HOW TO ENSURE YOU GET CREDITS

- Hold an IDAHO pesticide applicator license
- Be present for the duration of the presentation
- Registered each applicator you plan to request credit for (group viewing doesn’t work)
- Accurately entered each applicator’s license number

University of Idaho Extension

IPM PART 1: PRINCIPLES OF IPM

DESIREÈ WICKWAR

UI INTEGRATED PEST MANAGEMENT PROGRAM MANAGER

Topic Itinerary:

1. What is IPM?
2. Monitoring tactics and tools
3. Identification, importance and resources

Where do you manage pests?

In what plants or setting?

Wait…what is a “pest”?

A Pest is…

- A destructive insect or other animal that attacks crops, food, livestock or human health…
- An annoying person or thing; a nuisance…
- An animal that is detrimental to humans or human concerns…

A pest is whatever you say it is!

Could a pest for one be a beneficial for another?

Could a pest for one be a beneficial for another?

A pesticide is….

Any substance or mixtures of substances that is intended to:

Prevent, destroy, repel or mitigate a pest

Be used as a plant regulator, defoliant or desiccant

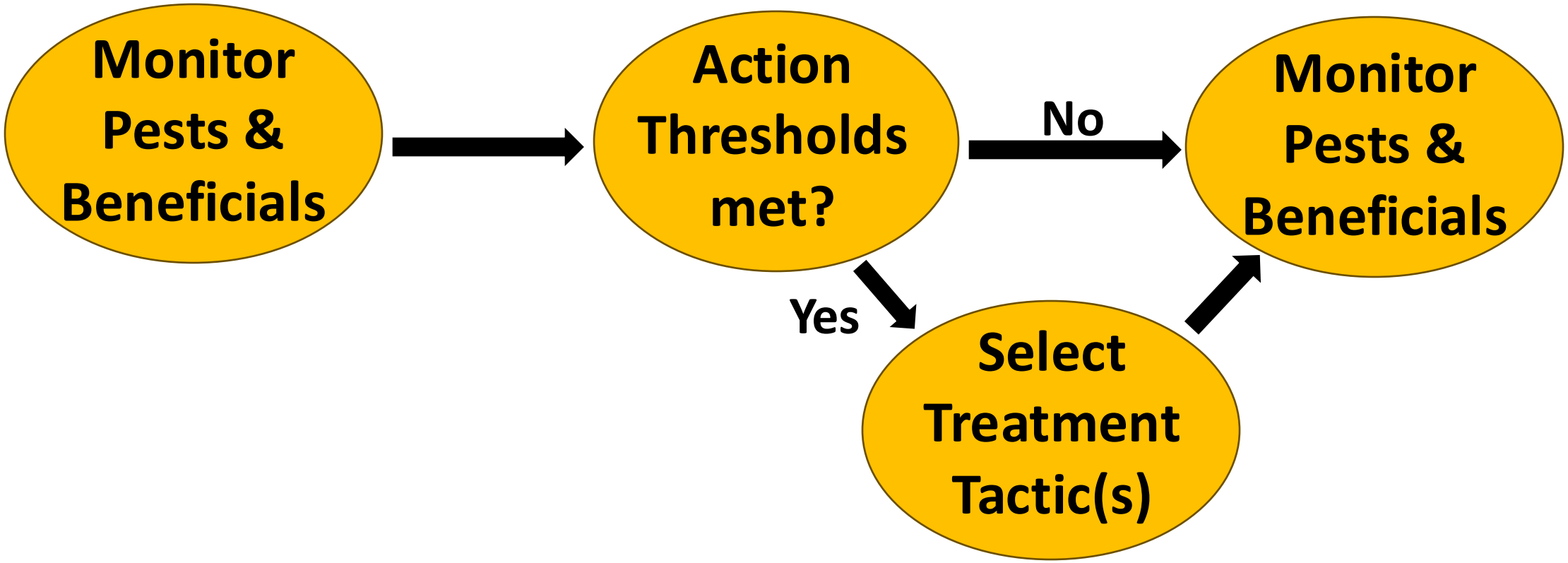
Act as a nitrogen stabilizer

(u) Pesticide

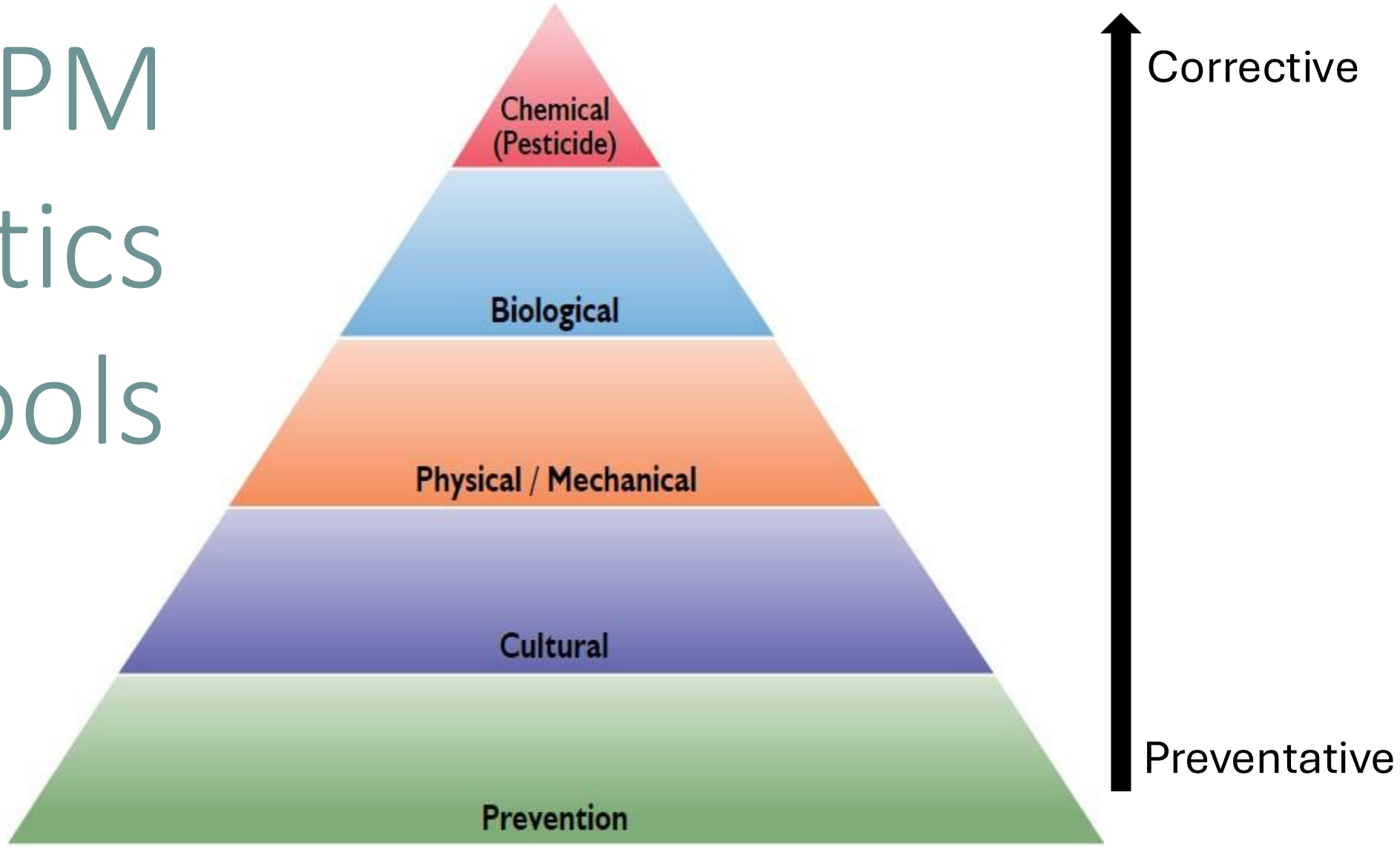
The term "pesticide" means (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, and (3) any nitrogen stabilizer, except that the term "pesticide" shall not include any article that is a "new animal drug" within the meaning of section 321(w) [1] of title 21, that has been determined by the Secretary of Health and Human Services not to be a new animal drug by a regulation establishing conditions of use for the article, or that is an animal feed within the meaning of section 321(x) [1] of title 21 bearing or containing a new animal drug. The term "pesticide" does not include liquid chemical sterilant products (including any sterilant or subordinate disinfectant claims on such products) for use on a critical or semi-critical device, as defined in section 321 of title 21. For purposes of the preceding sentence, the term "critical device" includes any device which is introduced directly into the human body, either into or in contact with the bloodstream or normally sterile areas of the body and the term "semi-critical device" includes any device which contacts intact mucous membranes but which does not ordinarily penetrate the blood barrier or otherwise enter normally sterile areas of the body.

U.S. Code Title 7, Chapter 6, Subchapter II, Section 136– Definitions - FIFRA

Integrated Pest Management (IPM)



IPM Tactics and Tools



Terms over time…

- “Integrated control” coined (1952)
- “Integrated control” defined as “applied pest control which combines and integrates biological and chemical control” (1959)
- “Pest management” coined (1966)
- “a pest management system, that, in the context of associated environment and population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains pest populations at levels below those causing economic injury” (1967)

But the idea of IPM isn’t new!

"The agriculture journals have from year to year, presented through their columns, various recipes, as preventive of the attacks, or destructive to the life, of the 'curculio,' the 'apple-moth,' the 'squash-bug,' etc. The proposed decoctions and washes we are well satisfied, in the majority of instances, are as useless in application as they are ridiculous in composition, and if the work of destroying insects is to be accomplished satisfactorily, we feel confident that it will have to be the result of no chemical preparations, but of simple means, directed by a knowledge of the history and habits of the depredators."

The Practical Entomologist (October 30, 1856)

What kind of IPM tool is each of these?

1,500 B.C.	First descriptions of cultural controls, especially manipulation of planting dates
324 B.C.	Chinese introduce ants in citrus trees to manage insects
300 A.D.	Predatory ants set up in citrus groves with bridges to move between trees.
~1000 A.D.	Date growers seasonally transport predatory ants from to oases to control pest ants Weeds controlled by mechanical removal with a hoe, crop rotations, and cultivation
1732 A.D.	Farmers first begin to grow crops in rows to facilitate weed removal
1763 A.D.	Linnaeus publishes a prize-winning essay that suggests using mechanical and biological control to manage orchard caterpillars
~1870 A.D.	Grape phylloxera & powdery mildew controlled through resistant root stocks & grafting
1888 A.D.	First major biological importation success (vedalia beetle for cottony cushion scale)
1901 A.D.	First successful biological control of a weed (lantana in Hawaii)
~1900 A.D.	Development of strains of cotton, cowpeas, and watermelon resistant to Fusarium

A significant shift in pest management…

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~1930s	**Widespread use of synthetic chemical pesticides**

Significant shifts…
including greater focus
on IPM

A short history of IPM…1960s

Silent Spring (1962)

- Rachel Carson publishes the book "Silent Spring" and brings the issue of pesticide safety to the attention of the public:
- Adverse effects on wildlife, water quality, human health?
- DDT found in milk and foods (biomagnification)
- Resistance of pests to pesticides ("super bugs" and weeds)
- Response to book leads eventually to public policy changes in 1970s.

A short history of IPM…1970s

- Serious beginning of research on IPM approaches to pest control
- USDA creates nationwide IPM Program in Land Grant Universities
- EPA created & given jurisdiction over pesticide registration & regulation
- Institutes Pesticide Education Programs in Land Grant Universities

A short history of IPM...1980s

- Increase in IPM research
- Beginning of genetic engineering applications in agriculture

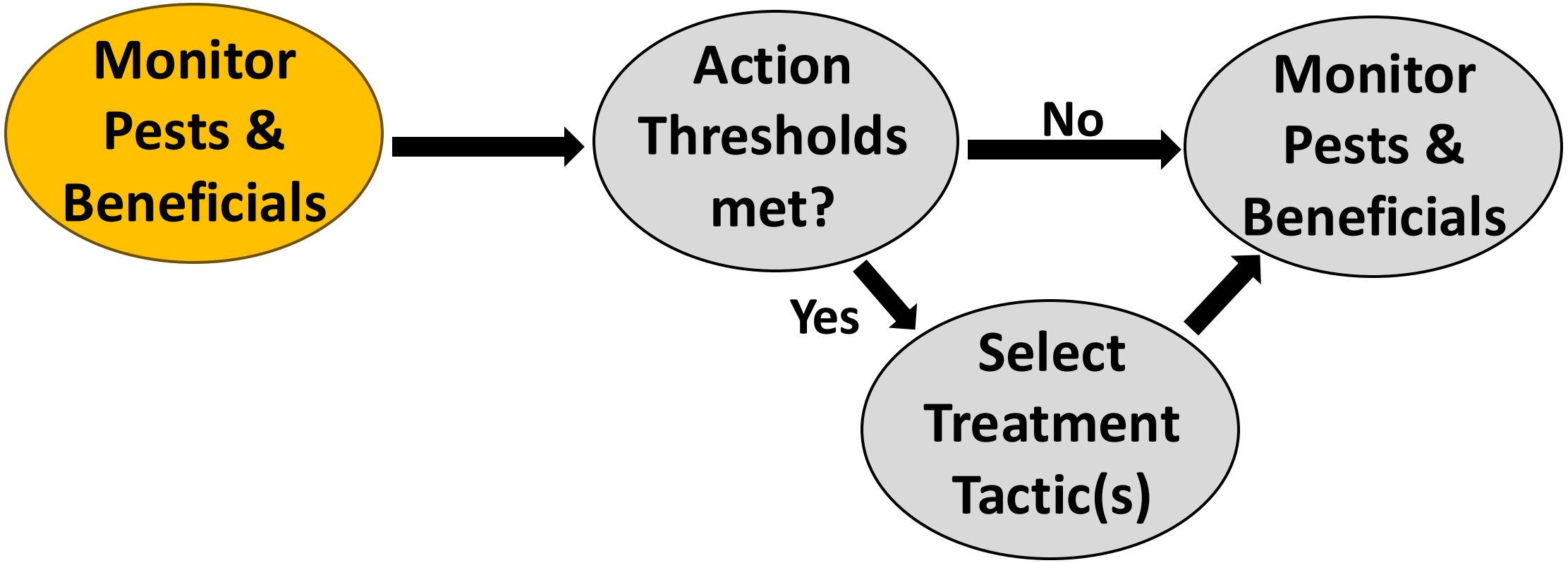
A short history of IPM...1990s

- New genetically engineered Bt crops (corn, potatoes) come into use
- Food Quality Protection Act (FQPA) brings changes to pesticide laws in US
- New emphasis on softer and/or more specifically targeted, low-volume chemicals
- Issues of children's health emphasized

A short history of IPM…2000s

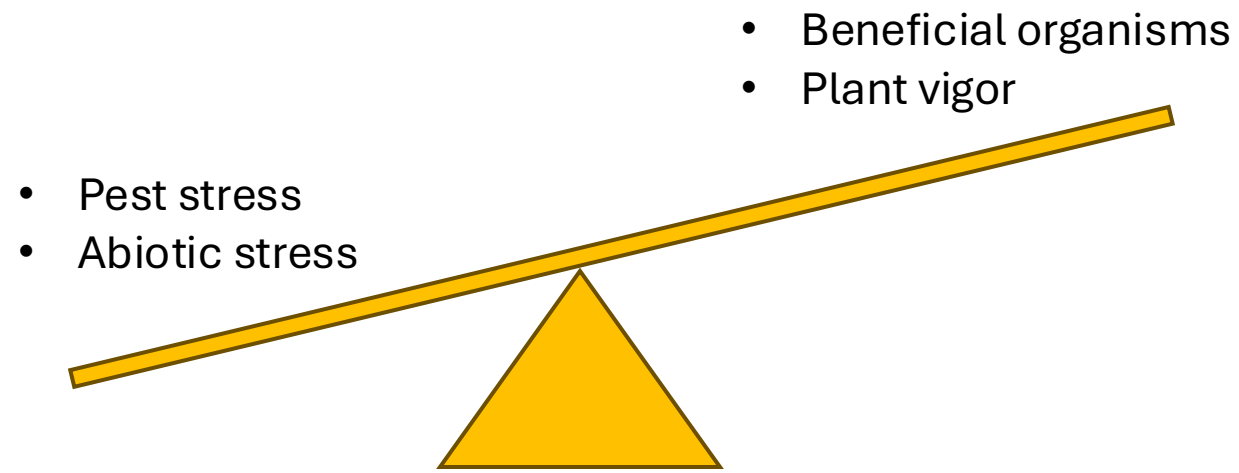
- Genetically engineered crops, resistant to pesticides, prevalent
  - E.g., “roundup ready”
- Food Quality Protection Act (FQPA) and EPA continue to enforce
    - Recent Endangered Species Act suit
- …what is next?

Pest Monitoring



Monitoring: why do we do it?

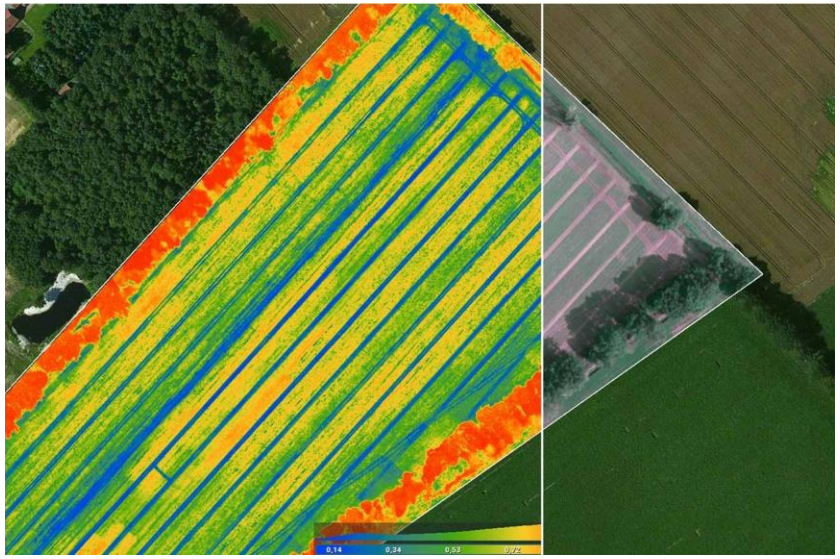
- Understanding how abiotic conditions, pests, and beneficial organisms are influencing plant health, and forecasting future change



Monitoring: why do we do it?

- Catching problems before they become hard (or even impossible) to recover from

- Determine if/when/where treatment is necessary



Monitoring: when do we do it?

- ALWAYS!

….okay but realistically…

Monitoring: when do we do it?

- When plants are in a vulnerable stage
  - Likely to be damaged/killed (e.g., seedling)
  - Harvest likely to be reduced (e.g., flowering)
  - When plants are already suffering from abiotic stress

- When pests are most likely to outbreak
  - Particular portions of lifecycle (e.g., hatching of an insect pest)
  - When abiotic conditions allow (e.g., high humidity for fungal pathogens)

- When pests are most able to inflict economic damage
  - E.g., larger larvae able to eat more plant matter

Monitoring: how do we do it?

- Trapping (passive)
  - Insect traps
  - Spore traps

- Collecting (active)
  - Sweep net (insects)
  - Soil samples (nematodes/spores/bacteria/weed seed)
  - Tissues samples (plant tissue with pest or pest damage)

Monitoring: how do we do it?

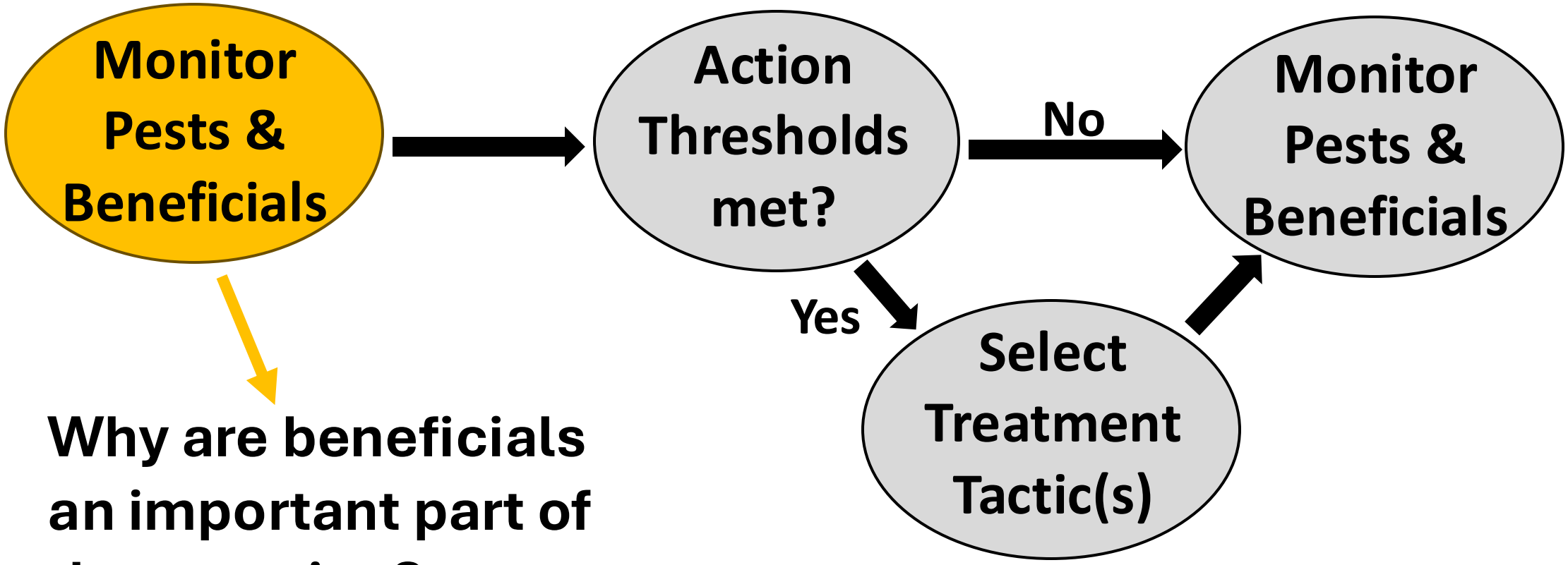
- Visual scouting
  - With naked eye
  - With aid of magnification
  - With aid of technology
    - drone, both “normal” imaging and multi-spectral imaging
    - “weed seeker”-like technologies, identify pest problems

To prioritize when and where to monitor, consider…

1) pest lifecycles and likely times for increases in their abundance

2) which plants and/or plant growth stages are most vulnerable to pest damage

Pest Monitoring



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Pest Identification

Identifying the problem

1. Identify the affected plant

Identifying the problem

1. Identify the affected plant
2. Identify the symptoms

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3. Review potential environmental stressors

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4. Look for pests and/or their signs
   - The pest (e.g., a caterpillar)
   - Its sign (e.g., frass)
   - Its symptoms (e.g., chlorosis from a virus)

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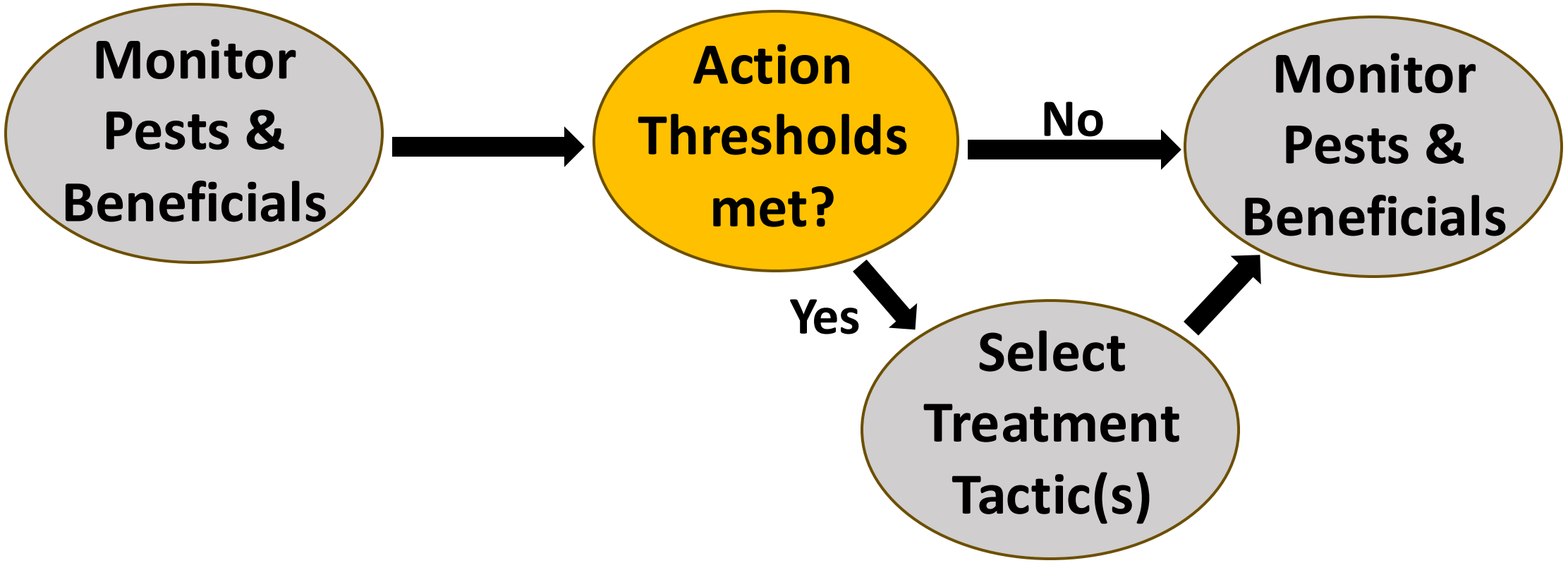
   - Its symptoms (e.g., chlorosis from a virus)
5. Determine distribution and severity

Using online resources for ID assistance

- DO…
  - Use reputable sources
  - Check a few different resources
  - Use resources from your area
  - Learn key terminology for pest identification

- DON’T
  - Rely only on recommendations from industry
  - Rely on apps or AI to identify pests
  - Use resources from outside your region

Determining if action thresholds have been met



What is an action threshold?

When you should take action to manage a pest.

…

But how/why do you treat then and there?

How do you decide when to treat?

Put your answers in the chat!

What is an action threshold?

1) Damage threshold: the level of damage a crop can sustain without yield loss.
    a. (E.g., percent defoliation before reduced production of fruits or vegetables)

What is an action threshold?

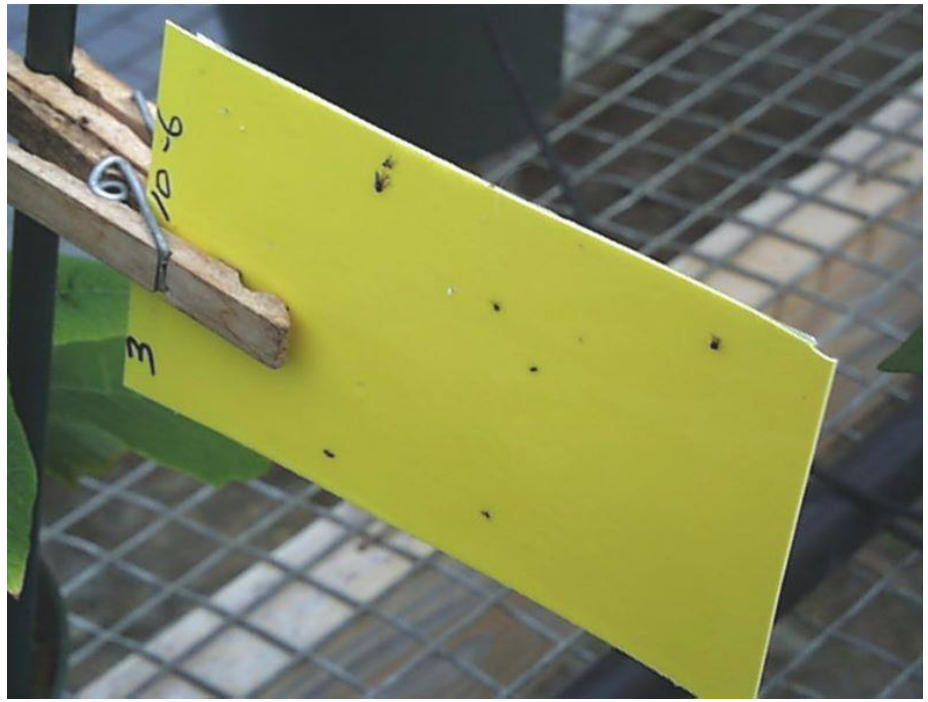
2) Economic injury threshold: the lowest pest density at which economic damage occurs

a. E.g., the lowest pest density at which the cost of the damage inflicted by the pest becomes higher than the cost of treatment

What is an action threshold?

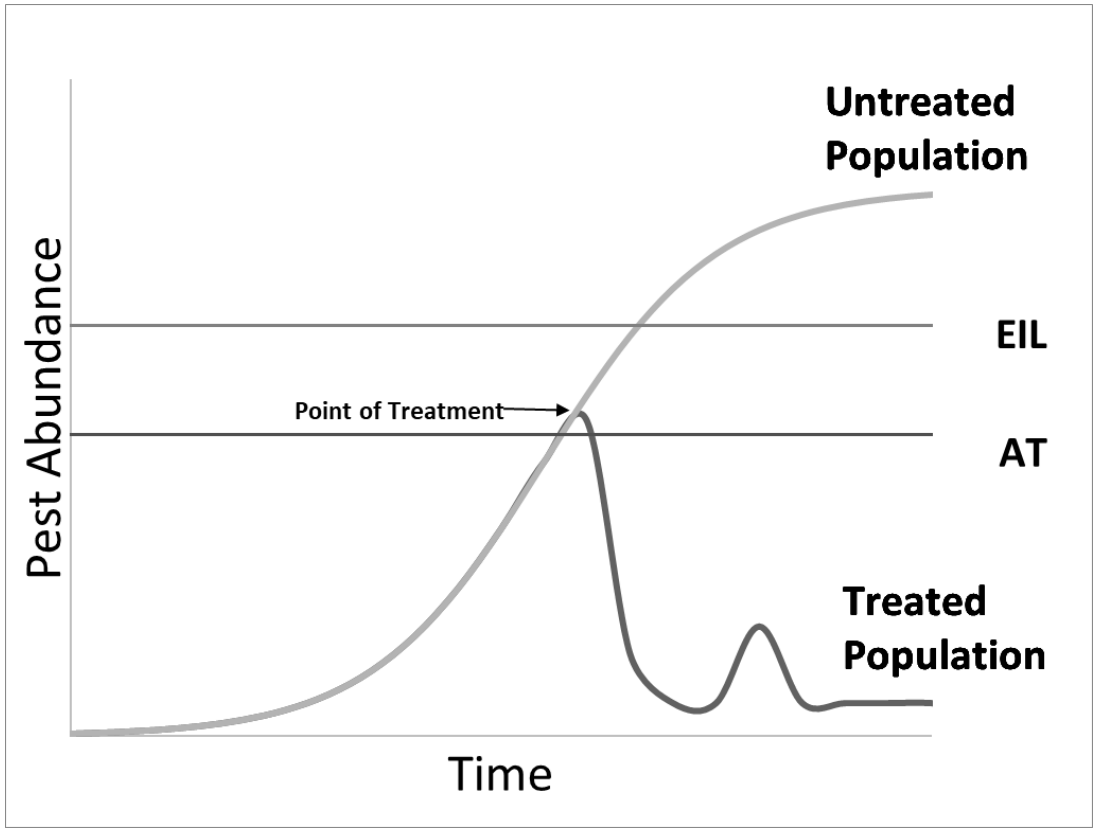
3) Action threshold (aka economic threshold): the level of pest abundance or damage at which treatment should be made to avoid economic injury.

a. E.g., the number of pests per plant that warrants treatment



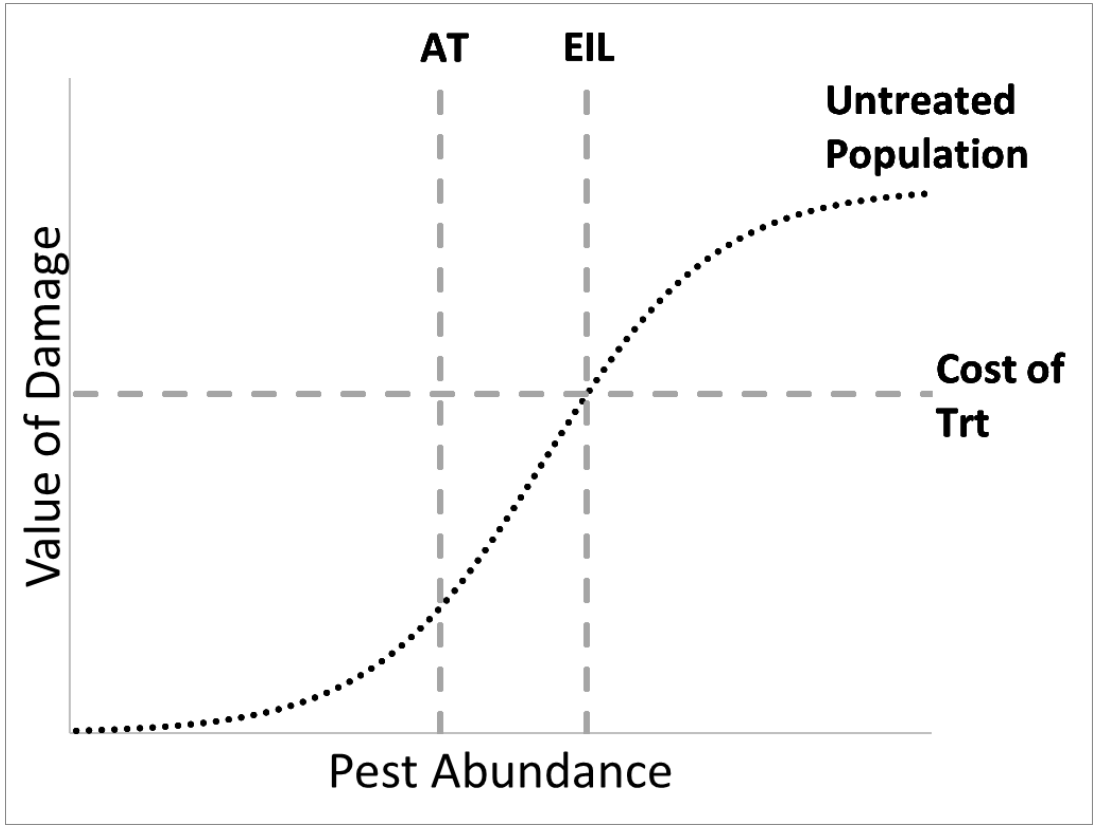
What is an action threshold?

4) Aesthetic threshold: the level of pest abundance or damage at which cosmetic damage is severe enough to warrant management.



EIL=economic injury level

AT=action threshold/economic threshold



EIL=economic injury level

AT=action threshold/economic threshold

Develop a threshold by asking key questions:

1. What losses might this pest cause?
    - If your goal is food production, the plant in question may be able to sustain significant damage (e.g., defoliation) before yield is reduced. If a plant is ornamental, don’t forget to account for the fact that many plants can overcome and obscure pest damage with regrowth given adequate fertility and irrigation. Make sure to consider the pest lifecycle and knowledge of when the host plant will be most vulnerable and when the pest is most likely to increase in number when making this determination as well.

Develop a threshold by asking key questions:

2. How much damage can you tolerate?
    - Just as it is rarely feasible to eliminate all pests, it is rarely feasible to avoid all pest damage, so determining how much you are willing to tolerate will guide how intensive your pest management needs to be.

Develop a threshold by asking key questions:

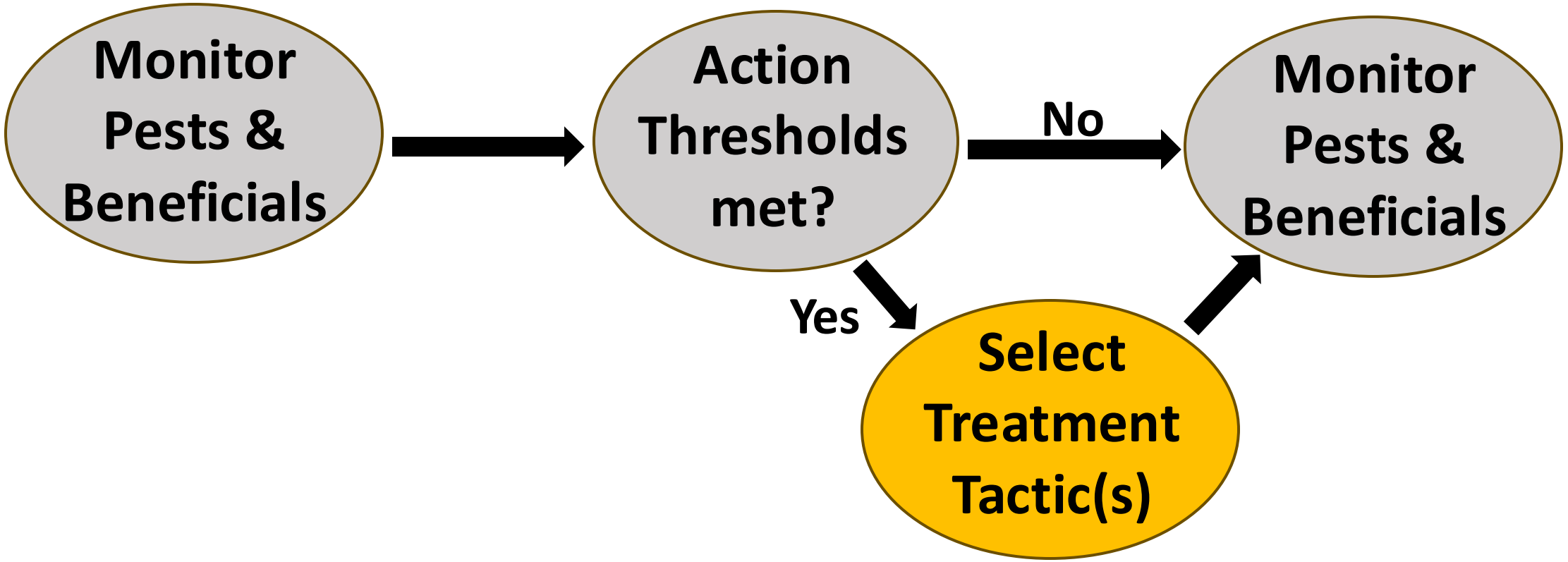
3. What might be the costs and consequences of treatment?
    - Make sure to consider the monetary cost, potential loss of beneficial organisms, chemical runoff, and risks for those who might come into contact with chemical treatments when considering different treatments. Balancing risks and rewards of different management programs is an important job of any gardener.

Remember…

Eliminating all pests is rarely feasible or advantageous. Avoiding unnecessary treatments reduces costs, protects beneficial insects and pollinators, and reduces the risk of chemicals to both people and the environment.

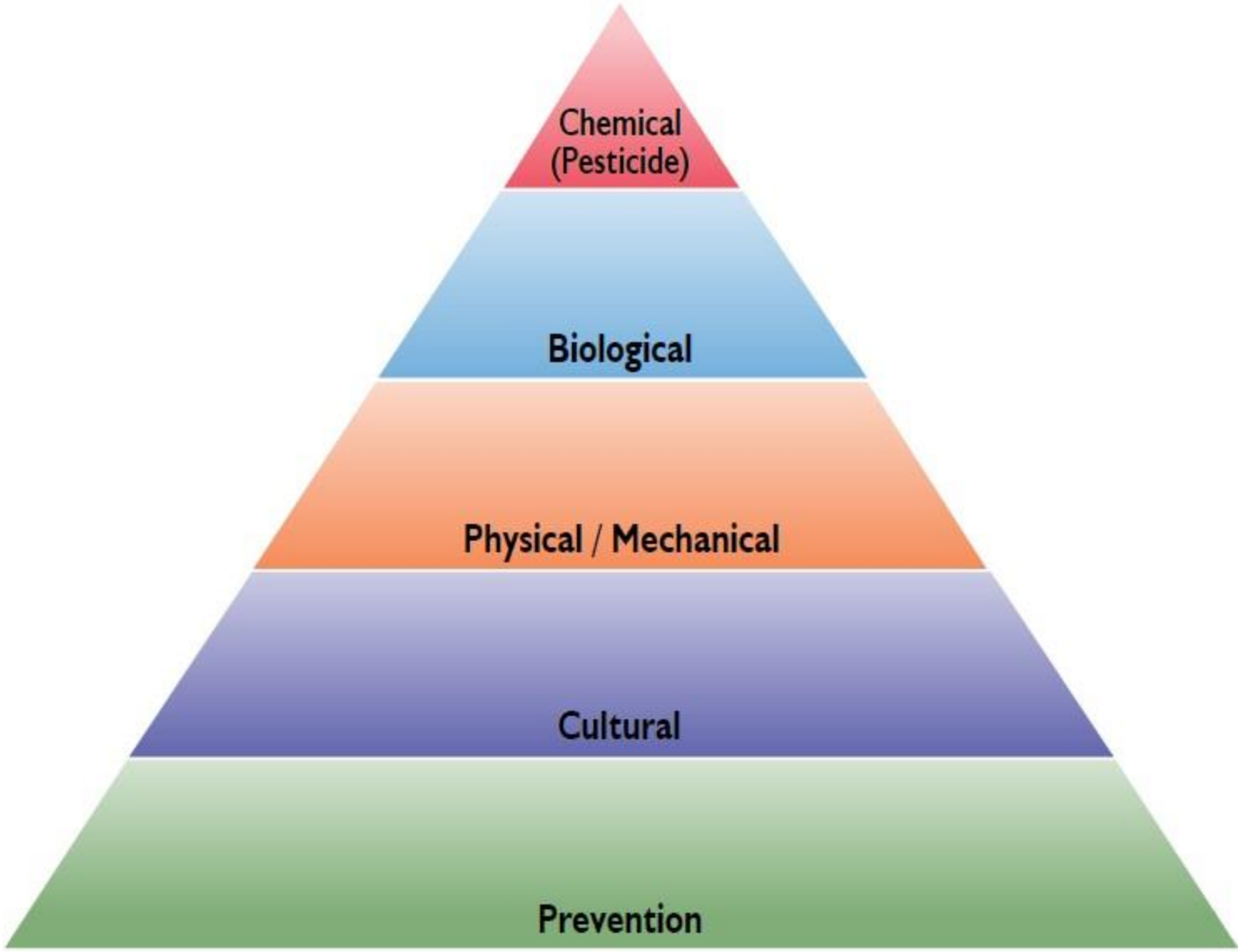
Now that we have discussed… Do you think you engage in IPM at some level?

Tune in for the next webinars for more on IPM tactics!



Post Webinar Survey

What IPM tool is most important for you?



Questions?