

Oregon Cranberry School

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Sprague Community Theater

Bandon, Oregon

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Integrated Pest Management (IPM)



Integrated Pest Management (IPM)

- IPM is a systematic plan which brings together different pest control tactics into one program.
- This approach considers all available tactics and how these tactics fit with other agricultural practices.
- It involves taking action to anticipate pest outbreaks and to prevent potential damage.

Integrated Pest Management (IPM)

- IPM is based on the identification of pests, accurate measurement and monitoring of pest populations, assessment of damage levels, and knowledge of available pest management strategies or tactics that enable the manager to make intelligent decisions about control.

Integrated Pest Management (IPM)

- IPM focuses not on just the pest, but also on underlying causes that increase pest numbers:
 - Location – air flow, sun light, temperature
 - Buildup of inoculum/spores, insect population, weed seed – old berries, leaves, trash, overwintering pupae and/or eggs, adults, etc.
 - Irrigation timing-soil moisture
 - Previous treatment and control programs
 - Vine depth
 - Variety

Integrated Pest Management (IPM)

- A good Integrated Pest Management program has three key components:
 1. Identification and monitoring pest problems
 2. Selecting the best pest management tactics
 3. Recordkeeping and evaluating the program

Integrated Pest Management (IPM)

1. Identification and monitoring pest problems

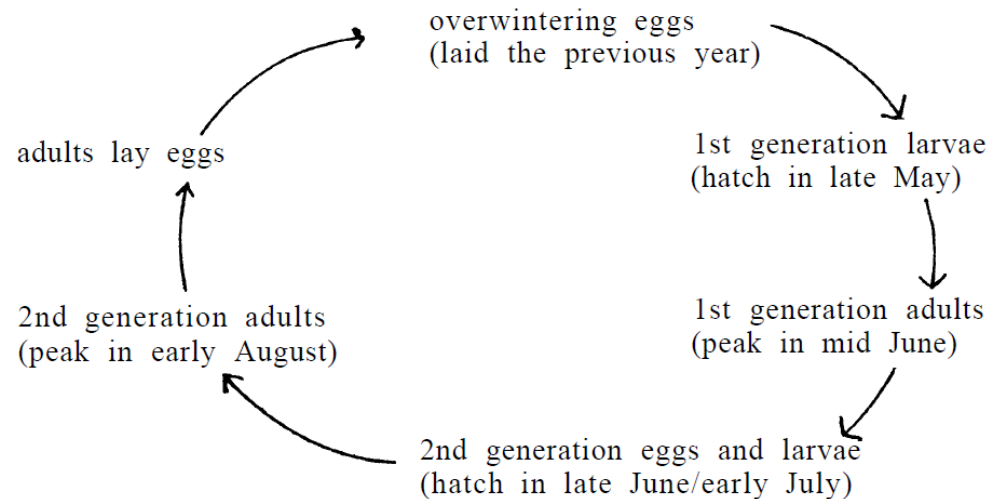
Traps: pheromone, pit, light; Sweep net counts, visual counts, damage assessment, etc.



Integrated Pest Management (IPM)

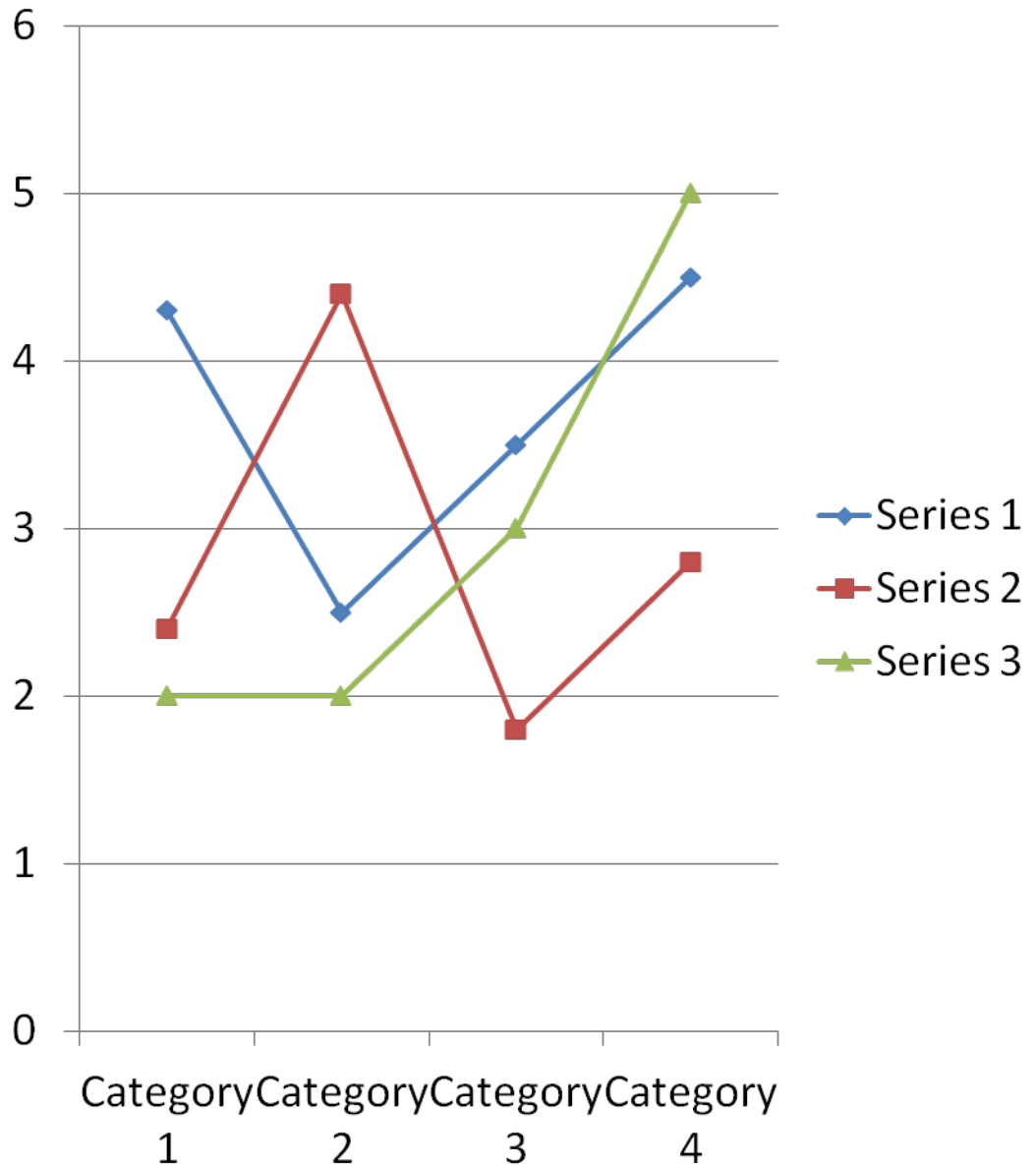
2. Selecting the best pest management tactics

- Understand the life cycle and habits of the pest. Most control methods work only if they are used at the correct time.



Integrated Pest Management (IPM)

3. Recordkeeping and evaluating the program
 - Dates, weather conditions, growth stage of crop, materials and rates utilized, levels of pests.
 - Use different methods on separate beds and/or leave untreated check areas to compare treatments



Integrated Pest Management (IPM)

- Prevention, suppression and eradication are three approaches to maintain damage below economic levels.
 - Prevention includes planting weed and disease-free plants and growing varieties of plants resistant to disease or insects; sanitation, using cultural controls to prevent weeds from seeding, etc.

Integrated Pest Management (IPM)

Pest Management Methods: The combination of prevention and suppression usually enhances a pest management program. When implementing an IPM program try to select the methods which are most effective and the least harmful to people and the environment.

- Consider local conditions: temperature, rain, wind, sunshine, etc.; those which can be controlled; irrigation timing/rates, holding water-drowning/suffocation, sanding and naturally occurring predators, parasites and pathogens.

IPM Management Plant Disease

Fruit Rot



Image from *Plant Health Progress* article:
[A Photographic Diagnostic Guide for Identification of the Principal Cranberry Fruit Rot Pathogens](#)

Twig Blight-Lophodermium



Photo: American Phytopathological Society

Apothecia (open when wet) of *Lophodermium oxycocci* on lower surface of a leaf.

IPM Management Plant Disease

Tobacco Steak Virus?



Photo: Unknown

Disease carried and transferred by insects: thrips, aphids, bees (pollen)?

Rose Bloom



Photo: American Phytopathological Society

Production of basidiospores gives abnormal branch a powdery-white appearance

IPM Management Plant Disease

Tip Blight – Precursor to Cotton Ball



Photo by Peter Bristow, WSU-Puyallup

The tip blight stage of the disease. Note the whitish-gray fungal growth on the stem.

Berries infected with Cotton Ball



Photo by Peter Bristow, WSU-Puyallup

IPM Management Plant Disease



Photo: American Phytopathological Society

A cranberry bed with vines showing acute symptoms of root rot caused by *Phytophthora cinnamomi*. Other *Phytophthora* species generally cause less dramatic symptoms.

IPM Management Plant Disease



Black patches of sooty mold from a scale infestation in a bog mid-March (photo: CBouska)

IPM-Fruit Rot

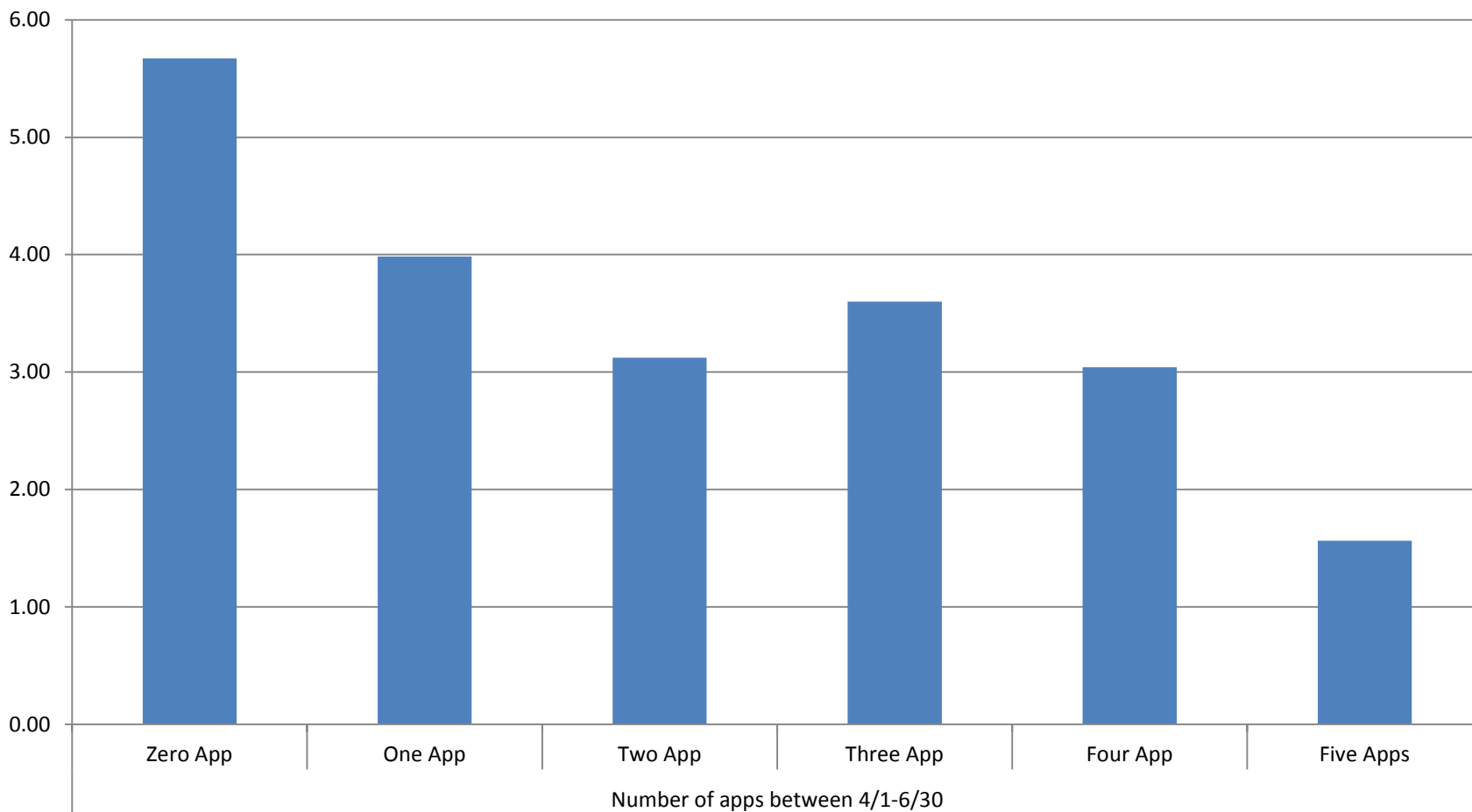
- Primary infection during bloom and early fruit set.
 - When a fruit rot fungicide use is needed, Dr. Peter Oudemans of Rutgers University says, “We’ve figured out that if we can treat the disease during the bloom period, we’ve got it seventy to ninety percent controlled. Once the bloom period is over, treatment gives us diminishing returns.
- Higher fruit rot pressure in individual beds may need greater number of fungicide applications.

Fungicide-Application Timing



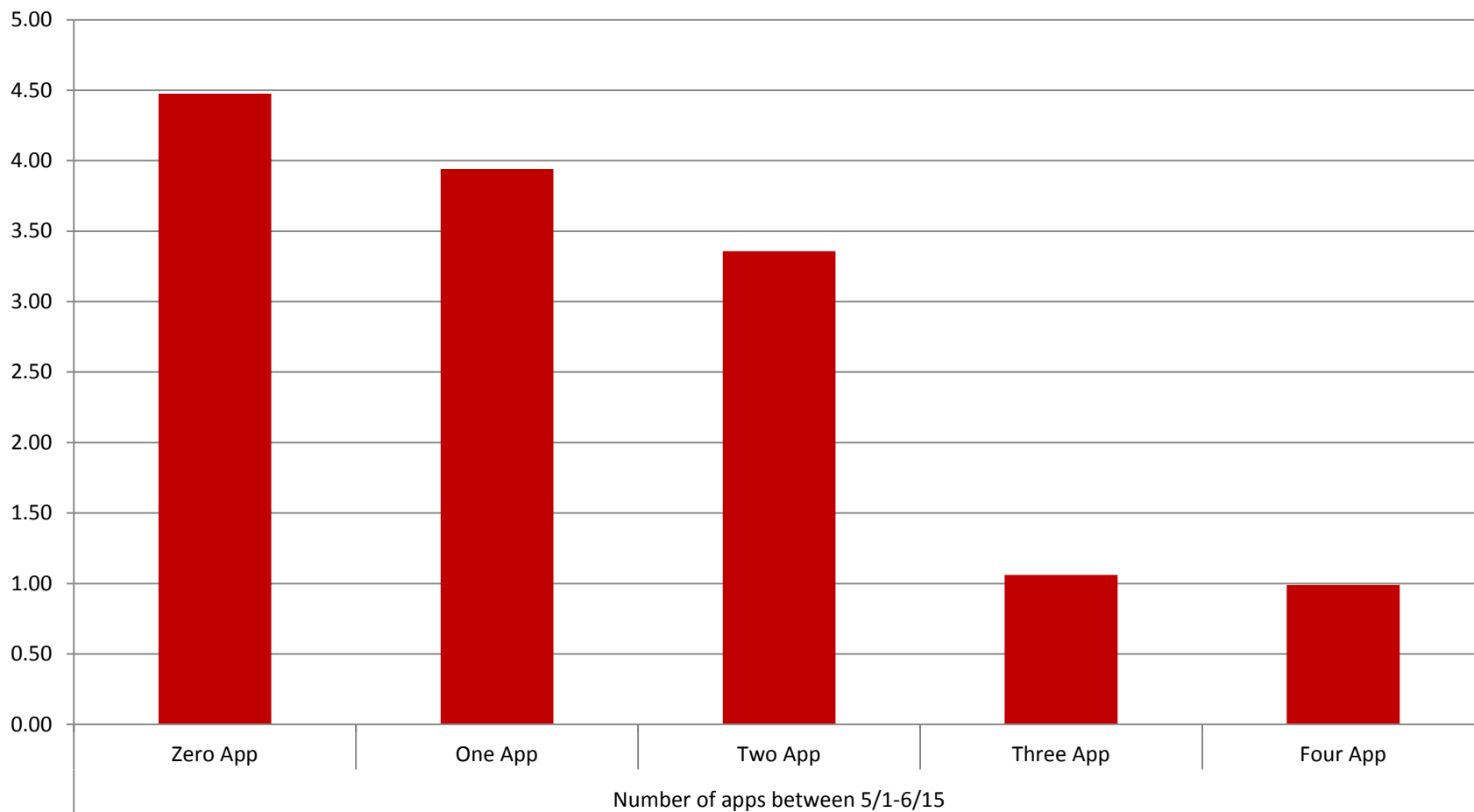
Fungicide-Application Timing

Percent Poor



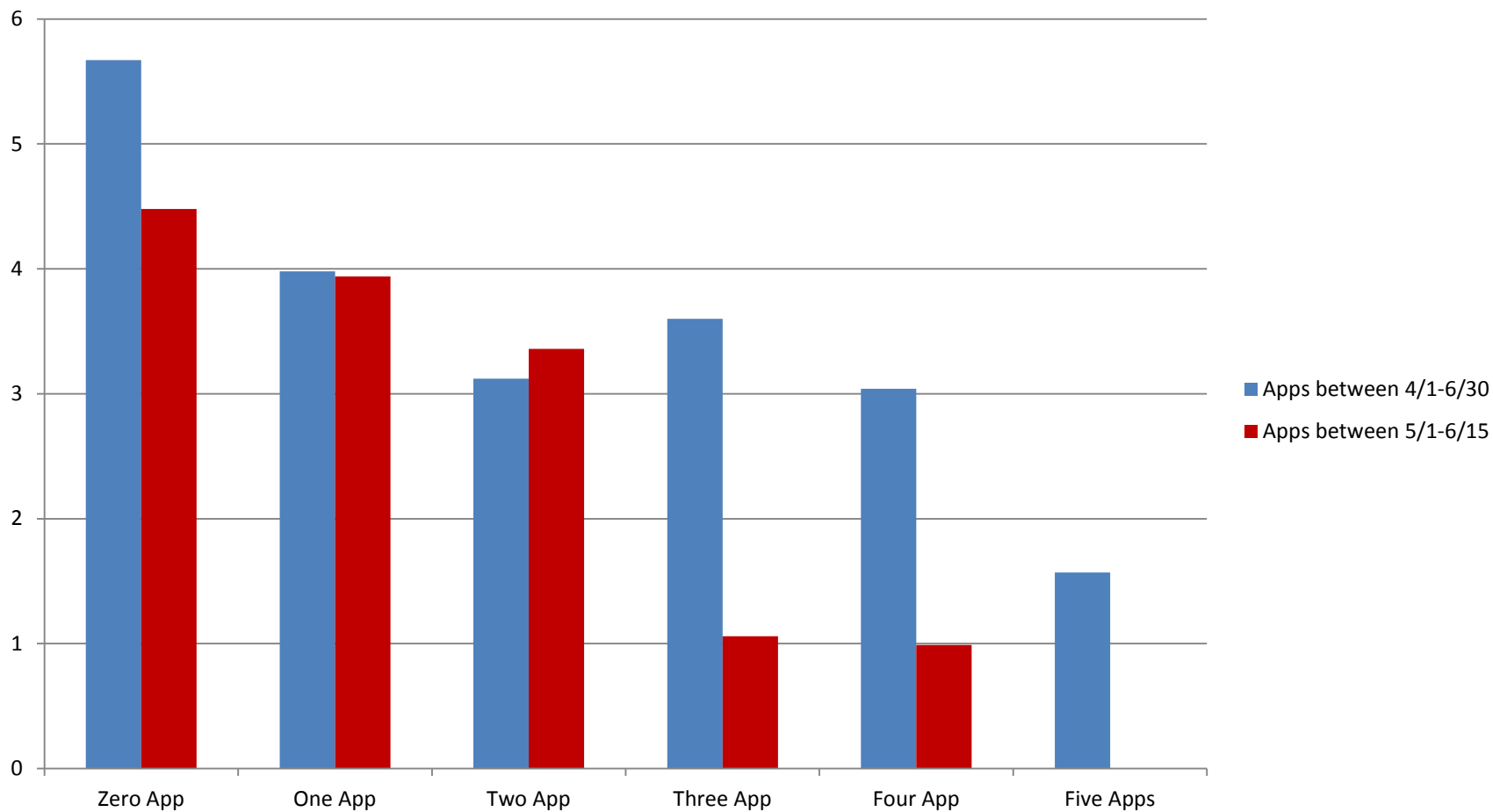
Fungicide-Application Timing

Percent Poor



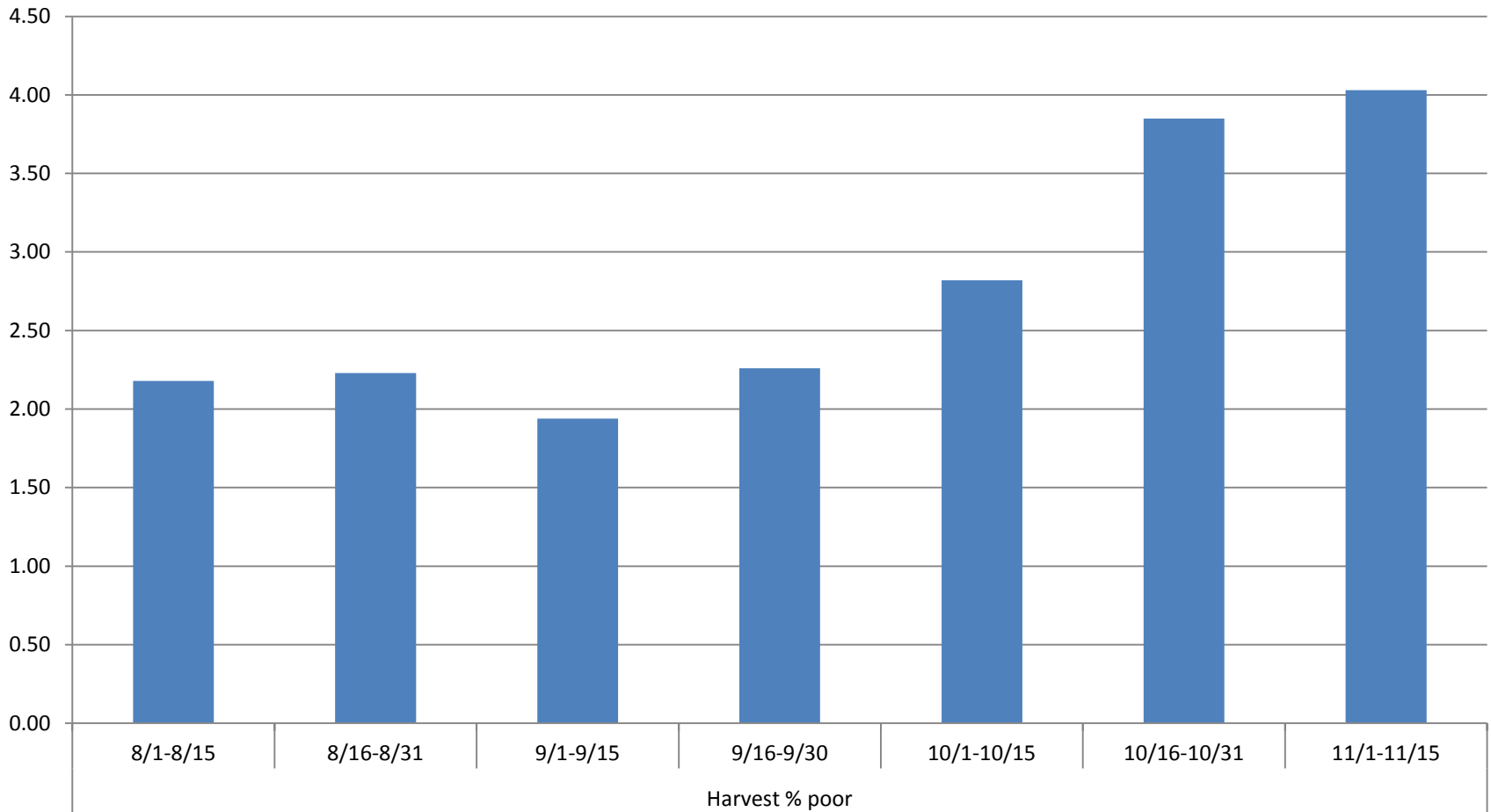
Fungicide-Application Timing

Percent Poor



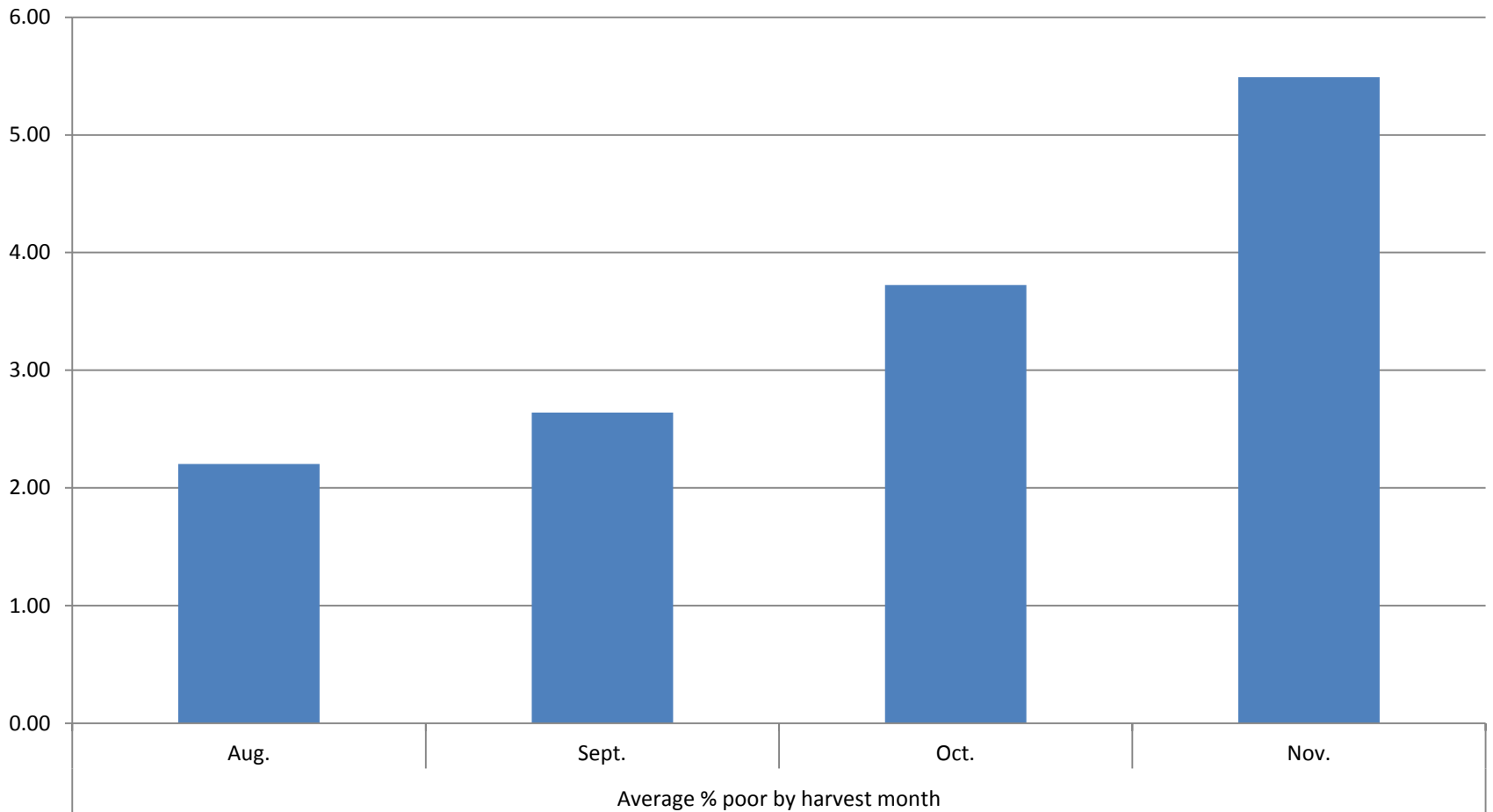
Harvest-Delivery Timing

Percent Poor

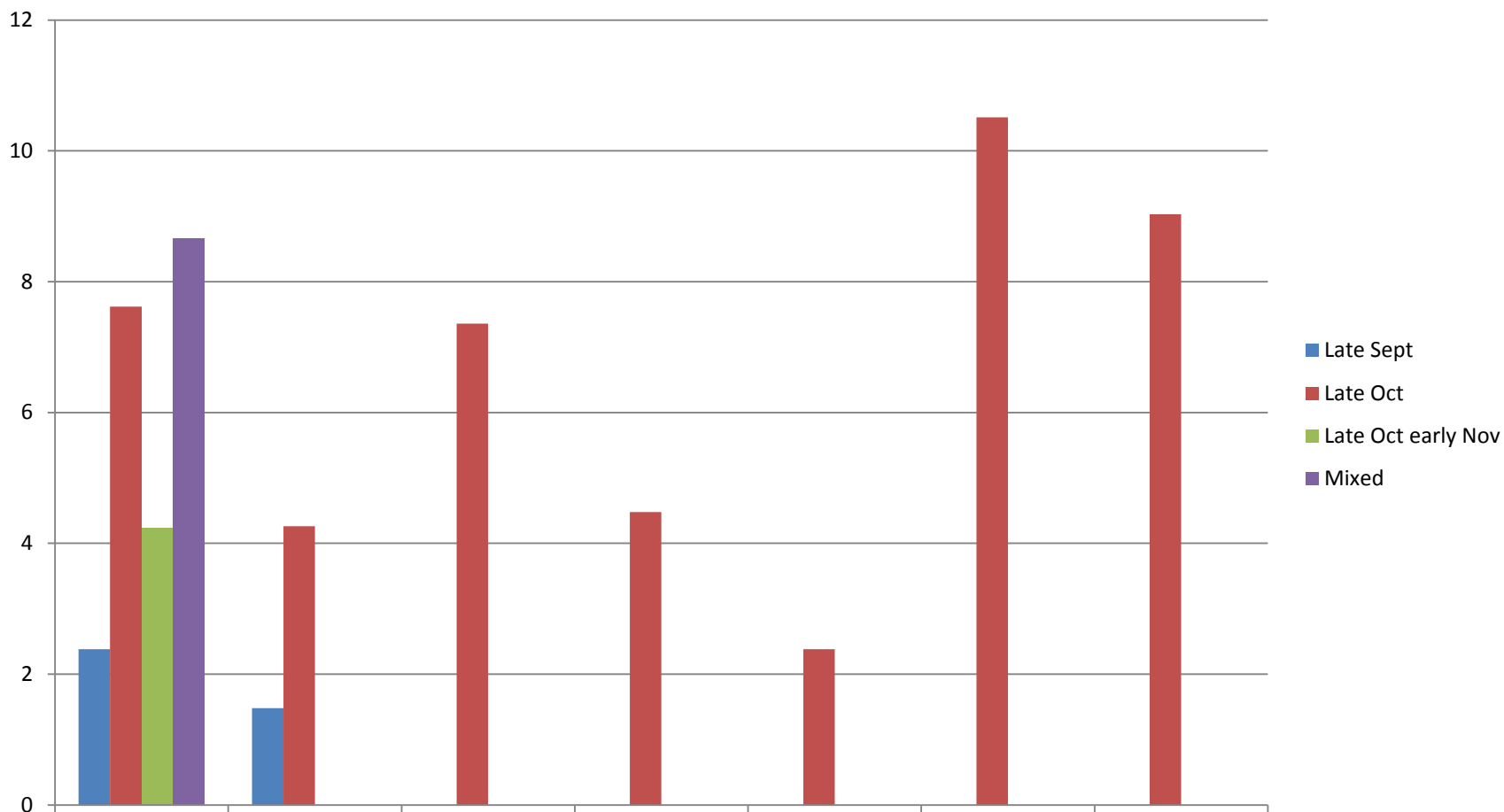


Harvest-Delivery Timing

Percent Poor



Zero Bloom Fungicide Apps-Harvest Timing



IPM-Fruit Rot

- If using new chemistry; start the season with the new chemistry.
 - o Abound (11) – Evito(11) : Systemic
 - o Indar(3) – Proline(3) : Systemic
 - o Single-site mode of action
 - ❖ Bravo(M) – EBDC(M) = Dithane, Mancozeb, Manzate : Surface protectorate
 - ❖ Multiple-site mode of action

IPM-Fruit Rot

- Tank mix chemistries FRAC 3 and FRAC 11 to maximize fungicide protection and is the best practice for resistance management.
 - Indar doesn't work well on bitter rot disease but Abound does.
 - If planning on applying just a couple of applications best to tank mix.
 - If planning on applying multiple applications can separate materials per treatment, i.e., 7-10 day schedule.

IPM-Fruit Rot

- First application early to mid bloom (15%), systemic or surface protectorate.
- If using new chemistry (tank mix): next application should go on 10-14 days later. If using older chemistry, or not tank mixing new chemistry; next application should go on 7-10 days later.
- Never apply fungicides at less than the registered rate, i.e., 6-12oz; don't apply less than 6oz.
- New chemistry: no more than two sequential applications, best not to apply more than twice a year.

IPM-Fruit Rot

- Fungicides (especially protectorates) require consistent coverage of flowers, fruit, leaves and stems.

IPM-Fruit Rot

- Reduce fruit rot
 - o Cultural practices
 - Variety selection
 - o Uniform beds equal shorter bloom period
 - Vine depth and density
 - Location – temperature, humidity, rainfall, air flow, sun light
 - Remove buildup of inoculum/spores – old berries, leaves, trash, etc. Trash flood.

IPM-Disease

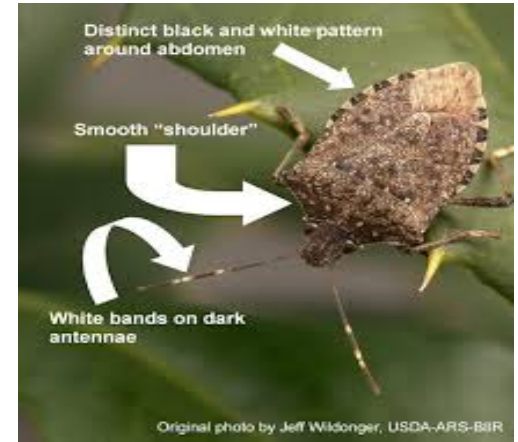
- Reduce fruit rot
 - o Cultural practices
 - Irrigation systems, timing, uniformity
 - o Over-watering can increase likelihood of root and fruit rot.
 - Drainage
 - o Uniform drainage helps minimize infection. Puddles or standing water are the first places fungi such as *Phytophthora cinnamomi* or *Phyllosticta* occur, and drainage methods that remove standing water (such as installing new underdrain, below) are very useful in controlling root rot

IPM-Disease

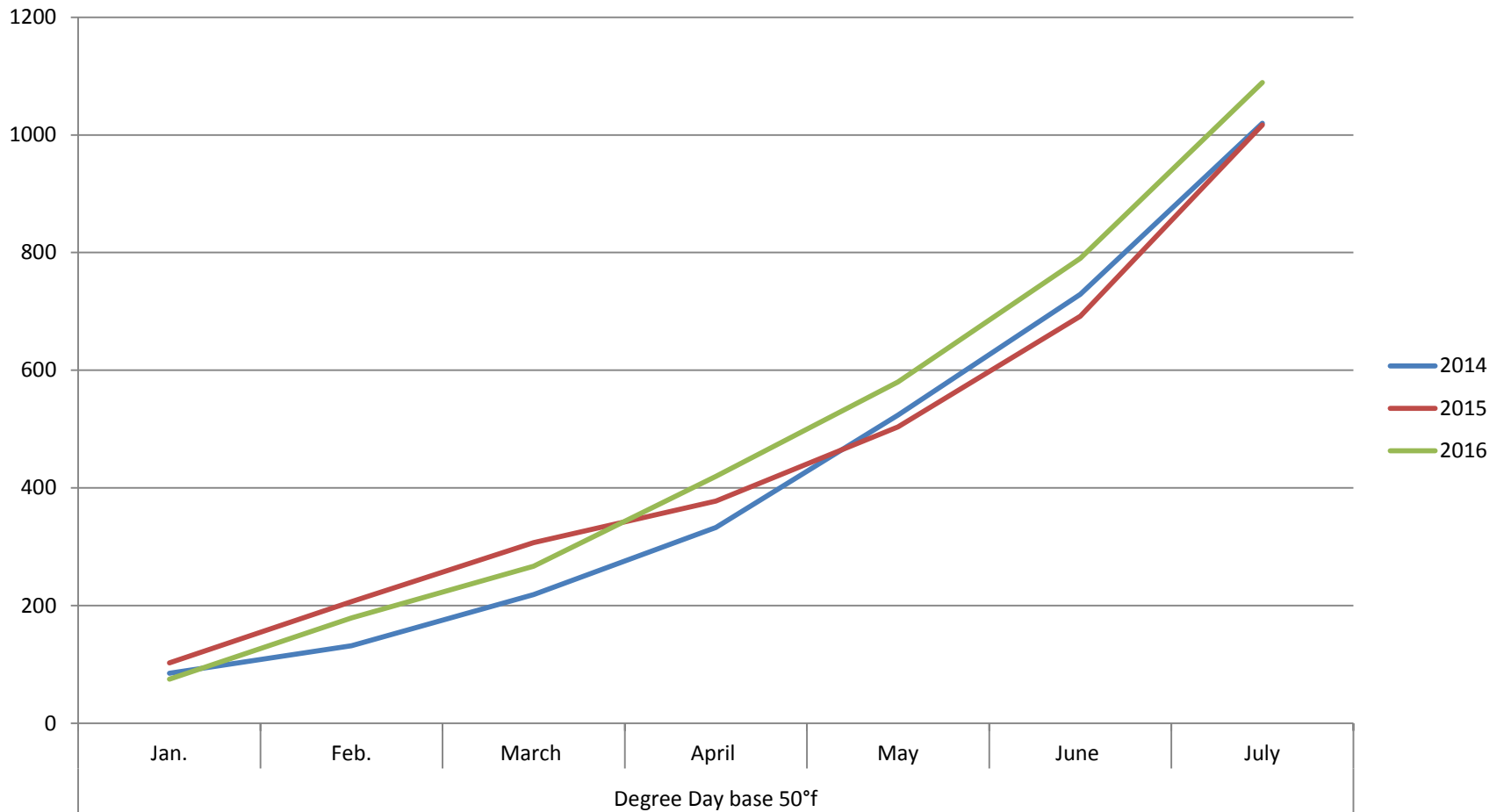
- Reduce fruit rot
 - o Cultural practices
 - Fertilizer timing and rates
 - Sanding – bury trash and inoculum
 - Efficient and effective applications of fungicides
 - Timing of harvest
 - Float time

Integrated Pest Management (IPM)

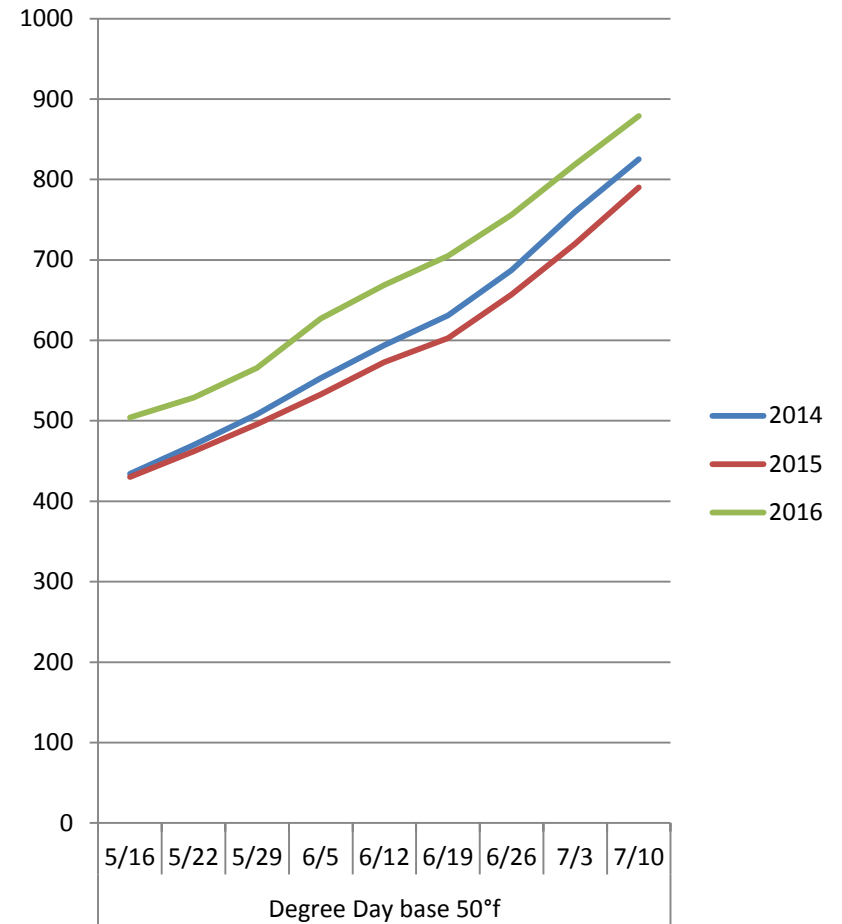
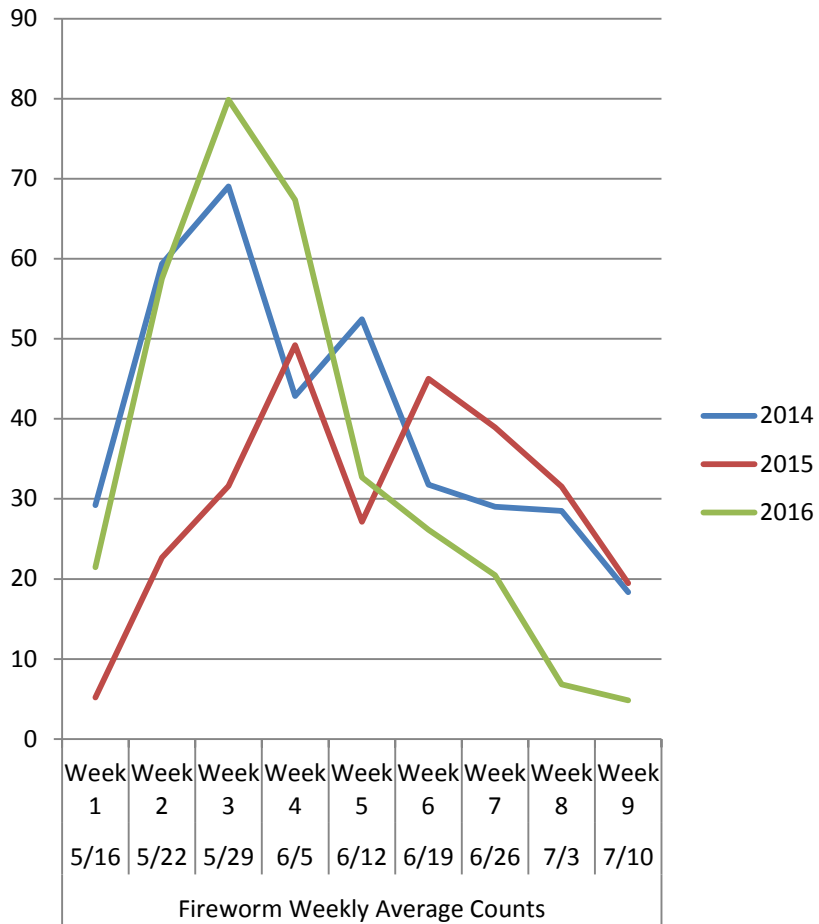
Insects



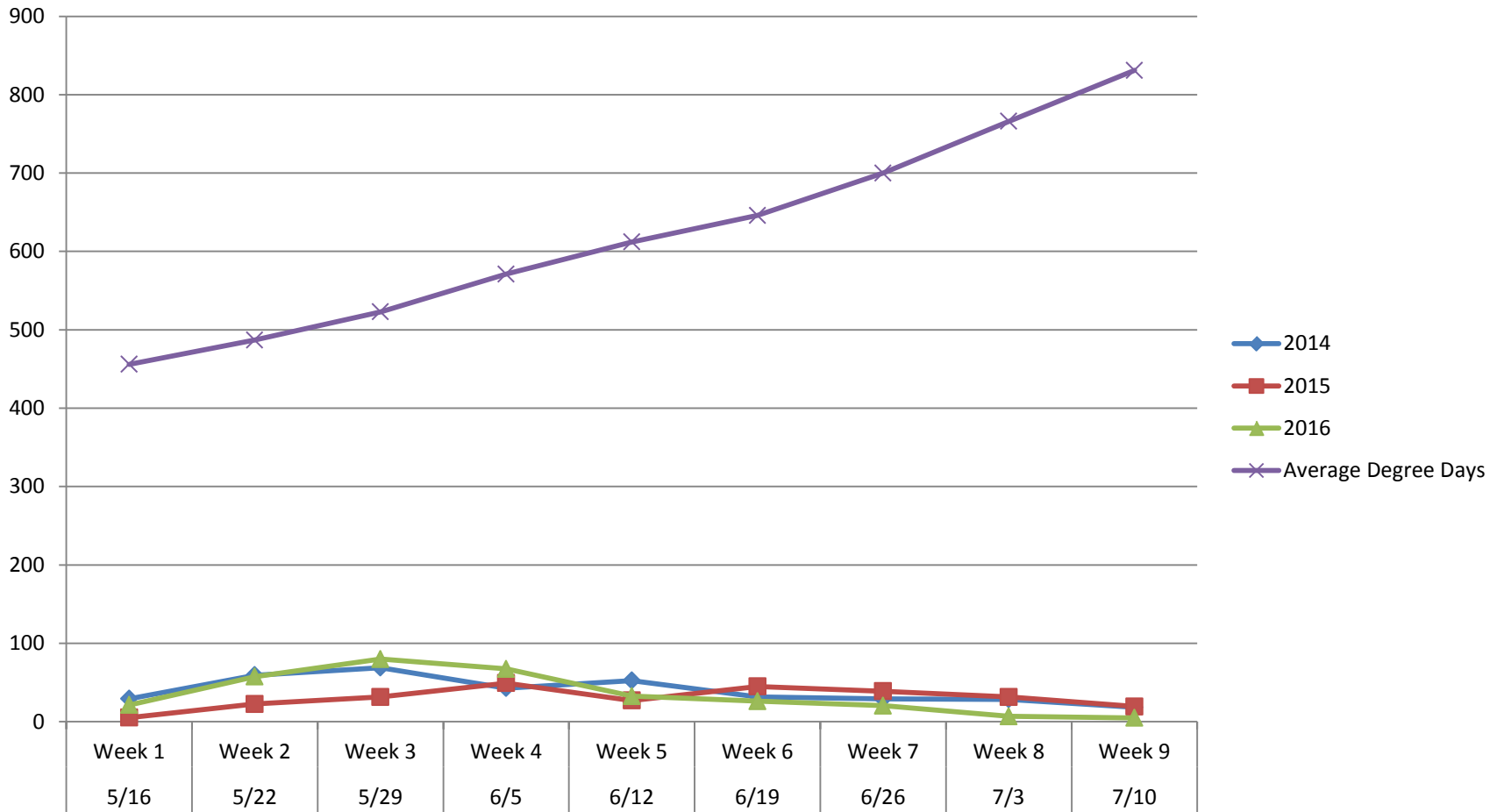
Degree Day Calculations



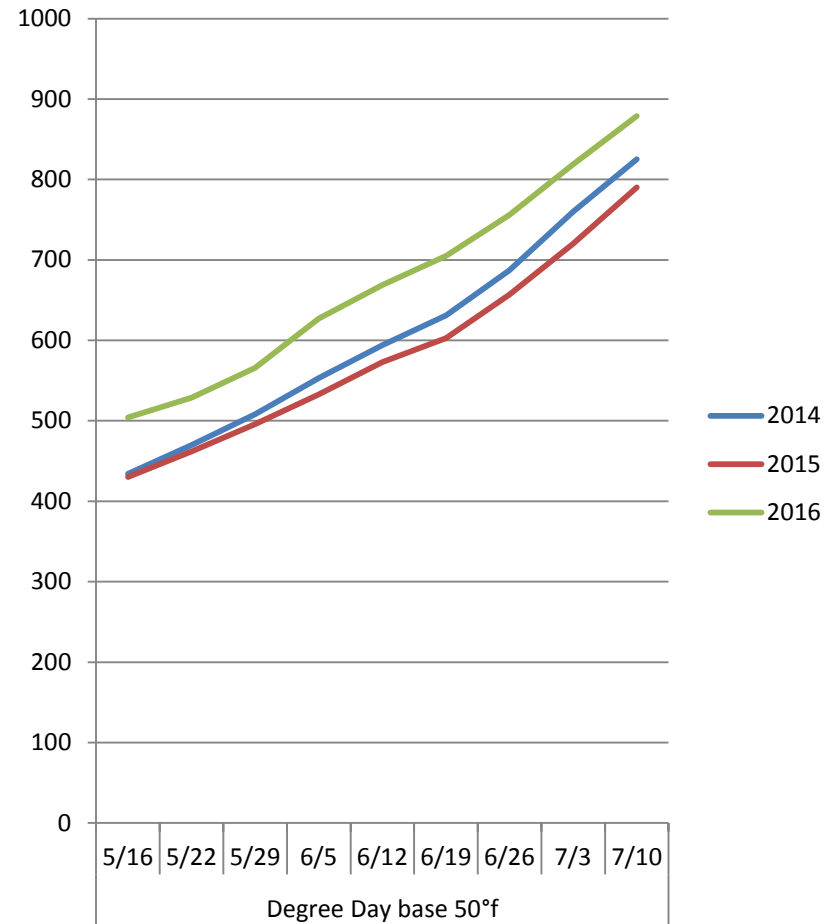
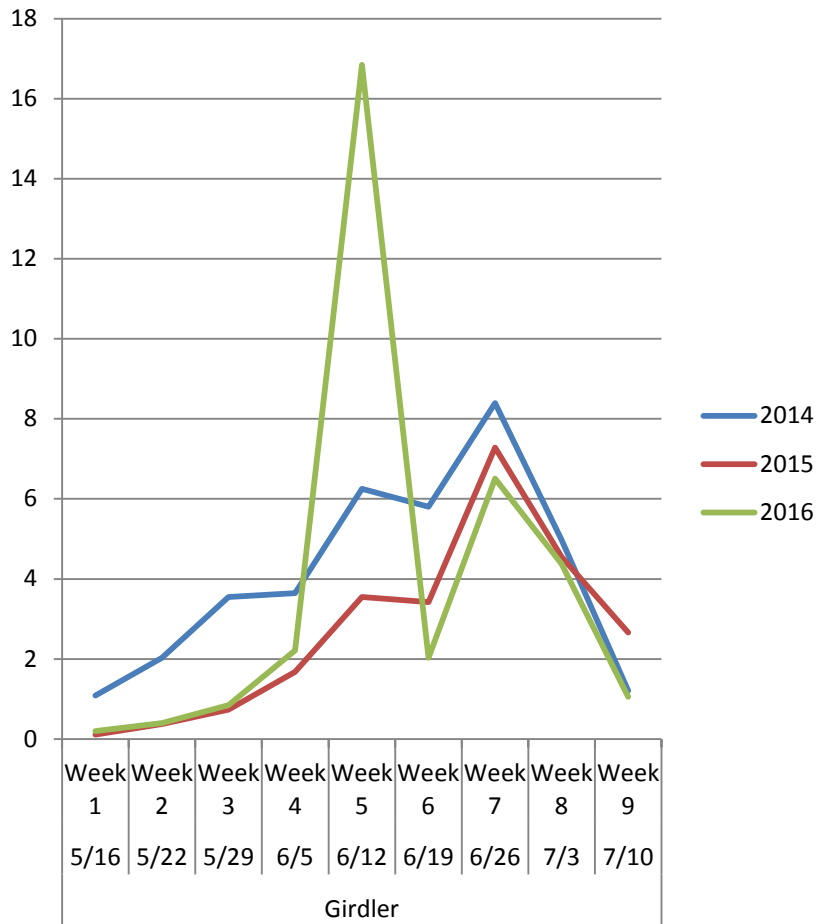
Fireworm



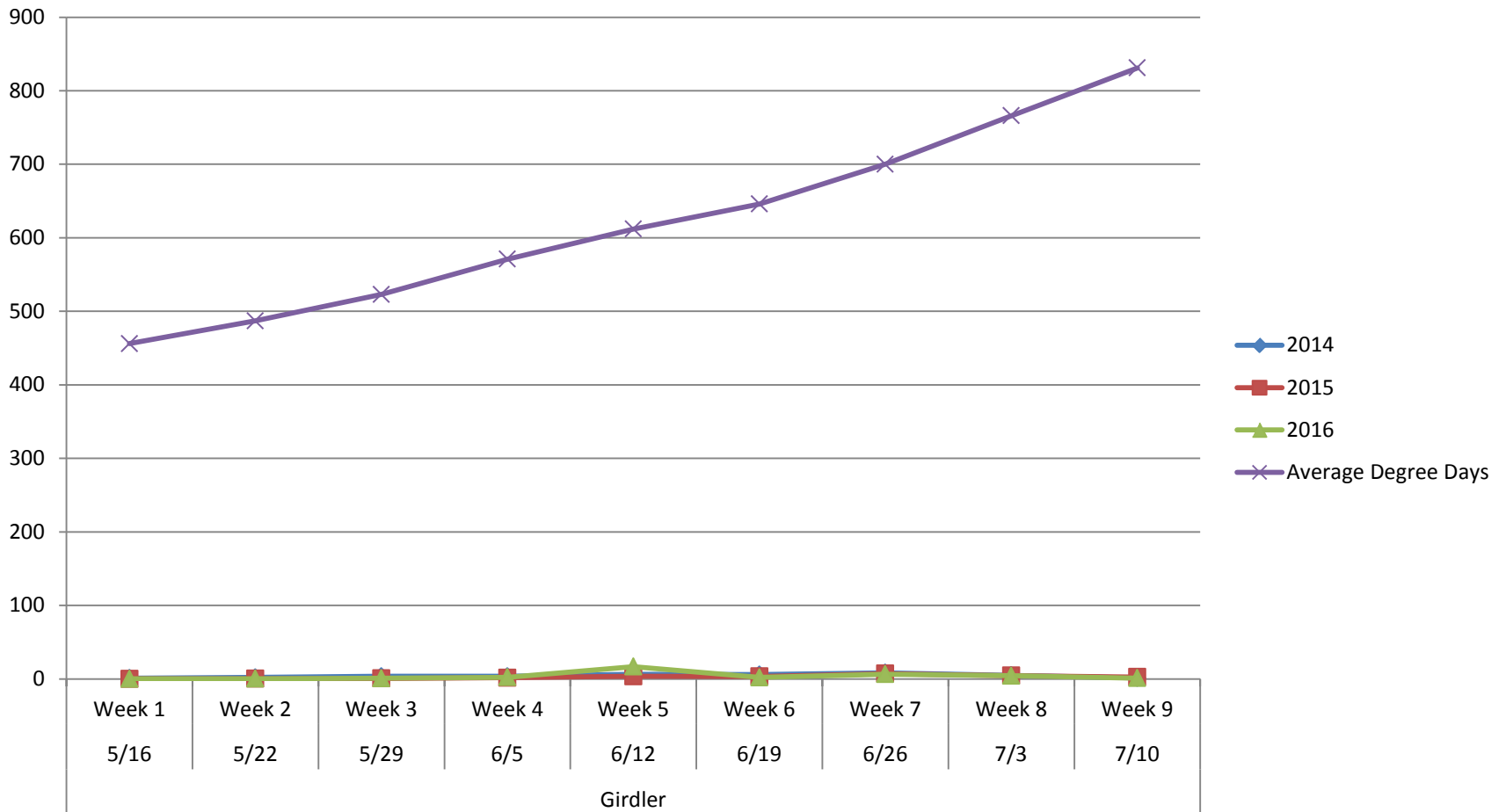
Fireworm



Girdler



Girdler



IPM-Insects

- Insect pressure influenced by many factors:
 - o Variety – early vs. late development
 - o Vine depth – sun light exposure creates higher soil temperature and drier areas.
 - o Location – air flow, sun light, temperature, air movement.
 - Insect development closely tied to air and/or soil temperatures.
 - o Buildup of populations – more adults lay more eggs resulting in more larvae = more damage.

IPM-Insects

- Newly-hatched blackheaded fireworm larvae prefer to eat new leaves, and may refuse to eat old leaves, even to the point of starvation.
- For example, the majority of larvae began feeding on the newest leaves of growing cuttings within 6 hours after hatching whereas the majority of larvae on dormant cuttings failed to feed and died within a few days.

Stephen D. Cockfield and Daniel L. Mahr
Department of Entomology
University of Wisconsin-Madison

IPM-Insects

- Using chemical controls
 - o Application timing determined by presence, counts, environmental conditions, etc. systemic or contact material.
 - o Avaunt on weevil control – can we time application to control more than one pest, bigger bang for the buck?
 - o Is Avaunt the best/safest material; Nematodes? Bee safety?

IPM-Insects

- Is a single application of Altacor sufficient?
 - o Season control but what about escapes?
- Selective vs. non-selective insecticides?
 - o What are the effects on beneficial insects; Praying Mantis, spiders, parasitic wasps and flies.

IPM-Insects

- If a broadcast Insecticide application is being made the treatment requires even coverage across the bog.
- Is the infestation localized – Scale?
- Can the pest be controlled with spot spray treatment saving bees and beneficials?

IPM-Weeds



IPM-Weeds

- Identification
 - o Annual vs. perennial
 - o Summer annual vs. winter annual
- Pre-emergent vs. post emergent or combination
- Residual soil activity
- Population
 - o Spot vs. broadcast

IPM-Weeds

- Resistance management – spot escapes.
- Transfer of seed, stems or roots between bogs or farms.
 - o Vines plantings, equipment, flood water during harvest.

IPM

- Have a plan
- Consider consequences of actions

Thank You

