WHAT DO ALL THESE FORESTS HAVE IN COMMON?
IPM:
Developed because we realized pesticides were affecting pollinators, beneficial & other non-target organisms often to the disadvantage of the grower.
WHAT IS IPM & WHY USE IT
IPM
Not just a tool,
IPM

Not just a tool,
It's a tool box of options.
“Integrated pest management (IPM) is an ecologically-based pest control strategy that relies heavily on natural mortality factors such as natural enemies and weather, and seeks out control tactics that disrupt these factors as little as possible.”
“IPM can use pesticides, but only after systematic monitoring of pest populations and natural control factors indicates a need.”
“Ideally, an integrated pest management program considers all available pest control actions, including no action, and evaluates the potential interaction among various control tactics, cultural practices, weather, other pests, and the crop to be protected.”

END OF DEFINATION
IPM: THEORY AND PRACTICE
It requires a thorough understanding of the biology of the crop (or resource), the pest, the environment, and their complex interrelationships.
IPM is about limiting factors in an ecosystem. A site can support only a certain number of pests because one or more of the key requirements – food, water, and shelter – is limited. Reduce the right one and you reduce the pest numbers.
IPM program may target a single pest, a pest category (e.g. insects, weeds, diseases or rodents) or the whole pest complex. While traditional pest control considers each pest exclusively.
IPM systems can be flexible and the program may vary with time of year, location, and type of crop. The best IPM plans start simple.
Regardless of what method is used, unless it includes constant monitoring and observation of the plants & pest conditions, the pest will come back and bite you!
First, Do No Harm!

No animal in itself is a “Pest”, the way each of us feels about a visitor determines whether the animal is welcome or not. It’s a value judgment.
Some one will have to decide what risk they are willing to accept, which will be determined by the IPM method chosen. It will be your role to educated them on this.
Your plant diagnostic techniques & abilities can well determine your success with IPM.

Plants can withstand more insect damage than we give them credit for.
Management vs. control vs. eradication.

A ‘Pest-free’ garden is not a healthy garden.
Prevention is easier than treatments.

Spot treatment can be a more effective control than nuking the whole area.

IPM is not static: New information can require you to change/modify your tool box.
IPM is not just for agriculture, it can be used applied to structural, medical, & foods.
Sometimes the best thing to do is NOTHING.
Using IPM
What do you think the problem is?
You do not have a problem till you find it or see it.
It is important to define the problem.
VERIFICATION
HISTORY
& MONITORING
WHAT ARE THE PREFERRED RESULTS?
TOOLS & METHODS AVAILABLE & REQUIRED FOR DESIRED RESULTS?
Plan on strategies that are:

- Least disruptive of natural controls
- Least hazardous to human health
- Least toxic to nontarget organisms
- Least damaging to the general environment
- Most likely to produce a permanent reduction in the pests’ population
- Easiest to carry out effectively
- Most cost effective over the short/long term
APPLICATIONS: NOTES & SPECIAL CONSIDERATIONS
PROTECTION OF BENEFICIALS’S & POLLINATORS
VERIFICATION & RE-INSPECTION
RECORD KEEPING FOR LEARNING & FOR HISTORY!
Tools & Methods

Let's see what's in the tool box.
YOUR MIND
that is
(your knowledge, experience)
This is the most important tool you have
Do you need a small tool box with just a few tools or a big one with many tools?

Depends on the job.
However...
You do need more than hammers. If all you have are hammers you will see all problems as a...
NAIL to hit as hard as you can
Your likely results...
CULTURAL CONTROL... creates the most favorable conditions for the plant.

Decrease the stress on the plants to the maximum extent possible.
Plants have optimal growing needs: sun light, intensity of the sun light, water and when it's needed. Optimal temperature for growth, minimum and maximum temperatures. Soil type for growth. Wind tolerance.
CULTURAL CONTROLS (cont)

- Resistant crop varieties
- Planting dates
- Mulches
- Crop rotation, Companion crops, trap crops, intercropping, & insectary crops
- Mowing
- Fertilizing—based on current soil test
Make conditions less favorable to pests:

- Some crop diseases survive the winter on crop debris, burying crop residue can help avoid some diseases.
- Some diseases are not controlled by tillage. Some diseases use weeds as alternative hosts. Remove these weeds.
- Mulch can inhibit the germination of some weed species.
- Pruning to remove infected/infested parts so other control methods can work.
SANITARY CONTROL

Clean your equipment; it can prevent diseases, nematodes, & especially weeds from spreading.

Planting certified seed assures that the grower is not spreading disease or weed species.

Purchase healthy plants.
SANITARY CONTROL

Self-imposed quarantine on new plant purchases

Quarantines are a method that governments have of stopping or slowing the spread of pests through an area.
MECHANICAL CONTROL

Uses manual labor, tools, machinery other specialize equipment or specialize methods to control pests

• Hand picking, Vacuuming, Water blasting
• Freezing, Microwaving
• Barriers: screens, nets, caulking holes
• Trapping to kill
• Selective baiting, lures to kill or reward
• Heating/flaming: weeds & structures
• Mechanical disking/weeding, tilling
NATURAL CONTROLS

Naturally occurring beneficial insects or diseases are occurring in healthy gardens & yard. Protecting and enhancing these organisms should be a priority for all garden/yard owners.

Timing and method of management/control.

Providing food, shelter, reproductive sites for beneficial organisms.
BIOLOGICAL CONTROL OR IMPORTATION

Introducing biological organisms (predators, parasites, or disease) with the intent to control pest(s). Release may either supplement or it may be a 'new' organism. You are manipulating the 'system'. Annual releases may be necessary for argumentation. If establishment occurs, no additional organism may need to be released.
Examples of Natural/Biological control organisms

- **MICRO INVERTEBRATES**
  - Nematodes
  - Fungus
  - Bacteria
  - Virus

- **INVERTEBRATES**
  - Insects
  - Spiders
  - Mites

- **VERTEBRATES**
  - Birds
  - Lizards
  - Toads
  - Snakes
  - Chickens
  - Ducks

- **VEGETATION**
CHEMICAL PESTICIDES

The label is the law!

Pesticides are a natural/man made poison designed to kill biological organisms.

Non-Target organisms, plants, other animals, soil, human property can be impacted from misapplications.
• **Classification: By Formulation**
  - Baits, Dusts, Fumigants, Granules, Sprays, Oils

• **Classification: By Chemical Category**
  - Inorganic, Organic, Carbamates, Chlorinated hydrocarbons, Organophosphates, Synthetic pyrethroids, others

• **Classification: By Function**
  - Attractants, Repellents, Desiccants, Insect growth regulators, Poisons
    - Contacts, Stomach, fumigants, Pass through, Systemic, Sterilants-Soil

• **Classification: By Toxicity**
  - LD 50, Organic vs. inorganic, Labeling- Caution-IV, Caution-III, Warning-II, Danger-I
OTHER CONTROL METHODS

- CHANGING HUMAN BEHAVIOR
- EAT them, the ultimate pest control
PROTECT the POLLINATORS & BENEFICIAL!
Following are some typical ‘Problems’ you could expect to encounter as a Master Gardener. In addition ways you could use the IPM method to help you solve your client ‘problem’
Try to see the issue as if you had the problem in your yard (maybe you have), so you can better “Help” those seeking solutions to their ‘pest’ problems.
Methods & Tools - a review -
What do you think the problem is? Verification, History & Monitoring
What are the preferred results? Tools & methods available?
Planning, tools, methods required for desired results?
Application notes & special considerations.
Protection of Beneficial & Pollinators. Verification & Re-Inspections.
Record Keeping for learning & History.
TOOLS
- Cultural
- Mechanical
- Sanitary
- Natural
- Biological
- Chemical
- Other management/control methods
Blacken and sticky vegetable plants.
Maybe you notice things around your garden were also covered with what looks like black mold or dust.
Honeydew is not permanent and can be easily washed off the plants.

The sucking of the plant’s nutrients by these insects can cause significant damage to the plant.
The physical act of sucking can also cause the leaves to deform or curl up. This is a classic system of sucking insect damage.

This sucking can also cause chlorosis (yellowing) of the leaves.
LISTEN TO Rich.
LISTEN TO Rich.

This is an official IPM uniform.
Beneficial’s that prey on Homopteran insects, know them!
Ants will 'milk' aphids for their honeydew like we milk cows.
Ants will also protect "Their" aphids from aphid predators while they 'milk' them for their honeydew.
Ant control may be critical to your success. Tangle foot is used as a barrier to prevent ants from tending ‘their’ aphids and protecting them.
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While you are waiting for you Tangle foot to work you can enjoy your own form of Tangle Foot.
Ant control may be critical to your success. Tangle foot is used as a barrier to prevent ants from tending ‘their’ aphids and protecting them.
For 'Ant Control' you have to destroy the colony. Your control method must be effective enough to reach and kill the queen.
Tomato plants, the fruit has blacken areas
While at the MG Plant clinic desk a man, Mr. Holmes, walked in and ask for help regarding his tomato plants. His story: This was my best year ever with my tomato plants. I have carefully weeded around each, staked and trimmed and tied the plants, and watered regularly.
While my wife and I took a 3 week vacation, I had a neighbor take care of my garden. He didn't do anything, he water my garden once. It has not rained so I lost plants. My tomatoes have big dark spots on the bottom of the biggest fruits. What has happened? What disease is affecting them?
Early blight, late blight, alternaria, or Blossom end rot. Which?
This is why it is critical to make sure you have a proper ID of what you may think the pest/pathogen is. History of your tomato growing may help you eliminate some possibilities. Time of the year is another.
MONITORING & HISTORY

- Is the damage only on the ends?
- What has been the watering schedule?
- Soil history the tomato is growing in?
- If new soil, calcium not likely to be the issue. If it can not be taken up...
- If old soil, what was grown in past (could have used up much of the calcium?)
- Have you had a soil test?
Blossom end rot on tomato

Two common causes of this physiological disorder

• Lack of calcium (low levels in soil or impeded uptake)
• Alternating soil moisture extremes can promote this
CONTROL METHODS/STRATEGY AVAILABLE?

- Cultural

Mechanical, Sanitary, Natural, Biological or Chemical methods are not likely to help this problem.
Cultural
SOIL TEST!
If water is an issue, what is a better watering schedule?
Avoid too much or too little water.
Mulch to retain soil moisture.
Avoid damaging roots.
SOIL TEST!
If Calcium is the issue what are the ways to correct the deficiency?
Improve or replace soil in the growing area to correct the nutritional issues.
Calcium management: do not add calcium unless a soil test indicates the need to do so & make sure you know how to add it to solve the issue.
PROTECT THE POLLINATORS & BENEFICIAL'S
No broad spectrum pesticide should be considered for this problem

RE-INSPECT
Problem not solved, retest soil
If soil ok tweak the watering schedule

RECORD KEEPING AND LEARNING FOR THE NEXT TIME!
You have something munching on your plants, not sure what it is, from the damage done it seems be elephants.
WHAT DO YOU THINK THE PROBLEM IS?
Is the damage chewing damage or sucking damage?

Slugs  
Grass Hoppers  
Cucumber beetles  
Flea beetles  
Asparagus beetles  
Cabbage loppers  
Corn Earworms

Armyworms  
Grubs June beetles  
Leaf beetles  
Pear sawfly  
Earwigs  
Root weevils  
Weevils  
Cutworms

Thrips  
Aphids  
Leafhoppers  
Mites  
Lygus bugs  
Stink bugs  
Boxelder bug
VERIFICATION OF PROBLEM

Holes on the edges and in the centers of leaves.
Have you seen insects or slugs on the leaves?
Have you seen slugs elsewhere in the garden?
Have you looked at night?
Have you noticed slime trails?
Slime is indisputable evidence of gastropod grazing which also leaves long, stringy fecal remains. Rasp-like feeding damage, particularly in the interior of a leaf versus the edge, distinguishes snail and slug damage from caterpillar feeding.
WHAT CONTROL METHODS/STRATEGY ARE AVAILABLE?

• Cultural
• Mechanical
• Sanitary
• Natural
• Biological
• Chemical
Cultural & Mechanical:

- There's one layer of epidermal cells that separates slugs from death by desiccation. Anything that can be done to enhance drying the surfaces where plants are kept can be useful.
- Timing of irrigation can have a major impact.
- Most snails and slugs are decomposers.
Cultural & Mechanical:

- Leaf debris and cuttings will increase their survival.
- Cultivation is very disturbing for slugs.
- Hand pick snails, dump into a bucket of soapy water then dump into your compost pile.
Cultural & Mechanical:

- Very dry materials, such as gravel, sand, or cinders, might help in controlling garden slugs.
- Wood ashes and diatomaceous earth deter slugs and snails, but only until the next irrigation or rain reduces their efficacy.
- A more permanent solution is the use of copper strips.
Sanitary

• Do not step on snails crushing them and leaving them. The remains will become snail food (shell and all)
• Clean field equipment.
• Purchase healthy plants, & carefully inspect the new plants.
• Know the pest control methods of your local nursery.
Natural & Biological

• Natural control agents should be encouraged. Snakes, amphibians, shrews, birds (chickens, ducks ex.) Predacious beetles, parasitoids and/or parasitic flies.
• Human food-get revenge eat them. They should be cleaned of pesticides and other things first.
Chemical control almost always comes into the equation at some point. Molluscides (pesticides) known as carbamates have been shown to have the greatest effect on snails and slugs and still dominate our list of control options. This includes the active ingredient, metaldehyde.
Chemical pesticides

Metaldehyde is toxic by contact & ingestion. Leads to dehydration & death. Best in conditions when warm & high humidity, followed by hot, dry weather. If they recover in wet conditions (reduces dehydration), bait aversion can occur. Kids and dogs are sensitive to this poison, colorants and bitter agents are added to reduce poisoning. Toxic to earthworms.
Chemical pesticides

Methiocarb (Mesurol) is another carbamate used to control snails and slugs. It interferes with the nervous system. Mesurol works better under cool, damp conditions but is a restricted-use pesticide.
Chemical pesticides

Iron phosphate (Sluggo) has proven to have good efficacy against snails/slugs. They must ingest the bait, which causes immediate feeding inhibition. The poisoned animals generally crawl away and succumb to starvation after several days. Product is less susceptible to moisture or sunlight, and has low mammalian toxicity.
Neonicotinoids can exacerbate slug problems, reducing crop yield. Researchers planted quarter-acre plots with soybean seeds that were either treated with a neonicotinoid or untreated. They tracked slug and predatory insect populations, finding that slugs themselves were unaffected by the neonicotinoids (they are mollusks, not insects).
However, the slugs did indirectly transmit the insecticide to predatory ground beetles, impairing or killing more than 60 percent of the beetles in the test field. In addition, the neonicotinoids directly decreased activity of other slug predators. The result was a decrease in crop yield by 5% over the untreated field.
PROTECT THE POLLINATORS

Be sure you read the PNW Insect Management Handbook section on protecting 'Bees'.

Most bee poisoning incidents occur when insecticides are applied to bee-pollinated crops during the bloom period.
Insecticides Concerns:

- Applications to blooming weeds
- To tree fruit orchards.
- Drift onto adjacent blooming crops or weeds.
- Bees can collect insecticide-contaminated nesting materials, for example, leaf pieces collected by leafcutter bees.
Pollinator Protection Starts with:

What do you think the problem is? Is there really a pest doing damage that needs to be managed?
Pollinator Protection
Verification, history & monitoring
Preferred results?
Pollinator Protection

Tools & Methods that should be used before chemicals

- Cultural
- Sanitary
- Mechanical
- Natural
- Biological
Pollinator Protection

Why are Chemical pesticides of such concern?

They are chemically designed to kill biological organisms.
How are pesticide effective?

- By direct Kills
- Disruption of the organisms’ protection, energy and/or reproduction.
Pollinator Protection

Some try to “Rate” pesticides’ danger by how fast it kills and if it does not kill quickly its “safer”.
Pollinator Protection

Pesticides can kill other than by direct contact. Examples:
Behavior Effects:
Lose fear of potential predators
Lose control of body
Lose will/means to eat
Lose way/bearing in environment
Pollinator Protection

Reproduction Effects:
Make them infertile
Kills the eggs or larva stage
Prevents/stops development
Pollinator Protection

Timing of application effects:
Applications during light vs night
Flight temperature
Flowering periods of all blooming plants in area
Pollinator Protection

Toxicity Effects:
- Persistence/duration of toxicity
- Residuals
- Chemicals
- Inert ingredients
Pollinator Protection

Labels:
Legally must be followed
What they tell you
What they do not tell you
Except for the concentration these pesticides are the same.
ENVIRONMENTAL HAZARDS STATEMENT

PROVADO 1.6
A commercial pesticide

ADMIRE 2 FLOWABLE INSECTICIDE
A commercial pesticide

Bayer Advance 12 Month Tree & Shrub Insect control. What you buy
Please beware that products, containing imidacloprid or clothianidin, which are neonicotinoids are lethal to our native bees if they are used in an improper manner.
How You Can Help?

• Provide a healthy habitat for all pollinators (hummingbirds, butterflies, bees)
• Have messy borders! (Ground dwelling bees!)
• Be careful with chemicals & pesticides. Think organic. Teach your neighbors if they will listen!
• Try raising bees.
Thank You.

Questions?
Only if we understand can we care. 
Only if we care will we help. 
Only if we help shall all be saved. 
~ Jane Goodall
Rumor has it that the neighbors put in raised beds.

So I've heard.