td> <td>Zoysiagrass (<i>Zoysia japonica</i>)</td> </tr> <tr> <td>Buffalograss (<i>Buchloe dactyloides</i>)</td> <td>St. Augustinegrass (<i>Stenotaphrum secundatum</i>)</td> <td></td> </tr> </tbody> </table> <p><b>Fallow Treatments in Turfgrass Seed and Sod Production Areas</b></p> <p>This product may be used on fallow areas prior to establishing turfgrass plants. Allow 4 weeks between application and seeding or sodding of turfgrass.</p> <p><b>Tank Mixtures for Turfgrass Renovation</b></p> <p><b>SANDEA plus GLYPHOSATE AGRICULTURAL HERBICIDES plus NIS</b></p> <p>For <b>non-selective</b> control of all vegetation prior to turfgrass renovation, SANDEA may be applied at 2/3 oz by weight per acre in combination with glyphosate agricultural herbicides for pre-plant burndown of emerged annual grasses, broadleaf weeds and nutsedge.</p> <p><b>Refer to the glyphosate agricultural herbicide label for use instructions, weeds controlled, and application restrictions.</b></p> <p>It is the pesticide user's responsibility to ensure that all products in the listed mixtures are registered for the intended use. Users must follow the most restrictive directions and precautionary language of the products in the mixture.</p>	Established Cool-Season Grasses			Bentgrass, creeping ( <i>Agrostis stolonifera</i> )	Fescue, fine ( <i>Festuca rubra</i> )	Ryegrass, perennial ( <i>Lolium perenne</i> )	Blue Grass, Kentucky ( <i>Poa pratensis</i> )	Fescue, tall ( <i>Festuca arundinacea</i> )		Established Warm-Season Grasses			Bahigrass ( <i>Paspalum notatum</i> )	Centipedegrass ( <i>Eremochloa ophiuroides</i> )	Kikuyugrass ( <i>Pennisetum clandestinum</i> )	Bermudagrass ( <i>Cynodun dactylon</i> )	Seashore paspalum ( <i>Paspalum vaginatum</i> )	Zoysiagrass ( <i>Zoysia japonica</i> )	Buffalograss ( <i>Buchloe dactyloides</i> )	St. Augustinegrass ( <i>Stenotaphrum secundatum</i> )	
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CROP	OZ/ACRE	DIRECTIONS FOR USE
<b>TURFGRASS SOD AND SEED FARMS (continued)</b>		<p><b>PRECAUTIONS:</b></p> <ul style="list-style-type: none"> <li>For best results, do not mow turf for 2 days before or 2 days after application.</li> <li>This product is effective if no rainfall occurs within 3 hours, but best results are obtained with no rainfall or irrigation for at least 8 hours.</li> <li>This product may be used on seeded, sodded, or sprigged turfgrass that is well established. Allow the turf to develop a good root system and uniform stand before application.</li> <li>Avoid application of SANDEA when turfgrass or nutsedge is under stress since turf injury and poor nutsedge control may result.</li> </ul> <p><b>RESTRICTIONS:</b></p> <ul style="list-style-type: none"> <li>Do not apply as an over the top spray to desirable shrubs or trees.</li> <li>Do not exceed the recommended amount of surfactant due to the potential for turf injury at higher rates.</li> <li>Do not apply more than 2 applications or 2 2/3 oz/A of product by weight (0.125 lb a.i./acre) per 12 month period.</li> </ul>

#### ROTATIONAL CROP RESTRICTIONS

Rotation intervals below may need to be extended if drought or cool conditions prevail. Rotation intervals may need to be extended on drip irrigated crops in Arizona and California. Canyon Group recommends that the end user test this product in order to determine its suitability for such intended use. When using SANDEA in tank mixes, refer to the individual product labels being tank mixed. To determine rotational crop restrictions follow the longest rotational limitation of the product being tank mixed.

#### TIME INTERVAL BEFORE PLANTING

CROP	MONTHS	EXCEPTIONS
<b>CROPS NOT SPECIFICALLY LISTED</b>	36	
Alfalfa	9	
Barley (winter)	2	
Beans, Dry	0	
Beans, Snap	9	2 months in the northeast, midwest, and southeast, 3 months in TX
Broccoli	18	3 months for muck soils in FL
Cabbage	15	3 months for muck soils in FL
Canola	15	
Carrot	15	
Cauliflower	18	3 months for muck soils in FL
Cereal crops, Spring	2	
Clovers	9	
Collards	18	
Corn, IR/IMR Field	0	
Corn, Normal Field and IT Field	1	
Corn, Seed	2	
Corn, Sweet and Pop	3	
Cotton	4	
Cucumbers	9	2 months in the northeast, midwest, and southeast, 3 months in TX
Eggplant	12	4 months for FL Transplants
Forage Grasses	2	
Lettuce crops	18	3 months for muck soils in FL
Melons	9	2 months in the southeast and TX
Mint	15	
Oats	2	
Onions and Leeks	18	
Peanuts	6	
Peas	9	
Peas, Field	9	
Peppers	10	4 months FL Transplants and 3 months in TX
Potatoes	9	
Pumpkins	9	2 months in the southeast
Proso Millet	2	
Radish	12	3 months for muck soils in FL
Rice	0	
Rye (winter)	2	
Sorghums	2	
Soybeans	9	Where soil pH is less than 7.5 the interval is 5 months
Spinach	24	3 months for muck soils in FL
Squash	9	2 months in the southeast
Strawberries	36	6 months for annual FL Transplants
Sugarbeet (Michigan only)	21	
Sugarbeet (ND, MN, Red River Valley)	36	

Sugarbeet and Red Beet	24	Where rainfall is sparse or irrigation is required, the time interval is 36 months.
Sugarcane	0	
Sunflowers	18	
Tomato	8	2 months in the northeast, midwest, and southeast, 3 months in TX
Wheat (winter)	2	

#### STORAGE AND DISPOSAL

DO NOT contaminate water, food, feed or seed by storage or disposal.

**PESTICIDE STORAGE:** Store under cool, dry conditions (below 120 F). Do not store under moist conditions.

**PESTICIDE DISPOSAL:** Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill for pesticide disposal or in accordance with applicable Federal, state or local procedures.

**CONTAINER DISPOSAL:** Nonrefillable container. Do not reuse or refill this container. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

**DISPOSAL AUTHORITIES:** If none of the foregoing procedures is permitted by state and local authorities, then contact your State Pesticide or Environmental Control Agency, or your local Hazardous Waste Disposal office, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

**FOR 24-HOUR EMERGENCY ASSISTANCE (SPILL, LEAK OR FIRE), CALL CHEMTREC® (800) 424-9300.**

For other product information, contact Canyon Group or see Material Safety Data Sheet.

#### NOTICE OF CONDITIONS OF SALE AND WARRANTY AND LIABILITY LIMITATIONS

Important: Read the entire Directions for Use and Notice of Conditions of Sale and Warranty and Liability Limitations before using this product. If terms are not acceptable return the unopened container for a full refund.

Our directions for use of this product are based on tests believed to be reliable. However, it is impossible to eliminate all risk associated with the use of this product. Crop injury, inadequate performance, or other unintended consequences may result due to soil or weather conditions, off target movement, presence of other materials, method of use or application, and other factors, all of which are beyond the control of Canyon Group. To the fullest extent permitted by law, when you buy this product, you agree to accept these risks.

Canyon Group warrants that this product conforms to the specifications on the label when used in strict conformance with Directions for Use, subject to the above stated risk limitations. CANYON GROUP MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

TO THE FULLEST EXTENT PERMITTED BY LAW, CANYON GROUP'S EXCLUSIVE LIABILITY FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, OR ANY OTHER LEGAL THEORY IS STRICTLY LIMITED TO THE PURCHASE PRICE PAID OR REPLACEMENT OF PRODUCT, AT CANYON GROUP'S SOLE DISCRETION.

Formulated in the United States using Active Ingredient made in Japan.  
 Manufactured by Nissan Chemical Industries, Ltd.  
 EPTAM® 7E and SANDEA® are trademarks of Gowan Company LLC.  
 YUKON® and TARGA® are trademarks of Nissan Chemical Industries, LTD  
 All other brands are registered trademarks of their respective owners.  
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EPA Text SANDEA (to EPA 10/14/2015)

# Sandeia

## Herbicide

**SANDEA® is a selective herbicide for control of listed broadleaf weeds and nutsedge.**

<b>ACTIVE INGREDIENT:</b>	<b>% BY WT.</b>
Halosulfuron-methyl, methyl 3-chloro-5-(4,6-dimethoxypyrimidin-2-ylcarbamoylsulfamoyl)	
-1-methylpyrazole-4-carboxylate.....	75.0%
<b>OTHER INGREDIENTS</b> .....	<u>25.0%</u>
	<b>TOTAL 100.0%</b>

### KEEP OUT OF REACH OF CHILDREN

## CAUTION

Si usted no entiende la etiqueta, busque a alguien para que se las explique a usted en detalle.  
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID	
IF IN EYES	<ul style="list-style-type: none"> <li>Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>Remove contact lenses, if present, after 5 minutes, then continue rinsing eye.</li> <li>Call poison control center or physician for treatment advice.</li> </ul>
IF SWALLOWED	<ul style="list-style-type: none"> <li>Call poison control center or physician immediately for treatment advice.</li> <li>Have person sip a glass of water if able to swallow.</li> <li>Do not induce vomiting unless told to do so by the poison control center or doctor.</li> <li>Do not give anything to an unconscious person.</li> </ul>
HOT LINE NUMBER	
Have the product container or label with you when calling poison control center, doctor or going for treatment. For emergency information concerning this product, call toll free 1-888-478-0798.	

#### PRECAUTIONARY STATEMENTS

#### HAZARDS TO HUMANS AND DOMESTIC ANIMALS

#### CAUTION

Causes moderate eye irritation. Harmful if swallowed. Avoid contact with eyes or clothing.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE)

**Applicators and other handlers must wear:**

- Long-sleeved shirt and long pants
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

**ENGINEERING CONTROLS STATEMENTS:** When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

#### USER SAFETY RECOMMENDATIONS

**Users should:**

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

#### ENVIRONMENTAL HAZARDS

This product is toxic to non-target vascular plants. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

Halosulfuron-methyl is known to leach through soil into ground water under certain conditions as a result of label use. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

**NET CONTENTS: OUNCES**



Produced For:  
Canyon Group LLC.  
C/O Gowan Company  
PO Box 5569  
Yuma, AZ 85366-5569

EPA Reg. No. 81880-18-10163  
EPA Est. No.

### DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

### AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard. Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls
- Chemical-resistant gloves made of any waterproof material
- Shoes plus socks

### PRODUCT INFORMATION

SANDEA is a dry flowable formulation that selectively controls certain broadleaf weeds and nutsedges in selected crops. SANDEA is effective both preemergence and postemergence. SANDEA can be absorbed through roots, shoots and foliage, and is translocated within the plant.

### WEED RESISTANCE STATEMENT

Weeds can develop resistance to herbicides. Some weed biotypes have inherent resistance to certain herbicides. Also, repeated use of herbicides with similar modes of action can result in the development of resistance in weed populations. SANDEA, a member of the sulfonylurea family, is an ALS enzyme inhibiting herbicide. To minimize the potential for resistance development and/or to control resistant weed biotypes, use a variety of cultural, mechanical, and chemical weed control tactics. Rotate with herbicides having different modes of action (e.g. non-ALS/AHAS materials). Contact your professional crop advisor, local cooperative extension specialist, or Gowan Company representative for additional information.

### APPLICATION EQUIPMENT AND INSTRUCTIONS

#### Ground Applications:

SANDEA can be applied as a broadcast or band application. For band applications, use proportionally less spray mixture based on the area actually sprayed. Do not concentrate the band. Consult the "APPLICATION INSTRUCTIONS" section of this label for the rates and procedures that are appropriate for your growing region.

Apply SANDEA in a spray volume that ensures thorough and uniform coverage. Use of 15 or more gallons of water per acre is recommended unless otherwise directed in the "APPLICATION INSTRUCTIONS" section. Choose nozzles that provide optimum spray distribution and coverage to the target weed at the appropriate pressure (psi). Avoid streaking, skips, overlaps, and spray drift during application. Thoroughly clean equipment prior to mixing spray solution. Follow the clean-up procedures on the labels of applied products. If no directions are provided, follow the 6 steps outlined in the "Sprayer Tank Cleanout" section below.

#### Aerial Applications:

Apply this product or approved tank mixtures with properly calibrated equipment in 3 - 15 gallons of water per acre. Thoroughly clean equipment prior to mixing spray solution. Avoid streaking, skips, overlaps, and spray drift during applications.

#### Spray Drift Management:

AVOIDING SPRAY DRIFT AT THE APPLICATION SITE IS THE RESPONSIBILITY OF THE APPLICATOR. Do not allow this product to drift onto neighboring crops or non-crop area or use in a manner or at a time other than in accordance with label directions because animal, plant or crop injury, illegal residues, or other undesirable results may occur. The interaction of many equipment - and weather - related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions. Where states have more stringent regulations, they should be observed. The following drift management requirements must be followed to avoid off-target drift movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses, or to applications using dry formulations.

1. The distance of the outer most nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees. Where states have more stringent regulations, they should be observed.

#### The importance of spray droplet size:

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential but may not prevent drift if applications are made improperly or under unfavorable environmental conditions (see the following "Wind", "Temperature and Humidity", and "Temperature Inversion" sections of this advisory).

#### Controlling initial droplet size:

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher flow rates produce larger droplets.
- **Pressure** - Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle orientation** - Orienting nozzles so the spray stream is released backwards, parallel to the air stream will produce larger droplets than other orientations. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- **Nozzle type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce larger droplets than other nozzle types.

#### Controlling placement of spray droplets:

- **Boom length** - For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.
- **Application height** - Applications should not be greater than 10 feet above the top of the tallest plants unless a greater height is required for aircraft safety. Greater application heights result in greater droplet size reduction through evaporation and greater movement in air currents. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.
- **Application speed** - Slower aircraft speeds within a safe range will produce less air turbulence and fewer small droplets.
- **Swath adjustment** - When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distances should increase with increasing drift potential (wind speed, droplet size, etc.).

#### Key environmental factors:

- **Wind** - Drift potential is the lowest between wind speeds of 2 - 10 mph. However, many factors including droplet size and equipment type determine drift potential at any given speed. Application should be avoided when wind speeds are below 2 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Applicators should be familiar with local wind patterns and how they affect drift.
- **Temperature and humidity** - When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.
- **Temperature inversions** - Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable air currents that are common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke detector. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

#### **Sensitive areas:**

Pesticides should only be applied when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas).

Thoroughly clean application equipment immediately after the use of SANDEA. Prepare a tank cleaning solution that consists of a 1% solution of household ammonia (one quart of ammonia for every 25 gallons of water). Use sufficient cleaning solution to thoroughly rinse all surfaces and to flush all hoses. Repeat the procedure with the ammonia solution. Complete the cleaning process by rinsing with clean water.

#### **CALIFORNIA ONLY**

##### **Sensitive Crop:**

##### **PRUNES**

##### **Buffer Zones:**

1. Aerial applications shall not be made closer than 4 miles.
2. Ground applications shall not be made closer than 1 mile from prunes unless wind direction during the application is away from prunes. When wind direction during the ground application is away from prunes, ground applications shall not be made closer than 1/2 mile from prunes.

##### **COTTON**

##### **Buffer Zones:**

1. Aerial applications shall not be made closer than 1 mile from cotton.
2. Ground applications shall not be made closer than 1 mile from cotton unless wind direction during the application is away from cotton. When wind direction during the ground application is away from cotton, ground applications shall not be made closer than 1/2 mile from cotton.

#### **MIXING INSTRUCTIONS**

Fill the spray tank to about 3/4 of the desired volume and begin agitation. Add the labeled amount of SANDEA. Complete the filling process while maintaining agitation. Remove the hose from the mixing tank immediately after filling to avoid siphoning back into the carrier source. Add nonionic surfactant (NIS) and other adjuvants as the last ingredients in the tank. Spray solutions should be applied within 24 hours after mixing.

#### **ADJUVANTS**

Unless otherwise stated, a NIS is recommended in the spray solution for postemergence applications or for preemergence applications where susceptible weeds are present prior to crop emergence. Use only nonionic-type surfactants that are approved for use on food crops and contain at least 80% active ingredients. Use 0.25 - 0.50% nonionic-type surfactant concentration (1 - 2 quarts per 100 gallons of spray solution). Use of SANDEA without an adjuvant when weeds are present may result in reduced efficacy. Use of crop oil concentrate (COC) or silicone-based adjuvants can result in increased crop injury and reduced yields and are not recommended for postemergence applications over the crop, unless stated otherwise.

#### **TANK MIXES**

Unless stated in the "Application Instructions" section or allowed by supplemental labeling, tank mix combinations have not been evaluated and are the user's responsibility. Refer to the companion product label for use instructions, additive requirements, weeds controlled, the size range of weeds that should be treated, and application restrictions. It is recommended that tank mixtures should be evaluated for miscibility and crop safety on a small test area prior to use. Tank mixtures should not be applied when the plants are under stress due to drought, water saturated soils, low fertility (especially low nitrogen levels), or other poor growing conditions.

## SPRAYER TANK CLEANOUT

To avoid injury to desirable crops, clean all mixing and spray equipment before and immediately following applications of SANDEA as follows:

1. Drain tank; thoroughly rinse spray tank, boom, and hoses with clean water. Remove the nozzles and screens and clean separately in a bucket containing agent and water. Loosen and physically remove any visible deposits.
2. Fill the tank with clean water and 1 gallon of household ammonia\* (containing 3% ammonia) for every 100 gallons of water. Flush the hoses, boom, and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 minutes. Again flush the hoses, boom, and nozzles with the cleaning solution and then drain the tank.
3. Remove the nozzles and screens and clean separately in a bucket containing agent and water.
4. Repeat step 2.
5. Rinse the tank, boom, and hoses with clean water.
6. The rinsate may be disposed of on-site or at an approved disposal facility.

\* Equivalent amount of an alternate strength ammonia solution can be used in the clean out procedure. Carefully read and follow the individual cleaner instructions.

## USE PRECAUTIONS

- Excessive amounts of water (greater than 1 inch) from rainfall or sprinkler irrigation soon after a preemergent application may cause crop injury. This potential injury can be enhanced if seeding depth is too shallow.
- Within 4 hours of a SANDEA application, avoid using overhead sprinkler irrigations or making applications when conditions favor rainfall.
- Broadcast applications of SANDEA over plastic mulch may result in significant crop injury when spray residue is concentrated in the plant hole by irrigation or rainfall. Properly crowned beds may minimize the potential for this injury.
- SANDEA can cause injury or crop failure under cool and wet growing conditions that delay early seedling emergence, vigor, or growth. Be especially cautious during the first planting of the season when these conditions are likely to occur.
- SANDEA may delay maturity of treated crops.
- SANDEA should not be applied if the crop or target weeds are under stress due to drought, water saturated soils, low fertility (especially low nitrogen levels), or other poor growing conditions.
- Use of soil or foliar applied organophosphate insecticides on SANDEA treated crops may increase the potential for crop injury and/or the severity of the crop injury.
- Avoid spray drift outside of targeted area.
- SANDEA may be applied to labeled crops (including cultivars and/or hybrids of these), however the user assumes responsibility for such use. Not all hybrids/varieties have been tested for sensitivity to SANDEA. For untested varieties, a small amount of the field should be sprayed to determine potential sensitivity to its use. Any plant injury arising from the use of SANDEA is the responsibility of the user.
- Thoroughly clean application equipment immediately after SANDEA use and prior to spraying another crop.
- Temporary yellowing or stunting of the crop may occur following SANDEA applications.
- Crop rotation intervals may need to be extended on drip irrigated crops in CA and AZ due to environmental conditions.
- Under certain environmental conditions, SANDEA applied over the top of a blooming crop may result in some bloom loss.

## USE RESTRICTIONS

- Do not apply SANDEA using air assisted (air blast) field crop sprayers.
- Do not apply this product through any type of irrigation system.
- Do not apply more than 2 oz of SANDEA per acre per 12 month period (includes applications to the crop and to row middles/furrows).

## FOR OPTIMUM RESULTS

The level of weed control following SANDEA application is dependent upon application rate and method, weed species, size and infestation intensity at application time, and growing conditions. Soon after SANDEA is applied, growth of susceptible weeds is inhibited, and they are no longer competitive with the crop. Following growth inhibition, the leaves and growing point begin to discolor. Complete control typically occurs within 7 - 14 days depending on the weed size, species, and growing conditions.

- Follow mixing instructions regarding adjuvants.
- **For preemergence applications:**
  - If susceptible weeds are present prior to crop emergence, use a surfactant as directed in the "Adjuvants" section.
  - Activating soil moisture is necessary for optimum preemergent weed control.
  - Preemergent weed control may be improved by incorporating SANDEA with irrigation (1/4 - 1/2 inch maximum).
- **For postemergence applications:**
  - Treat young actively growing broadleaf weeds 1 - 3 inches in height. Larger weeds may not be adequately controlled.
  - Treat actively growing nutsedge plants at the 3 - 5 leaf stage.
  - Wait to overhead sprinkler irrigate for 2 - 3 days after a postemergence application.
  - Avoid applications when weeds are under drought, stress, disease, or insect damage.
  - Use of SANDEA without an adjuvant can result in reduced efficacy.
- Heavy infestations should be treated early before the weeds become too competitive with the crop.
- A timely cultivation may be necessary to control suppressed weeds, weeds that were bigger than the maximum recommended size at application, weeds that emerge after an application, or weed species not on the SANDEA label. For best results, wait to cultivate treated soil area for 7 - 10 days after a postemergence application of SANDEA unless specified otherwise.
- Annual weeds may have multiple flushes of seedlings, or treated perennials may sometimes re-grow from underground stems or roots, depending upon rainfall and other environmental conditions. To maximize control of such weeds, it may be necessary to use sequential applications of SANDEA.

**WEEDS CONTROLLED BY SANDEA ALONE**

C = Control, S = Suppression, NA = No Activity

WEED SPECIES	PREEMERGENT ACTIVITY	POSTEMERGENT ACTIVITY
Amaranth, spiny <sup>2</sup> <i>Amaranth spinosus</i>	C <sup>2</sup>	C <sup>2</sup>
Bindweed <i>Calystegia sepium</i>	NA	S
Burcucumber <i>Sicyos angulatus</i>	NA	S
California arrowhead <sup>3</sup> <i>Sagittaria montevidensis</i>	NA	C <sup>3</sup>
Chickweed, common <i>Stellaria media</i>	C	NA
Cocklebur, common <i>Xanthium strumarium</i>	C	C
Corn spurry <i>Spergula arvensis</i>	C	C
Dayflower* <i>Commelina erecta</i>	C	S
Deadnettle, purple <i>Lamium purpureum</i>	C	NA
Devils Claw <i>Proboscidea louisianica</i>	NA	C
Eclipta* <i>Eclipta prostrata</i>	C	S
Flatsedge, rice* <sup>3</sup> <i>Cyperus iria</i>	S <sup>3</sup>	C <sup>3</sup>
Fleabane, Philadelphia <i>Erigeron philadelphicus</i>	NA	C
Galinsoga <i>Galinsoga</i>	C	C
Golden crownbeard* <i>Verbesina encelioides</i>	NA	C
Goosefoot <i>Chenopodium californicum</i>	C	C
Groundsel, common <i>Senecio vulgaris</i>	C	NA
Horseweed/Marestail <sup>2</sup> <i>Erigeron canadensis</i>	C <sup>2</sup>	NA
Horsetail <i>Equisetum arvense</i>	NA	S
Jimsonweed <i>Datura stramonium</i>	C	NA
Jointvetch <i>Aeschynomene virginica</i>	NA	C
Kochia <sup>2</sup> <i>Kochia scoparia</i>	C <sup>2</sup>	S <sup>2</sup>
Ladysthumb <i>Polygonum persicaria</i>	C	C
Lambsquarter, common <i>Chenopodium album</i>	C	NA
Lettuce, prickly <i>Lactuca serriola</i>	C	NA
Mallow, common <i>Malva neglecta</i>	C	NA
Mallow, Venice <i>Hibiscus trionum</i>	C	C
Mayweed chamomile (dog fennel) <i>Anthemis cotula</i>	C	NA
Milkweed, common <i>Asclepias syriaca</i>	NA	S

WEED SPECIES	PREEMERGENT ACTIVITY	POSTEMERGENT ACTIVITY
Milkweed, honeyvine <i>Ampelamus albidus</i>	NA	S
Morningglory, ivyleaf <sup>3</sup> <i>Ipomoea hederacea</i>	NA	S <sup>3</sup>
Morningglory, tall <sup>3</sup> <i>Ipomoea purpurea</i>	NA	S <sup>3</sup>
Mustard, wild <i>Sinapis arevensis</i>	C	C
Nutsedge, yellow <sup>1</sup> <i>Cyperus exculentus</i>	S	C <sup>1</sup>
Nutsedge, purple <sup>1</sup> <i>Cyperus rotundus</i>	S	C <sup>1</sup>
Passionflower, maypop <i>Passiflora incarnata</i>	NA	C
Pigweed, redroot <sup>2</sup> <i>Amaranthus retroflexus</i>	C <sup>2</sup>	C <sup>2</sup>
Pigweed, smooth <sup>2</sup> <i>Amaranthus hybridus</i>	C <sup>2</sup>	C <sup>2</sup>
Plantain <i>Plantago major</i>	C	NA
Pokeweed, common <i>Phytolacca Americana</i>	NA	C
Purslane <i>Portulaca oleracea</i>	S	NA
Radish, wild <i>Raphanus raphanistrum</i>	C	C
Ragweed, common <sup>2</sup> <i>Ambrosia artemisiifolia</i>	C <sup>2</sup>	C <sup>2</sup>
Ragweed, giant <sup>2</sup> <i>Ambrosia trifida</i>	NA	C <sup>2</sup>
Redstem <sup>3</sup> <i>Ammania auriculata</i>	NA	C <sup>3</sup>
Ricefield Bulrush <sup>2</sup> <i>Scirpus mucronatus</i>	NA	C <sup>2</sup>
Sesbania, hemp <i>Sesbania exaltata</i>	S	C
Shepherdspurse <i>Capsella bursa-pastoris</i>	C	S
Sida, prickly* <i>Sida spinosa</i>	NA	S
Smallflower umbrella sedge <sup>2</sup> <i>Cyperus difformis</i>	NA	C <sup>2</sup>
Smartweed, Pennsylvania <i>Polygonum pennsylvanicum</i>	C	S
Sunflower <i>Helianthus annuus</i>	C	C
Velvetleaf <i>Abutilon theophrasti</i>	C	C
Willowherb <i>Epilobium ciliatum</i>	C	NA
Yellowcress, creeping <i>Rorippa sylvestris</i>	C	C

\* Except California

1. Heavy infestations of nutsedge may require sequential applications. An earlier treatment may be required to prevent nutsedge from competing with the crop.
2. Certain biotypes of this weed species are known to be resistant to ALS herbicides. Where these ALS resistant biotypes are known to exist, an appropriate registered herbicide, active against the weed and with another mode of action, should be used alone or in tank mixtures with SANDEA to control these biotypes.
3. Use maximum label rates for best results.

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**APPLICATION INSTRUCTIONS  
PREHARVEST INTERVAL**

The required days between last application and harvest (PHI) are given in ( ) after each crop name.

**CUCURBIT CROPS**

CROP	OZ/ACRE	COMMENTS
<b>CUCUMBERS (30)</b> <i>(including pickles)</i> <b>CANTALOUPE (57),</b> <b>HONEYDEWS (57), AND</b> <b>CRENSHAW MELONS (57)</b>	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre.</p> <p><b>Direct-seeded: Bare ground (no mulch)</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has reached at least 3 - 5 true leaves but before first female flowers appear. SANDEA can be applied as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop.</li> </ul> <p><b>Direct-seeded: Plastic mulch</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-seeding</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Crop may be seeded into this treated area no sooner than 7 days after application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has at least 3 - 5 true leaves but before first female flowers appear. SANDEA can be applied as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop. Additional phytotoxicity may occur when applications are made over plastic due to concentration of product in the planting hole. <b>NOTE:</b> Over-the-top applications on plastic are not allowed in Northeastern and Midwestern states.</li> </ul> <p><b>Transplanted: Bare ground (no mulch)</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA as a pre-transplant application. Crop may be transplanted into this treated area no sooner than 7 days after application unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> <li>• <b>Post-transplant</b> - Apply SANDEA to transplants that are established and actively growing. Applications should not be made until plants are actively growing and in the 3 - 5 true leaf stage or no sooner than 14 days after transplanting unless local conditions demonstrate safety at an earlier interval, but before first female flowers appear. SANDEA may be applied as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop.</li> </ul> <p><b>Transplanted: Plastic mulch</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Crop may be transplanted into this treated area no sooner than 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> <li>• <b>Post-transplant</b> - Apply SANDEA to transplants that are established, actively growing and in the 3 - 5 true leaf stage or no sooner than 14 days after transplanting unless local conditions demonstrate safety at an earlier interval, but before first female flowers appear. Apply SANDEA as an over-the-top application, a directed spray application, or with crop shields to minimize contact of the herbicide with the crop. Additional phytotoxicity can occur when applications are made over plastic due to concentration of product in the transplant hole. <b>NOTE:</b> Over-the-top applications on plastic are not allowed in Northeastern and Midwestern states.</li> </ul> <p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted crop. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul> <p><b>Split Applications for Nutsedge:</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence followed by postemergence for nutsedge control</b> To maximize control of nutsedge, it may be necessary to use a postemergence application to those areas where the nutsedge has emerged later following a preemergence application. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate should not exceed 1 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. Avoid contact of the herbicide with the planted crop.</li> <li>• <b>Postemergence followed by postemergence for nutsedge control</b> To maximize control of nutsedge, it may be necessary to use a second postemergence spot application to those areas where the nutsedge has emerged or re-grown. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Allow a minimum of 21 days between applications. Application rate should not exceed 1 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. Avoid contact of the herbicide with the planted crop.</li> </ul> <ul style="list-style-type: none"> <li>• A maximum of 2 applications may be made per crop-cycle.</li> <li>• Do not apply more than 2 oz SANDEA per acre per crop-cycle not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middle/furrows).</li> <li>• Runners that come in contact with the plastic can pick up residual SANDEA and may exhibit a visual crop response.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<p><b>PUMPKINS and WINTER SQUASH (30)</b></p>	1/2 - 3/4	<p>Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre.</p> <p><b>Direct-seeded:</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rates on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has reached the 2 - 5 true leaf stage, preferably 4 - 5 true leaves, but before first female flowers appear. Use lower rates on lighter textured soils with low organic matter.</li> </ul> <p><b>Transplanted:</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA prior to transplant. Crop may be transplanted into this treated area no sooner than 7 days after application unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> <li>• <b>Post-transplant</b> - Apply SANDEA to transplants that are established, actively growing and in the 3 - 5 true leaf stage or no sooner than 14 days after transplanting unless local conditions demonstrate safety at an earlier interval, but before first female flowers appear. SANDEA can be applied as an over-the-top application, a directed spray application or with crop shields to minimize contact of the herbicide with the crop.</li> </ul>
	1/2 - 1	<p>Apply uniformly as a broadcast spray with ground equipment in a minimum of 15 gallons of water per acre.</p> <p><b>FOR PROCESSING ONLY - Direct-seeded:</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rates on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA after the crop has reached the 2 - 5 true leaf stage, but before first female flowers appear. Use lower rates on lighter textured soils with low organic matter.</li> </ul>
	1/2 - 1	<p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted crop while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
		<ul style="list-style-type: none"> <li>• A maximum of 2 applications may be made per crop-cycle.</li> <li>• Do not apply more than 1 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middles).</li> <li>• Where possible, apply 1/2 - 3/4 inch of sprinkler irrigation to settle the soil after planting and prior to application.</li> <li>• When rainfall or irrigation in excess of 3/4 inch occurs following a preemergence application and the crop is in the germination to early-seedling stage, there is the potential for significant plant stunting to occur.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<p><b>SUMMER SQUASH FOR PROCESSING (30)</b></p> <p>(AR, OK and MO only)</p>	2/3 - 1	<p>Apply uniformly with ground equipment in a minimum of 20 gallons of water per acre.</p> <p><b>Direct-seeded:</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to cracking. Use the lower rate on lighter textured soils with low organic matter.</li> </ul>
	1/2 - 1	<p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted summer squash. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed. Avoid contact of the herbicide with the planted crop.</li> </ul>
		<ul style="list-style-type: none"> <li>• Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to Row Middle/Furrows).</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<p><b>WATERMELONS (57)</b></p> <p>Only: AL, AR, AZ, CA, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, NH, NJ, NY, OH, OK, PA, RI, SC, TN, TX, VA, VT, WA, WV, WI</p>	1/2 - 3/4	<p>Apply uniformly with ground equipment in a minimum of 20 gallons of water per acre.</p> <p><b>Direct-seeded: Bare ground</b></p> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting, but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter. Where soil is fumigated prior to planting, allow at least five days after soil fumigation before an application of SANDEA.</li> </ul> <p><b>Direct Seeded: Plastic mulch</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-seeding</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Watermelons should be seeded into this treated area no sooner than 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. SANDEA treated soil from the soil surface into the planting hole can result in crop injury. Care should be taken to limit movement of SANDEA treated surface soil during the transplant process.</li> </ul> <p><b>Transplanted: Bare ground</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-transplant</b> - Apply SANDEA pre-transplant. Watermelons should be transplanted into this treated area no sooner than 7 days after application unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<b>WATERMELONS (57)</b>  <b>Only: AL, AR, AZ, CA, CT, DE, FL, GA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, NH, NJ, NY, OH, OK, PA, RI, SC, TN, TX, VA, VT, WA, WV, WI</b>  (continued)	1/2 - 3/4	<b>Transplanted: Plastic mulch</b> <ul style="list-style-type: none"> <li><b>Pre-transplant</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Watermelons should be transplanted into this treated area no sooner than 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. Use the lower rate on lighter textured soils with low organic matter. Care should be taken to limit movement of SANDEA treated surface soil during the transplanting process since if treated soils is moved into the transplant hole injury can occur.</li> </ul>
	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li><b>Row Middle Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted crop, while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
		<ul style="list-style-type: none"> <li>Do not apply more than 1 oz of SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middle).</li> <li>Runners that come in contact with the plastic can pick up residual SANDEA and may exhibit a visual crop response.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>OTHER COMMODITIES IN THE CUCURBIT VEGETABLES GROUP</b>  <i>Including but not limited to summer squash, gourd, watermelon (See text for PHI)</i>	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li><b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted cucurbit vegetables while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
		<ul style="list-style-type: none"> <li>Do not apply within 30 days of harvest for squash/cucumber subgroup.</li> <li>Do not apply within 57 days of harvest for melon subgroup.</li> <li>Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>

#### FRUITING VEGETABLE CROPS

CROP	OZ/ACRE	COMMENTS
<b>PEPPERS, BELL/CHILE (30)</b>  <b>AZ, CA, NM, TX and OK Only</b>	1/2 - 1	Apply uniformly with ground equipment in a minimum of 20 gallons of water per acre. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li><b>Postemergence</b> - Apply SANDEA as a directed spray 28 days after planting or when the plants have reached a minimum of six inches in height, but prior to flowering. Use lower rates on lighter textured soils with low organic matter.</li> </ul> <b>Transplanted:</b> <ul style="list-style-type: none"> <li><b>Post-transplant</b> - Apply SANDEA as a directed spray 21 days after transplanting or when the plants have reached a minimum of six inches in height, but prior to flowering.</li> </ul>
	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li><b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted peppers while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
		<ul style="list-style-type: none"> <li>A maximum of 2 applications may be made per crop-cycle.</li> <li>Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middle/furrows).</li> <li>Not all pepper varieties have been tested.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>TOMATOES (30)</b>	1/2 - 1	Apply uniformly with ground equipment in a minimum of 20 gallons of water per acre. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li><b>Postemergence</b> - Apply SANDEA over-the-top once tomatoes have reached the 4 leaf stage through 30 days prior to harvest. Applications following bloom could cause some bloom drop under certain environmental conditions. Apply as a directed spray or with crop shield when these conditions are present.</li> </ul> <b>Transplanted:</b> <ul style="list-style-type: none"> <li><b>Pre-transplant on Bareground</b> - Apply SANDEA as a pre-plant application to bareground. Tomatoes can be transplanted into this treated area 7 days after the application unless local conditions demonstrate safety at an earlier interval. Use lower rate on lighter textured soils with low organic matter. SANDEA treated soil from the soil surface into the transplant hole can result in crop injury. Care should be taken to limit the movement of treated surface soil during the transplant process.</li> <li><b>Pre-transplant Under Plastic Mulch Applications</b> - Apply SANDEA following final bed shaping and just prior to the installation of the plastic mulch. Tomatoes can be transplanted into this treated area 7 days after the application and the installation of the plastic mulch unless local conditions demonstrate safety at an earlier interval. SANDEA treated soil from the soil surface into the transplant hole can result in crop injury. Care should be taken to limit movement of SANDEA treated surface soil during the transplant process.</li> <li><b>Post-transplant</b> - Apply SANDEA over-the-top, post directed, or with crop shields to tomato transplants that are established, actively growing, and a minimum of 14 days after transplanting unless local conditions demonstrate safety at an earlier interval. Applications following bloom could cause some bloom drop under certain environmental conditions. Application as a directed spray or with crop shields should be considered when conditions are present.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<b>TOMATOES (30)</b> (continued)	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows for the control of nutsedge and listed broadleaf weeds. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul> <b>Split Applications for Nutsedge</b> <b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li>• <b>Pre-transplant followed by postemergence for nutsedge control</b>                To maximize control of nutsedge, it may be necessary to use a postemergence application to those areas where the nutsedge has broken through the plastic mulch. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. SANDEA treated soil in the transplant hole may result in crop injury. If transplanting after herbicide application, care should be taken to limit movement of SANDEA treated soil during the transplant process.</li> <li>• <b>Postemergence followed by postemergence for nutsedge control</b>                To maximize control of nutsedge, it may be necessary to use a postemergence spot application to those areas where the nutsedge has germinated or regrown. Allow a minimum of 21 days between applications. Application rate should not exceed 1 oz product per treated acre in these areas.</li> </ul>
		<ul style="list-style-type: none"> <li>• A maximum of 2 applications may be made per crop-cycle.</li> <li>• Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middles/furrows).</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>FRUITING VEGETABLES GROUP (30)</b> <i>Including but not limited to eggplant, peppers, tomatoes</i>	1/2 - 1	<b>Direct-seeded and Transplant:</b> <ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between rows of direct-seeded or transplanted fruiting vegetables while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
		<ul style="list-style-type: none"> <li>• Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>

#### PERMANENT CROPS

CROP	OZ/ACRE	COMMENTS
<b>APPLE (14)</b> (West of the Rockies)	3/4 - 2	Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre. Apply as a broadcast application to orchard floor on each side of the tree rows. <ul style="list-style-type: none"> <li>• <b>Postemergence application for control of nutsedge:</b>                Apply SANDEA as a single application when nutsedge is fully emerged (early – midsummer). Alternatively, 2 applications can be made. Apply first application to the initial nutsedge flush when it has reached the 3 - 5 leaf stage. If a second treatment is needed, apply SANDEA later in the season directed to secondary nutsedge emergence. To maximize nutsedge control, do not apply if nutsedge has exceeded 12 inches in height.</li> <li>• <b>Preemergence and Postemergence application for control of labeled broadleaf weeds:</b>                Apply SANDEA as a single or sequential application based on weed pressure. If small weeds are present, to maximize and enhance the spectrum of broadleaf control tank mix with a postemergence broad spectrum type herbicide.</li> </ul> Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity.
		<ul style="list-style-type: none"> <li>• Use a NIS or penetrating type surfactant.</li> <li>• Avoid spray contact with tree foliage and fruit with spray or drift.</li> <li>• Do not apply when orchard temperatures exceed 85°F at the time of application.</li> <li>• Do not concentrate the application rate into the treated swath.</li> <li>• Do not apply to trees established in a permanent orchard less than one calendar year.</li> <li>• Do not apply to nursery stock.</li> <li>• SANDEA may not control ALS resistant weeds.</li> <li>• Do not apply more than 2 oz of SANDEA per acre per crop cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<b>APPLE (14)</b> (East of the Rockies)	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre. Apply as a broadcast application to orchard floor on each side of the tree rows.</p> <ul style="list-style-type: none"> <li>• <b>Postemergence application for control of nutsedge:</b> Apply SANDEA as a single application when nutsedge is fully emerged. Alternatively, 2 applications can be made. Apply first application to the initial nutsedge flush when it has reached the 3 - 5 leaf stage. If a second treatment is needed, it may be applied later in the season directed to secondary nutsedge emergence. To maximize nutsedge control, apply SANDEA when nutsedge plants are in the 3 - 5 leaf stage. For best results, use a minimum of 0.75 oz/A of SANDEA.</li> <li>• <b>Preemergence and Postemergence application for control of labeled broadleaf weeds:</b> Apply SANDEA as a single or sequential application based on weed pressure. For best results, apply to bare ground. If small weeds are present, to maximize and enhance the spectrum of broadleaf control tank mix with a postemergence broad-spectrum type herbicide.</li> </ul> <p>Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity.</p> <ul style="list-style-type: none"> <li>• For best results, use a NIS with postemergence applications.</li> <li>• Avoid spray or drift contact with tree foliage and fruit.</li> <li>• Do not apply when orchard temperatures exceed 85°F at the time of application.</li> <li>• Do not concentrate the application rate into the treated swath.</li> <li>• Do not apply to trees established in a permanent orchard less than one calendar year.</li> <li>• Do not apply to nursery stock.</li> <li>• SANDEA may not control ALS resistant weeds.</li> <li>• Do not apply more than 2 oz of SANDEA per acre per 12 month period.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>13-07B HIGHBUSH BLUEBERRIES (14)</b>	1/2 - 2/3 1 - 4 year bushes  1/2 - 1 >4 year bushes	<p>Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre. Apply as a directed spray application to the ground on either side of the row.</p> <ul style="list-style-type: none"> <li>• <b>Preemergence and Postemergence directed application for control of labeled weeds:</b> Apply SANDEA as a single or sequential directed spray application. If small weeds are present tank mix with a postemergence broad-spectrum type herbicide to maximize and enhance the spectrum of broadleaf and grass control. Preemergence applications of SANDEA when ground cover prevents contact with the soil will result in reduced or no residual activity</li> <li>• <b>Postemergence directed application for control of nutsedge:</b> Apply SANDEA as a single directed spray application when nutsedge is fully emerged. Alternatively, 2 directed spray applications can be made. Apply first directed spray application to the initial nutsedge flush when it has reached the 3 - 5 leaf stage. If a second treatment is needed, it may be applied later in the season directed to secondary nutsedge emergence. To maximize control, apply SANDEA when nutsedge plants are in the 3 - 5 leaf stage. For best results, use a minimum of 0.75 oz/A of SANDEA.</li> </ul> <p>Contact of SANDEA with the blueberry bushes should be avoided. Contact will result in temporary chlorosis of treated leaves. Use of a shielded boom is recommended.</p> <ul style="list-style-type: none"> <li>• Minimum of 45 days between applications.</li> <li>• Do not concentrate the application rate into the treated swath.</li> <li>• Do not apply to bushes established less than one year or to plants under stress.</li> <li>• Do not apply to 'Elliott' variety bushes established less than four years.</li> <li>• Do not apply to areas where water is known to pond for periods of time following rainfall.</li> <li>• Do not contact foliage or green wood renewal canes with SANDEA. Herbicide uptake via contacted foliage or green canes will result in plant injury.</li> <li>• SANDEA may not control ALS resistant weeds.</li> <li>• Do not apply more than 2 oz of SANDEA per acre per 12 month period.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections of label for important usage information.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<b>TREE NUT CROP GROUP 14 (1)</b> (excluding Almonds)	2/3 - 1 1/3	<p>Apply SANDEA as a directed spray to established tree nut crops. Established tree nut crops are defined as those that have been transplanted into their final growing location for a period of at least 12 months, and where the soil has firmly settled around the roots from packing and rainfall or irrigation.</p> <ul style="list-style-type: none"> <li>• Extreme care must be exercised to avoid contact of spray containing SANDEA with trunk, stems, roots, or foliage of tree nut crops, or severe damage or death may result.</li> <li>• Labeled rates are based on broadcast treatment. For band applications reduce the broadcast rate of SANDEA in proportion to the area actually sprayed. For all applications, adjust the rate of SANDEA to account for high volume output nozzles, such as off-center nozzles, and overlaps in the spray pattern. Use of controlled droplet application, spot application, irrigation, or chemigation equipment for application of this product is not recommended due to variations in the actual application rate. Excessive application rates can result in severe tree injury or death.</li> <li>• Use a maximum of 1 oz by weight (0.047 lb active ingredient) SANDEA per acre on coarse textured soils classified as sands, loamy sands, and sandy loams with less than 18% clay and more than 65% sand, or on soils with less than 1% organic matter. Do not apply to gravelly soils. For the best results apply SANDEA in the spring when nutsedge is not drought stressed and maximize the interval between application and subsequent irrigation.</li> <li>• Mechanical cultivation or mowing may be required to control weed species not on the SANDEA label. If so, a sequential treatment may be required to control weeds in areas of disturbed soil.</li> <li>• If SANDEA is applied to trees that have been weakened by or recovering from stress caused by, but not limited to, excessive fertilizer or soil salts, disease, nematodes, frost, wind injury, drought, flooding, previously applied pesticides, insects, winter injury, soil pan of any type, nutrient deficiency, or mechanical damage, severe injury or death may result. Application of SANDEA to weakened or stressed trees as described, especially in soils with less than 1% organic matter, significantly increases the probability of severe injury or death. All such risks shall be assumed by the user.</li> <li>• <b>SANDEA may be applied at 2/3 - 1 1/3 oz by weight per acre in combination with glyphosate agricultural herbicides for control of emerged annual grasses, broadleaf weeds and nutsedge.</b></li> </ul> <p>Also refer to the "ROTATIONAL CROP INFORMATION" section of this label for applicable rotational crop restrictions.</p> <ul style="list-style-type: none"> <li>• SANDEA can be applied up to 2 applications with a total of all applications not to exceed 2 2/3 oz of product by weight (0.125 lb active ingredient) per acre per use season. On coarse textured soils classified as sand, loamy sand, and sandy loam with less than 18% clay and more than 65% sand, or on soils with less than 1% organic matter, SANDEA may be applied up to 2 applications with a total of all applications not to exceed 2 oz of product by weight (0.094 lb active ingredient) per acre per use season.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<b>BEANS, DRY (30)</b>	1/2 - 2/3	Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre. <b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• <b>Postemergence</b> - Apply SANDEA when plants have 1 - 3 trifoliolate leaves, but before flowering. Applications with a weed size of 6 inches or below will allow for the greatest control. Make only 1 broadcast application per season.</li> <li>• Only apply as a post directed row middle or furrow application in the state of California.</li> </ul> <p style="text-align: center;"><b><u>Tank Mixtures for Dry Beans:</u></b></p> <ul style="list-style-type: none"> <li>• Refer to the specific product labels and observe all precautions, mixing and application instructions for all products used in tank mixtures. Be sure to follow the specifications listed on the most restrictive label when planning and making applications. Tank mixtures for additional broadleaf weed control can be added.</li> <li>• Tank mixtures for postemergent grass control, including but not limited to TARGA® or other graminicides can be added.</li> <li>• Not all varieties have been tested for tolerance. Under adverse growing conditions (dry or excessive moisture, cool weather, etc.), maturity of the treated crop may be delayed which can influence harvest date, yield, and quality. Use of COC or MSO adjuvant may cause temporary crop response when plants are under stress. COC or MSO adjuvants can only be used in the states of CO, MN, NE, ND, and SD.</li> </ul>
	1/2 - 1	<ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications for Dry Beans</b> - Apply SANDEA between crop rows while avoiding contact of the herbicide with the planted crop. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not apply more than 1 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middles/furrows).</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>	
	SANDEA @ 1/2 - 2/3 oz  Plus EPTAM® 7-E @ 3 1/2 - 4 1/3 pts.	<b>Preplant or At Planting:</b> <ul style="list-style-type: none"> <li>• <b>Incorporation:</b> Apply and incorporate 1/2 - 2/3oz SANDEA and 3 1/2 - 4 1/2 pints EPTAM 7-E per acre to a depth of approximately 2 inches just before planting. Use lower rate on lighter textured soils with low organic matter. Refer to EPTAM 7-E label for specific incorporation directions. Rotary hoe lightly during or shortly after emergence of the beans to break any crust which occurs.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not apply more than 2/3 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middles/furrows).</li> <li>• Do not use EPTAM 7-E on Adzuki beans, cowpeas (black-eyed peas, black-eyed beans), Mung beans, or garbanzo beans. Under abnormal weather conditions, stunting may occur on Gratiot, Michilite, Sanilac, Seafarer, and Seaway varieties. Do not exceed 9 pints EPTAM 7-E per acre per crop.</li> <li>• Do not exceed 3 1/2 pints EPTAM 7-E per acre on small white beans or green beans grown on coarse textured soils.</li> <li>• Do not exceed 7 pints per acre per crop of EPTAM 7-E in the Southwestern and Southeastern regions. Do not exceed 8 pints per acre per crop of EPTAM 7-E in the Western Region. Do not exceed 9 pints per acre per crop of EPTAM 7-E in the Pacific Northwestern Region. Do not exceed 9 3/4 pints of EPTAM 7-E in the Northern Region.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>• A tank mix combination of SANDEA plus EPTAM 7-E will give a broader spectrum of weed control than either product used separately.</li> <li>• <b>Caution: Read both the SANDEA and EPTAM 7-E labels carefully before using. Observe all cautions and limitations on labeling of both products.</b></li> </ul>	
<b>BEANS, SUCCULENT SNAP (30) (including lima beans)</b>	1/2 - 1	<b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Preemergence</b> - Apply SANDEA after planting but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.</li> <li>• Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre.</li> </ul>
	1/2 - 2/3	<b>Direct-seeded:</b> <ul style="list-style-type: none"> <li>• <b>Postemergence</b> - Apply SANDEA over-the-top after the crop has reached the 2 - 4 trifoliolate leaf stage, but before flowering. Use the lower rate on lighter textured soils with low organic matter. Directed sprays may limit crop injury.</li> </ul>
	1/2 - 1	<ul style="list-style-type: none"> <li>• <b>Row Middle/Furrow Applications</b> - Apply SANDEA between crop rows while avoiding contact of the herbicide with the planted crop. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not apply more than 1 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middles/furrows).</li> <li>• Application of SANDEA may cause temporary stunting.</li> <li>• Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>	
	SANDEA @ 1/2 - 1 oz  Plus EPTAM 7E @ 3 1/2 - 4 1/2 pts.	<b>Preplant or At Planting:</b> <ul style="list-style-type: none"> <li>• Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre.</li> <li>• <b>Incorporation:</b> Apply and incorporate 1/2 - 1 oz SANDEA and 3 1/2 - 4 1/2 pints EPTAM 7-E per acre to a depth of approximately 2 inches just before planting. Use lower rate on lighter textured soils with low organic matter. Refer to EPTAM 7-E label for specific incorporation directions. Rotary hoe lightly during or shortly after emergence of the beans to break any crust which occurs.</li> </ul>

CROP	OZ/ACRE	COMMENTS
<b>BEANS, SUCCULENT SNAP (30)</b> (including lima beans) (continued)		<ul style="list-style-type: none"> <li>Do not apply more than 1 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period (includes applications to the crop and to row middles/furrows).</li> <li>Do not use EPTAM 7-E on flat-podded beans except Romano.</li> <li>Do not exceed 3 1/2 pints EPTAM 7-E per acre on green beans grown on coarse textured soils.</li> <li>Do not exceed 7 pints per acre per crop of Eptam in the Southwestern and Southeastern regions. Do not exceed 8 pints per acre per crop of EPTAM 7-E in the Western Region. Do not exceed 9 pints per acre per crop of EPTAM 7-E in the Pacific Northwestern Region. Do not exceed 9 3/4 pints of EPTAM 7-E in the Northern Region.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>A tank mix combination of SANDEA plus EPTAM 7-E will give a broader spectrum of weed control than either product used separately.</li> <li><b>Caution: Read both the SANDEA and EPTAM 7-E labels carefully before using. Observe all cautions and limitations on labeling of both products.</b></li> </ul>
<b>6B SUCCULENT SHELLED PEA AND BEAN SUBGROUP (30)</b> (Any succulent shelled cultivar of bean (Phaseolus) including lima bean, green; broad bean, succulent; (Vigna) including blackeyed pea, cowpea, southern pea (Pisum) including English pea, garden pea. green pea, and pigeon pea	1/2	<p><b>Preemergence application for control of labeled broadleaf weeds</b> - Apply SANDEA as a single broadcast application after planting but before crop emergence.</p> <p><b>Application of SANDEA may cause significant, temporary stunting and delay maturity of peas resulting in delayed harvest. This product is available to the end-user /grower solely to the extent that the benefit and utility, in the sole opinion of the end-user/grower, outweigh the extent of potential injury associated with the use of this product. Due to the risk of crop damage, all such use is at the end-user/growers risk.</b></p>
	1/2 - 1	<p><b>Postemergence</b> – Apply SANDEA uniformly with ground equipment in a minimum of 15 gallons of water per acre. Apply as a directed spray when plants have 2 - 4 trifoliolate leaves and before flowering. Make one broadcast application. Directed sprays are recommended to limit crop injury.</p> <p>Use a NIS.</p> <p><b>Not all varieties have been tested for tolerance. Under adverse growing conditions (dry or excessive moisture, cool weather, etc.), maturity of the treated crop may be delayed which can influence harvest date, yield, and quality. For untested varieties, a small area of the field should be sprayed to determine potential sensitivity to its use.</b></p>
		<ul style="list-style-type: none"> <li>SANDEA may not control ALS resistant weeds.</li> <li>Do not apply more than 1 oz of SANDEA per acre per crop cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>Do not feed to livestock.</li> </ul>



CROP	OZ/ACRE	COMMENTS
<p><b>CORN, FIELD AND FIELD CORN GROWN FOR SEED (30)</b></p>	<p>2/3 - 1 1/3</p>	<p><b>Postemergence</b> - Apply SANDEA over-the-top or with drop nozzles from the spike-through layby stage of field corn.</p> <p style="text-align: center;"><b><u>Tank Mixtures for Corn Only</u></b></p> <p>Ensure that spray equipment is set up to avoid applying an excessive rate directly over the rows and into the whorl of the cornstalk. To insure good spray coverage of weeds and to reduce the risk of spraying directly into the whorl, tank mix applications made after corn is 24 inches tall should be directed or semi-directed using drop nozzles.</p> <p style="text-align: center;"><b><u>SANDEA Post Field Corn Applications</u></b></p> <p>Refer to “<b>MIXING INSTRUCTIONS</b>,” and “<b>USE RATE GUIDES</b>” sections of this label for detailed information on SANDEA application.</p> <p><b>Refer to the specific product labels and observe all precautions, mixing and application instructions for all products used in tank mixtures. Be sure to follow the specifications listed on the most restrictive label when planning and making applications.</b></p> <p>Before mixing in the spray tank, it is recommended that compatibility be tested by mixing all components in a small container in proportionate quantities. For tank mixtures, add individual formulations to a spray tank in the following sequence: water soluble bags, dry flowables, emulsifiable concentrates, drift control additive, water soluble liquids followed by NIS or COC.</p> <p>Tank mixtures should not be applied if the crop is under severe stress due to drought, water-saturated soils, poor fertility (especially low nitrogen levels), hail, frost, insects or when the maximum daytime temperature is above 92° F at time of application. Tank mix applications under these conditions may cause temporary crop injury.</p> <p>Tank mixtures for additional broadleaf weed control, including but not limited to 2,4-D, Armezon™, atrazine, Buctril®, Callisto®, dicamba, Impact®, Laudis® or Yukon® can be added.</p> <p>Tank mixtures for postemergence grass control, including but not limited to Accent®, Beacon®, Option® or Steadfast® can be added.</p>

CROP	OZ/ACRE	COMMENTS																						
<b>CORN, FIELD AND FIELD CORN GROWN FOR SEED (30)</b> (continued)	2/3 - 1 1/3	<p>Tank mixtures for additional postemergence grass and broadleaf control, including but not limited to Roundup® brands or glyphosate (glyphosate-tolerant corn only) or Ignite® and Liberty® (LibertyLink® hybrids only) can be added.</p> <p><b>Refer to the specific product labels and observe all precautions, mixing and application instructions, and follow-crop intervals for all products used in tank mixtures.</b></p> <p><b>SANDEA and SOIL RESIDUALS in emerged corn</b></p> <p>Alachlor, acetochlor, metolachlor and dimethenamid may be tank mixed with SANDEA for residual control of foxtails and other grass weeds in field corn.</p>																						
		<ul style="list-style-type: none"> <li>SANDEA may be applied up to 2 applications with a total application not to exceed 2 2/3 oz of product by weight (0.125 lb active ingredient) per acre per use season.</li> <li>Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> <li>Refer to the "ROTATIONAL CROP INFORMATION" for applicable rotational crop restrictions.</li> </ul>																						
		<p><b><u>SANDEA Soil Applications</u></b></p> <p>When used exclusively with <b>Pioneer IR field corn hybrids</b>, SANDEA may be soil applied at the rate of 1 1/3 - 2 oz per acre (0.062 - 0.094 lb of active ingredient per acre) for residual control of velvetleaf, common cocklebur, common lambsquarters, common ragweed, pigweed, smartweed, sunflower, and other difficult to control weeds.</p> <p>This product is labeled as an early pre-plant surface-applied, pre-plant incorporated, or preemergence treatment. SANDEA offers effective broadleaf control across all tillage systems and is intended for use in tank mixtures with preemergence grass herbicides, including but not limited to: alachlor, acetochlor, metolachlor, and dimethenamid active ingredient materials. Refer to the labels for these products, or any other grass preemergence herbicide used for use instructions, weeds controlled, and application restrictions.</p>																						
<b>CORN, SWEET AND POPCORN (30)</b>	2/3 - 1	<p>Apply SANDEA over-the-top or with drop nozzles from the spike through layby stage of the corn. If necessary, a sequential treatment of this product at 2/3 oz per acre may be applied only with drop nozzles semi-directed or directed to avoid application into the corn plant whorl.</p>																						
		<ul style="list-style-type: none"> <li>No more than 2 applications of SANDEA per 12 month period in sweet corn or popcorn.</li> <li>Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> <li>Do not use SANDEA on "Jubilee" sweet corn. All varieties have not been tested for sensitivity to SANDEA.</li> <li>Any injury arising from use of SANDEA is the responsibility of the user.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>																						
<b>COTTON (28)</b>	2/3 - 1 1/3	<p>Apply SANDEA as a directed spray in hooded equipment for postemergent weed control in emerged cotton. Applications may be made anytime after cotton emergence until row closure inhibits use of hooded spray equipment. The applicator is responsible for maintaining proper spray speed and equipment position so spray mist does not contact cotton plants.</p>																						
		<ul style="list-style-type: none"> <li>Do not apply more than 1 1/3 oz SANDEA per acre per crop-cycle, not to exceed 1 1/3 oz per acre per 12 month period.</li> <li>Also refer to the "Rotational Crop Information" for applicable rotational crop restrictions.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>																						
<b>MILLET, PROSO</b>  <b>(0 Millet Forage)</b>  <b>(50 Millet Grain and Straw)</b>  <b>(37 Millet Hay)</b>	1/2 - 2/3	<p>Millet Growth Stage: SANDEA, alone, can be applied from the 2 leaf through layby stage (before grain head emergence).</p> <p>Temporary stature reduction may occur to the crop following application of SANDEA if the proso millet is under stress. This effect will be most evident 7 - 10 days after application. The crop will quickly recover under normal growing conditions. Applications should be made after weed emergence and actively growing. If adding a tank mix, refer to the tank mix section of this label.</p> <p><b><u>TANK MIXTURES</u></b></p> <p>Refer to "MIXING INSTRUCTIONS," and "USE RATE GUIDES" sections of this label for detailed information on SANDEA application.</p> <p>Refer to the specific product labels and observe all precautions, mixing and application instructions for all products used in tank mixtures. Be sure to follow the specifications listed on the most restrictive label when planning and making applications.</p> <p>Tank mixtures for additional broadleaf weed control, including but not limited to 2,4-D, and dicamba can be added.</p> <p>Insecticide and fungicide products can be tank mixed with SANDEA.</p>																						
		<ul style="list-style-type: none"> <li>Do not exceed 2/3 oz/A of SANDEA per 12 month period.</li> <li>0 Day Pre grazing interval for grass forage for ALL animals (lactating and non-lactating).</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>Listed day intervals following an application of SANDEA.</li> </ul>																						
		<table border="1"> <thead> <tr> <th rowspan="2">Crop</th> <th colspan="3">All Animals (Lactating and Non-lactating)</th> </tr> <tr> <th>Pre-Grazing Interval (PGI)</th> <th>Pre-Harvest Interval (PHI)</th> <th>Pre-Slaughter Interval (PSI)</th> </tr> </thead> <tbody> <tr> <td>Millet Forage</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Millet Grain</td> <td>N/A</td> <td>50</td> <td>0</td> </tr> <tr> <td>Millet Straw</td> <td>N/A</td> <td>50</td> <td>0</td> </tr> <tr> <td>Millet Hay</td> <td>N/A</td> <td>37</td> <td>0</td> </tr> </tbody> </table>	Crop	All Animals (Lactating and Non-lactating)			Pre-Grazing Interval (PGI)	Pre-Harvest Interval (PHI)	Pre-Slaughter Interval (PSI)	Millet Forage	0	0	0	Millet Grain	N/A	50	0	Millet Straw	N/A	50	0	Millet Hay	N/A	37
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CROP	OZ/ACRE	COMMENTS
RICE (48, CA 69)	2/3 - 1 1/3	<p><b>Pre-plant, at planting, preemergence and postemergence applications to rice</b></p> <ul style="list-style-type: none"> <li>• <b>Pre-plant:</b> Apply SANDEA at 2/3 oz per acre in combination with glyphosate or other suitable agricultural herbicides for burn down of emerged annual grasses, broadleaf weeds and nutsedge. If this product is applied pre-plant burn down, refer to "TIME INTERVAL BEFORE PLANTING" table in complete directions for use.</li> <li>• <b>Preemergence and Postemergence:</b> Apply SANDEA for postemergent weed control from prior to the emergence of rice until after permanent flood is established. Apply SANDEA at 2/3 - 1 1/3 oz per acre, with the total application rate not to exceed 1 1/3 oz of product (0.062 lb active ingredient) per acre per use season.</li> </ul> <p>SANDEA can be applied as a foliar spray or dry broadcast. SANDEA can be tank mixed with Propanil containing rice herbicides (e.g. Stam and Propanil 4E) at 2/3 - 1 1/3 oz per acre of this herbicide and labeled rates of the tank mix products.</p> <p>Foliar applications of SANDEA can be made at the 3 - 5 leaf stage of rice when weeds have 2 - 4 leaves. Dry broadcast applications can be made at the 1 - 2 leaf stage of rice when weeds have two leaves or less.</p> <p>SANDEA can also be applied post flood with dry broadcast applications of SANDEA at 1 - 1 1/3 oz by weight per acre, with the total application rate not to exceed 1 1/3 oz product by weight per acre per use season.</p> <p>It is best to use 0.25 - 0.5% NIS which contains at least 80% active ingredient with foliar applications of SANDEA.</p> <p>With all foliar applications of SANDEA use a minimum 3 - 15 gallons of water per acre for aerial equipment and a minimum of 10 gallons of water per acre for ground equipment. It is best to apply spray solutions the day they are mixed. <b>NOTE:</b> See "APPLICATION EQUIPMENT AND INSTRUCTIONS" section for spray drift management techniques.</p> <p>Water levels in rice fields and checks should remain static (3 - 6 inch depth) following dry broadcast applications of SANDEA. Do not reintroduce water into rice fields or checks for at least five days following dry broadcast applications of SANDEA. Rice fields and checks may be irrigated to maintain water level, but this may reduce weed control.</p> <p>Control of emerged weeds with foliar applications is best when 70% - 80% of the weed foliage is exposed. Control of submerged weeds is best when weeds have 2 leaves or less. Do not reintroduce water into rice fields or checks for at least 24 hours following foliar applications of SANDEA.</p> <p>Do not apply within 48 days of harvest. Do not apply within 69 days of harvest in California. CAUTION: To ensure product effectiveness avoid using SANDEA on rice fields which have a history of weed biotypes resistant to ALS herbicides.</p> <p style="text-align: center;"><b><u>SANDEA Tank Mixture Options in Rice</u></b></p> <p>Refer to "MIXING INSTRUCTIONS," and "USE RATE GUIDES" sections of this label for detailed information on SANDEA application. Refer to the specific product labels and observe all precautions, mixing and application instructions for all products used in tank mixtures. Be sure to follow the specifications listed on the most restrictive label when planning and making applications. Before mixing in the spray tank, it is recommended that compatibility be tested by mixing all components in a small container in proportionate quantities. For tank mixtures, add individual formulations to a spray tank in the following sequence: water soluble bags, dry flowables, emulsifiable concentrates, drift control additive, water soluble liquids followed by NIS or COC. Tank mixtures should not be applied if the crop is under severe stress due to drought, poor fertility (especially low nitrogen levels), hail, frost and insects. Tank mix applications under these conditions may cause temporary crop injury.</p> <ul style="list-style-type: none"> <li>• <b>Preemergence &amp; Pre-Plant Applications:</b> Tank mixtures for additional preemergence weed control, including but not limited to Bolero®, Command® 3ME, glyphosate, pendimethalin or quinclorac can be added.</li> <li>• <b>Postemergence Applications:</b> Tank mixtures for additional broadleaf weed control, including but not limited to Grandstand®, Propanil and Propanil products, Aim®, Facet®, Basagran®, Londax®, Grasp®, Regiment®, NewPath®, Beyond® and 2-4-D can be added.</li> </ul> <p>Tank mixtures for postemergence grass control, including but not limited to Newpath®, Beyond®, Propanil, Facet®, Grasp®, and Regiment® can be added.</p> <p>Insecticide and fungicide products can be tank mixed with SANDEA. Refer to the specific product labels and observe all precautions, mixing and application instructions, and follow-crop intervals for all products used in tank mixtures.</p> <p>Sequential Applications: SANDEA can be applied sequentially with Ordram®, Bolero®, Clincher®, Regiment® and Shark®. Read the Ordram, Bolero, Clincher, Regiment and Shark labels for application information, restrictions, and precautions.</p>

CROP	OZ/ACRE	COMMENTS
SORGHUM, GRAIN (MILO) (30)	2/3 - 1	<p><b>Postemergence</b> - Apply SANDEA from the 2 leaf through layby stage (before grain head emergence). Temporary stature reduction may occur to the crop following application of SANDEA if the grain sorghum is under stress. This effect will be most evident 7 - 10 days after application. The crop will quickly recover under normal growing conditions.</p> <p><b>Tank Mixtures for Grain Sorghum</b></p> <p>Tank mixtures with SANDEA can include, but are not limited to atrazine, Buctril® or 2,4-D. Refer to the specific product labels and observe all precautions, mixing and application instructions, and follow crop intervals for all products used in tank mixtures.</p>
		<ul style="list-style-type: none"> <li>Only apply SANDEA in a single application with the total application rate not to exceed 1.0 oz of product by weight (0.047 lb active ingredient) per acre per use season.</li> <li>Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
SUGARCANE (30)	2/3 - 1 1/3	<p>When used alone, apply SANDEA prior to planting, prior to emergence or after the emergence of the sugarcane, and until row closure. Mechanical cultivation may be required to control weed species not on the label. If so, a <b>sequential treatment</b> may be required to control weeds in areas of disturbed soil.</p> <p>Apply SANDEA at 2/3 - 1 1/3 oz by weight per acre (0.031 - 0.062 lb active ingredient per acre) in combination with glyphosate agricultural herbicides for pre-plant burn down of emerged annual grasses, broadleaf weeds and nutsedge in sugarcane.</p> <p><b>Tank Mixtures for Sugarcane</b></p> <p>Tank mixtures with SANDEA can include, but are not limited to Asulox®, atrazine, Callisto®, Envoke®, Evik®, glyphosate, or 2,4-D.</p> <p>Refer to the specific product labels and observe all precautions, mixing and application instructions, and follow crop intervals for all products used in tank mixtures.</p>
		<ul style="list-style-type: none"> <li>Refer to the "ROTATIONAL CROP INFORMATION" section of this label for applicable rotational crop restrictions.</li> <li>No more than 3 applications (including pre-plant applications) may be made with the total use rate not to exceed 2 2/3 oz of product by weight (0.125 lb active ingredient) per acre per year.</li> <li>Following application to foliage allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>

#### OTHER CROPS AND APPLICATIONS

CROP	OZ/ACRE	COMMENTS
ALFALFA (14)  CA & AZ Only	2/3 - 1	<p><b>Established Fields</b></p> <ul style="list-style-type: none"> <li><b>Postemergence Broadcast</b> - Apply SANDEA as a broadcast application to established alfalfa. Alfalfa should be well established in the field for a minimum of 6 months prior to application of SANDEA. Apply uniformly with ground equipment in a minimum of 20 gallons of water per acre. Use a water volume that will provide uniform coverage of plants. It is recommended to make an application as soon as possible after removal of hay from the field and prior to an irrigation to minimize crop injury. Wait for at least 48 hours after application before irrigation.</li> <li><b>Postemergence Spot Treatment</b> - Apply SANDEA as a spot treatment application to only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for</li> <li><b>Postemergence followed by Postemergence</b> - To maximize control of nutsedge, it may be necessary to use a second postemergence spot application to those areas where the nutsedge has emerged or re-grown. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate must not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. This use pattern will result in greater potential of growth and yield reduction.</li> </ul>
		<p>Research has shown that alfalfa growth and yields will be reduced for one or more cuttings after a SANDEA application. Application of SANDEA to alfalfa where re-growth exceeds 6" will result in greater yield reduction. Symptoms may be temporary. Follow all directions carefully to minimize potential reduced plant growth and yield. Apply uniformly with ground equipment in a minimum of 20 gallons of water per acre. Use a water volume that will provide uniform coverage of plants.</p>
		<ul style="list-style-type: none"> <li>Do not apply more than 2 oz of SANDEA per acre per crop cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
ARTICHOKE (5)	1 - 2	<p>Apply SANDEA uniformly with ground equipment in a minimum of 15 gallons of water per acre. Apply as a broadcast application to the ground on either side of the row and winter ditches while avoiding crop foliage.</p> <ul style="list-style-type: none"> <li><b>Row Middle</b> - Apply SANDEA between rows of perennial artichokes for the control of nutsedge and listed broadleaf weeds. Applications should be made when oxalis is in full bloom. Avoid contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. To maximize nutsedge control, apply when plants are in the 3 - 5 leaf stage</li> </ul> <p>Application of SANDEA may cause significant, temporary stunting and delay maturity of artichokes if sprayed directly. This product is available to the end-user /grower solely to the extent that the benefit and utility, in the sole opinion of the end-user/grower, outweigh the extent of potential injury associated with the use of this product. Due to the risk of crop damage, all such use is at the end-user/growers risk.</p>

CROP	OZ/ACRE	COMMENTS
<b>ARTICHOKE</b> (5) (continued)		<ul style="list-style-type: none"> <li>For best results, use a NIS with applications.</li> <li>Use rates are broadcast per acre. Reduce rate and spray volume in proportion to area actually sprayed.</li> <li>Do not apply by air.</li> <li>SANDEA may not control ALS resistant weeds.</li> <li>Do not apply more than 2 oz of SANDEA per acre per 12 month period.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>ASPARAGUS</b> (1)	1/2 - 1 1/2	<p>Apply uniformly with ground equipment in a minimum of 15 gallons per acre.</p> <p><b>Nursery, Transplanted Crowns and Established Beds</b></p> <ul style="list-style-type: none"> <li><b>Postemergence/Post transplant</b> - Apply SANDEA to asparagus before or during the harvesting season. SANDEA may cause a temporary stunting or twisting of fern on certain asparagus varieties when applied during spear emergence. The addition of surfactants and postemergent grass herbicides may accentuate the crop response. Spectrum and degree of weed control may be reduced where SANDEA is used without a surfactant.</li> <li><b>Post-harvest</b> - Apply SANDEA at the end of the harvest season. Under heavy nutsedge pressure, split applications are recommended. Contact with the fern may cause temporary yellowing. A NIS or COC should be used with post-harvest applications. Crop injury will be minimized and weeds control will be more effective when applications are made with drop nozzles as a directed spray below the ferns to allow for more complete coverage of target weeds.</li> <li><b>Split application for enhanced control of nutsedge</b> - Apply a split application with 3/4 - 1 oz product per acre during the cutting/harvesting season when the first flush of nutsedge is in the 3 - 5 leaf stage, followed by a second application of 3/4 - 1 oz product per acre at least 21 - 30 days later up to lay-by to control later flushes of nutsedge. SANDEA can be applied post-harvest during the fern stage. Contact with the fern may cause temporary yellowing. Crop injury will be minimized and nutsedge more effectively controlled when applications are made with drop nozzles directing the spray below the ferns allowing for more complete coverage of nutsedge.</li> </ul> <ul style="list-style-type: none"> <li>For first year transplants, apply no sooner than six weeks after fern emergence.</li> <li>NIS can be used east of the Rockies to enhance weed control, do not use NIS west of the Rockies.</li> <li>Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>FALLOW GROUND</b>	2/3 - 1 1/3	<p>Applications of SANDEA to fallow ground.</p> <ul style="list-style-type: none"> <li>SANDEA may be applied up to 2 applications with a total application not to exceed 2 2/3 oz of product by weight (0.125 lb active ingredient) per acre per use season.</li> <li>Refer to the "WEEDS CONTROLLED" section of this label for weed control recommendations. Also refer to the "ROTATIONAL CROP INFORMATION" section of this label for applicable rotational crop restriction.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>OKRA</b> (30)	1/2 - 1	<p><b>Direct-seeded and Transplant:</b></p> <ul style="list-style-type: none"> <li><b>Row Middle/Furrow Applications/Shielded Spray</b> - Apply SANDEA between rows of direct-seeded or transplanted okra, while avoiding contact of the herbicide with the planted crop. If plastic is used on the planted row, adjust equipment to keep the application off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.</li> </ul> <ul style="list-style-type: none"> <li>Do not apply more than 2 oz SANDEA per acre per crop-cycle, not to exceed 2 oz per acre per 12 month period.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>
<b>17 PASTURE, RANGELAND &amp; CRP FORAGE GRASSES/HAY</b> (37)	2/3 - 1 1/3	<p><b>Established Fields</b></p> <p><b>Postemergence Broadcast</b> – Apply SANDEA as a broadcast application to established Pasture &amp; Rangeland. Apply uniformly with ground equipment in a minimum of 10 gallons of water per acre. Use a water volume that will provide uniform coverage of plants. It is recommended to make an application as soon as possible after removal of hay or before weeds exceed label height restriction. Wait for at least 48 hours after application before irrigation.</p> <p><b>Postemergence Spot Treatment</b> – Apply SANDEA as a spot treatment application to only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants.</p> <p><b>Postemergence followed by Postemergence</b> - To maximize control of nutsedge, it may be necessary to use a second postemergence spot application to those areas where the nutsedge has emerged or re-grown. For these situations, use a spot treatment method treating only those areas of emerged nutsedge. Application rate should not exceed 3/4 oz product per treated acre in these areas. Use a water volume that will allow for good coverage of the plants. This use pattern will result in greater potential of growth and yield reduction.</p> <p style="text-align: center;"><b>TANK MIXTURES</b></p> <p>Refer to "MIXING INSTRUCTIONS," and "USE RATE GUIDES" sections of this label for detailed information on SANDEA application.</p> <p>Refer to the specific product labels and observe all precautions, mixing and application instructions for all products used in tank mixtures. Be sure to follow the specifications listed on the most restrictive label when planning and making applications.</p> <p>Tank mixtures for additional broadleaf weed control, including but not limited to 2,4-D, dicamba and, Grazon® can be added.</p> <p>Labeled insecticides, including <b>Confirm</b>®, and labeled fungicide products can be tank mixed with SANDEA.</p>

CROP	OZ/ACRE	COMMENTS											
17 PASTURE, RANGELAND & CRP FORAGE GRASSES/HAY (37)		<ul style="list-style-type: none"> <li>Do not apply more than 1 1/3 oz of SANDEA per acre per 12 month period.</li> <li>0 Day pre grazing interval for lactating and non-lactating animals.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> <li>Listed day intervals following an application of SANDEA.</li> </ul> <table border="1"> <thead> <tr> <th rowspan="2">Crop</th> <th colspan="3">Lactating and Non-lactating Animals</th> </tr> <tr> <th>Pre-Grazing Interval (PGI)</th> <th>Pre-Harvest Interval (PHI)</th> <th>Pre-Slaughter Interval (PSI)</th> </tr> </thead> <tbody> <tr> <td>Pasture, Rangeland, CRP and Forage Grasses/Hay</td> <td>0</td> <td>37</td> <td>0</td> </tr> </tbody> </table>	Crop	Lactating and Non-lactating Animals			Pre-Grazing Interval (PGI)	Pre-Harvest Interval (PHI)	Pre-Slaughter Interval (PSI)	Pasture, Rangeland, CRP and Forage Grasses/Hay	0	37	0
		Crop		Lactating and Non-lactating Animals									
Pre-Grazing Interval (PGI)	Pre-Harvest Interval (PHI)		Pre-Slaughter Interval (PSI)										
Pasture, Rangeland, CRP and Forage Grasses/Hay	0	37	0										
RHUBARB (60)	1/2 - 1	<p>Apply uniformly with ground equipment in a minimum of 15 gallons of water per acre.</p> <p>Apply SANDEA as a single broadcast application to <b>dormant</b> rhubarb. The timing of the application should be as late as possible, or just prior to the breaking of rhubarb dormancy. Application of SANDEA may cause significant crop stunting. It is recommended that the user begin with a the lower rate to determine potential sensitivity to its use along with speed and degree of recovery.</p> <p>Use a NIS if labeled weeds are emerged.</p> <ul style="list-style-type: none"> <li>SANDEA may not control ALS resistant weeds.</li> <li>Do not apply more than 1 oz of SANDEA per acre per year.</li> <li>Consult "Use Precautions" and "For Optimum Results" sections for important usage information.</li> </ul>											
TURFGRASS SOD AND SEED FARMS	2/3 - 1 1/3	<p>SANDEA is a selective herbicide for postemergence control of sedges such as purple and yellow nutsedge in sod or turf seed farms. This product will not injure nearby established ornamentals, trees, and shrubs when used according to label directions.</p> <p>For postemergence control of purple or yellow nutsedge found in established turfgrass, apply 2/3 - 1 1/3 oz by weight of this product per acre (0.031 - 0.062 lbs. active ingredient per acre) after nutsedge has reached the 3 - 5 leaf stage of growth. Use the lower rate in light infestations and the higher rate in heavy infestations.</p> <p>A second treatment may be required 6 - 10 weeks after the initial treatment. As a sequential treatment, when new purple or yellow nutsedge plants have reached the 3 - 5 leaf stage of growth, apply 2/3 - 1 1/3 oz by weight of this product per acre (0.031 - 0.062 lbs. active ingredient per acre). Use the lower rate in light infestations and the higher rate in heavy infestations. No more than 2 applications can be made with the total use rate not exceeding 2 2/3 oz of product (0.125 lb active ingredient) per acre per use season.</p> <p>Use 0.25 - 0.5% NIS concentration (1 - 2 quarts per 100 gallons of spray solution) for broadcast applications. For high volume applications, DO NOT exceed 1 quart of surfactant per acre. Use only NIS which contain at least 80% active material.</p> <p><b>DO NOT exceed the recommended amount of surfactant due to the potential for turf injury at higher rates. Refer to the surfactant label and observe all precautions, mixing and application instructions.</b></p> <p>When applied as directed under the conditions described, the following established turfgrasses are tolerant to application of this product:</p>											
		<b>Established Cool-Season Grasses</b>											
		Bentgrass, creeping ( <i>Agrostis stolonifera</i> )	Fescue, fine ( <i>Festuca rubra</i> )	Ryegrass, perennial ( <i>Lolium perenne</i> )									
		Blue Grass, Kentucky ( <i>Poa pratensis</i> )	Fescue, tall ( <i>Festuca arundinacea</i> )										
		<b>Established Warm-Season Grasses</b>											
		Bahiagrass ( <i>Paspalum notatum</i> )	Centipedegrass ( <i>Eremochloa ophiuroides</i> )	Kikuyugrass ( <i>Pennisetum clandestinum</i> )									
		Bermudagrass ( <i>Cynodun dactylon</i> )	Seashore paspalum ( <i>Paspalum vaginatum</i> )	Zoysiagrass ( <i>Zoysia japonica</i> )									
Buffalograss ( <i>Buchloe dactyloides</i> )	St. Augustinegrass ( <i>Stenotaphrum secundatum</i> )												

CROP	OZ/ACRE	COMMENTS
TURFGRASS SOD AND SEED FARMS (continued)	2/3 - 1 1/3	<p align="center"><b>Fallow Treatments in Turfgrass Seed and Sod Production Areas</b></p> <p>This product may be used on fallow areas prior to establishing turfgrass plants. Allow 4 weeks between application and seeding or sodding of turfgrass.</p> <p align="center"><b>Tank Mixtures for Turfgrass Renovation</b>  <b>SANDEA plus GLYPHOSATE AGRICULTURAL HERBICIDES plus NIS</b></p> <p>For <b>non-selective</b> control of all vegetation prior to turfgrass renovation, SANDEA may be applied at 2/3 oz by weight per acre in combination with glyphosate agricultural herbicides for pre-plant burndown of emerged annual grasses, broadleaf weeds and nutsedge.</p> <p><b>Refer to the glyphosate agricultural herbicide label for use instructions, weeds controlled, and application restrictions.</b></p>
		<ul style="list-style-type: none"> <li>For optimum results, do not mow turf for 2 days before or 2 days after application.</li> <li>This product is effective if no rainfall occurs within 3 hours, but best results are obtained with no rainfall or irrigation for at least 8 hours.</li> </ul>
		<ul style="list-style-type: none"> <li>This product may be used on seeded, sodded, or sprigged turfgrass that is well established. Allow the turf to develop a good root system and uniform stand before application.</li> <li><b>Avoid application of SANDEA when turfgrass or nutsedge is under stress since turf injury and poor nutsedge control may result.</b></li> <li>Do not apply as an over the top spray to desirable shrubs or trees.</li> </ul>

**ROTATIONAL CROP INFORMATION**

Gowan Company recommends the following recropping intervals for crop safety. Planting prior to the intervals shown below may result in crop injury when using SANDEA. Rotation intervals below may need to be extended if drought or cool conditions prevail. Rotation intervals may need to be extended on drip irrigated crops in Arizona and California. Gowan Company recommends that the end user test this product in order to determine its suitability for such intended use. It may be appropriate to use shorter Intervals in areas where local experience has demonstrated safety. In the event of crop failure, labeled crops may be planted back into the treated area at the user's risk for potential phytotoxicity to the subsequent crop. When using SANDEA in tank mixes, refer to the individual product labels being tank mixed. To determine rotational crop restrictions follow the longest rotational limitation of the product being tank mixed.

**TIME INTERVAL BEFORE PLANTING**

CROP	MONTHS	EXCEPTIONS
<b>CROPS NOT SPECIFICALLY LISTED</b>	36	
Alfalfa	9	
Barley (winter)	2	
Beans, Dry	0	
Beans, Snap	9	2 months in the northeast, midwest, and southeast, 3 months in TX
Broccoli	18	3 months for muck soils in FL
Cabbage	15	3 months for muck soils in FL
Canola	15	
Carrot	15	
Cauliflower	18	3 months for muck soils in FL
Cereal crops, Spring	2	
Clovers	9	
Collards	18	
Corn, IR/IMR Field	0	
Corn, Normal Field and IT Field	1	
Corn, Seed	2	
Corn, Sweet and Pop	3	
Cotton	4	
Cucumbers	9	2 months in the northeast, midwest, and southeast, 3 months in TX
Eggplant	12	4 months for FL Transplants
Forage Grasses	2	
Lettuce crops	18	3 months for muck soils in FL
Melons	9	2 months in the southeast and TX
Mint	15	
Oats	2	
Onions and Leeks	18	
Peanuts	6	
Peas	9	
Peas, Field	9	
Peppers	10	4 months FL Transplants and 3 months in TX
Potatoes	9	
Pumpkins	9	2 months in the southeast
Proso Millet	2	
Radish	12	3 months for muck soils in FL

Rice	0	
Rye (winter)	2	
Sorghums	2	
Soybeans	9	Where soil pH is less than 7.5 the interval is 5 months
Spinach	24	3 months for muck soils in FL
Squash	9	2 months in the southeast
Strawberries	36	6 months for annual FL Transplants
Sugarbeet (Michigan only)	21	
Sugarbeet (ND, MN, Red River Valley)	36	
Sugarbeet and Red Beet	24	Where rainfall is sparse or irrigation is required, the time interval is 36 months.
Sugarcane	0	
Sunflowers	18	
Tomato	8	2 months in the northeast, midwest, and southeast, 3 months in TX
Wheat (winter)	2	

**Southeast:** LA, MS, AL, FL, GA, NC, SC, TN, Puerto Rico

**Northeast & Midwest:** PA, DE, MA, MD, NY, ME, NJ, CT, RI, VA, NH, VT, WV, MI, WI, MN, IA, IL, IN, OH, MO, KY, ND, SD, NE

## STORAGE AND DISPOSAL

**DO NOT** contaminate water, food, feed or seed by storage or disposal.

**PESTICIDE STORAGE:** Store under cool, dry conditions (below 120° F). Do not store under moist conditions.

**PESTICIDE DISPOSAL:** Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill for pesticide disposal or in accordance with applicable Federal, state or local procedures.

**CONTAINER DISPOSAL:** Nonrefillable container. Do not reuse or refill this container. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

**DISPOSAL AUTHORITIES:** If none of the foregoing procedures is permitted by state and local authorities, then contact your State Pesticide or Environmental Control Agency, or your local Hazardous Waste Disposal office, or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.

**FOR 24-HOUR EMERGENCY ASSISTANCE (SPILL, LEAK OR FIRE), CALL CHEMTREC® (800) 424-9300.**

For other product information, contact Gowan Company or see Material Safety Data Sheet.

### NOTICE OF CONDITIONS OF SALE AND WARRANTY AND LIABILITY LIMITATIONS

Important: Read the entire Directions for Use and Notice of Conditions of Sale and Warranty and Liability Limitations before using this product. If terms are not acceptable return the unopened container for a full refund.

Our directions for use of this product are based on tests believed to be reliable. However, it is impossible to eliminate all risk associated with the use of this product. Crop injury, inadequate performance, or other unintended consequences may result due to soil or weather conditions, off target movement, presence of other materials, method of use or application, and other factors, all of which are beyond the control of Gowan Company. All such risks shall be assumed by the Buyer and User.

Gowan Company warrants that this product conforms to the specifications on the label when used in strict conformance with Directions for Use, subject to the above stated risk limitations. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, GOWAN COMPANY MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, GOWAN COMPANY'S EXCLUSIVE LIABILITY FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, OR ANY OTHER LEGAL THEORY IS STRICTLY LIMITED TO THE PURCHASE PRICE PAID OR REPLACEMENT OF PRODUCT, AT GOWAN COMPANY'S SOLE DISCRETION.

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(01-R0715)



## 1 Identification

### · Product identifier

· Trade name: **Sandea® Herbicide**

**EPA Registration No.: 81880-18-10163**

· CAS Number: Active Ingredient: Halosulfuron-Methyl (75%), CAS:100784-20-1

· Relevant identified uses of the substance or mixture and uses advised against

· Sector of Use Agriculture use

· Application of the substance / the mixture Agricultural herbicide

### · Details of the supplier of the safety data sheet

· Manufacturer/Supplier:

Gowan Company

P.O. Box 5569

Yuma, Arizona 85366-5569

(928) 783-8844

· Information department: [sds@gowanco.com](mailto:sds@gowanco.com)

· Emergency telephone number:

Chemtrec® Emergency Telephone 24 - Hours: (Spills, leak or fire) Inside U.S. & Canada: (800) 424-9300

Outside the U.S. & Canada: +011 (703) 527-3887

For medical emergency (Prosar®): (888) 478-0798

## 2 Hazard(s) identification

### · Classification of the substance or mixture



GHS07

Acute Tox. 4 H302 Harmful if swallowed.

### · Label elements

· GHS label elements

The product is classified and labeled according to the Globally Harmonized System (GHS).

· Hazard pictograms



GHS07

· Signal word: Warning

· Hazard statements

Harmful if swallowed.

· Precautionary statements

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

If swallowed: Call a poison center/doctor if you feel unwell.

Rinse mouth.

Dispose of contents/container in accordance with local/regional/national/international regulations.

· Hazard description: Causes moderate eye irritation. Harmful if swallowed. Avoid contact with eyes or clothing.

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acc. to OSHA

Printing date 06/30/2015

Reviewed on 06/30/2015

**Trade name: Sandea® Herbicide**  
**EPA Registration No.: 81880-18-10163**

(Contd. of page 1)

· **Classification system:**

· **NFPA ratings (scale 0 - 4)**



**HAZARD INDEX:**

4 Severe Hazard  
 3 Serious Hazard  
 2 Moderate  
 1 Slight Hazard  
 0 Minimal Hazard

· **HMIS-ratings (scale 0 - 4)**



**HAZARD INDEX:**

4 Severe Hazard  
 3 Serious Hazard  
 2 Moderate Hazard  
 1 Slight Hazard  
 0 Minimal Hazard

· **Other hazards**

· **Results of PBT and vPvB assessment**

- **PBT:** Not applicable in US.
- **vPvB:** Not applicable in US.

### 3 Composition/information on ingredients

· **Chemical characterization: Mixtures**

· **Description:** Only the identities of the active ingredient(s) and any hazardous inert ingredients are listed.

· **Dangerous components:**

100784-20-1	Halosulfuron present as methyl ester	75.0%
	⚠ Aquatic Acute 1, H400; Aquatic Chronic 1, H410	

### 4 First-aid measures

· **Description of first aid measures**

· **General information:**

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

You may also contact 1-888-478-0798 for emergency medical treatment information.

· **After eye contact:**

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after first 5 minutes, then continue rinsing eyes.
- Call a poison control center or doctor for treatment advice.

· **After swallowing:**

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by a poison control center or doctor.

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- *Do not give anything by mouth to an unconscious person.*
- **Information for doctor:**
  - *Most important symptoms and effects, both acute and delayed* No further relevant information available.
  - *Indication of any immediate medical attention and special treatment needed*  
No further relevant information available.

## 5 Fire-fighting measures

- **Extinguishing media**
  - **Suitable extinguishing agents:**  
CO<sub>2</sub>, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**  
Firefighters and others that may be exposed to vapors, mists, dusts, or products of combustion should wear full protective clothing and self-contained breathing apparatus. Equipment should be thoroughly cleaned after use.
  - **Protective equipment:** Wear self-contained respiratory protective device.

## 6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**  
Causes moderate eye irritation. Harmful if swallowed. Avoid contact with eyes or clothing.
- **Environmental precautions:**  
This product is toxic to non-target vascular plants. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark.
- **Methods and material for containment and cleaning up:**  
Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush residual spill area with water. Refer to Section 13 for disposal information and Section 15 for reportable quantity information.
- **Reference to other sections**
  - See Section 7 for information on safe handling.
  - See Section 8 for information on personal protection equipment.
  - See Section 13 for disposal information.

## 7 Handling and storage

- **Handling:**
  - **Precautions for safe handling**  
Avoid contact with eyes or clothing. Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.
  - **Information about protection against explosions and fires:** No special measures required.
- **Conditions for safe storage, including any incompatibilities**
  - **Storage:**
    - **Requirements to be met by storerooms and receptacles:**  
Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Store under cool, dry conditions (below 120°F). Do not store under moist conditions.
    - **Information about storage in one common storage facility:** Store away from foodstuffs.
    - **Further information about storage conditions:** None.

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· **Specific end use(s)** No further relevant information available.

## 8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

· **Additional information:**

Causes moderate eye irritation. Harmful if swallowed. Avoid contact with eyes or clothing.

· **Exposure controls**

· **Personal protective equipment:**

· **General protective and hygienic measures:**

Users should:

• Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

• Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

· **Breathing equipment:** Not required.

· **Protection of hands:**



Protective gloves

· **Material of gloves** Chemical-resistant made of any waterproof material

· **Penetration time of glove material**

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· **Body protection:**

Applicators and other handlers must wear:

• Long-sleeved shirt and long pants

• Shoes plus socks

## 9 Physical and chemical properties

· **Information on basic physical and chemical properties**

· **General Information**

· **Appearance:**

· **Form:** Granulate

· **Color:** Beige

· **Odor:** Slightly Vanilla

· **Odour threshold:** Not determined.

· **pH-value at 20 °C (68 °F):** 6.6

· **Change in condition**

· **Melting point/Melting range:** Undetermined.

· **Boiling point/Boiling range:** Undetermined.

· **Flash point:** Not applicable.

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· <b>Flammability (solid, gaseous):</b>	Not determined.
· <b>Ignition temperature:</b>	
· <b>Decomposition temperature:</b>	Not determined.
· <b>Auto igniting:</b>	Product is not self-igniting.
· <b>Danger of explosion:</b>	Product does not present an explosion hazard.
· <b>Explosion limits:</b>	
· <b>Lower:</b>	Not determined.
· <b>Upper:</b>	Not determined.
· <b>Vapor pressure:</b>	Not applicable.
· <b>Density at 20 °C (68 °F):</b>	0.656 g/cm <sup>3</sup> (5.474 lbs/gal)
· <b>Relative density</b>	Not determined.
· <b>Vapour density</b>	Not applicable.
· <b>Evaporation rate</b>	Not applicable.
· <b>Solubility in / Miscibility with</b>	
· <b>Water:</b>	Dispersible.
· <b>Partition coefficient (n-octanol/water):</b>	Not determined.
· <b>Viscosity:</b>	
· <b>Dynamic:</b>	Not applicable.
· <b>Kinematic:</b>	Not applicable.
· <b>Other information</b>	No further relevant information available.

## 10 Stability and reactivity

### · Reactivity

#### · Chemical stability

This product should be stable for at least two years under normal conditions of warehouse storage. Store in a cool, well-ventilated place away from foodstuffs, reducing agents and acids.

· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.

· **Possibility of hazardous reactions** No dangerous reactions known.

· **Conditions to avoid** Store under cool, dry conditions (below 120°F). Do not store under moist conditions.

· **Incompatible materials:** Reducing agents and acids

· **Hazardous decomposition products:** No dangerous decomposition products known.

## 11 Toxicological information

### · Information on toxicological effects

#### · Acute toxicity:

#### · LD/LC50 values that are relevant for classification:

Oral	LD50	1287 mg/kg (rat)
Dermal	LD50	>5000 mg/kg (rat)
Inhalative	LC50/4 h	>5.7 mg/l (rat)

#### · Primary irritant effect:

· **on the skin:** Slightly irritating

· **on the eye:** Moderately Irritating

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- **Sensitization:** No sensitizing effects known.
- **Additional toxicological information:**  
 The product is not subject to classification according to internally approved calculation methods for preparations:  
 When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.
- **Carcinogenic categories**

· <b>IARC (International Agency for Research on Cancer)</b>
None of the ingredients are listed.
· <b>NTP (National Toxicology Program)</b>
None of the ingredients are listed.
· <b>OSHA-Ca (Occupational Safety &amp; Health Administration)</b>
None of the ingredients are listed.

## 12 Ecological information

- **Toxicity**

This product is toxic to non-target vascular plants. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Halosulfuron-methyl is known to leach through soil into ground water under certain conditions as a result of label use. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

- **Aquatic toxicity:** No further relevant information available.
- **Persistence and degradability** No further relevant information available.
- **Behavior in environmental systems:**
  - **Bioaccumulative potential** No further relevant information available.
  - **Mobility in soil** No further relevant information available.
  - **Other information:**  
 Ecotoxicity data shown is for the active ingredient, halosulfuron-methyl.  
 48-hr EC50 Daphnia magna: >107 mg/L; practically nontoxic.  
 96-hr LC50 Bluegill sunfish: >118 mg/L; practically nontoxic.  
 96-hr LC50 Rainbow trout: >131 mg/L; practically nontoxic.  
 5-day EC50 Algae (Selenastrum capricornutum): 0.0041/L; very highly toxic.

- **Ecotoxicological effects:**

- **Other information:**

This product is toxic to non-target vascular plants. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

Halosulfuron-methyl is known to leach through soil into ground water under certain conditions as a result of label use. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

- **Additional ecological information:**

- **General notes:**

Water hazard class 2 (Self-assessment): hazardous for water  
 Do not allow product to reach ground water, water course or sewage system.  
 Danger to drinking water if even small quantities leak into the ground.

- **Results of PBT and vPvB assessment**

- **PBT:** Not applicable.
- **vPvB:** Not applicable.

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· **Other adverse effects** No further relevant information available.

## 13 Disposal considerations

· **Waste treatment methods**

· **Recommendation:**

Wastes resulting from the use of this product that cannot be used or chemically reprocessed should be disposed of in a landfill for pesticide disposal or in accordance with applicable Federal, state or local procedures.

· **Uncleaned packagings:**

· **Recommendation:**

Nonrefillable container. Do not reuse or refill this container. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

## 14 Transport information

· **UN-Number**

· **DOT**

Not Regulated

· **ADR, IMDG, IATA**

UN3077

· **UN proper shipping name**

· **ADR**

3077 Environmentally hazardous substances, solid, n.o.s.  
(Halosulfuron-Methyl)

· **IMDG**

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID,  
N.O.S. (Halosulfuron-Methyl), MARINE POLLUTANT

· **IATA**

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID,  
N.O.S. (Halosulfuron-Methyl)

· **Transport hazard class(es)**

· **ADR, IMDG, IATA**



· **Class**

9 Miscellaneous dangerous substances and articles

· **Label**

9

· **Packing group**

· **ADR, IMDG, IATA**

III

· **Environmental hazards:**

Product contains environmentally hazardous substances:  
Halosulfuron present as methyl ester

· **Marine pollutant:**

Yes

Symbol (fish and tree)

· **Special marking (ADR):**

Symbol (fish and tree)

· **Special marking (IATA):**

Symbol (fish and tree)

· **Special precautions for user**

Warning: Miscellaneous dangerous substances and articles

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· **Danger code (Kemler):** 90  
 · **EMS Number:** F-A,S-F

· **Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable

· **UN "Model Regulation":** US DOT:  
Not regulated

All OTHERS:  
UN3077, Environmentally hazardous substances, solid, n.o.s.  
(Halosulfuron-Methyl), 9, III

## 15 Regulatory information

### · Safety, health and environmental regulations/legislation specific for the substance or mixture

#### EPA /FIFRA Information:

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals.

#### · SARA Title III

##### · Section 355 (extremely hazardous substances):

None of the ingredients are listed.

##### · Section 313 (Specific toxic chemical listings):

None of the ingredients are listed.

##### · TSCA (Toxic Substances Control Act):

None of the ingredients are listed.

#### · Proposition 65

##### · Chemicals known to cause cancer:

None of the ingredients are listed.

##### · Chemicals known to cause reproductive toxicity for females:

None of the ingredients are listed.

##### · Chemicals known to cause reproductive toxicity for males:

None of the ingredients are listed.

##### · Chemicals known to cause developmental toxicity:

None of the ingredients are listed.

#### · Carcinogenicity categories

##### · EPA (Environmental Protection Agency)

None of the ingredients are listed.

##### · TLV (Threshold Limit Value established by ACGIH)

None of the ingredients are listed.

##### · NIOSH-Ca (National Institute for Occupational Safety and Health)

None of the ingredients are listed.

#### · GHS label elements

Not applicable

The product is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 9)



# Safety Data Sheet

acc. to OSHA

Printing date 06/30/2015

Reviewed on 06/30/2015

**Trade name: Sandea® Herbicide**  
**EPA Registration No.: 81880-18-10163**

(Contd. of page 8)

- **Hazard pictograms:**

*Not applicable*

- **Signal word:**

*(US EPA) CAUTION*

- **Hazard statements**

*Causes moderate eye irritation.*

*Harmful if swallowed.*

*Avoid contact with eyes or clothing.*

*Harmful if swallowed.*

- **Precautionary statements**

*Wash thoroughly after handling.*

*Do not eat, drink or smoke when using this product.*

*If swallowed: Call a poison center/doctor if you feel unwell.*

*Rinse mouth.*

*Dispose of contents/container in accordance with local/regional/national/international regulations.*

- **Chemical safety assessment:** *A Chemical Safety Assessment has not been carried out.*

## 16 Other information

*This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.*

- **Department issuing SDS:** *Supply Chain*

- **Contact:** *sds@gowanco.com*

- **Date of preparation / last revision** *06/30/2015 / 6*

- **Abbreviations and acronyms:**

*ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)*

*IMDG: International Maritime Code for Dangerous Goods*

*DOT: US Department of Transportation*

*IATA: International Air Transport Association*

*ACGIH: American Conference of Governmental Industrial Hygienists*

*EINECS: European Inventory of Existing Commercial Chemical Substances*

*ELINCS: European List of Notified Chemical Substances*

*CAS: Chemical Abstracts Service (division of the American Chemical Society)*

*NFPA: National Fire Protection Association (USA)*

*HMIS: Hazardous Materials Identification System (USA)*

*LC50: Lethal concentration, 50 percent*

*LD50: Lethal dose, 50 percent*

*Acute Tox. 4: Acute toxicity, Hazard Category 4*

*Aquatic Acute 1: Hazardous to the aquatic environment - Acute Hazard, Category 1*

*Aquatic Chronic 1: Hazardous to the aquatic environment - Chronic Hazard, Category 1*

- **Sources**

*Halosulfuron-methyl is manufactured by Nissan Chemical Industries, Ltd.*

*Sandea® is a registered trademark of Gowan Company, L.L.C.*

- **\* Data compared to the previous version altered.**

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Date: (Filing No. H- )

AGRICULTURE, CONSERVATION AND FORESTRY

Reproduced and distributed under the direction of the Clerk of the House.

STATE OF MAINE  
HOUSE OF REPRESENTATIVES  
127TH LEGISLATURE  
SECOND REGULAR SESSION

COMMITTEE AMENDMENT " " to H.P. 759, L.D. 1099, Bill, "An Act To Establish a Fund for the Operations and Outreach Activities of the University of Maine Cooperative Extension Animal and Plant Disease and Insect Control Laboratory"

Amend the bill by striking out everything after the title and before the summary and inserting the following:

Emergency preamble. Whereas, acts and resolves of the Legislature do not become effective until 90 days after adjournment unless enacted as emergencies; and

Whereas, this legislation provides funding in fiscal year 2015-16 for the testing of ticks provided by the public for pathogenic organisms; and

Whereas, this funding will help keep people safe outdoors and combat the rise of Lyme disease in Maine; and

Whereas, in the judgment of the Legislature, these facts create an emergency within the meaning of the Constitution of Maine and require the following legislation as immediately necessary for the preservation of the public peace, health and safety; now, therefore,

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 7 MRSA c. 417 is enacted to read:

CHAPTER 417

ANIMAL AND PLANT DISEASE AND TICKS AND OTHER INSECTS  
MANAGEMENT FUND

§2431. Fund established

The Animal and Plant Disease and Ticks and Other Insects Management Fund, referred to in this chapter as "the fund," is established. The fund is administered by the University of Maine Cooperative Extension and consists of funds received from any

**COMMITTEE AMENDMENT**

1 appropriation or allocation from the Legislature and funds transferred pursuant to this  
2 section. The fund, to be accounted within the University of Maine Cooperative  
3 Extension, must be held separate and apart from all other money, funds and accounts.  
4 Eligible investment earnings credited to the assets of the fund become part of the assets of  
5 the fund, and the fund is a nonlapsing fund. The fund may not be used to pay for  
6 administrative costs incurred by the University of Maine Cooperative Extension.  
7 Beginning in fiscal year 2016-17, notwithstanding any other provision of law, at the close  
8 of each fiscal year, the State Controller shall transfer at least \$400,000 from available  
9 balances in Other Special Revenue Funds accounts within the department or other sources  
10 available to the department to the fund. On or before June 30th of each fiscal year, the  
11 commissioner shall determine from which accounts or sources the funds must be  
12 transferred so that the sum equals at least \$400,000 and notify the State Controller and the  
13 joint standing committee of the Legislature having jurisdiction over appropriations and  
14 financial affairs of the amounts to be transferred from each account or source.

15 **§2432. Expenditures from fund**

16 Funds in the fund must be distributed to the University of Maine Cooperative  
17 Extension and used for the following purposes:

18 1. Pest management education. Outreach and education initiatives on pest  
19 management and pesticide safety, including community pest management and medical  
20 and veterinary pest management, focusing on health-related issues caused by ticks and  
21 mosquitoes, and pesticide application and use, focusing on pollinator health and safety;  
22 and

23 2. Laboratory operations. Testing ticks provided by the public for pathogenic  
24 organisms, and general laboratory operations involving pesticide management,  
25 management of ticks and other insects, including invasive insects as determined by the  
26 department, and host ecology and management.

27 **Sec. 2. Transfer; unexpended funds; Board of Pesticides Control account.**  
28 Notwithstanding any other provision of law, the Department of Agriculture, Conservation  
29 and Forestry shall transfer \$400,000 from the Board of Pesticides Control, Other Special  
30 Revenue Funds account to the University of Maine Cooperative Extension, Animal and  
31 Plant Disease and Ticks and Other Insects Management Fund, Other Special Revenue  
32 Funds account by June 30, 2016.

33 **Emergency clause.** In view of the emergency cited in the preamble, this  
34 legislation takes effect when approved.'

35 **SUMMARY**

36 This amendment, which is the majority report of the committee, renames the Animal  
37 and Plant Disease and Insect Control Fund in the bill the Animal and Plant Disease and  
38 Ticks and Other Insects Management Fund and changes the permitted uses of the fund. It  
39 also changes the funding source of the fund from a 20¢ fee on every sale of a container of  
40 consumer packaged pesticides to an annual allocation from the Legislature of at least  
41 \$400,000. In fiscal year 2015-16, this allocation will come from the Other Special  
42 Revenue Funds account within the Department of Agriculture, Conservation and

1 Forestry, Board of Pesticides Control. Beginning in fiscal year 2016-17, the  
2 Commissioner of Agriculture, Conservation and Forestry is required to determine from  
3 which accounts or sources the funds must be transferred so that the sum equals at least  
4 \$400,000. The amendment also adds an emergency preamble and emergency clause.





# 127th MAINE LEGISLATURE

## SECOND REGULAR SESSION-2016

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Legislative Document

No. 1543

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H.P. 1052

House of Representatives, January 7, 2016

### **An Act To Create Stability in the Control of Pesticides**

---

Approved for introduction by a majority of the Legislative Council pursuant to Joint Rule 203.

Reference to the Committee on State and Local Government suggested and ordered printed.

A handwritten signature in cursive script that reads "Robert B. Hunt".

ROBERT B. HUNT  
Clerk

Presented by Representative TIMBERLAKE of Turner.

Cosponsored by Representatives: BLACK of Wilton, LONG of Sherman, TIMMONS of Cumberland.

1 **Be it enacted by the People of the State of Maine as follows:**

2 **Sec. 1. 22 MRSA §1471-C, sub-§13-A**, as enacted by PL 1987, c. 723, §3, is  
3 amended to read:

4 **13-A. Household use pesticide product.** "Household use pesticide product" means  
5 any general use pesticide product ~~which that~~ contains no more than 3% active ingredients  
6 and ~~which that~~ is applied undiluted by homeowners to control pests in and around the  
7 family dwelling and associated structures. For the purposes of this definition and section  
8 1471-U ~~1471-W~~, subsection 5, petroleum solvents ~~shall~~ are not ~~be~~ considered active  
9 ingredients.

10 **Sec. 2. 22 MRSA §1471-U**, as repealed and replaced by PL 1989, c. 93, §1, is  
11 amended to read:

12 **§1471-U. Municipal ordinances**

13 **1. Centralized listing.** The Board of Pesticides Control shall maintain for  
14 informational purposes, for the entire State, a centralized listing of municipal ordinances  
15 that specifically apply to pesticide storage, distribution or use and that meet the  
16 requirements in subsection 6.

17 ~~**2. Existing ordinances.** The clerk of any municipality which, on the effective date~~  
18 ~~of this section, has an ordinance to be listed under subsection 1 shall file a copy of that~~  
19 ~~ordinance with the board by December 31, 1988.~~

20 **2-A. Existing ordinances.** The clerk of any municipality that, on the effective date  
21 of this subsection, has an ordinance to be listed under subsection 1 shall file a copy of that  
22 ordinance with the board by December 31, 2016.

23 **3. New ordinances.** The clerk of the municipality shall provide the board with  
24 notice and a copy of any ordinance to be listed under subsection 1 at least 7 days prior to  
25 the meeting of the legislative body or the public hearing at which adoption of the  
26 ordinance will be considered. The clerk shall notify the board within 30 days after  
27 adoption of the ordinance.

28 ~~**4. Intent.** It is the intent of this section to provide information on municipal~~  
29 ~~ordinances. This section shall not affect municipal authority to enact ordinances.~~

30 **5. Failure to file.** For any ordinance ~~which that~~ is not filed with the board, with  
31 notice given to the board in accordance with this section, ~~which that~~ is otherwise valid  
32 under the laws of this State, any provision that specifically applies to storage, distribution  
33 or use of pesticides ~~shall be~~ is considered void and of no effect after the deadline for  
34 filing and until the board is given proper notice and the ordinance is filed with the board.

35 **6. Ordinance restriction.** A municipal ordinance that specifically applies to  
36 pesticide storage, distribution or use may be adopted in accordance with this subsection.

37 A. A municipality may adopt an ordinance that specifically applies to pesticide  
38 storage, distribution or use only if the ordinance does not apply to farms, nurseries as

1 defined in Title 7, section 2211, subsection 3 and golf courses and the Department of  
2 Agriculture, Conservation and Forestry determines that the municipality has  
3 established a municipal reviewing authority that is similar to the board.

4 B. Nothing in this subsection prohibits the Department of Agriculture, Conservation  
5 and Forestry from enforcing the provisions of this chapter or Title 7, chapter 103,  
6 subchapter 2-A or rules adopted pursuant to this chapter or Title 7, chapter 103,  
7 subchapter 2-A to protect the public health.

8 C. The Department of Agriculture, Conservation and Forestry shall adopt rules to  
9 implement this subsection. The rules must include criteria for the establishment of a  
10 municipal reviewing authority similar to the board. Rules adopted pursuant to this  
11 paragraph are routine technical rules as defined in Title 5, chapter 375, subchapter  
12 2-A.

13 **SUMMARY**

14 This bill prohibits a municipality from adopting an ordinance that specifically applies  
15 to pesticide storage, distribution or use unless the ordinance exempts farms, nurseries and  
16 golf courses and the municipality establishes a municipal reviewing authority that is  
17 similar to the Board of Pesticides Control within the Department of Agriculture,  
18 Conservation and Forestry.





STATE OF MAINE  
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY  
BOARD OF PESTICIDES CONTROL  
28 STATE HOUSE STATION  
AUGUSTA, MAINE 04333

PAUL R. LEPAGE  
GOVERNOR

WALTER E. WHITCOMB  
COMMISSIONER

March 14, 2016

Jesse Wheeler  
Acadia National Park  
PO Box 177  
Bar Harbor, Maine 04609

Ms. Wheeler:

Thank you for your variance application.

The Board adopted a policy in 2013 allowing for the issuance of multi-year variances for the control of invasive species. In determining this policy the Board emphasized the need for a long-term plan for re-vegetation of the site, and demonstration of knowledge of efficacy and appropriate practices—the goal being to ensure that the site is reverted to native species, and not made available for another invasive species.

This letter will serve as your Chapter 29 variance permit until December 31, 2018 for the treatment of invasive plants within 25 feet of various water bodies at Acadia National Park.

Please bear in mind that your permit is based upon adherence to the precautions listed in Sections V and X of your variance application. If it is determined that a different product needs to be used, you must contact the Board first and get a new variance.

If you have any questions concerning this matter, please feel free to contact me at 287-2731.

Sincerely,

Henry Jennings  
Director  
Maine Board of Pesticides Control



STATE OF MAINE  
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY  
BOARD OF PESTICIDES CONTROL  
28 STATE HOUSE STATION  
AUGUSTA, MAINE 04333

PAUL R. LEPAGE  
GOVERNOR

WALTER E. WHITCOMB  
COMMISSIONER

February 26, 2016

Ryan Minzner  
The Woodlands Club  
39 Woods Road  
Falmouth, Maine 04105

Re: 2016 Variance Permit

Dear Mr. Minzner:

This letter will serve as The Woodlands Club's Chapter 29 variance permit for your 2016 pest management program. Please bear in mind that this variance permit is dependent upon following the measures outlined in the variance application, particularly Section IX: Method to assure equivalent protection.

We will alert the Board at its March 25, 2016 meeting that the variance permit has been issued. If you have any questions concerning this matter, please feel free to contact me at 287-2731.

Sincerely,

Henry Jennings  
Director  
Maine Board of Pesticides Control

Maine Board of Pesticides Control

**Miscellaneous Pesticides Articles**  
**March 2016**

*(identified by Google alerts or submitted by individuals)*

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A popular fly bait is being misused to kill raccoons and other animals.

# Regulators move to limit wildlife deaths from misuse of deadly fly killer

By Nala Rogers | Feb. 18, 2016 , 3:45 PM

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This past May, a dog named Gunner wandered into his neighbor's barn and lapped sweet blue liquid from two pie tins on the floor. Then he collapsed and started to convulse. When Gunner's veterinarian heard the story, he immediately guessed what was in the tins, according to a case summary from the Office of Indiana State Chemist (OISC). It was a mixture of Coca Cola and methomyl, a chemical sold to attract and kill flies.

Gunner eventually recovered, but other animals have been less lucky. Over the past few decades, wildlife researchers and environmental regulators in the United States have become increasingly alarmed by the intentional misuse of methomyl to kill "nuisance" wildlife including skunks and raccoons. Sometimes, however, the victims include dogs, cats, and even bald eagles.

"It's indiscriminate, intentional poisoning of wildlife," says Brian Rowe, who recently retired as pesticide section manager at the Michigan Department of Agriculture & Rural Development in Lansing. "Some of them die with their face in the pan that they're licking out of. I mean, it kills them that quick."

In response, this week Michigan officials are considering new rules to limit the use of the pesticide. If the rules are approved, as expected, Michigan would join a growing number of states and the federal Environmental Protection Agency (EPA) in trying to prevent the misuse of methomyl, in part by restricting who can buy it and requiring new warning labels. But some observers fear the labels—which depict a raccoon in a red circle with a slash through it—might unintentionally make matters worse.

Methomyl, which first hit the market in 1966, has a broad range of uses, including killing pests in agriculture. Under federal and state law, only licensed applicators can purchase and use the most potent methomyl products. But fly baits, which contain relatively low concentrations of methomyl, are available to everyone. The baits—commonly sold under the trade names Golden Malrin, Lurectron Scatterbait, and Stimukil—are designed to be placed in fly-prone areas, such as livestock enclosures.

Consumers, however, soon figured out that the baits could be repurposed for what is often called "critter control" on internet message boards. The poison is especially popular among sweet corn growers who are having trouble with raccoons, Rowe says, although people have employed it in attempts to kill everything from rodents to wolves. Rowe has documented more than 50 examples of people swapping advice and poison recipes online, and as of January,

instructions for how to kill raccoons with methomyl are still among the first results of a Google search for “Golden Malrin.”

Rowe first heard about misuse of fly bait in the 1990s, and he started raising the issue with state and federal regulators in 2006. At first, it was hard to get anyone to take it seriously, he says. People dismissed it as a local problem, even though more than half of states that responded to Rowe’s inquiries confirmed they had at least one incident on record.

Between 2010 and 2012, regulators in Michigan and Indiana decided to see how deep the problem went. Agents posed as customers in hardware and farm supply stores, asking how to get rid of skunks or raccoons. In about a quarter of cases, the salespeople recommended fly bait. One store even had a sign: “Golden Malrin®—Kills Groundhogs, Opossums and Raccoons—One cup fly bait and one can regular coke.”

“We didn’t think it was a problem in Indiana ... and then finally when we started looking, we said holy smokes, it is a problem,” says Leo Reed, a certification and licensing manager at OISC in West Lafayette. “Our contention is that if methomyl [fly bait] is being sold in your state, it’s being misused in your state.”

Starting in 2010, the six states in EPA’s Region 5, a regulatory region that includes Indiana and Michigan, joined forces to call for change from EPA. Their proposed solution: Reclassify methomyl fly baits as “restricted use” products. This would get the poison out of the hands of the general public, limiting access to trained, licensed applicators and the people they supervise.

The fly bait companies opposed that solution, however, and instead reached a compromise with EPA in April 2015. By early 2017, the agreement calls for the companies to stop distributing methomyl fly baits to general retailers such as hardware stores, and to stop making small containers. Farm supply stores will still be able to sell larger 4.5- and 18-kilogram containers, which will come with new warning labels and explanatory pamphlets. The companies and EPA plan to monitor reports of misuse through 2020, and further restrict use to licensed applicators if incidents aren’t “significantly reduced.”

The maker of one of the products, Golden Malrin, says the arrangement makes sense. “[Golden Malrin] is an important tool in reducing fly populations which have the potential to spread disease to livestock and humans,” wrote Mark Newberg, a representative for Wellmark International in Schaumburg, Illinois, which produces Golden Malrin, in an email. “We did what was asked of us by the EPA to keep the product available as a fly insecticide.”



Methomyl products will now carry this logo, meant to warn against using them to poison raccoons. But some observers worry it might carry the opposite message.

Some observers, however, have questions about the new warning labels. The red raccoon symbol is meant to be eye-catching, and according to EPA it means “not for use on raccoons.” But in some people’s eyes, it looks more like it is advertising the chemical as a good way to get rid of raccoons.

“Isn’t that the best advertisement for misuse you can possibly have?” Indiana’s Reed says. When he described the symbol at a meeting of regulators last year, participants started laughing.

The image could be misinterpreted, says Andrea Rother, an environmental and occupational health specialist at the University of Cape Town in South Africa who studies how people interpret symbols on pesticide labels. Before adopting the raccoon symbol, she says, the companies or EPA should have tested it with consumers.

EPA officials say no such testing occurred, but are confident that people will read the new labels as intended. The agency notes that text below the symbol reads “it is illegal to use this product with the intention to kill raccoons, skunks, opossums, coyotes, wolves, dogs, cats, or any other non-target species.”

“We believe that these two warnings together will make it clear that these uses are not legal,” wrote an EPA spokesperson in an email.

Even if consumers do get the right message, they’re unlikely to change their behavior, Rother predicts. People who use fly bait to poison raccoons already know they aren’t following label directions. The most effective way to combat such deliberate misuse, she says, is to limit people’s access.

Some states are doing just that, going beyond EPA’s mitigation measures and instead making the products illegal for sale to the general public. Indiana reclassified methomyl fly baits as restricted use products in 2013. Michigan is following suit, with a hearing to finalize the restrictions scheduled for 19 February.

In the rest of the country, Rowe expects illegal poisonings to continue, at least while current EPA rules are in place. It will fall on researchers and regulators to document and report such incidents, he says, so that the companies and the EPA will have the data they need in 2020 to determine if the existing restrictions are working.

Posted in: [Plants & Animals](#), [Science and Policy](#)

DOI: 10.1126/science.aaf4082

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**Nala Rogers**

 [Twitter](#)

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[These birds use song to keep their mates from straying](#)



# South Portland to consider pesticides ordinance

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 [www.pressherald.com/2016/02/29/south-portland-to-consider-pesticides-ordinance/](http://www.pressherald.com/2016/02/29/south-portland-to-consider-pesticides-ordinance/)

By Kelley Bouchard Staff Writer [email protected] | @KelleyBouchard | 207-791-6328

**SOUTH PORTLAND** — Property owners here may soon be limited in the chemicals they can use to control lawn and garden pests and weeds under a partial pesticide ban that the City Council is set to review Monday.

The proposed ordinance would prohibit the use of synthetic pesticides and herbicides on city-owned and private property, but it wouldn't apply to pesticides permitted in organic farming or exempted from federal regulation.

The ordinance would be phased in over two years, promoted by a Pest Management Advisory Committee and enforced with fines levied by the city's code enforcement officer.

"The draft ordinance represents an earnest attempt by (municipal) staff to balance public health and environmental protection with aesthetic expectations for public and private landscape management," said Julie Rosenbach, the city's sustainability coordinator, in a memo that accompanies the proposed ordinance.

The council is scheduled to review the ordinance during a 6:30 p.m. workshop at City Hall.

The ordinance was drafted at the council's direction by Rosenbach, Sarah Neuts, the city's director of parks, recreation and waterfront, and Fred Dillon, the city's stormwater program coordinator. They studied a wide variety of research and regulations and interviewed many officials and stakeholders, including private landscaping contractors.

"We focused on drafting an ordinance that is bold but realistic," Rosenbach wrote.

The ordinance doesn't specifically name pesticides that would be allowed or prohibited; it would prohibit the use of synthetic pesticides other than products allowed by the Organic Materials Review Institute or exempt from regulation by the U.S. Environmental Protection Agency.

It would, for instance, prohibit most property owners from using glyphosate, the active ingredient in Monsanto's Roundup weed killer. While the EPA says glyphosate is "safe" when used correctly, the International Agency for Research on Cancer last year classified it as "probably carcinogenic."

## **PARTIAL PESTICIDE BAN**

The ordinance wouldn't apply to the sale of pesticides or their use in commercial agriculture, on golf courses or to kill poisonous plants and biting, destructive or disease-carrying insects. Exempted pesticides would include pet flea and tick treatments, disinfectants and germicides, insect repellents, rodent control supplies, swimming pool chemicals, aerosol products, and paints, stains and sealants.

The proposed ordinance doesn't address fertilizers, which environmentalists say are flowing into Casco Bay and harming valuable ecosystems. City officials plan to address fertilizer use in a future ordinance.

"We're not letting go on that," said Rachel Burger, founder and president of Protect South Portland, a group that has been pushing for environmental action on several fronts.

"The pesticides ordinance is just step one," Burger said. "I'm very pleased with it. It's beautifully written, well thought out and very positive."

Twenty-six Maine communities, including Ogunquit, Brunswick, Rockland, Wells, Lebanon and Waterboro, have pesticide-control ordinances that ban or regulate the type or method of pesticides used in municipal, agricultural and

forestry applications, and near drinking-water supplies.

Ogunquit is the only town to extend its ordinance broadly to include all private property owners. However, like South Portland's proposed ordinance, it's not an outright ban. It allows restricted pesticides to be used to kill noxious or invasive plants, such as poison ivy, and to address health and safety threats, such as disease-carrying insects.

Last fall, the Montgomery County Council in Maryland restricted the use of "cosmetic pesticides" on private lawns, on certain county land, and at child-care facilities and playgrounds. Some provinces and hundreds of municipalities across Canada have taken similar steps, along with anti-pesticide measures in France, Germany and the Netherlands.

## **OPPOSITION FROM APPLICATORS**

Released Friday, South Portland's proposed ordinance drew immediate opposition from Mainers for Greener Communities, a coalition of nurseries, landscapers, turf companies, arborists, golf course managers and pesticide applicators.

"This proposal is not based in science and would make South Portland only the third community in the nation to regulate what people put on their own lawns," coalition leader Jesse O'Brien, owner of Down East Turf Farm in Kennebunk, said in a prepared statement. "Communities with similar policies for city property found a significant degradation in the quality of athletic fields and a two- to threefold increase in maintenance costs."

The ordinance would apply to city property during the first year and broaden to private property during the second year. It would be reviewed during the third year for possible revision. Following an initial warning, violators would face escalating fines of \$200, \$500 and \$1,000 per offense.

Property owners could apply to the city for waivers to use pesticides when public health or safety is threatened. If a waiver were approved, the property owner would have to post signs notifying neighbors of the date, time and type of pesticide applied. Licensed applicators would have to submit annual reports to the city providing detailed information on each use of synthetic pesticides.

The ordinance would call for a broad public education campaign including notices, posters, brochures, workshops and training sessions for homeowners, retail employees and others.

"It's a cultural change," Burger acknowledged. "It's going to be a big learning curve, but it's an exciting one."

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[Send questions/comments to the editors.](#)



City Council Workshop

Agenda Item #2

February 29, 2016

Pesticides Ordinance

At the June 8, 2015 workshop, the Council heard a presentation put together by Protect South Portland around the use of pesticides. Protect South Portland was joined by Jay Feldman, from Beyond Pesticides in Washington DC; Chip Osborne, of Osborne Organics LLC in Marblehead, MA; and Mary Cerullo, Associate Director, of the Friends of Casco Bay. Each talked about the harmful effects of pesticide use and the negative impacts to the environment. Alternative methods were presented as a means of providing another way for lawn care/vegetation maintenance.

The City Council voiced support for pursuing a pesticide ordinance and various types of ordinances were presented and discussed at the July 13, 2015 workshop. A pesticide ordinance committee consisting of Sustainability Coordinator Julie Rosenbach, Parks, Recreation & Waterfront Acting Director Sarah Neuts and Stormwater Program Coordinator Fred Dillon was created and proposed ordinance language was developed (attached), which will be discussed at next Monday's workshop.

Included is a memorandum from Julie Rosenbach which includes an outline of the process taken to develop the ordinance. The committee members will be at Monday's meeting to answer any questions.

  
City Manager



*SUSTAINABILITY  
OFFICE*

JULIE A. ROSENBACH  
Sustainability Coordinator

To: James H. Gailey, City Manager  
From: Julie Rosenbach, South Portland Sustainability Coordinator  
CC: Fred Dillon, South Portland Stormwater Program Coordinator  
Sarah Neuts, Acting Director, Parks, Recreation & Waterfront  
Date: February 22, 2016  
**Subject: Draft Ordinance to Ban the use of Pesticides**

---

Following a City Council Workshop this past summer on organic landscaping and lawn care practices (June 8, 2015) and subsequent workshop to review different types of pesticide ordinances (July 13, 2015), the City Council directed staff to develop an ordinance that greatly reduces and potentially eliminates the use of synthetic pesticides throughout most of the City.

Over the next six months, the designated staff draft pesticide ordinance committee (consisting of myself, Sarah Neuts, Parks Department Superintendent and Fred Dillon, Stormwater Program Coordinator) reviewed numerous documents and conducted several interviews with groups and individuals including policy makers, practitioners, local advocates and industry representatives to develop a draft ordinance. **The attached memo summarizes our process and key considerations for the Council.**

The draft ordinance, completed in January 2016, represents an earnest attempt by staff to balance public health and environmental protection with aesthetic expectations for public and private landscape management.

To summarize, we focused on drafting an ordinance that is bold but realistic.

We relied on the precautionary principle to guide our efforts, acknowledging that while the science regarding risks associated with synthetic pesticides is not settled, there are enough studies linking these products to reproductive disorders, birth defects, learning disabilities, neurological disease, endocrine disorders, and cancer to warrant a ban with minimal exemptions.

At the same time, we recognize there may be situations we have not and cannot anticipate so we included a waiver process in the ordinance and designed it to be a living document that is revisited in year 3 and adjusted as needed.



*SUSTAINABILITY  
OFFICE*

JULIE A. ROSENBACH  
Sustainability Coordinator

We included a long implementation period to allow sufficient time for a successful transition in our thinking and practices. It is also important to note that during the transition phase lawn and turf conditions may appear to get worse before they get better because it takes time to (re)build a healthy and resilient ecosystem which is not dependent on synthetic chemicals.

Recognizing that any meaningful reduction of synthetic pesticides will depend on the cooperation of residents and local businesses, we included a robust education and outreach section. Because the ordinance will involve a culture change as much as a policy change, we believe the strong education and outreach section balances the challenges inherent to enforcement.

The overarching goal of the ordinance is to reduce toxics in our community by reducing the use of synthetic pesticides and promoting a transition to organic land care practices. The Council's review of the ordinance and subsequent public input may provide further refinement, which staff are ready to incorporate.

Lastly, as you may know a bill (LD 1543) was introduced at the state level which would require municipalities to create a "municipal reviewing authority that is similar to the Board of Pesticides Control" in order to pass any type of local ordinance. The Maine Municipal Association (MMA) voted to oppose this bill at their last meeting, and Maine's Environmental Priorities Coalition has made it one of their four priority bills. The bill was assigned to the State and Local Government Committee but then tabled pending review, where it has remained. The bill is expected to remain tabled this session.

Respectfully,

A handwritten signature in black ink, appearing to read "Julie Rosenbach".

Julie Rosenbach  
Sustainability Coordinator

## South Portland Draft Pesticide Ordinance Process & Key Considerations

### BACKGROUND

In early June of 2015, the nonprofit group Protect South Portland sponsored a presentation to the City Council by proponents for organic landscaping and lawn care practices. The goal of this initiative was to encourage the Council to consider establishing an ordinance that greatly restricts or eliminates the use of synthetic pesticides and fertilizers throughout most of the City in recognition of growing concerns about adverse impacts from the use of these materials on public health and the environment.

The Council held a subsequent meeting in July 2015 to allow for public comment. The majority of speakers favored the creation of an ordinance that would ban the use of synthetic pesticides in most cases. Individuals who expressed reservations with a pesticide ban generally represented commercial landscaping and lawn care interests and favored an Integrated Pest Management (IPM)<sup>1</sup> approach rather than an outright ban of synthetic pesticides. All of the Councilors supported the creation of an ordinance to regulate synthetic pesticide use with some strongly preferring an outright ban and others favoring a more moderate approach. Following extensive coverage in local newspapers, the City Manager subsequently received more balanced comments for and against a ban on synthetic pesticides.

Shortly after the July 2015 Council meeting, an intern for the City Manager developed an initial draft pesticide ordinance based on several similar documents developed by communities throughout the State and elsewhere in the country. The City Manager then appointed a committee consisting of the Sustainability Coordinator, the Parks & Recreation Department Superintendent and the Stormwater Program Coordinator to further develop and refine the draft ordinance based on more in-depth research.

Staff reviewed numerous documents and conducted several interviews with groups and individuals including policy makers, practitioners, local advocates and industry representatives to finalize the draft ordinance. The discussion below summarizes the rationale and most significant findings for the final draft document that the Council will consider in early 2016.

### INTRODUCTION

Given the Council's consensus that synthetic pesticide use in South Portland should either be restricted or eliminated, staff relied on the ***precautionary principle*** to guide their efforts

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<sup>1</sup> [Integrated Pest Management](#) consists of practices that emphasize quality production and health while minimizing reliance on pesticides.

in developing the draft ordinance. The precautionary principle acknowledges that while there may be conflicting scientific claims about the relative risks associated the use of potentially harmful products, erring on the side of caution by reducing the use of these products is justified to protect public health and the environment – particularly when the costs to do so are not excessive. Staff considered the four central tenets of the precautionary principle<sup>2</sup> when drafting the ordinance:

- Taking preventative action in the face of uncertainty
- Shifting the burden of proof to the proponents of an activity
- Exploring a wide range of alternatives to possibly harmful actions
- Increasing public participation in decision making

Even though monitoring for synthetic pesticides in South Portland has been limited, there is evidence that these chemicals are a potential cause for concern. There is also an increasing body of research both nationally and globally that synthetic pesticides are having detrimental effects on human health and the environment.

The draft ordinance addresses these concerns by greatly restricting synthetic pesticide use and promoting organic landscaping and lawn care practices to prevent pest problems. The ordinance also stresses the importance of education and outreach in recognition that any meaningful reduction of potentially harmful chemical use depends on the cooperation of residents and local businesses.

Thus, the overarching goal of the ordinance is to reduce toxics in our community by reducing the use of synthetic pesticides and promoting a transition to organic land care practices. In so doing, the ordinance will protect people, pets and the environment.

## **PROCESS FOR DEVELOPING DRAFT ORDINANCE**

In the process of developing South Portland's draft ordinance, staff reviewed a wide variety of information sources including (but not limited to):

- ***Academic research studies and summaries:*** policy implementation evaluation of Toronto's municipal bylaw; study on state regulations, organic lawn management, and nutrient accumulation in soils; journal article on the precautionary principle and its applications; and Rutgers University paper on the management of turf grass using 'low-impact' pesticides.
- ***Local, state and federal regulations and guidance documents:*** Maine Board of Pesticide Control; Environmental Protection Agency; Canada Ministry of Environment; European Union; Washington State Dept. of Agriculture; and several municipal ordinances.

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<sup>2</sup> [\*The Precautionary Principle in Environmental Science\*](#) (Sept. 2001 Environmental Health Perspectives)

- ***Non-governmental organization interviews and reference documents:*** Beyond Pesticides; Friends of Casco Bay; Casco Bay Estuary Partnership; Maine Organic Farmers and Gardeners Association; and the Northeast Organic Farming Association.
- ***Interviews with local and state governmental officials:*** Takoma Park MD; Ogunquit ME; and the Cumberland County Soil and Water Conservation District.
- ***Interviews with private landscaping contractors:*** Ornamental Horticulture Council; Maine Landscape and Nursery Association; Down East Turf; Lucas Tree; Sable Oaks Golf Course; Scotts Lawn Care; Broadway Gardens; Osborne Organics; and Go Green Landscaping.

This in-depth process included detailed discussions by staff about which provisions to include in the draft ordinance. From mid-July until late December, staff met on a weekly (and occasionally biweekly) basis to carefully consider all elements in the draft ordinance. The most substantive discussion topics and resulting decisions – all of which were reached by consensus – are summarized below.

***Fertilizers:*** after extensive research and careful consideration, staff decided that developing a comprehensive management strategy to protect water resources from nutrient runoff (esp. nitrogen) should be addressed through a separate stand-alone ordinance. Virtually all municipalities with fertilizer ordinances have also adopted this approach. Given [the increasing concerns about adverse impacts from excessive nitrogen inputs to Casco Bay](#), staff believe that developing a draft fertilizer ordinance would be a significant next step.

***Provisions:*** Following the National Organic Program, the provisions of the ordinance are centered around natural and organic practices. In general, synthetic pesticides are prohibited unless specifically permitted and organic products are permitted unless specifically prohibited. It is also important to emphasize that "organic" is not synonymous with safe. There are risks associated the misuse and overuse of organic pesticides that can also result in adverse impacts to human health and the environment, although the risks are generally considered to be lower than those associated with synthetics.

***Exemptions and Waivers:*** While the goal of the ordinance is to make organic pest management the primary management tool in our community, staff recognize that exemptions are necessary to ensure a successful transition. South Portland's draft ordinance allows for two exemption areas – which is less than most other municipal ordinances.

- **Public Health and Safety Protection:** there may be potential situations requiring the use of synthetic pesticides because there are currently no comparable organic alternatives available. The protection of public health and safety are paramount and



there are numerous circumstances that potentially qualify for an exemption as described in the ordinance.

- **Golf Courses:** there are currently few (if any) examples of golf courses that are being managed successfully without some synthetic pesticide use. Consequently, golf course playing surfaces have also been exempted until organic turf management practices become better established and proven. The City may want to consider creating a pilot program to test various organic practices at the municipal course prior to requiring these practices on a more widespread basis.

Waiver applications will be required for situations involving the protection of public health and safety. A Pesticide Management Advisory Committee (PMAC) will review these applications to ensure that the waiver requests are justified based on a lack of viable alternatives. The PMAC must find that three conditions exist prior to granting and/or approving a waiver; these conditions align with Shoreland Overlay Districts (article XIII) standards in our zoning ordinance.

Staff decided against exempting athletic playing fields primarily because of the higher likelihood that young athletes could come into direct contact with pesticides. Additionally, there are several examples in other communities where these areas are being managed successfully using organic pest management practices. There may also be grant funds available to assist the City in implementing these practices for our fields.

**Public Notification:** For instances when synthetic pesticides are allowed (through the waiver review process), the ordinance includes a detailed notification section that applies to both licensed applicators and private citizens. Staff believe this is an important provision because the public has a right to know when and where these chemicals are being applied.

**Reporting:** Even though the ordinance should greatly reduce synthetic pesticide use and potential exemptions will (hopefully) be few and infrequent, a reporting requirement is included to provide ongoing tracking data for the use of these chemicals. The City's Parks & Recreation Department already maintains detailed records for when, where, how much and what kind of synthetic pesticides are used on City properties. The ordinance will require landscaping contractors to annually report with the same level of detail for private properties.<sup>3</sup> Staff also discussed requiring individual residents to provide synthetic pesticide usage data but recognized this would likely create an undue administrative burden.

**Phasing:** The phasing section allows for a transition period and begins with public properties to demonstrate the City's commitment to leading by example. There is a one

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<sup>3</sup> Landscaping contractors we met with stated that they already keep this data so it would not be overly burdensome to report it.

year lag period so municipal departments can test new practices and products. Phase 2 applies to all private property and begins after two years. Golf courses were initially considered for a third phase but there are currently not enough proven organic management practices to ensure that course playing surfaces could be maintained adequately. Consequently, emphasis was placed on data collection and management practices to inform future provisions. Since the ordinance is intended to be a living document, Phase 3 instead focuses on evaluating the effectiveness of the pesticide regulations and revising them as needed based on the condition of public land, community feedback, new information and emerging science.

**Outreach and Education:** Education alone has not proven successful in reducing the use of synthetic pesticides. According to the [Maine Board of Pesticide Control](#), the use of pesticides for residential land care has increased nearly sevenfold over the past twenty years. However, other municipalities have demonstrated that ordinances combining education with enforcement can be successful tools for setting new community standards.

Because the ordinance will be a culture change as much as a policy change, staff believe a strong outreach and education section balances the challenges inherent to enforcement. The behavior change approach outlined in the ordinance targets different segments of the population through diverse means and includes education for and through retailers. This provision in particular targets private citizens who are the least likely to have any knowledge or training about the hazards associated with synthetic pesticide use.

Staff also considered including provisions to require training and certification on organic land care for landscaping contractors but decided against it given that state law already requires all applicators of synthetic pesticides to be certified. However, the City may want to consider lobbying the Maine Board of Pesticides Control to establish an Organic Pest Management (OPM) certification program.

**Authority:** The Pesticide Management Advisory Committee (PMAC) has a lofty charge. The committee's success will depend largely on the effectiveness of their outreach and education strategy, which will require funding to develop and implement.

## CONCLUSION

Following the public meetings earlier this year, the City Council directed the Manager to establish an ordinance that greatly reduces and potentially eliminates the use of synthetic pesticides throughout most of the City. The draft ordinance completed in January 2016 represents an earnest attempt by staff to balance public health and environmental protection with aesthetic expectations for public and private landscape management. The Council's review of this document and subsequent public input will allow further refinement to create an ordinance that best reflects the overall intent and interests of the community.

## **Purpose**

The purpose of this article is to safeguard the health and welfare of the residents of the City of South Portland and to conserve and protect the City's water and natural resources. South Portland strives to make organic pest management the primary management tool in our community so that synthetic pesticide use and its damaging effects on the health and welfare of residents and the environment are significantly curtailed.

## **Findings**

WHEREAS, The State of Maine is one of only 7 states, and the District of Columbia, that uphold the rights of localities to restrict pesticides, and this should be seen as an opportunity to affect positive change;

WHEREAS, the EPA, the Committee on Environmental Health of the American Academy of Pediatrics, the National Academy of Sciences, and the 2010 President's Cancer Panel have all concluded that pesticide exposure is linked to reproductive disorders, birth defects, learning disabilities, neurological disease, endocrine disorders, and cancer;

WHEREAS, the EPA acknowledges, along with esteemed Mt. Sinai Children's Environmental Health Center, that children, with their developing bodies and brains, are especially vulnerable to the harmful effects of lawn and garden pesticides. Children's behavior (hand to mouth interactions, proximity to the ground, walking or running through lawns instead of paved sidewalks, especially where there are none), dispose children to far more contact with lawn pesticides than adults;

WHEREAS, pesticides are harmful to pets, wildlife including threatened and endangered species, soil microbiology, plants, and natural ecosystems;

WHEREAS, the City of South Portland has five streams designated by the Maine Department of Environmental Protection (MEDEP) as "urban impaired" for failing to meet state water quality standards primarily due to adverse impacts from surrounding development. All of these streams drain to Casco Bay, which is widely recognized as a natural asset of significant ecological and economic value. The Bay faces long-term threats from stormwater runoff and the use of pesticides has the potential to exacerbate these threats;

WHEREAS, the use of hazardous pesticides is not necessary to create and maintain green lawns and landscapes given the availability of viable non-toxic alternative practices and products;

WHEREAS, people have a right not to be involuntarily exposed to pesticides in the air, water or soil that inevitably result from chemical drift and contaminated runoff;

WHEREAS, recognizing that if an emergency public health situation warrants the use of pesticides, which would otherwise not be permitted under this ordinance, the Pest Management Advisory Committee shall have the authority to grant a temporary waiver on a case-by-case basis after an evaluation of all alternative methods and materials.

WHEREAS, numerous communities and municipalities are embracing a precautionary approach to the use of toxic pesticides in order to adequately protect people and the environment from pesticides' harmful effects.

## **Definitions**

The following words, terms and phrases, when used in this ordinance, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

**Commercial Agriculture:** involves the production of crops for sale, crops intended for widespread distribution to wholesalers or retail outlets and any non-food crops.

**Golf course:** an area of land laid out for golf with a series of 9, 18 or more holes. Mini-golf courses are not considered golf courses.

**Inert ingredient:** Any substance (or group of structurally similar substances if designated by the Environmental Protection Agency), other than an active ingredient, which is intentionally included in a pesticide product, except as provided by EPA 40 CFR §174.3.

**Invasive Species:** An invasive plant is defined as a plant that is not native to a particular ecosystem, whose introduction does or is likely to cause economic or environmental harm or harm to human health. For purposes of this ordinance, invasive species include those listed by the Maine Bureau of Agriculture, Conservation and Forestry as currently invasive, potentially or probably invasive, and highly likely but not currently invasive.

**Natural, organic or "Non-synthetic":** A substance that is derived from mineral, plant, or animal matter and does not undergo a synthetic process as defined in section 6502(21) of the Organic Foods Production Act (7 U.S.C. 6502(21)).

**Organic pest management:** An extension of the principles and practices of organic agriculture to the care of turf and landscape.

**Pests:** are considered undesirable terrestrial or aquatic plants, insects, fungi, bacteria, viruses, nematodes, rodents, birds, animals, or other micro-organisms (except viruses, bacteria or other micro-organisms on or in living

persons or other living animals) declared to be a pest under federal or state laws.

**Pesticide:** Any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest; any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant. It does not include multicellular biological controls such as mites, nematodes, parasitic wasps, snails or other biological agents not regulated as pesticides by the U.S. Environmental Protection Agency. Herbicides, fungicides, insecticides and rodenticides are considered pesticides.

**Pest Management Advisory Committee (PMAC):** shall act in an advisory capacity to develop and oversee the ordinance, and advise the City Manager or his/her designee of any problems encountered or amendments required to achieve the full and successful implementation of this article including granting waivers.

**Synthetic:** a substance that is formulated or manufactured by a chemical process or by a process that chemically changes a substance extracted from naturally occurring sources, except that such term shall not apply to substances created by naturally occurring biological processes.

## Provisions

The following provisions shall be applicable to all turf, landscape and outdoor pest management activities conducted within the City of South Portland, on both public and private land.

(a) *Permitted:*

Use or application of natural, organic land care protocols.

All pest control products that can be used on Maine Organic Farmers and Gardeners Association Certified Farms, and/or products certified by the Organic Materials Review Institute and/or the Washington State Dept. of Agriculture and/or permitted by the USDA National Organic Program.

(b) *Prohibited:*

Use or application of synthetic pesticides on City-owned and private property, other than pesticides classified by the US Environmental Protection Agency as exempt materials under 40 CFR 152.25, and those products permitted by the Organic Materials Review Institute and/or the Washington State Dept. of Agriculture.

## Exemptions

The following applications are exempt from the provisions of this ordinance:

- a. Commercial agriculture;
- b. Pet supplies such as shampoos and tick and flea treatments;
- c. Disinfectants, germicides, bactericides, and virucides;
- d. Insect repellents;
- e. Rat and rodent control supplies;
- f. Swimming pool supplies;
- g. Aerosol products;
- h. General use paints, stains and wood preservatives and sealants.

Prohibited pesticides may also be applied for the following purposes:

1. **Health and Safety** – Pesticides can be used to control plants that are poisonous to the touch, such as poison ivy; insects that bite, sting, are venomous or are disease carrying, like mosquitoes; and animals or insects that may cause damage to a structure, such as carpenter ants or termites.
2. **Golf course playing surfaces** – including tees, fairways, greens and roughs are conditionally exempt from this ordinance if the owner or operator of the golf course submits and makes public an annual management plan. The plan shall include: a map or plan of the golf course showing all application areas, all measures taken to minimize use of synthetic pesticides on playing surfaces and their exposure to humans and waterways to date, and how the use of pesticide ingredients will be minimized in the next calendar year. These plans must be made public by posting on the golf course's website and a copy provided to the Pest Management Advisory Committee. Non-playing areas associated with golf courses such as lawns, driveways, paths, patios, trees, shrubs, ornamental plantings and gardens are not exempt from this ordinance.

## Waivers

In cases that threaten the public health and safety by creating a hazardous situation, and for the control of invasive species that pose a threat to the environment, individuals and/or companies may apply for a waiver from the provisions of this ordinance.

A waiver application is a public record, stating the proposed location(s) and timing(s) of use, substance(s) and amounts to be applied, the date(s) of application, and the reason for requesting use of a synthetic pesticide. The Pest Management Advisory Committee shall decide whether to issue a waiver, and for what duration.

The Pest Management Advisory Committee must find all three (3) of the following conditions to exist in order to approve a waiver for the application of a prohibited pesticide:

- (1) That natural and organic methods have proven unsuccessful;
- (2) The application of pesticides will not occur within two hundred and fifty (250) feet of a tributary, creek, stream, river, lake, or drainage ditch;
- (3) That the granting of the waiver will not result in material damage to other properties in the vicinity, nor be detrimental to the public health, safety or welfare;

### **Public Notifications and Signs**

If prohibited pesticides are applied through an exemption or waiver, the following posting requirements are to be followed. These requirements are in addition to licensed applicators complying with the Maine Board of Pesticide Control rules regarding public notification:

1. Whenever pesticides are to be applied to any land subject to this ordinance, the responsible individuals and/or companies shall post warning signs that meet the requirements of this ordinance. These signs must be posted before application activities commence and left in place for at least 48 hours after actual application or until expiration of the restricted entry interval or reentry time indicated by the pesticide label, whichever is longer.
2. All signs shall be at least five inches high and four inches wide in size. Signs shall be attached to the upper portion of a dowel or other supporting device so that the bottom of the sign is not less than 12" and the top of the sign is not more than 48" above the ground. The signs shall be of rigid, weather resistant material substantial enough to be easily read for at least 48 hours when placed outdoors.
3. All notification signs must be light colored (white, beige, yellow or pink) with dark, bold letters (black, blue or green). They shall have lettering that is conspicuous and clearly legible.
4. The sign must bear the following state requirements:
  - a. The word "CAUTION" in 72 point type;
  - b. The words "PESTICIDE APPLICATION" in 30 point type or larger;
  - c. The Maine Board of Pesticides Control designated symbol;
  - d. Any reentry precautions from the pesticide labeling;
  - e. The name and telephone number of the entity making the pesticide application;
  - f. The date and time of the application;

- g. A date and/or time to remove the sign.
5. All notification signs shall state the chemical and trade name of the pesticide, the date to be applied, the length of time to remain off the treated area as indicated by the pesticide label, and a phone number of the responsible party for more information.

## Reporting

In addition to complying with the Maine Board of Pesticide Control rules regarding record keeping and reporting requirements outlined in Chapter 50, all licensed applicators are required to submit to the City of South Portland an annual summary report. The report shall contain the following information for EACH application in the City of South Portland: date of application, street address, site and size of area treated, quantity and type of synthetic pesticide and diluents applied, EPA#, application method, total undiluted pesticide, and an explanation of any differences in pesticide use or quantity used from the previous annual report submitted.

Reports shall be submitted to the City Clerk's office by December 31 of each year.

## Phase In

**Phase One:** Effective (Date - 1yr) Prohibits the use or application of pesticides on City-owned property, other than pesticides classified by the US Environmental Protection Agency as exempt materials under 40 CFR 152.25, and those products permitted by the Organic Materials Review Institute.

**Phase Two:** Effective (Date - 2yrs) Prohibits the use or application of pesticides on private property. It shall be illegal to apply pesticides on private property in the City, whether by the property owner or a tenant, service provider, or other agent. other than pesticides classified by the US Environmental Protection Agency as exempt materials under 40 CFR 152.25, and those products permitted by the Organic Materials Review Institute.

**Phase Three:** Effective (Date - 3yrs) Conduct an evaluation of this ordinance including a review of pilot project results and reporting data, and provide recommendations for any revisions deemed appropriate.

## Outreach and Education

The City Manager or his/her designee shall publish notice of this ordinance and shall provide periodic notice to identified retailers and lawn, garden, and tree-care providers serving South Portland and to churches, schools, and other institutions in the City, upon adoption of this ordinance.



The Pest Management Advisory Committee shall prepare and publish materials designed to educate the community about the role of pesticides in our local environment and the benefits of organic pest management. This outreach should include:

- A. A community-based social marketing (CBSM) campaign targeting City households
- B. Distribution of information and news about City practices through South Portland internet and web-based resources
- C. SPC-TV public service announcements
- D. News releases and news events
- E. Tax and water bill inserts
- F. Posters and brochures made available at City events and applicable locations that serve the public
- G. Workshops, trainings, and demonstration projects
- H. Targeted outreach to schools
- I. Any additional methods deemed appropriate

The Pest Management Advisory Committee shall also develop a program to work directly with retailers who sell synthetic pesticides in the City of South Portland to:

- A. Provide educational training for all retail store employees who recommend and sell pesticides for use in the home and garden highlighting
  - (a) federal, state, and local pesticide regulations
  - (b) principles of organic pest management
  - (c) pesticide toxicity & health and environmental concerns
  - (d) proper pesticide display and storage
  - (e) the role of personal protective equipment, pesticide poisoning symptoms, and emergency procedures in case of spills
- B. Implement a toolkit consisting of educational materials and signage (i.e. posters, signs, stickers) that can be customized, printed, and placed in stores to help consumers understand the pesticide ordinance and alternatives to prohibited products/synthetic pesticides.

There are a variety of options for different levels of professional and municipal employee education and training based on the Northeast Organic Farming Association's (NOFA) *Standards for Organic Land Care*, which extends the principles of organic agriculture to land care practices:

- A. Accreditation through a three- to five-day course
- B. Certificate course online
- C. Trainings & webinars targeting organic management of turf and lawn

### **Authority**

The South Portland City Manager or his/her designee shall oversee the implementation of the synthetic pesticide ordinance. A Pest Management Advisory Committee shall be created to act in an advisory capacity to oversee the ordinance through

- (1) Advising the City Manager or his/her designee of any problems encountered or amendments required to achieve the full and successful implementation of this ordinance.
- (2) Reviewing and granting waivers when applicable.
- (3) Developing and implementing outreach and education as specified in the ordinance.
- (4) Reviewing annual data and issuing a summary report annually.
- (5) Additional responsibilities as deemed necessary by the City.

The Pest Management Advisory Committee will seek the participation, advice and counsel of experts in the fields of organic turf and landscape management, maintenance of trees and shrubs, and organic pest protocol. Broad community participation, from parents, schools, advocates, and local arboriculture and landscaping businesses, will be encouraged. The committee will work closely with the City's Sustainability Office to develop and implement outreach and education.

The Pest Management Advisory Committee shall include:

1. City Stormwater Coordinator
2. City Parks & Recreation Superintendent or his/her designee
3. Two Maine Board of Pesticide Control-licensed landscape professionals; at least one having experience in organic land care management; appointed by the City Manager or his/her designee.
4. Two resident or taxpayer representatives, at-large; appointed by the City Council.

The Pest Management Advisory Committee shall meet regularly and waivers shall be reviewed at scheduled committee meetings. Waiver applications must be submitted at least two (2) weeks before a scheduled meeting date in order to be reviewed. Minutes shall be kept of all meetings with a copy filed with the City Clerk. An annual report of the data submitted by all licensed applicators and a review of the committee's activities shall be submitted to the City Council in March of each year.

### **Fines and Enforcement**

Any law enforcement or Code Enforcement Officer may issue a municipal complaint ticket or citation for offenses of this section.

- A. A first offense of any provision of this ordinance shall warrant a letter of warning.
- B. A second offense shall be punishable by a fine of two hundred dollars (\$200.00).
- C. The third offense shall be punishable by a fine of five hundred dollars (\$500.00).

- D. Any subsequent offense shall be punishable by a fine of one thousand dollars (\$1,000).

PEST EXTERMINATION

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TAG Bees , Pesticides , honey bees

# Pesticide 'Dumbs Down' Bees, Causes Deficits In Memory And Learning

By Dianne Depra, Tech Times | March 3, 6:03 AM

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Honeybees have it tough out there. Researchers have found that the pesticide chlorpyrifos, used for protecting crops against mites and insects, causes memory and learning deficits when ingested, even in minute amounts. (Photo : Courtney Collison | Flickr)

After ingesting minute doses of a pesticide called chlorpyrifos, bees suffered severe deficits in memory and learning, potentially threatening their survival, according to a research from the University of Otago in New Zealand.

For the study, published in the *Journal of Chemical Ecology*, researchers collected bees from 51 hives in 17 locations across Otago in Southern New Zealand, detecting low levels of chlorpyrifos in samples from six of the hives and three of the 17 sites.

The presence of the pesticide was not actually surprising because chlorpyrifos has been found in plant, water and air samples even from areas not sprayed, because of the pesticide's high volatility and great ability to travel distances.

In the lab, the researchers fed other bees with the pesticide at levels similar to what they recorded from the samples and them carry out certain tasks to test learning performance.

Based on their findings, the researchers saw that those bees fed with the pesticide performed worse in odor-learning tasks, recalling odors poorly even when the chlorpyrifos dose was considered to be at a "safe" level. For instance, the dosed bees were not able to respond as intended to odors that have been previously deemed as rewarding.

Elodie Urlacher, the study's lead author, explained that honeybees rely on memory mechanisms to find flower targets. Given the result of the study, it appears that chlorpyrifos is stunting bees' effectiveness as nectar foragers and pollinators.

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The researchers also identified the dose threshold for the pesticide that prompts sub-lethal effects involving memory and odor learning, setting it at 50 picograms.

This figure is thousands lower than the lethal dose for pure chlorpyrifos and is at the lower range of pesticide levels detected in bees in collected in the field.

According to Urlacher, the results of their work raise serious questions about pesticide use, highlighting the need to review regulations, now that it has been shown that even non-lethal doses can affect honeybees, which also hint at potential dramatic effects for hives around the world.



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Other researchers involved in the [study](#) include: Alison Mercer, Kimberly Hageman, Sue Michelsen-Heath, Christie Lombardi, Freddie-Jeanne Richard, Coraline Rivière, and Coline Monchanin.

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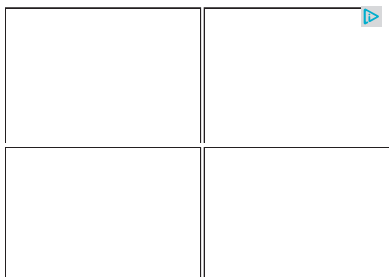
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**Article**

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# Measurements of Chlorpyrifos Levels in Forager Bees and Comparison with Levels that Disrupt Honey Bee Odor-Mediated Learning Under Laboratory Conditions

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## Abstract

Chlorpyrifos is an organophosphate pesticide used around the world to protect food crops against insects and mites. Despite guidelines for chlorpyrifos usage, including precautions to protect beneficial insects, such as honeybees from spray drift, this pesticide has been detected in bees in various countries, indicating that exposure still occurs. Here, we examined chlorpyrifos levels in bees collected from 17 locations in Otago, New Zealand, and compared doses of this pesticide that cause sub-lethal effects on learning performance under

laboratory conditions with amounts of chlorpyrifos detected in the bees in the field. The pesticide was detected at 17 % of the sites sampled and in 12 % of the colonies examined. Amounts detected ranged from 35 to 286 pg.bee<sup>-1</sup>, far below the LD<sub>50</sub> of ~100 ng.bee<sup>-1</sup>. We detected no adverse effect of chlorpyrifos on aversive learning, but the formation and retrieval of appetitive olfactory memories was severely affected. Chlorpyrifos fed to bees in amounts several orders of magnitude lower than the LD<sub>50</sub>, and also lower than levels detected in bees, was found to slow appetitive learning and reduce the specificity of memory recall. As learning and memory play a central role in the behavioral ecology and communication of foraging bees, chlorpyrifos, even in sublethal doses, may threaten the success and survival of this important insect pollinator.

## Keywords

Chlorpyrifos Honey bee Appetitive learning Memory specificity Field measurements

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Control Bee

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## Are pesticides changing how bees forage?

New research shows that bees treated with a common pesticide may collect more pollen, but have a harder time learning and remembering flower structures and foraging strategies.

By **Ben Thompson**, Staff | MARCH 15, 2016

The latest research on pesticides' effects on bees and their behavior suggests that widely used chemical insect deterrents could negatively affect bees' relationships with flowers.

A new study published in *Functional Ecology* concluded that neonicotinoid pesticides, which are widely used to protect crops against aphids, grubs, and other insects – cause bees to forage for more pollen from wildflowers than do bees not exposed to the insecticides, but that the bees treated with neonics were less efficient, learned to pollinate differently, and ended up with different floral preferences than the ones left chemical-free.



A bee lands on a Shungiku blossom at the Chino family farm in Rancho Santa Fe, Calif., in 2013. (Mike Blake/Reuters/File)

“Bees rely on learning to locate flowers, track their profitability and work out how best to efficiently extract nectar and pollen,” said the paper’s senior author Nigel Raine, a University of Guelph professor and pollination researcher, in a university news release.

“If exposure to low levels of pesticide affects their ability to learn, bees may struggle to collect food and [impair the essential pollination services they provide](#) to both crops and wild plants,” Dr. Raine added.

Raine and lead author Dara Stanley decided to test the impact of thiamethoxam on the *Bombus terrestris audax* subspecies of European bumblebees. The scientists chose thiamethoxam, a neonicotinoid, to differentiate their experiment from previous studies, many of which primarily focused on the [effects of the widely used neonic, imidacloprid](#), they said. The duo used thiamethoxam concentrations consistent with “field conditions” observed in wild bee populations, dosing separate bumblebee colonies with solutions of either the typical amount of the neonic or simply sugar water, as a control.

The nearly two-week study concluded with the both the treated and untreated bees being introduced to an outdoor “flight arena” filled with flowering *Lotus corniculatus*, or bird's-foot trefoils, and *Trifolium repens* white clovers. The two European Fabaceae flower types were chosen for their complexity and importance to bumblebees, according to the



researchers. The bees were introduced to the flight zone individually, where their foraging patterns and flower manipulation – and by extension, their success at pollination – were recorded by observers who had no knowledge of the insects' treatment groups.

The results showed that the bees exposed to the neonic solution spent more time foraging overall, but less time at each flower and less time learning foraging strategies. The insecticide-treated bees also visited the trefoils nearly 60 percent more often than the control bees while visiting the clovers around 20 percent less. The researchers recorded more data on the bees' foraging habits, concluding that “chronic exposure to field-realistic levels of thiamethoxam altered the interactions between bumblebees and morphologically complex wildflowers.”

“Our results suggest that current levels of pesticide exposure could be significantly affecting how bees are interacting with wild plants, and impairing the crucial pollination services they provide that support healthy ecosystem function,” Raine said.

The exposed bees “initially foraged faster and collected more pollen,” while the clean ones “may be investing more time and energy in learning,” according to Mr. Stanley.

The results contrast with those of previous studies involving imidacloprid, which found that bees treated with that neonic brought back less pollen less often. But thiamethoxam's impact on the insects' learning and foraging process, especially under “challenging conditions in a wild, fully-outdoor setting,” could augment the learning issues and negatively impact the bees' “delivery of pollination services” as well as potentially contribute to [worldwide bumblebee population problems](#).

“Our findings have important implications for society and the economy as pollinating insects are vital to support agriculture and wild plant biodiversity,” Stanley said.

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# Chronic exposure to a neonicotinoid pesticide alters the interactions between bumblebees and wild plants

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## Summary

1. Insect pollinators are essential for both the production of a large proportion of world crops and the health of natural ecosystems. As important pollinators, bumblebees must learn to forage on flowers to feed both themselves and provision their colonies.

2. Increased use of pesticides has caused concern over sublethal effects on bees, such as impacts on reproduction or learning ability. However, little is known about how sublethal exposure to field-realistic levels of pesticide might affect the ability of bees to visit and manipulate flowers.

3. We observed the behaviour of individual bumblebees from colonies chronically exposed to a neonicotinoid pesticide (10 ppb thiamethoxam) or control solutions foraging for the first time on an array of morphologically complex wildflowers (*Lotus corniculatus* and *Trifolium repens*) in an outdoor flight arena.

4. We found that more bees released from pesticide-treated colonies became foragers, and that they visited more *L. corniculatus* flowers than controls. Interestingly, bees exposed to pesticide collected pollen more often than controls, but control bees learnt to handle flowers efficiently after fewer learning visits than bees exposed to pesticide. There were also different initial floral preferences of our treatment groups; control bees visited a higher proportion of *T. repens* flowers, and bees exposed to pesticide were more likely to choose *L. corniculatus* on their first visit.

5. Our results suggest that the foraging behaviour of bumblebees on real flowers can be altered by sublethal exposure to field-realistic levels of pesticide. This has implications for the foraging success and persistence of bumblebee colonies, but perhaps more importantly for the interactions between wild plants and flower-visiting insects and ability of bees to deliver the crucial pollination services to plants necessary for ecosystem functioning.

**Key-words:** bumble bee *Bombus terrestris*, ecotoxicology, flower visitation, foraging behaviour, insecticide, pollen, pollinator declines

## Introduction

Bumblebees are important pollinators of both crops and wild plants (Stanley & Stout 2014; Kleijn *et al.* 2015). They forage in the environment to collect nectar and pollen, both to feed themselves but also to provision their colonies and feed their developing brood. An individual worker will continue to forage even when they themselves are satiated, and can forage throughout their entire lifetime (Hagbery & Nieh 2012). In order to forage effectively, bees must be able to learn to locate flowers, assess their profitability and how to manipulate them to extract their rewards. As flowers vary hugely in their salient features for pollinators

(including their colour, scent and morphology), there is considerable variation in the range of cues bees must detect and learn. As a result, foraging can be a cognitively challenging task, and foraging on complex flowers is typically more challenging than on simple ones (Lavery 1994). In addition, bees may forage for nectar, pollen or both, and it has been suggested that foraging for pollen can be a more challenging task than foraging for nectar (Raine & Chittka 2007b).

In recent years, declines in bumblebees (Grixti *et al.* 2009; Cameron *et al.* 2011; Dupont, Damgaard & Simonsen 2011) and other pollinators (Biesmeijer *et al.* 2006; Ollerton *et al.* 2014) have led to concern over the use of pesticides in agriculture. Bees can become exposed to pesticides while foraging on treated crops or in treated areas,

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but typically are exposed at levels that are not lethal. This has resulted in an increasing body of research on the sublethal impacts of pesticides on bees, and a moratorium on the use of three neonicotinoid pesticides as seed treatments for crops attractive to bees in the EU (Regulation (EU) No 485/2013). Neonicotinoids are widely used worldwide and have received much attention in terms of bees due to the risk they pose in comparison to other pesticides (Sanchez-Bayo & Goka 2014). In addition, they are commonly applied as seed treatments to flowering crops that results in oral exposure of bees foraging on contaminated nectar and pollen. Neonicotinoids are agonists of the nicotinic acetylcholine receptors (nAChRs) and can cause neuronal deactivation in the mushroom bodies of honeybee brains by overexcitation following blocking (Palmer *et al.* 2013; Moffat *et al.* 2015). As the mushroom bodies are linked with both learning and memory (Zars 2000; Menzel 2012), it is unsurprising that impacts of pesticides on learning ability have been established in both honeybees (Decourtye *et al.* 2004a,b, 2005; Williamson, Baker & Wright 2013; Williamson & Wright 2013) and bumblebees (Stanley, Smith & Raine 2015). In addition to direct effects on learning and memory ability, a range of sublethal effects of pesticide exposure on bees have been identified such as impacts on foraging (Gill, Ramos-Rodriguez & Raine 2012; Schneider *et al.* 2012; Feltham, Park & Goulson 2014; Gill & Raine 2014), navigation (Vandame *et al.* 1995; Fischer *et al.* 2014) and reproduction (Gill, Ramos-Rodriguez & Raine 2012; Whitehorn *et al.* 2012; Rundlöf *et al.* 2015).

However, there is an increasing call to make research on pesticides and bees more 'field-realistic', using measurements from field trials or experiments as close to field conditions as possible. With this in mind, semi-field experiments have shown that the impacts of pesticides on learning ability measured in the lab seem to translate into impacts on bee foraging ability in the field. Using RFID technology to measure when bumblebees enter and leave their colony, it has been shown that bees exposed to neonicotinoid pesticides bring back smaller pollen loads or pollen less often, and also behave differently in terms of the amount of time spent foraging (Gill, Ramos-Rodriguez & Raine 2012; Feltham, Park & Goulson 2014; Gill & Raine 2014). Although this evidence suggests that pesticide exposure can alter the ability of bees to forage and manipulate flowers, direct observations of flower-visiting behaviour are lacking. Whilst it has been shown that pesticide exposure can alter flower visitation patterns to apples, a commercial crop with simple floral morphology (Stanley *et al.* 2015), it is not known whether this may also be the case for wild plants with more complex floral morphology.

Here, we investigated whether pesticide exposure can cause changes in the ability of bumblebees to learn how to manipulate and forage from morphologically complex flowers (Laverty 1994). To do this, we allowed naive

individual bumblebees (from colonies pre-exposed chronically to either pesticide or control solutions) access from their colony to a flight arena provisioned with complex flowers of *Lotus corniculatus* L. (bird's foot trefoil) and *Trifolium repens* L. (white clover; Fig. 1), both species commonly encountered by bumblebees in agricultural areas (Carvell *et al.* 2006). We then recorded their flower visitation and foraging behaviour.

## Materials and methods

*Lotus corniculatus* and *T. repens* were obtained as plant plugs (from British Wild Flower Plants, Fig. 1), and potted into larger pots in March 2014. Ten colonies of *Bombus terrestris audax* were obtained from Biobest (Westerlo, Belgium) in the middle of June, with a queen and an average of 109 workers (range 87–127). On arrival, colonies were transferred to bipartite wooden nest boxes (28 × 16 × 11 cm); the brood in the rear chamber, and the front chamber was used for feeding. The 10 colonies were ranked in terms of number of workers and split into five pairs (blocks), and treatment was randomly assigned within block.

We chose to investigate impacts of the neonicotinoid pesticide thiamethoxam, which was the most widely applied neonicotinoid pesticide on oilseed rape crops in the UK in 2012 (Garthwaite *et al.* 2012), on foraging behaviour. Most studies on the potential effects of neonicotinoids on bees have investigated impacts of another compound, imidacloprid (Decourtye *et al.* 2004a; Laycock *et al.* 2012; Bryden *et al.* 2013; Gill & Raine 2014). However, it has been suggested that impacts of neonicotinoid pesticides may not be the same (Goulson 2013), and that in particular thiamethoxam may be less toxic to bees than imidacloprid (Iwasa *et al.* 2004; Mommaerts *et al.* 2010; Blacqui re *et al.* 2012; Laycock *et al.* 2014). A solution of 10 parts per billion (ppb) thiamethoxam was prepared by dissolving 10 mg thiamethoxam (Sigma Aldrich) in 100 mL acetone, then 10 µL of this stock solution was added to 1 L of 40% sucrose solution (these calculations are carried out on a v/v basis; on a w/w basis this would give a solution of 8.5 ppb thiamethoxam). The same process was repeated using 10 µL acetone only to produce an equivalent control solution. Solutions were stored in a dark refrigerator for up to 7 days, after which a new batch was prepared to ensure consistent pesticide concentrations. We chose to use 10 ppb thiamethoxam as this falls within the range of neonicotinoid concentrations measured in plant residues under field conditions (Castle *et al.* 2005; Dively & Kamel 2012; Stoner & Eitzer 2012; Godfray *et al.* 2014, 2015; Stewart *et al.* 2014; Bot as *et al.* 2015; Rundlöf *et al.* 2015) and is comparable to previous work (Gill, Ramos-Rodriguez & Raine 2012; Laycock *et al.* 2012, 2014; Stanley *et al.* 2015). Every 2 days, a new colony pair began treatment with either 10 ppb thiamethoxam in sugar water or control sugar water (prepared as explained above), to minimize potential for intercolony variation in duration of the pesticide exposure. Colonies were fed both their treatment sucrose solution and untreated commercial honeybee collected pollen (that had previously been frozen) every 2 days. The majority of sugar water was consumed and bees had no alternative food source for a 9–10 day period; therefore any workers tested would have fed on their treatment solution.

Colonies were tested after 9 or 10 days of pesticide exposure. This length of time was chosen to mimic a situation where bees fed on oilseed rape and/or contaminated wild plants exclusively during peak flowering period of the crop. Prior to testing, each colony was allowed access to a gravity feeder (containing their treatment solution) in a flight arena (60 × 35 × 100 cm) to encourage foraging behaviour for 48 h. On the day of testing, each block was connected to a large flight arena



**Fig. 1.** Complex morphology of *Lotus corniculatus* (bird's foot trefoil; left) and *Trifolium repens* (white clover; right; being visited by the large carder bee, *Bombus muscorum*). Photos by DAS.

(78 × 52 × 100 cm) in a bright but shaded outdoor location. Flight arenas were provisioned with two flowering *L. corniculatus* plants (with an average of 131 florets across both plants per day) and one flowering *T. repens* (average 11 flowering inflorescences per day; the term flower will subsequently be used to signify *L. corniculatus* florets and *T. repens* inflorescences). These species were chosen as they are known to be important forage plants for bumblebees (Carvell *et al.* 2006), and their flowers have complex morphology (Fig. 1) making them relatively difficult for bumblebees to learn how to handle to extract nectar and pollen. The number of flowers provided by each species was standardized across pairs so each colony in the pair (block) was exposed to the same floral density on each day.

Bees were allowed to enter the flight arena one at a time and the foraging behaviour of each bee was recorded individually by an observer (DAS or DW) using Etholog software (Ottoni 2011). This allowed us to record the number of flowers of each species visited, the time taken to handle each flower, whether individuals collected pollen (or not) and the size of pollen loads (classified as either 'small', 'medium' or 'large'). We also judged when a bee had properly 'learnt' to manipulate a flower (i.e. when a bee landed on a flower and immediately collected nectar and/or pollen, without exploring the flower first; this was not recorded for all bees as in some cases the transition was not obvious). Each bee was observed for 30 min or until it tried to return to the colony, whichever was sooner. At the end of each observation period, tested individuals were placed into a plastic vial and frozen for subsequent measurement of body size. Individuals that did not visit any flowers within 20 min were assumed not to be foragers and removed, and the next bee released. A 10-min break was taken between testing foragers to allow dissipation of any scent marks and replenishment of nectar in the flowers (Stout, Goulson & Allen 1998). Each colony was observed for 2 days, and plants were changed each day. The treatment of the colony observed was unknown by one of the observers, although the other was aware of treatment as they were also responsible for managing and feeding colonies in the lab. Observations were carried out from 23 June until 3 July, between 1030 and 1600. After the experimental period, we measured the thorax width (as a proxy for body size) of all tested bees using digital callipers.

A number of measures of behaviour were extracted from the Etholog data sets: (i) the length of time spent foraging (the time elapsed between the first and last flower visit); (ii) the average length of time between flower visits; (iii) the average visit length to each flower species; (iv) the amount of time it took each bee to learn proper foraging behaviour (as defined above; when a bee immediately went for nectar and/or pollen rather than exploring the flower first); (v) the total number of flowers of each species

visited separately; (vi) the number of switches between flower species; (vii) the number of flowers visited before proper foraging behaviour was learnt; (viii) whether bees visited *L. corniculatus* or *T. repens* first; (ix) the proportion of visits to *T. repens* and (x) the proportion of bees that foraged for pollen. We investigated treatment (pesticide-exposed vs. control) differences in these behavioural measures of foragers using linear mixed effects models in R (R Development Core Team 2011). We used the lme function from the nlme package for models in which time was the response variable (Pinheiro *et al.* 2012), the glmer function from the lme4 package for any response variables that were counts or proportions (with poisson or binomial distributions specified: (Bates *et al.* 2014)), and the glmmPQL function from the MASS package for any models where data were overdispersed (Venables & Ripley 2002). To account for any differences in behaviour caused by weather conditions or other interdiurnal differences, date of testing (nested within block) was included as a random effect. The body size of bees was included as a covariate, and models were simplified by removing this term if it was not significant. Models were validated by inspecting qq-plots and histograms of residuals, and plotting standardized residuals vs. fitted values, and data were transformed (log X+1) if necessary to improve model fit.

## Results

In total, 160 bees were observed leaving their colonies to enter the flight arena (average 15 per colony from pesticide colonies, and 17 per colony from control colonies; no difference in numbers of bees released between treatments, quasipoisson glm:  $F_{1,8} = 4.14$ ,  $P = 0.08$ ) of which 74 bees (46%) were classed as 'foragers' (we classified a bee as a forager if it landed on five or more flowers during its time in the arena). A significantly greater number of bees active in the flight arena were foragers in pesticide-treated colonies (63% of bees per colony for pesticide-treated, 33% per colony for control colonies; glmer:  $\chi^2 = 4.9044$ ,  $P = 0.03$ ), but worker body size did not differ between treatments (GLM:  $F_{1,68} = 0.0277$ ,  $P = 0.87$ ).

There was no difference between treatments in terms of how long bees spent foraging (Table 1), how long they took to handle either species of flower, or the amount of time spent between flower visits (Table 1). Interestingly, although bees exposed to pesticide learnt to manipulate flowers earlier on in their time in the foraging arena,

**Table 1.** Summary of variables measured in observations of individuals from pesticide colonies and control colonies.  $n = 47$  foragers from five pesticide colonies, and 27 foragers from five control colonies (except for 'time taken to for foraging behaviour to be learnt' and 'number of flowers visited before foraging behaviour was learnt' where  $n = 22$  foragers from four pesticide colonies, and 11 foragers from four control colonies)

Variable	Mean $\pm$ SEM		Model	
	Control	10 ppb	Treatment	Width
Length of time spent foraging	850.79 $\pm$ 81.07	940.09 $\pm$ 89.38	$\chi^2 = 0.76, P = 0.38$	$\chi^2 = 2.68, P = 0.10$
Length of time spent between flower visits†	35.51 $\pm$ 5.24	31.55 $\pm$ 5.26	$\chi^2 = 1.31, P = 0.25$	
Mean visit length to <i>L. corniculatus</i>	7.52 $\pm$ 1.06	6.9 $\pm$ 0.66	$\chi^2 = 0.1, P = 0.76$	
Mean visit length to <i>T. repens</i>	27.77 $\pm$ 4.44	23.82 $\pm$ 3.56	$\chi^2 = 0.18, P = 0.67$	
Time until foraging behaviour was learnt†	815.21 $\pm$ 107.91	549.35 $\pm$ 78.77	$\chi^2 = 4.32, P = 0.04^*$	
No. of visits to <i>L. corniculatus</i> †	15.81 $\pm$ 5.84	38.02 $\pm$ 7.62	$\chi^2 = 9.8, P = 0.002^*$	
No. of visits to <i>T. repens</i> †	7.52 $\pm$ 1.71	5.87 $\pm$ 1.64	$\chi^2 = 0.07, P = 0.79$	$\chi^2 = 0.47, P = 0.49$
No. of switches between flower varieties†	1.1 $\pm$ 0.28	1.7 $\pm$ 0.46	$\chi^2 = 0.85, P = 0.36$	$\chi^2 = 2.90, P = 0.09$
No. flowers visited before foraging behaviour learnt	3.7 $\pm$ 1.06	9.6 $\pm$ 1.8	$\chi^2 = 7.3, P = 0.007^*$	
Proportion of bees that visited <i>L. corniculatus</i> first	0.52	0.81	$\chi^2 = 6.54, P = 0.01^*$	
Proportion of visits to <i>T. repens</i>	0.46	0.21	$\chi^2 = 6.24, P = 0.01^*$	
Proportion of bees that foraged for pollen	0.15	0.39	$\chi^2 = 4.53, P = 0.03^*$	

All times given are in seconds. Values given are means ( $\pm$  S.E.M.) across all individuals released.

\*indicates significant differences ( $P < 0.05$ ).

†Indicates data were transformed for analysis.

control bees learnt how to manipulate flowers after fewer learning visits than bees exposed to pesticide (Table 1, Fig. 2). Most bees foraged only for nectar, with only 23 of 73 individuals collecting pollen. We found that significantly more bees exposed to pesticide foraged for pollen than control bees (Table 1). All seven of the bees classified as carrying 'medium' sized pollen loads were from pesticide-exposed colonies, while the 15 bees with 'small' loads came from both treatment groups (11 pesticide and four control bees).

Bees exposed to pesticide visited more *L. corniculatus* flowers than control bees (Table 1, Fig. 2, Table S1, Supporting information), although there was no difference in the number of *T. repens* flowers visited between treatment groups; however, this meant that a higher proportion of visits by control bees were to *T. repens*. Interestingly, there was a trend towards a preference of pesticide-exposed bees to visit a *L. corniculatus* flower first rather than a *T. repens* (13 of 27 control bees (48%) first landed on *T. repens*, whereas only 9 of 47 pesticide-exposed bees (19%) chose *T. repens* first; Table S1), although this was not significant. There was no difference in the frequency with which bees from each treatment switched between flower species (Table 1).

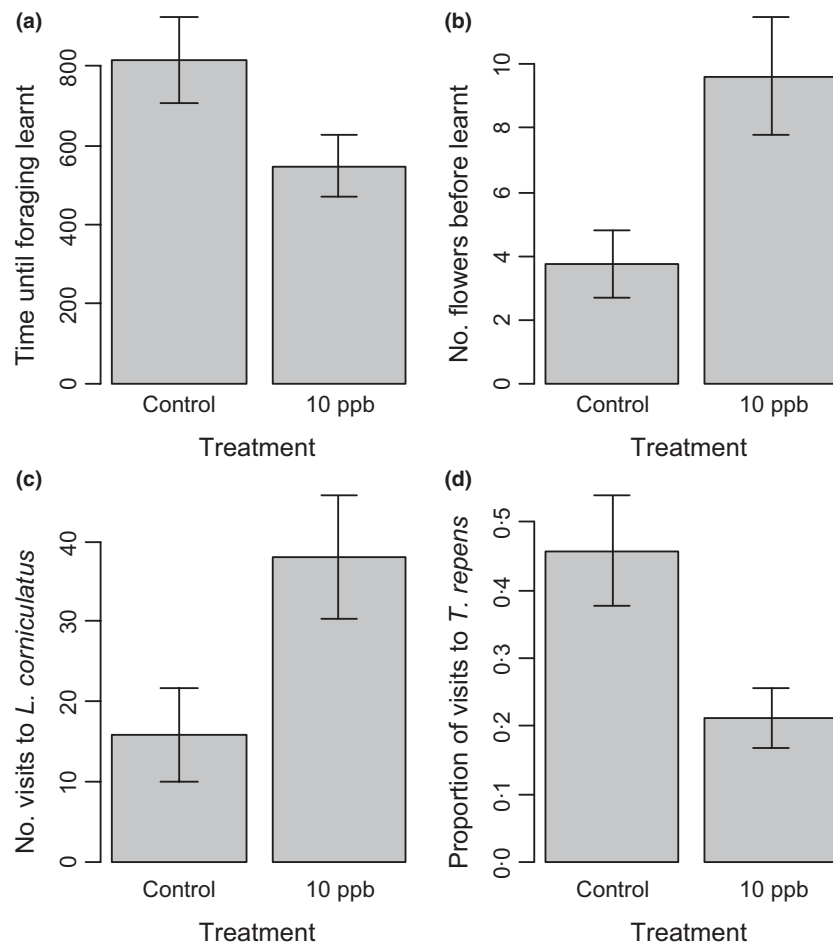
## Discussion

We found that chronic exposure to field-realistic levels of thiamethoxam altered the interactions between bumblebees and morphologically complex wildflowers. First, a higher proportion of bees that were released from pesticide-treated colonies became foragers in comparison to control colonies. Of these foragers, bees exposed to pesticide visited more *L. corniculatus* flowers, showed a trend towards

a preference for this species on their first flower visit and collected more pollen. However, although bees exposed to pesticide learnt to manipulate flowers sooner, control bees learnt to manipulate flowers after fewer flower visits than pesticide-exposed bees, and also visited a higher proportion of *T. repens* flowers.

Interestingly, we see increased activity in bees exposed to pesticide in terms of the numbers of *L. corniculatus* flowers visited. This is similar to work showing bees visit a higher number of apple flowers when exposed to field-realistic thiamethoxam levels (Stanley *et al.* 2015), a result that may be indicative of hormesis; a stimulation of biological processes at low doses (Cutler & Rix 2015). Other putative hormetic effects have been found following exposure to other neonicotinoids: imidacloprid, in combination with the acaricide coumaphos, can cause modest improvement in honeybee learning and memory (Williamson, Baker & Wright 2013) and exposure to low-levels of clothianadin can lead to improved orientation behaviour in moths (Rabhi *et al.* 2014). However, although individual bees visited more flowers in the Stanley *et al.* (2015) study, the pollination services provided were not affected suggesting that this increased activity did not deliver improved pollination quality.

Previous studies of colonies foraging freely outside in the field have found that bees exposed to imidacloprid bring back pollen less often (Feltham, Park & Goulson 2014) and/or bring back smaller pollen loads (Gill, Ramos-Rodriguez & Raine 2012). Here, we find bees exposed to similar levels of thiamethoxam actually bring back pollen more often than controls. This may be related to the decreased amount of time spent learning how to manipulate flowers, allowing pesticide-exposed bees more time to collect pollen (see additional discussion of speed-



**Fig. 2.** The differences in (a); top left time until foraging behaviour was learnt, (b); top right number of flowers visited before the individual bee learnt to properly manipulate the flower, (c); bottom left number of visits to *Lotus corniculatus* and (d); bottom right proportion of visits to *Trifolium repens*, for individual bees exposed to control (untreated) or 10 ppb thiamethoxam treatments. Columns show means ( $\pm$ SEM) across all foragers observed (47 individuals from 10 ppb colonies, 27 individuals from control colonies for number and proportion of visits to species, and 22 individuals from 10 ppb colonies and 11 from control colonies for time and number of flowers until foraging behaviour learnt). There was a significant difference ( $P < 0.05$ ) between treatments for all variables displayed (Table 1)

accuracy trade-offs below). However, this pattern may change over time, as bees exposed to imidacloprid have been shown not to improve their foraging ability over time – unlike, unexposed, control bees (Gill & Raine 2014). In addition, our data were collected in an outdoor flight arena in which bees had to fly less than 50 cm to access their first flower, representing a relatively simple environment with little need to navigate, locate forage resources or avoid predators. Previous studies were carried out in a natural, outdoor setting (Gill, Ramos-Rodriguez & Raine 2012; Feltham, Park & Goulson 2014), with bees facing a much more challenging environment in terms of navigation and location of floral resources. This could indicate that impairments in foraging ability following pesticide exposure may not be due to patterns of flower visitation, but the ability of bees to deal with variation in weather conditions, landscape-scale navigational complexity or indeed responses to additional stressors in the environment.

Although pesticide-exposed bees collected pollen more often and visited more flowers overall, we found that control bees visited fewer flowers before manipulation behaviour was learnt. As bumblebees display trade-offs between the speed and accuracy with which they make foraging decisions (Chittka *et al.* 2003; Ings & Chittka 2008; Chittka, Skorupski & Raine 2009), and exposure to pesticides can affect learning and memory performance in

bumblebees (Stanley, Smith & Raine 2015), it is also possible such exposure could affect speed-accuracy trade-offs. Bees exposed to pesticide initially forage faster and collect more pollen as control bees might be investing more time and/or energy in learning. It can take up to 30 foraging trips for an individual bee to reach maximum foraging efficiency (Peat & Goulson 2005), and the average handling times for *L. corniculatus* measured here on a first foraging bout are higher than those measured for experienced bees in the field (Stout & Goulson 2002). Therefore as we only observed the first foraging trip, control bees had not yet fully learnt how to forage to the best of their ability, and so may not yet have been ‘accurate’ foragers. This view is supported by previous work showing that bees exposed to (imidacloprid) pesticide do not improve their pollen collection performance over time but un-exposed bees do (Gill & Raine 2014).

We found a difference in floral preferences between our treatment groups; pesticide-exposed bees visited more *L. corniculatus* flowers and were more likely to visit this species first, but control bees visited a higher proportion of *T. repens* flowers. Previous work has also found differences in the colour of pollen loads collected by imidacloprid-exposed bees compared with untreated controls (Gill & Raine 2014), suggesting impacts of pesticides on floral preference. A mechanism for this could be

detrimental impacts of pesticide on cognition (Stanley, Smith & Raine 2015), particularly the ability to learn to manipulate a greater number of flower types - a task known to be more cognitively challenging (Gegear & Laverty 1995, 1998). *Lotus corniculatus* and *T. repens* differ in colour, morphology (Fig. 1) and quantity of rewards (with *L. corniculatus* producing more nectar than *T. repens*; Raine & Chittka 2007a), all of which may affect how bees learn to manipulate them. However, *T. repens* is a more nutritious forage source than *L. corniculatus* with twice the total sugar content and higher concentrations of amino acids (E. Power, personal communication). The nutritive quality of floral resources can influence bee foraging behaviour (Somme *et al.* 2015); therefore another mechanism could be that pesticide may influence a bee's ability to choose forage resources based on nutritive content (although bees cannot taste neonicotinoids Kessler *et al.* 2015). These changes in floral preference may be the cause of differences seen in other measures in our study, such as length of time spent foraging. However, to fully disentangle these effects of species choice and arrangement, bees would have to be presented with both species singly and as mixtures which would be a useful follow-on experiment from this study.

Although, to our knowledge, this study is the first to investigate impacts of pesticides on foraging behaviour of bees on real wildflowers, some previous studies have investigated similar impacts using artificial food sources in the laboratory. Using RFID technology in a flight arena, honeybees exposed to imidacloprid and clothianadin showed a reduction of foraging activity and longer foraging bouts when exposed to high pesticide concentrations, although with no impact seen at field-realistic levels. (Schneider *et al.* 2012). Morandin & Winston (2003) found that bumblebees (*Bombus impatiens*) exposed to 7 ppb imidacloprid in pollen had a similar foraging rate to untreated controls, but that bees exposed to higher levels (30 ppb) had a significantly lower foraging rate. Using comparable doses of another neonicotinoid, clothianadin, Franklin, Winston & Morandin (2004) found no difference in times taken by pesticide-treated and control bees to access rewards from artificial flowers in a foraging arena after 48 days of exposure, although there was a trend towards lower mean access times for bees exposed to 6 ppb and 36 ppb. However, it is likely that visitation to real flowers with complex morphology represents a significantly more challenging task to bees than foraging on simple artificial flowers, and our work suggests that under these conditions impacts on foraging behaviour may be more apparent.

Changes in foraging behaviour resulting from pesticide exposure are interesting from the 'bee' perspective as it introduces the potential to alter colony provisioning that places additional stress on the colony with implications for colony survival (Bryden *et al.* 2013). However, bees provide essential pollination services to crops and wild plants

(Klein *et al.* 2007; Ollerton, Winfree & Tarrant 2011), and as such changes in foraging behaviour may have knock-on impacts for the pollination services they deliver. Although pesticide exposure has been shown to decrease pollination services delivered to apple crops (Stanley *et al.* 2015), the extent to which this might also be true for wild plants is unclear. An increase in numbers of foragers, thereby making more flower visits and collecting more pollen (and hence transporting more pollen between individual plants), may have positive implications for the delivery of pollen to flowers and therefore seed set. Alternatively, if bees exposed to pesticide take longer to learn to manipulate flowers and show different floral preferences, or scent mark flowers without proper visitation thereby discouraging other bees from visiting them (Stout, Goulson & Allen 1998; Stout & Goulson 2002), this could have negative impacts on pollination service delivery.

The majority of research on the impacts of neonicotinoids on bees to date has focussed on imidacloprid, using honeybees as a model system (Godfray *et al.* 2014, 2015; Lundin *et al.* 2015). Here, we find that field-realistic levels of thiamethoxam can alter foraging behaviour of bumblebees in a relatively simple environment. At similar exposure levels of thiamethoxam, effects on bumblebee reproduction seem to be variable; at 10 ppb nest building was delayed and no larvae were produced (Elston, Thompson & Walters 2013), no detectable effect on reproduction or survival of queenless microcolonies was detected at 11 ppb (Laycock *et al.* 2014) or on male production at 10 ppb (Mommaerts *et al.* 2010). However, following chronic exposure to 10 ppb thiamethoxam bumblebees learn an olfactory conditioning task more slowly than controls and their short term memory can be affected (Stanley, Smith & Raine 2015). This suggests that it could be useful to incorporate other behaviours, such as learning ability and foraging, into pesticide risk assessments that currently use only mortality or reproduction; impacts may be seen on foraging when no impacts on reproduction are detectable (Mommaerts *et al.* 2010).

There are a number of environmental stressors that can cause changes in bee foraging behaviour (e.g. parasites; Schmid-Hempel & Stauffer 1998; Gegear, Otterstatter & Thomson 2005; Otterstatter *et al.* 2005; invasive species; Dohzono *et al.* 2008; predators: Jones & Dornhaus 2011). Our work shows that exposure to field-realistic levels of pesticide stress can also alter foraging behaviour of bumblebees on real wildflowers with complex morphology even in a relatively unchallenging scenario. This suggests that under more challenging conditions in a wild, fully-outdoor setting, impacts may be augmented. As we only looked at the first foraging bout of individuals, it is likely that impacts may also change over the foraging life of the individual. Our work highlights the need to include taxa other than honeybees in risk assessments for pesticide use, and that bumblebees can also be a useful study taxon. It also confirms that changes in foraging behaviour on wildflowers represent another sublethal impact of pesticide use,

which may have implications for the delivery of pollination services to wild plants.

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## Author contributions

DAS and NER conceived the project, designed the experiment and wrote the manuscript. DAS carried out the experiment and statistical analyses.

## Data accessibility

Data are given in the Supporting Information.

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## Supporting Information

Additional Supporting information may be found in the online version of this article:

**Table S1.** Sequences and flower handling times (in seconds) of the first 30 floral choices for all foragers exposed to control (a) or pesticide (10 ppb thiamethoxam) (b) treatments; n = the total number of flowers visited in the foraging bout. Light grey represents visits to *Lotus corniculatus*, and dark grey represents visits to *Trifolium repens*.

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News

## GMO Mosquito Gets Finding of 'No Significant Impact' from FDA

🕒 Tue, 03/15/2016 - 9:48am

👤 by Seth Augenstein, Digital Reporter

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The world's first self-limiting tropical mosquito, seen as a possible control to the spread of viral diseases such Zika, dengue and yellow fever, is on its way to approval.

The engineered *Aedes Aegypti* male mosquitoes breed with females and produce offspring that do not live to adulthood. The OX513A mosquito, created by UK-based Oxitec, Ltd., is seen as a population control tool to curb the spread of the disease-carrying bug.



The FDA released **its preliminary finding of no significant impact on Friday**, in the first environmental assessment. The public comment period **will last 30 days**.

The company said **it was "pleased" with the finding**.



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The *Aedes aegypti* mosquito represents a significant threat to human health, and in many countries has been spreading Zika, dengue and chikungunya viruses,” said Hadyn Perry, the Oxitec CEO. “This mosquito is non-native to the U.S. and difficult to control, with the best available methods only able to reduce the population by up to 50 percent, which is simply not enough. We look forward to this proposed trial and the potential to protect people from *Aedes aegypti* and the diseases it spreads.”

The Oxitec mosquitoes are males, and do not bite or spread disease. But they do mate with the native female population, resulting in short-lived offspring.

The company claims field trials in the Cayman Islands, Panama and Brazil have resulted in reduction of the insect population by 90 percent.

The *Aedes aegypti* bug is non-native to the United States – but has spread north to the Florida Keys in recent years. [The latest field trial for Oxitec is taking place in Key Haven, Monroe County.](#)

The FDA, in its conclusion, found that the GMO insect was preferable to massive use of insecticides over large areas.

“The impact on the environment and non-target organisms is likely to be less than the use of broad spectrum insecticides for mosquito control,” the agency found.

The FDA has approved other genetically-modified species. In November, [they issued an approval for a kind of salmon for consumption.](#)

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#### COMMENTS

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# FDA Announces Comment Period for Draft Environmental Assessment for Genetically Engineered Mosquito

March 11, 2016

The FDA is releasing for public comment a draft environmental assessment (EA) submitted by Oxitec, Ltd., that assesses the potential environmental impacts of a field trial of the company's genetically engineered (GE) *Aedes aegypti* mosquitoes (OX513A) in Key Haven, Florida. *Ae. aegypti* is known to transmit potentially debilitating human viral diseases, including Zika, dengue, yellow fever and chikungunya.

The National Environmental Policy Act (NEPA) requires federal agencies to assess the environmental impacts of certain actions. Pursuant to FDA regulations, sponsors opening an Investigational New Animal Drug (INAD) file must submit either a draft EA or a claim of categorical exclusion from the EA requirement.

The FDA is also releasing a preliminary finding of no significant impact (FONSI) that agrees with the draft EA's conclusion that the field trial of such GE mosquitoes will not result in significant impacts on the environment.

Oxitec will not conduct the field trial of its OX513A mosquito until the FDA has had the opportunity to review public comments on the draft EA, and subsequently has issued either a final EA and FONSI or an environmental impact statement.

The FDA is accepting public comments on the draft EA and preliminary FONSI for 30 days from the date of publication in the Federal Register. To submit your comments electronically to the docket, go to [www.regulations.gov](http://www.regulations.gov) (<http://www.regulations.gov>) and type FDA-2014-N-2235 in the search box. While comments are welcome at any time, you should submit them by the closing date to ensure FDA considers your comments.

To submit your comments to the docket by mail, use the following address. Be sure to include docket number FDA-2014-N-2235 on each page of your written comments.

The Division of Dockets Management  
HFA-305  
Food and Drug Administration  
5630 Fishers Lane, Room 1061  
Rockville, MD 20852

## Additional Information

- [Oxitec Mosquito](http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/ucm446529.htm)  
([/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/ucm446529.htm](http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/ucm446529.htm))
- [Oxitec Mosquito - Draft Environmental Assessment \(PDF - 33.3MB\)](http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/UCM487377.pdf)  
([/downloads/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/UCM487377.pdf](http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/UCM487377.pdf))
- [Oxitec Mosquito - Preliminary Finding of No Significant Impact \(PDF - 148KB\)](http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/UCM487379.pdf)  
([/downloads/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/UCM487379.pdf](http://www.fda.gov/AnimalVeterinary/DevelopmentApprovalProcess/GeneticEngineering/GeneticallyEngineeredAnimals/UCM487379.pdf))
- [Notice of Availability: Draft Environmental Assessment and Preliminary Finding of No Significant Impact Concerning](#)

**[Investigational Use of Oxitec OX513A Mosquitoes \(https://www.federalregister.gov/articles/2016/03/14/2016-05622/environmental-assessments-availability-etc-investigational-use-of-oxitec-ox513a-mosquitoes\)](https://www.federalregister.gov/articles/2016/03/14/2016-05622/environmental-assessments-availability-etc-investigational-use-of-oxitec-ox513a-mosquitoes)**

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**[2015 CVM Updates \(/AnimalVeterinary/NewsEvents/CVMUpdates/ucm429225.htm\)](/AnimalVeterinary/NewsEvents/CVMUpdates/ucm429225.htm)**

**[2014 CVM Updates \(/AnimalVeterinary/NewsEvents/CVMUpdates/ucm383906.htm\)](/AnimalVeterinary/NewsEvents/CVMUpdates/ucm383906.htm)**

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