

Protecting Pollinators— Everyone's Job

Ronda Hirnyck

University of Idaho Extension Pesticide Specialist

rhirnyck@uidaho.edu



A close-up photograph of two bees on a golden honeycomb. The bee on the left is facing left, and the bee on the right is facing right. Both bees have yellow and black striped abdomens and translucent wings. The honeycomb cells are hexagonal and filled with a golden substance.

Bee
Aware!

**What You can do as a Pesticide Applicator
to Safeguard Bees from Pesticide Poisoning.**



Slide Presentation Credits

- Sherman Takatori, ISDA
- Thia Walker, Colorado State University
- Bill Skelton and Wayne Buhler, North Carolina State University



INTRODUCTION

- The importance of pollinators
- The status of pollinators and what is proposed to reduce impacts
- How pesticide applicators can help protect pollinators
- How to minimize risks to pollinators from pesticides



Who is a pollinator?



Why care about pollinators?

**Wild lands and the environment
– the value is incalculable**

**80 % of all
flowering plants
require animal
pollinators**



Why care about pollinators?

- The majority of flowering plants in our environment depend on pollinators for seed and fruit production
- **Human consumption**
- **Food for wildlife:**
 - Song birds
 - Elk
 - Deer
 - Grouse
 - Wild turkeys
 - Bear



DO YOU OWN THE LAND?

- Protect vegetation within ½ mile of cropland: shrub land, grassland, riparian and wetlands, suburban woods, and non-invasive weedy areas
- Protect farmscape features: permanent meadows with wildflowers; hedgerows, windbreaks, fencerows, annual flowering cover crops allowed to bloom, source of clean surface water



Importance of Pollinators

- Essential to the production of more than 90 crops in the U.S.
- **1 out of every 3 bites** of food we eat daily can be attributed to pollinators.



Your Grocery Store Without Bees



Marla Spivak, UMinn



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750,000+ acres of almonds in Central CA require 1.5 million colonies of honey bees for pollination



No Bees, No Nuts



Photo source: Coy's Honey Farm



Champion Pollinator of Food Crops: The European Honey Bee

Honey bees are relied on to perform most of the commercial pollination.

In Southern Idaho alkali and leafcutter bees are purchased by alfalfa seed growers to pollinate crops; part of their input costs.



Nicholas Calderone

A truckload of honey bee colonies



Tom Butzler,
Penn State

Pollinators are Important to Idaho Agriculture

- Crops Pollinated
- Seed crops:
- Alfalfa seed
- Clover seed
- Variety of vegetable seeds
- Canola and mustard
- Onions
- Sugar beets
- Alfalfa hay
- Peaches
- Apples
- Grapes
- Other fruits



Honey Bee Pollination

Adds more than \$15 billion in value to U.S.
agricultural crops each year



What is the current status of pollinators?



2013-2014 Honey Bee Overwintering Losses – 23.2% died over the winter (an unsustainable number)

-USDA /Bee Informed Survey



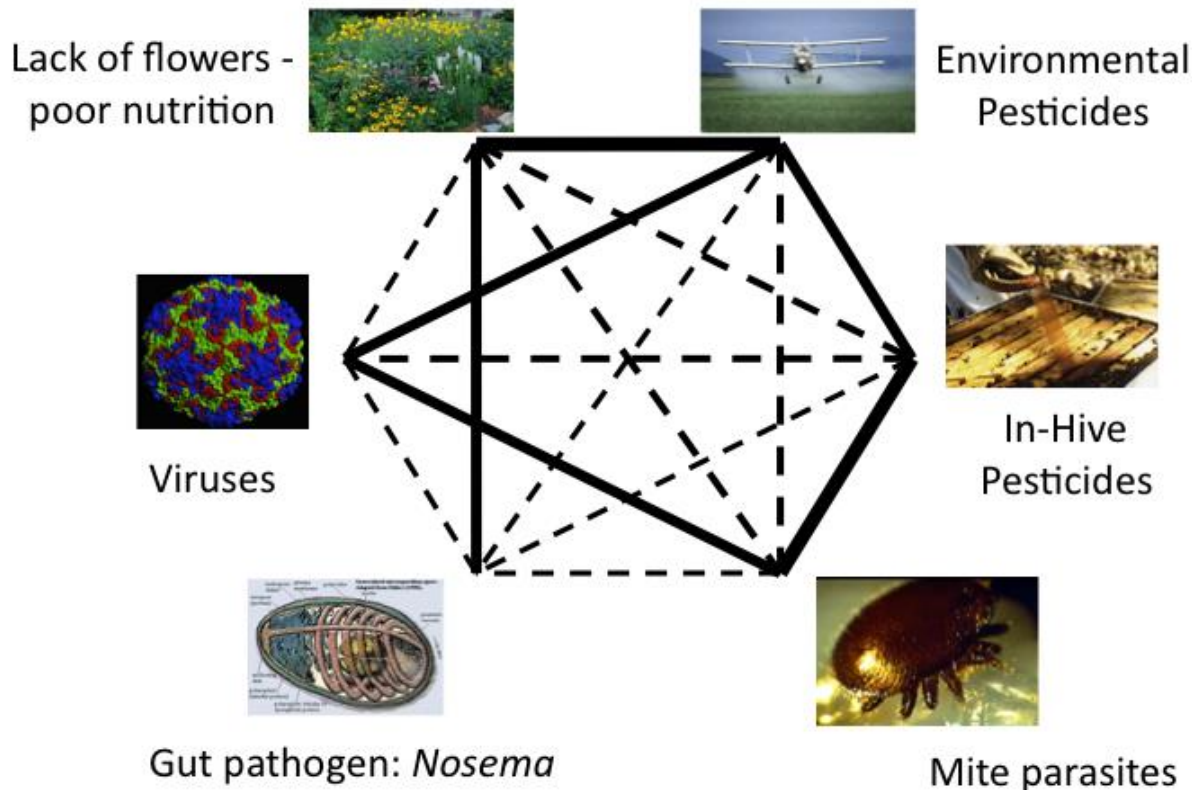
Colony Collapse Disorder

- Affects honeybee species.
- Worker bees disappear, fail to return to hive.
- Recognized and named in 2006.
- Is a world-wide issue.
- Potential for reduced production, and yields.



Causes of pollinator decline???

Several possible factors or a combination of them



Source: Marla Spivak, Univ. of MN

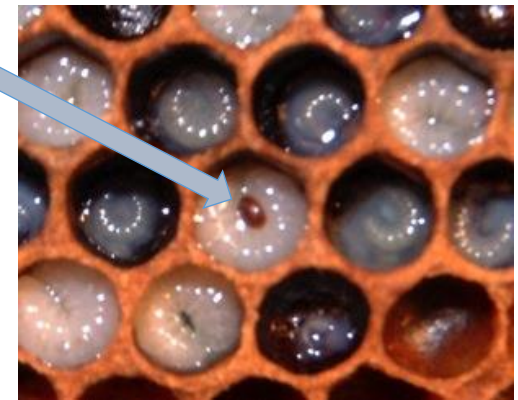


Varroa mite is the chief menace

Large mite
sucks bee blood
Circulates bee
viruses



Mite feeding on adult bee



Mite feeding on immature bees (brood)

Photo Source: M. Spivak, UMinn

Pesticide Issues and Colony Collapse Disorder

- Pesticide use in its relation to CCD is not completely understood.
- Sublethal effects on honey bees are being studied.
 - Further studies are needed to establish the risks, and possible link to population decline.
 - Herbicides and Fungicides need to be further researched to their possible effects on honey bee populations.



Significant Issues



- More research is needed to determine the effects of neonicotinoids, pyrethroids, organophosphates, and carbamates on honey bees.
- Weed control efforts may have reduced the nutrition for colony health.



Federal Strategy to Promote the Health of Honey Bees and Other Pollinators

- In effect June, 2014
- Serious problem & requires immediate attention
- Ensure sustainability of food production
- Avoid additional economic impact on the agricultural industry
- Protect the health of the environment



Federal Actions

- Establish the Pollinator Health Task Force
- National Pollinator Health Strategy
- Studies of the health of managed and native bees
- Expanded collection and sharing of data related to pollinator losses
- Assessments of the status of native pollinators
- Strategies to develop affordable pollinator-friendly seed mixes
- Identify existing and new methods and practices to reduce pollinator exposure to pesticides
- Restoration of pollinator habitat



EPA's Proposal to Protect Bees from Acutely Toxic Pesticides

Prohibit applications of pesticides highly toxic to bees when:

- Crops are in bloom
- Bees are under contract for pollination services

Applies to:

- Liquid or dust formulations
- Foliar use
- Active ingredients highly toxic to bees (less than 11 micrograms/bee)



EPA's Proposal to Protect Bees from Acutely Toxic Pesticides

State and Tribal managed pollinator protection plans:

- **Address use of highly toxic pesticide in areas where managed bees are present**
- **Gives states the flexibility to develop a management plan based on their concerns**
- **Methods for applicators to know if managed bees are nearby**
- **Methods for applicators to identify and contact beekeepers prior to application (a registry)**
- **Best management practices to mitigate risk of pesticides to bees**



POLLINATOR PROTECTION IS A PRIORITY!



Which pesticides can harm pollinators?

- ***Insecticides with these active ingredients:***

- Organophosphate
- Carbamates
- Synthetic pyrethroids
- Pyrethrin
- Neonicotinoids

- ***Herbicides***

- Through reduced floral resources
- MSMA, paraquat,

- ***Fungicides***

- Rarely cause any problems...Captan? Rovral?



Pesticide Toxicity to Honey Bees

Most poisoning occur when bee-toxic insecticides are applied to crops during the BLOOMING PERIOD

Poisoning of pollinators:

- 1. DRIFT of pesticides onto adjoining crops or plants that are in bloom**
- 2. CONTAMINATION OF FLOWERING GROUND COVER plants when sprayed with pesticides**
- 3. Pesticide RESIDUES, PARTICLES, OR DUSTS picked up by foraging pollinators and taken back to the colony**
- 4. Pollinators drinking or touching CONTAMINATED WATER sources or dew on recently treated plants**



EPA Pesticide Assessment for bee toxicity

- 1. Honey bee acute contact—lab study determines the amount that kills 50% of bees tested**
- 2. Honey bee toxicity of residues on foliage—lab study determines the amount of time that pesticide residues on leaves remain toxic to bees**
- 3. Field testing for pollinators—conducted if the above tests cause an toxic impact to bees**



| Toxicity Group (defined by EPA) | Precautionary statement (product HAS extended residual toxicity) | Precautionary statement (product has NO extended residual toxicity) |
|---|--|--|
| I: <i>acute LD₅₀ ≤ 2 mgr/bee</i> | This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area. | This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area. |
| II: <i>acute LD₅₀ > 2 mgr./bee but < 11mgr/bee</i> | This product is toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product if bees are visiting the treatment area. | This product is toxic to bees exposed to direct treatment . Do not apply this product if bees are actively visiting the treatment area. |



Even Pesticides used in Organic Production can be toxic!

| PESTICIDE | NON-TOXIC | LOW TOXICITY | HIGHLY TOXIC |
|---|-----------|--------------|--------------|
| Insecticides/Repellants/Pest Barriers | | | |
| <i>Bacillus thuringiensis</i> (Bt) | | | |
| <i>Beauveria bassiana</i> | | | |
| <i>Cydia pomonella</i> granulosis | | | |
| Diatomaceous Earth | | | |
| Garlic | | | |
| Insecticidal Soap | | | |
| Kaolin Clay | | | |
| Neem | | | |
| Horticultural Oil | | | |
| Pyrethrins | | | |
| Rotenone | | | |
| Sabadilla | | | |
| Spinosad | | | |
| Herbicides/Plant Growth Regulators/Adjuvants | | | |
| Adjuvants | | | |
| Corn Gluten | | | |
| Gibberellic Acid | | | |
| Horticultural Vinegar | | | |
| Fungicides | | | |
| Copper | | | |
| Copper Sulfate | | | |
| Lime Sulfur | | | |
| Sulfur | | | |



Eric Mader – The Xerces Society for Invertebrate Conservation

**PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND
DOMESTIC ANIMALS**

CAUTION: Harmful if absorbed through the skin. Causes moderate eye irritation. Avoid contact with skin, eyes, or clothing. Wash thoroughly with soap and water after handling.

FIRST AID

IF ON SKIN: Wash with plenty of soap and water. Get medical attention.

IF IN EYES: Flush eyes with plenty of water. Call physician if irritation persists.

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.

As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not apply directly to water. Do not contaminate water when disposing of equipment washwaters or rinsate.

BEE HAZARD

This product is toxic to bees exposed to direct treatment. Do not apply this product while bees are actively visiting the treatment area.

PHYSICAL AND CHEMICAL HAZARDS

Do not use or store near heat or open flame.



Triple Action Neem Oil

**Broad Spectrum Fungicide/Insecticide/Miticide
For Indoor/Outdoor Use on
Ornamental Flowering Plants,
Trees, Shrubs, Foliage,
Vegetables, Fruits, Nuts and
Home and Residential Landscapes**

ACTIVE INGREDIENT:

Clarified Hydrophobic Extract of Neem Oil 70%

INERT INGREDIENTS: 30%

TOTAL 100%

Neem Oil is a registered product of Certis USA



KEEP OUT OF REACH OF CHILDREN CAUTION

See Side Panel for additional PRECAUTIONARY STATEMENTS

Distributed By:

Southern Agricultural Insecticides, Inc.

Palmetto, FL 34220 Hendersonville, NC 28793 Boone, NC 28607
E.P.A. Reg. No. 70051-2-829 J1 E.P.A. Est. No. 829-FL-1

Net Contents Liquid: 1 Pint (.474liters)

Controls Fungal Diseases Including Black Spot, Mildews, Rusts, and Scab. Kills Mites and Insects Including Whiteflies, Aphids, and Scales.



The specific Directions for use of this product are located inside of label.

Follow directions on side of label to open.



0 51538 08722 3

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PULL HERE TO OPEN ►

RESTRICTED USE PESTICIDE

DUE TO TOXICITY TO FISH AND AQUATIC ORGANISMS

FOR RETAIL SALE TO AND USE ONLY BY CERTIFIED APPLICATORS, OR PERSONS UNDER THEIR DIRECT SUPERVISION, AND ONLY FOR THOSE USES COVERED BY THE CERTIFIED APPLICATOR'S CERTIFICATION.

GROUP **3** INSECTICIDE



Warrior II[®]

with Zeon Technology[®]

Insecticide

Active Ingredient:

Lambda-cyhalothrin^{1,2} 22.8%

Other Ingredients: 77.2%

Total: 100.0%

Warrior II with Zeon Technology contains 2.08 lbs. of active ingredient per gal. and is a capsule suspension.

¹CAS No. 91465-08-6 ²Synthetic pyrethroid

Contains petroleum distillate.

KEEP OUT OF REACH OF CHILDREN.

WARNING / AVISO

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

See additional precautionary statements and directions for use in booklet.

EPA Reg. No. 100-1295 EPA Est. 39578-TX-1

Product of the United Kingdom

Formulated in the USA

SCP 1295A-L2B 0709

Environmental Hazards

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are visiting the treatment area.

®

Warrior II[®]



RESTRICTED USE PESTICIDE

Due to Toxicity to fish and aquatic organisms

For retail sale to and use only by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator's certification.



25 WP Insecticide

EPA Reg. No. 279-3051

EPA Est. 279-IL-1

Active Ingredients:

By Wt.

| | |
|-------------------|--------|
| *Permethrin** | 25.0% |
| Other Ingredients | 75.0% |
| | 100.0% |

*(3-Phenoxyphenyl)methyl (±) cis-trans 3-(2,2-dichloroethenyl)-2, 2-dimethyl-
clopropanecarboxylate

**cis/trans ratio: Max. 55% (±) cis and min. 45% (±) trans

KEEP OUT OF REACH OF CHILDREN
WARNING
AVISO

No Extended
Residual Toxicity
warnings

Environmental Hazards

This pesticide is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds while bees are actively visiting the treatment area.



Products containing Carbaryl

INTENDED FOR AGRICULTURAL OR COMMERCIAL USE
Includes Residential Turf Spot Treatments

ACTIVE INGREDIENT:

Carbaryl (1-naphthyl N-methylcarbamate) 43.0% by wt.

INERT INGREDIENTS: 57.0% by wt.

(Contains 4 Pounds Carbaryl Per Gallon)

EPA Reg. No. 432-1227-72112

**KEEP OUT
OF REACH
OF CHILDREN
CAUTION**

ENVIRONMENTAL HAZARDS

BEE CAUTION: MAY KILL HONEYBEES AND OTHER BEES IN SUBSTANTIAL NUMBERS.

This product is highly toxic to bees exposed to direct treatment or residues on crops or weeds in bloom.

For crops in bloom, do not apply this product to target crops or weeds in bloom. Notifying beekeepers within 1 mile of treatment area at least 48 hours before product is applied will allow them to take additional steps to protect their bees. Limiting application to times when bees are least active, e.g., within 2 hours of sunrise or sunset, will minimize risk to bees.

MOST EXTENSIVE BEE LANGUAGE WARNING ON A LABEL!



What Can You Do...?



Pesticide applicators can help by reducing risks to honey bees and other pollinators

- Understand How Pesticides Can Harm Bees
- Recognize Pollinator Foraging Habits
- Read the Label
- Use IPM
- Follow Best Management Practices



Pollinator poisoning can occur from:

- **Direct exposure** during application
- **Residues** picked up through foraging (pollen and nectar) and taken back to the hive
- **Residues** from non-crop plants (ground cover, field edges, ditches, etc.)




The “Bee Advisory Box”


THE NEW EPA BEE ADVISORY BOX

On EPA's new and strengthened pesticide label to protect pollinators

PROTECTION OF POLLINATORS



APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.



Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators. Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:
<http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state/tribe, go to: www.aapco.org. Pesticide incidents can also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

Alerts users to separate restrictions on the label. These prohibit certain pesticide use when bees are present.

The new bee icon helps signal the pesticide's potential hazard to bees.


Makes clear that pesticide products can kill bees and pollinators.

Bees are often present and foraging when plants and trees flower. EPA's new label makes it clear that pesticides cannot be applied until all petals have fallen.

Warns users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.



Read EPA's new and strengthened label requirements: <http://go.usa.gov/jHH4>

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Product Labels

- All neonicotinoid labels will have application restrictions.
- Watch for the bee hazard icon in the Directions for Use section of the label.
 - Will indicate restrictions or mandates.



Pollinator protection statements should inform you of pesticide selection--and application timing--decisions

REMEMBER:

Take time, uninterrupted and undisturbed, to read and understand the label

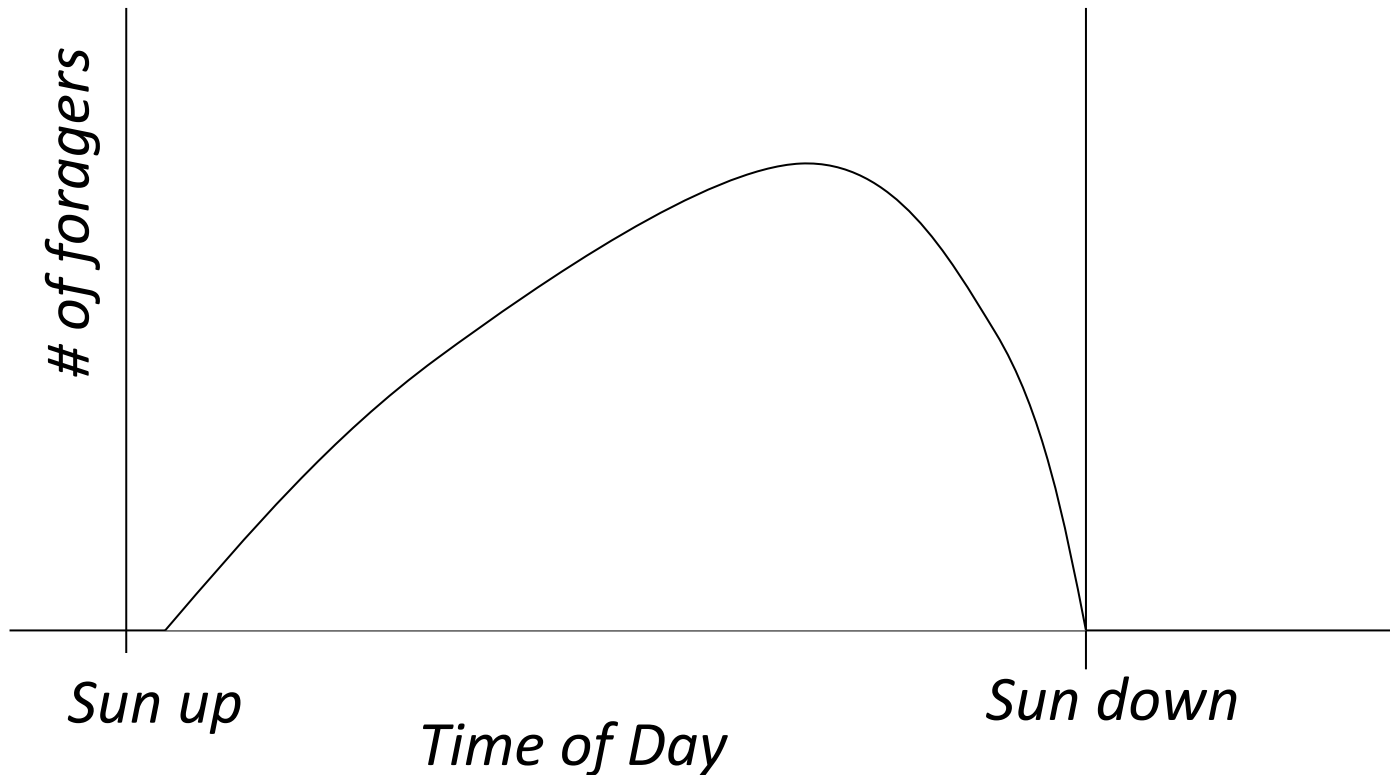


Your actions must protect bees during application (and afterwards!).

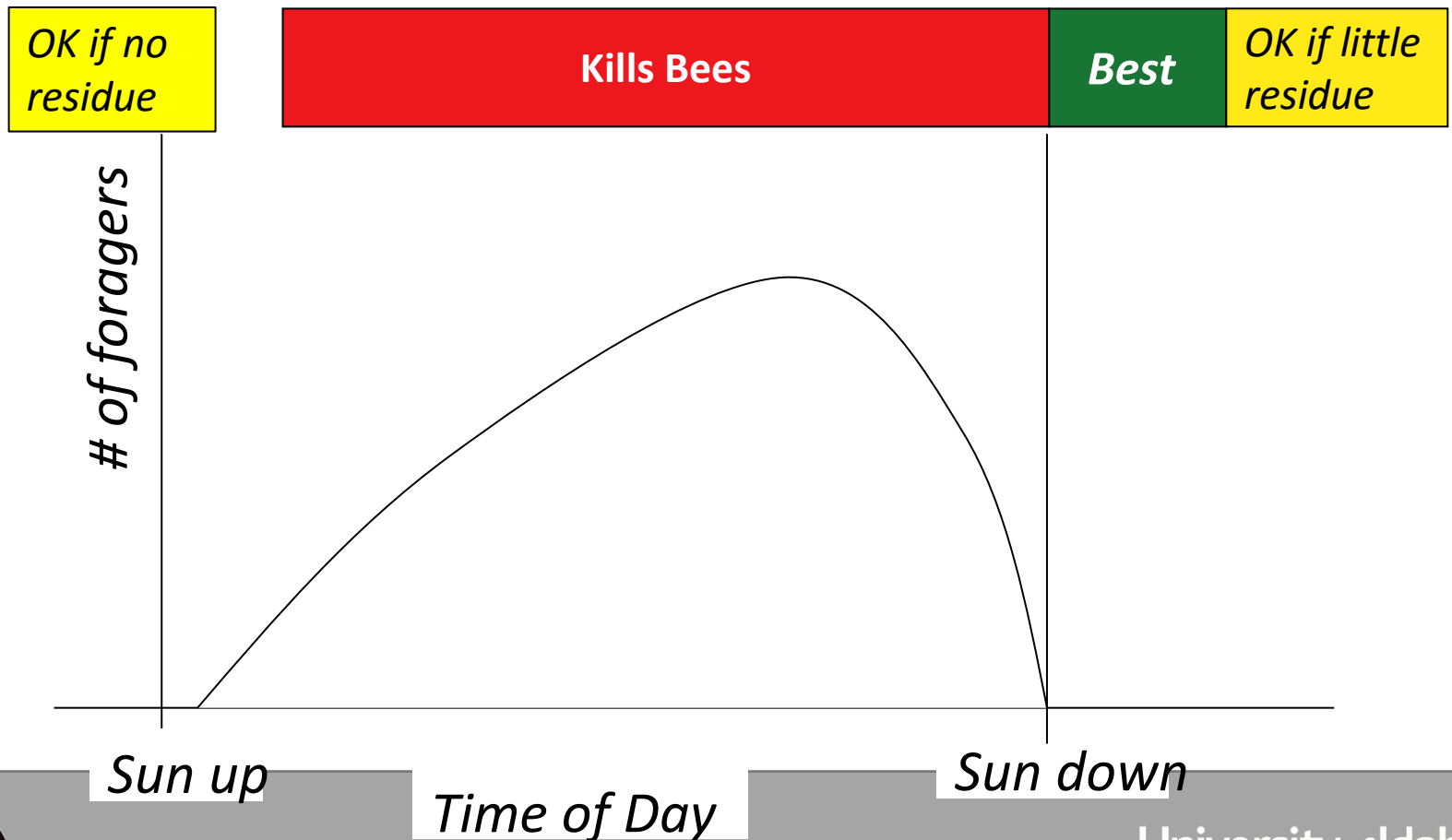


A Honey Bee's (Daily) Life

Honey bees forage sun up to sun down unless it's raining



Best time for pesticide application: Dusk to Dawn



Extended Residual Toxicity (ERT)

Compounds that remain toxic to bees for an extended period of time following foliar applications.



ERT pesticides should not be applied to blooming crops or weeds.



Pesticides with Extended Residual Toxicity

The *families* of pesticides most commonly associated with ERT include:

Organophosphates (e.g., acephate, chlorpyrifos, malathion)

Carbamates (e.g., carbaryl)

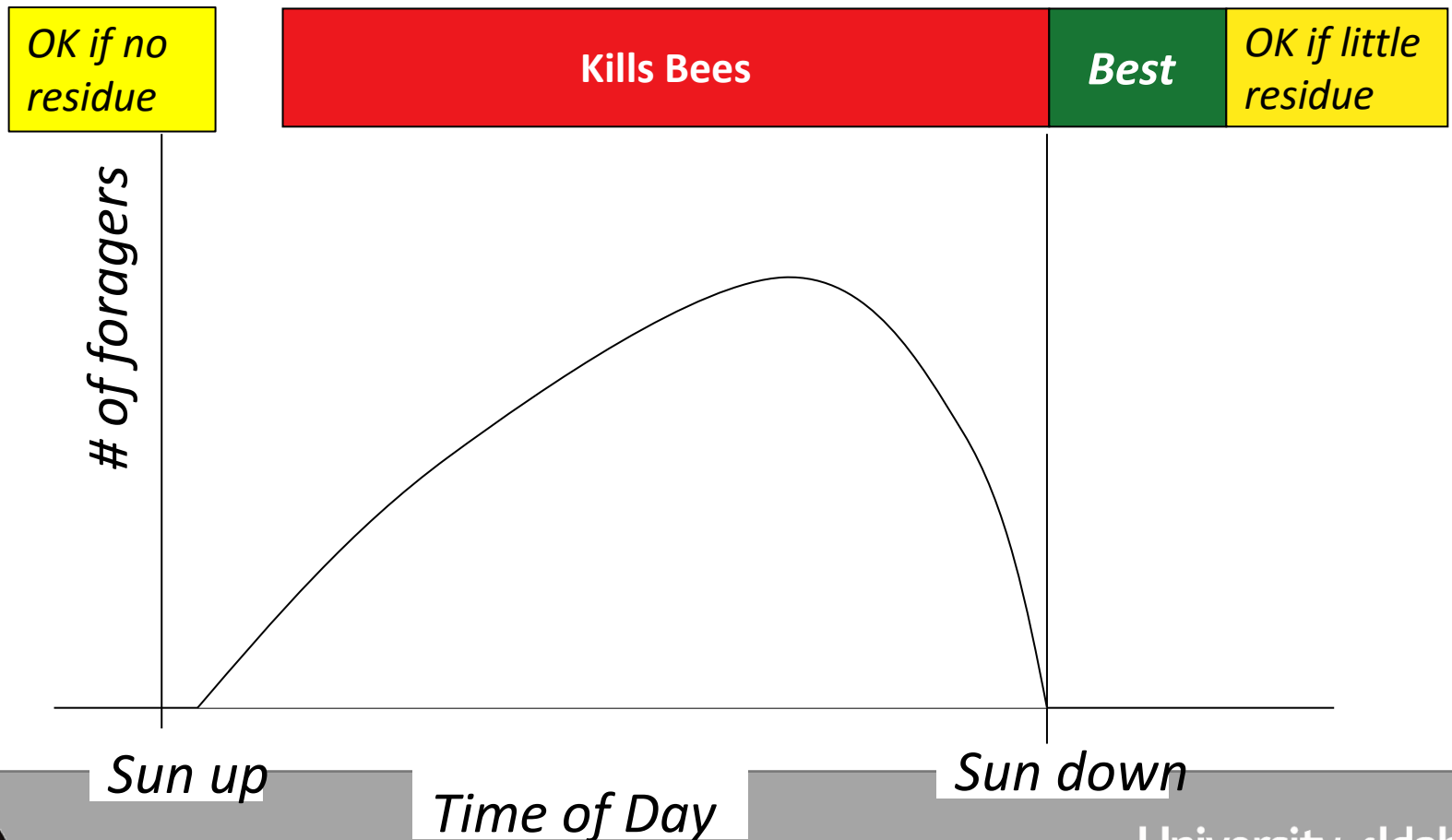
Neonicotinoids (e.g., imidacloprid)

Pyrethroids (e.g., deltamethrin and cyfluthrin)

Always read the label to determine if a pesticide leaves residues that are toxic to bees!



Best time for pesticide application: Dusk to Dawn



In Summary: Develop an IPM Plan

- Use a variety of tools beyond chemical controls only
- Use pesticides only when needed
- Determine the need for treatment through pest scouting or monitoring
- When using pesticides:
 - Read labels
 - Prevent drift



Before Application

- *Watch for the bloom!*

- Pollinators are more at risk when plants are blooming.
- Plan for applications or delay applications until bloom is over.
- Cover crops and weeds can be mowed to remove blossoms.



Before Application

- *Know what is in the area of your application.*

- Plants/crops attractive to bees
- Hives or nesting areas
- Water sources
- Foraging bees
- Backyard beekeepers



Before Application

- *Communication with beekeepers.*

- Contact beekeepers if hives are in the area at least 48 hours prior to application.
- If alfalfa seed operations are in the area, contact the grower to protect bees.



Before Application

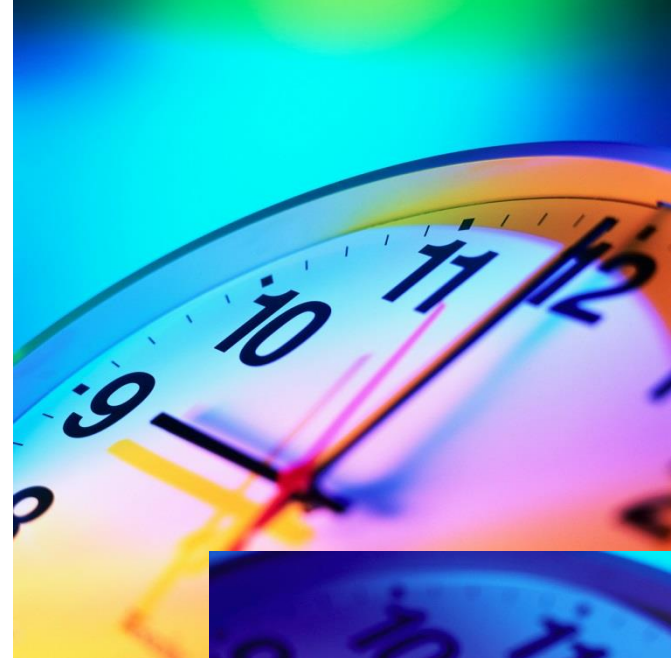
- *Check the weather.*

- Check temperatures, humidity (dewpoint), and cloud cover.
- Monitor wind speed and wind direction.
- Pay attention to forecasts beyond application times



During Application

- *Time application start to spray when bees are not active.*
- Late evening, evening, or morning hours after bees have returned to hives or nests.
- Does not mean that there will be no bee damage!



During Application

- *Watch Spray Drift!*

- Use correct spray nozzles.
- Use correct spray pressure.
- Watch weather and environmental conditions.



Key questions to consider

- What is the growth cycle of the crop?
- When will the crop be in bloom?
- What are the predicted dates that pests will need to be treated?
- What else is blooming in or near the field?
 - Cover crops
 - Weeds
 - Fencerow vegetation
 - Adjacent crops or orchards
- What pollinator activity is nearby?
- Can (non-crop) blossoms be removed by mowing or other methods before applying bee-toxic pesticides?



PROTECTING POLLINATORS IS IMPORTANT TO EVERYONE

