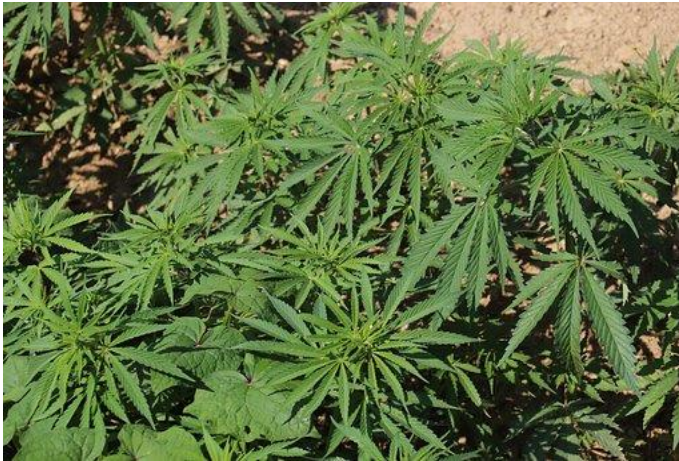


# Pest Management: CT and EPA Pesticides Registered for Hemp



Candace L. Bartholomew  
Extension Educator  
UConn Extension



# Pesticides Approved for use on Domestic Hemp Production



# CT DEEP Pesticides Registered for Hemp

- Information for Hemp and Medical Marijuana Growers
- Guidance for the Selection of Pesticides for Use on Hemp & Medical Marijuana in Connecticut
- Google CT DEEP Pesticides Hemp
- **OR:**
- [https://www.ct.gov/deep/lib/deep/pesticides/pesticides\\_hemp\\_marijuana.pdf](https://www.ct.gov/deep/lib/deep/pesticides/pesticides_hemp_marijuana.pdf)

Company Name on Label	Product Name	EPA Number	CT Expiration	Pesticide Type	Comments	Date Added
NorCal Plant Nutrients LLC	86 Mites + Mold Concentrate	25(b)	2021	Fungicide, Miticide		9/10/2019
Certis USA, LLC	Agree WG	70051-47	2023	Insecticide		9/10/2019
OHP, Inc.	Ancora	70051-19-59807	2021	Insecticide, Fungicide	Greenhouse only	9/10/2019
RX Green Technologies, LLC	Axiom Harpin Proteins	71771-3-89112	2021	PGR		9/10/2019
Gowan Company	Aza-Direct Biological Insecticide	71908-1-10163	2022	Insecticide		9/10/2019
BioSafe Systems, LLC	AzaGuard	70299-17	2019	Insecticide		9/10/2019
Parry America	AzaMax	71908-1-81268	2021	Insecticide, Nematicide		9/10/2019
Arborjet, Inc.	AzaSol	81899-4-74578	2019	Insecticide		9/10/2019
OHP, Inc.	Azatin O Biological Insecticide	70051-9-59807	2021	IGR		9/10/2019
PBI/Gordon Corporation	Azatrol EC Insecticide	2217-836	2021	Insecticide		9/10/2019
McLaughlin Gormley King Company	Azera Insecticide	1021-1872	2021	Insecticide, Miticide, Fungicide		9/10/2019
McLaughlin Gormley King Company dba MGK	Azera Pro	1021-1872	2021	Insecticide	Greenhouse use only	9/10/2019
Bayer Advanced	Bayer Advanced Natria Disease Control Ready to Spray	264-1161-72155	2019	Fungicide		9/10/2019
Bayer Advanced	Bayer Advanced NATRIA Insecticidal Soap Ready-To-Use	67702-21-72155	2019	Insecticide	Use allowed prior to final transplant.	9/10/2019
BioSafe Systems, LLC	BioSafe Disease Control (Concentrate)	70299-16	2019	Fungicide		9/10/2019
Bonide Products, Inc.	Bonide All Seasons Horticultural & Dormant Spray Oil Ready to Spray	4-80	2019	Insecticide		9/10/2019
Bonide Products, Inc.	Bonide Diatomaceous Earth Crawling Insect Killer	73729-1-4	2019	Insecticide		9/10/2019
Bonide Products, Inc.	Bonide Insecticidal Soap Multi-Purpose Insect Control Ready To Use	67702-13-4	2019	Insecticide	Use allowed prior to final transplant.	9/10/2019
Bonide Products, Inc.	Bonide Rose Rx 3 in 1 Concentrate	70051-2-4	2019	Fungicide, Insecticide, Miticide		9/10/2019
LAM International Corporation	Botanigard Maxx	82074-5	2020	Insecticide		9/10/2019
Lawn and Garden Products, Inc	Bug Buster-O	1021-1771-54705	2022	Insecticide	Outdoor use only.	9/10/2019
Gowan Company	Captiva	10163-326	2022	Insect Repellent		9/10/2019
Gowan Company	Captiva Prime	10163-336	2022	Insecticide		9/10/2019
Growth Technology Ltd.	Clonex Rooting Gel	79664-1	2022	PGR		9/10/2019
Winfield Solutions LLC	Confine Extra	1381-244	2020	Fungicide	Prior to transplanting only.	9/10/2019
Espoma Organic	Copper Soap	67702-1-83598	2023	Fungicide		9/10/2019
Matson, LLC	Corry's Slug & Snail Killer	67702-33-8119	2021	Molluscicide		9/10/2019
Imerys Filtration Minerals, Inc	Deadzone	73729-1	2022	Insecticide		10/18/2019
Certis USA, LLC	Deliver Biological Insecticide	70051-69	2023	Insecticide		9/10/2019
EP Naturals, a Division of EP Minerals, LLC	Desect AG Diatomaceous Earth Insecticide	7655-1	2023	Insecticide		9/10/2019
Certis USA, LLC	Des-X Insecticidal Soap Concentrate	67702-22-70051	2023	Insecticide		9/10/2019

# Criteria for Registering a Pesticide on Hemp in CT

1. The label must allow for use on unspecified crops and/or plants (e.g. “other crops” “flowering plants”);
2. The label must allow for application of the pesticide to the intended site; (e.g. greenhouse, field);
3. The label does not prohibit use on crops or plants grown for human consumption;

# Criteria for Registering a Pesticide on Hemp CT

4. All label requirements must be followed;
5. Active ingredients on the pesticide label must be exempt from the requirement of a tolerance for pesticide chemical residues on or in food.
6. Use of any pesticide must comply with the requirements of Connecticut General Statutes, as well as all requirements of the **Federal Worker Protection Standard**.

# Insect Pests

- European Corn Borer
- Corn earworm
- Aphids (types not identified)
- Southern corn rootworm or spotted cucumber beetle
- Plant hoppers (multiple types, types not identified)
- Anthomyiidae fly
- Japanese beetle
- Leafminer (type not identified)
- Mites (type not identified)
- Grasshoppers

# Diseases

- Septoria leaf spot
- Bipolaris leaf spot (suspected but not confirmed)
- Gray mold
- White mold

**Weeds:** All Native Weeds



# EPA Takes Steps to Provide Needed Clarity and Certainty for U.S. Agriculture

U.S. EPA Office of Chemical Safety and Pollution Prevention sent this bulletin at [Dec.19, 2019 09:31 AM EST](#)

“EPA is approving the use of 10 pesticide products on hemp in time for the 2020 growing season. Nine of these products are [biopesticides](#) and one is a [conventional](#) pesticide.”

Federal Register vol. 84, No. 243, Pg. 6929, (84 FR 58522)  
Wednesday, December 18, 2019 (Interim Final Rule)

**UConn** | COLLEGE OF AGRICULTURE,  
HEALTH AND NATURAL RESOURCES

EXTENSION

# Biopesticides

- Biopesticides are pesticides derived from natural materials such as animals, plants, bacteria, and certain minerals.
- For example, canola oil and baking soda have pesticidal applications and are considered biopesticides.

# Biopesticides fall into three major classes:

- (1) Microbial pesticides, Example: bacterium, fungus, virus or protozoan.
- (2) Plant-Incorporated-Protectants (PIPs), Bacillus spp. pesticidal protein introduced into the plant's own genetic material.
- (3) **Biochemical pesticides**, Example: mating disruption pheromones and plant extracts used as trap lures for insects.

# What EPA has Registered (on Dec. 19, 2019)

Debug-ON

Debug Optimo

Debug Turbo

Debug Tres

Stargus & Amplitude

Prevasyn

Defguard

Azamax

Regalia Biopesticide

Exile - conventional pesticide

# Debug Products all ECs

- **Debug On EC: Neem Oil Only, 70.0%, other 30.0%**
  - **“CAUTION”** Harmful if absorbed through skin or if inhaled. Causes moderate eye irritation.  
Pests Controlled: Most effective on mites, aphids and whiteflies, curative control of powdery mildew
- **Debug Optimo EC: Margosa 49.%, Azadriachtin 0.70%, other 84.26%**
  - **“CAUTION”** Harmful if absorbed through skin or if inhaled. Causes moderate eye irritation.
- **Debug Tres EC : Margosa 4.70%, Azadriachtin 3.00%, other 92.3.0%**
  - **“WARNING”**, Harmful if absorbed through skin or inhaled. Causes substantial but temporary eye injury.
- **Debug Turbo EC: Margosa 65.80%, Azadriachtin 0.70%, other 33.50%**
  - **“CAUTION”** Harmful if absorbed through skin or if inhaled. Causes moderate eye irritation.

# Azadirachtin



**Active Ingredient:** **Azadirachtin** comes from the *Azadirachta indica* tree (India and Southern Asia), seeds are soaked overnight in water then ground into powder that is then sprayed onto crops.

**Mode of Action:** **Azadirachtin** does not directly kill insects. It acts as an antifeedant, repellent, and egg-laying deterrent and thus protect the crop from damage. The insects starve and die within a few days. It also suppresses the hatching of pest insects from their eggs.

# Margosa aka Neem Oil



- **Active Ingredient: Azadirachtin** seeds are cold pressed to extract the oil from the seeds.

Margosa or Neem oil works in several different ways;

1.) The oil suffocates the insect

2). It has a repellent effect on certain insects and mites. Neem oil prevents the germination and penetration of some fungal spores. In one study, researchers discovered that a one percent neem oil treatment was effective in managing powdery mildew

# All Debug Products ECs

**Type of Pesticide:** Antifeedant, Insect Repellent, Insecticide, Miticide, Fungicide & Nematicide

**Sites:** Agriculture, Horticulture & Greenhouses, Golf Courses, Turf, Parks & Ornamentals, Home Gardens, Hemp

**Pests Controlled:** Insects, Mites, Diseases, Nematodes,

**Diseases Listed:** *Phylloxera, Phythium, Psylla, Rhizoctonia, Solani, Sclerotinia, Sclerotiorum, (powdery mildew)*



# Debug ON EC



- **Debug On EC: Neem Oil Only, 70.0%, other 30.0%**
- **Note on Pests Controlled:** Most effective on mites, aphids and whiteflies, curative control of powdery mildew
- **Mfg.Recommends:** Using **DEBUG–ON** as a preventative application even if there is not infestation. Start applying when the plants are tall enough to be susceptible to infestation. Repeat application every 10 to 15 days.

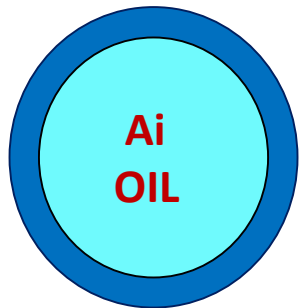
# Debug Products all ECs

- **Debug On EC:** Oils of Margosa (NEEM) **70.0%**, other 30.0%
- **“CAUTION”** Harmful if absorbed through skin or if inhaled. Causes moderate eye irritation.  
Pests Controlled: Most effective on mites, aphids and whiteflies, curative control of powdery mildew
- **Debug Optimo EC:** Margosa **49.0%**, Azadriachtin **0.07%**, other 84.26%
- **“CAUTION”** Harmful if absorbed through skin or if inhaled. Causes moderate eye irritation.
- **Debug Tres EC :** Margosa **4.70%**, Azadriachtin **3.00%**, other 92.3.0%
- **“WARNING”**, Harmful if absorbed through skin or inhaled. Causes substantial but temporary eye injury.
- **Debug Turbo EC:** Margosa **65.80%**, Azadriachtin **0.07%**, other 33.50%
- **“CAUTION”** Harmful if absorbed through skin or if inhaled. Causes moderate eye irritation.

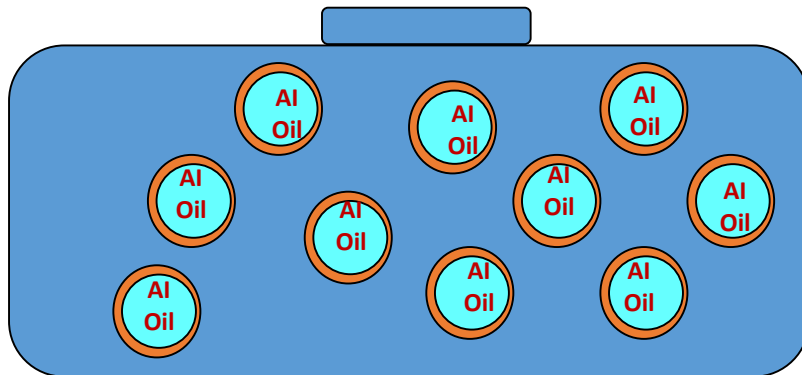
# All Debug Products are ECs (Emulsible Concentrates)

- One liquid dispersed within another liquid  
like milk

**Ai** is dissolved in oil (oil/ai droplet) and mixed with an emulsifier



**Ai/Oil** mixture is suspended in water forming a white emulsion



# REGALIA<sup>®</sup> Bioprotectant Concentrate



**Active Ingredient:** *Reynoutria sachalinensis* (*Polygonum*, related to giant knotweed), a plant extract.

**Mode of Action:** to boost the plants' defense mechanisms to protect against certain fungal and bacterial diseases, and to improve plant health. Increases the plant's defense system due to a five-fold increase in phenolics and antioxidants which strengthens cell walls.

**Brand Names:** REGALIA<sup>®</sup> Biofungicide Concentrate, REGALIA<sup>®</sup> PTO Biofungicide, REGALIA<sup>®</sup> Rx Biofungicide, REGALIA<sup>®</sup> Rx, Regalia<sup>®</sup> CG, Regalia ST, Regalia Rx Plant Health, REGALIA<sup>®</sup>

# REGALIA® Bioprotectant Concentrate



Type of Pesticide: Group P 5, fungicide

Sites: Specialty Crops; Row Crops; Greenhouse

Pests Controlled: Can be used to control certain diseases of container, bench, flat, plug, bed or field-grown ornamentals and edible crops in greenhouses, shade-houses, outdoor nurseries, retail nurseries and other landscape areas. For greenhouse application on the crops and diseases.

# Stargus and Amplitude



- **Active Ingredient:** *Bacillus amyloliquefaciens* strain F727, cells and spent fermentation media, 96.40%  
Other Ingredients 03.60%
- **Brand Names:** Stargus, Stargus CG, Amplitude, MBI-110 ST, Amplitude ST, Stargus ST, Stargus Biofungicide, Amplitude Biofungicide, Stargus CG Biofungicide, MBI-110 EP Biofungicide
- **Type of Pesticide:** broad-spectrum biofungicide/bactericide for control and suppression of fungal and bacterial plant diseases.

# Stargus and Amplitude



- **Mode of Action:** The active ingredient is a beneficial growth-promoting rhizobacterium that colonizes plant root hairs, leaves and other surfaces to prevent establishment of fungal and bacterial plant diseases.
- **Note:** Stargus and Amplitude have a protective effect because it inhibits spore germination and a curative effect because it inhibits mycelial growth and sporulation of the fungus on the leaf surface.

However, optimum disease control is achieved when MBI-110 EP is applied preventatively in a regularly scheduled protective spray program and used in rotation or tank-mix program with other registered fungicides.

- **Sites:** Agricultural Crop Use, Turf & Ornamental, Home & Garden Use

# Stargus and Amplitude



- **Signal Word:** “**Caution**” Protective eyewear and Respirators required, mixers/loaders and applicators must wear a NIOSH-approved particulate filter with any N, R, or P filter with NIOSH approval number prefix TC-84A; or a NIOSH-approved powered air purifying respirator with an HE filter with NIOSH approval number prefix TC-21C. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.
- **Pests controlled:** numerous fungal and bacterial diseases including, Hemp canker (*Sclerotinia sclerotiorum*) and Hemp Leaf Spot (*Bipolaris sp.*)



# Prevasyn



- **Active Ingredients:** Capsicum oleoresin extract 7.60%  
Garlic oil 23.40%  
Soybean oil 9.70%
- **Type of Pesticide:** insect repellent- insecticide concentrate
- **Sites:** For use on outdoor and greenhouse food and non food crops, ornamental flowers, hemp, trees, shrubs and plants, landscapes, parks and recreational areas.

# Prevasyn



- **Signal Word:** “CAUTION”, Harmful if absorbed through skin. Avoid contact with skin, eyes or clothing. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.
- **Pests Controlled:** Mites, thrips, psyllids leafhoppers lepidoptera larvae, white flies. Other pests such as borers, mealy bugs and plant bugs.

# Prevasyn



- **Mfg. Note:** Prevasyn has been evaluated for phytotoxicity on a wide range of crops and ornamentals. However, since testing on all varieties of all crops and ornamentals is not feasible, testing a small portion of the area to be treated for phytotoxicity is recommended before treating the entire area.

# Defguard



- **Active Ingredient:** *Bacillus amyloliquefaciens* strain D747 98.85%  
Other Ingredients 1.15%
- **Brand Names:** Defguard, Black Shield, Phase-Out
- **Type of Pesticide:** Aqueous suspension biofungicide/bactericide

# Defguard



- **Sites:** Vegetables, tree fruit, berries, herbs and spices, coffee, cereal grains, hops, and hemp.
- **Signal Word:** “CAUTION”, Mixer/loaders and applicators must wear a NIOSH approved particulate filter with any N,R, P filter with NIOSH approval number prefix TC-84A; or a NIOSH approved powered air purifying respirator with an HE filter with NIOSH approval number prefix TC-21C. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

# Defguard



- **Pests Controlled:** Diseases on foliage, flowers, fruit, and hemp or other above ground parts of plants. Also, for soil borne diseases infecting seeds, seedlings, roots, crown, stems or other plant parts below ground or in contact with soil.
- **Mfr. Notes:** Tank mix or rotate with copper-based fungicides at label rates for improved control.

# AZAMAX

- **Active Ingredient:** Azadirectin 1.20%  
Other Ingredients 98.8%
- **Type of Pesticide:** Botanical, Antifeedant, Insect Repellent, Insecticide Growth Regulator
- **Sites:** Greenhouse and outdoor food crops, ornamental flowers, hemp, trees, shrubs and plants



# AZAMAX



- Signal Word: **“CAUTION”** Harmful if swallowed, absorbed through skin or if inhaled. Causes moderate eye irritation. Avoid breathing vapor. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.
- Pests Controlled: pea aphid, Rosy apple aphid, Japanese beetle, peachtree borers, peach twig borers, Lygus bugs and stink bugs, caterpillars, flies, leafhoppers leafminers, white flies, mealy bugs psyllids weevils, scales, thirps.
- Mode of Action: target pests on contact or by ingestion, acts on pests by way of repellence, antifeedance and interference with the molting process.



# Exile M-Bold or Bane conventional registered pesticide.



- **Active Ingredient:** Potassium Salts of Fatty Acids 49.0%  
Other Ingredients 51.0%
- **Brand Names:** EXILE , M-BOLD, BANE, Exile PRO
- **Type of Pesticide:** Insecticide Miticide, Fungicide
- **Sites:** Indoor, Greenhouse and Outdoor

# Exile, M-Bold or Bane conventional registered pesticide

- **Signal word:** “**WARNING**”, Causes substantial but temporary eye injury and skin irritation.



- **Pests Controlled:** This product may be used only as a foliar spray to control or suppress soft bodied pests which include:

This product is most effective on mites, aphids and whiteflies. Effects on other pests are limited to early growth stages and eggs. This product provides curative control of powdery mildew.

When hemp was last produced in major quantities, during World War II, only one insect was mentioned as significant to production (Willsie et al. 1942)

## European corn borer

*Ostrinia nubilalis*



Photograph from the website of the Canadian Hemp Trade Alliance



Photographs courtesy of Frank Peairs





**What kinds of arthropods will we find associated with hemp in this new era?**



Copyrighted material

# HEMP DISEASES AND PESTS

MANAGEMENT AND  
BIOLOGICAL CONTROL

J.M. McPartland, R.C. Clarke  
and D.P. Watson

KOPPERT  
BIOLOGICAL SYSTEMS

GW Pharmaceuticals Ltd  
Copyrighted material

  
CABI Publishing

**This book has very well summarized the information known about hemp pests, worldwide, prior to 2000.**

<https://www.amazon.com/Hemp-Diseases-Pests-Cabi-McPartland-ebook/dp/B00DUXGA6M>

# Koppert Biological Systems [www.koppert.nl/](http://www.koppert.nl/)



**KOPPERT**  
BIOLOGICAL SYSTEMS

- [Contact Koppert](#)
- [Languages](#) »
- [The company](#)
- [Subsidiaries](#) »
- [Distribution](#)
- [Pest control products](#)
- [Guidelines](#)
- [Pests/Diseases](#) »
- [Pollination products](#)
- [Crops](#) »
- [Support](#)
- [Research](#)
- [Side effects](#)
- [News](#)
- [Crop tips](#)



Providing state of the art biological control and natural pollination for professional growers around the world

ENGLISH





**Nematode products reformulated**  
ENTONEM and LARVANEM have recently been improved. A new formulation technique was developed which results in "High Concentrate" (HC) products with the same amount of nematodes but only 50% of the carrier material.

[Read further >>](#)

**BEMIPAR to combat Bemisia tabaci**

With the production of the parasite *Eretmocerus mundus* Koppert has developed an effective solution against *Bemisia tabaci*. During the past year and a half, BEMIPAR has already solved big problems for numerous Spanish growers.

[Read further >>](#)

# The Future –Research is Needed

Agronomic practices

Certified seed

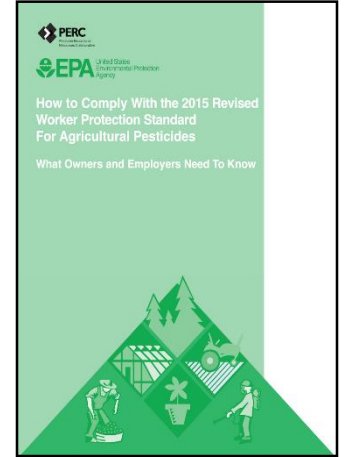
Market development

Processing methods

Pest Management

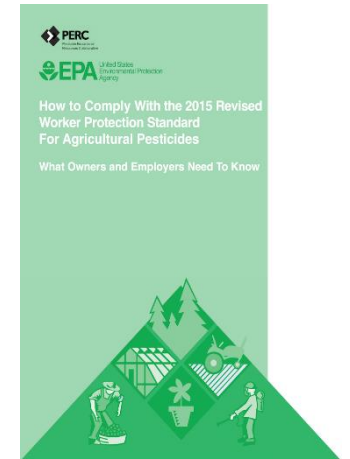
# EPA's Worker Protection Standard

Revised 2015



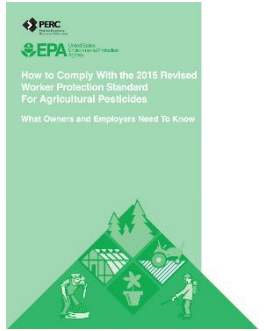


# Objectives of the WPS: Inform, Protect, Mitigate



The 2015 revisions to the WPS regulation strengthened elements of the existing rule to better protect workers and handlers from occupational exposure to pesticides and reduce the numbers of potentially preventable pesticide incidents and illnesses.

The 2015 revisions also ensure workers and handlers receive workplace protections comparable to those that are already provided to workers in other industries, while still considering the unique needs of agricultural operations.



# Goals of the Revised WPS

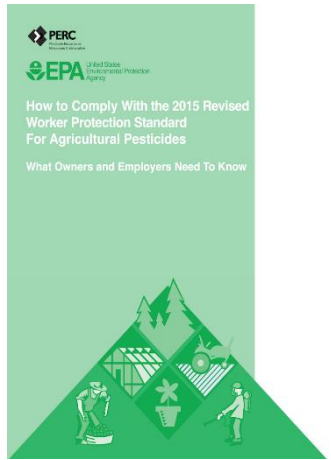
- Improve **occupational protections for agricultural workers and handlers** to make them comparable to those for workers in other industries covered by OSHA
- Reduce **acute occupational pesticide exposures** and incidents
- Reorganize and streamline rule to make it **easier to understand and follow**
- Address concerns raised through **years of stakeholder engagement** through EPA's Federal Advisory Committee, the National Assessment process, and in meetings with regulatory partners



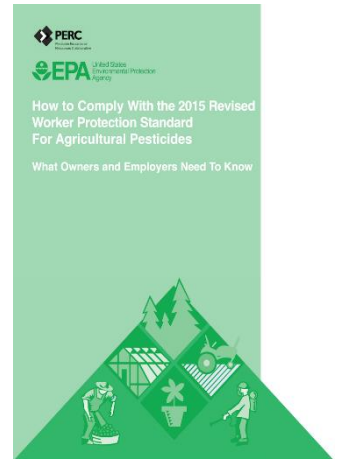
# Key Revisions to WPS

**Protect** workers, handlers and other people from exposure to pesticide

- If labeling requires respirator for handler, provide medical evaluation, fit testing and respirator training
- Application exclusion zone during applications
- Handlers and early-entry workers must be 18 years old



# Key Revisions to WPS



**Mitigate** any pesticide exposures that workers or handlers receive

- Provide routine decontamination supplies for workers, handlers and early-entry workers
- Provide eyewash system for mixers/loaders if labeling requires protective eyewear