

# Plant Health Management

By Connie Kuramoto



## The "PEST" System



- P – Prevent pest problems
- E – Evaluate the problem
- S – Solve the problem
- T – Take appropriate action

## Prevent pest problems

"An ounce of prevention is worth a pound of pesticide"



## Steps to Prevent Pest Problems

1. Build Healthy Soil
2. Double Dig
3. Mulch
4. Right Plant, Right Place
5. Crop Rotation
6. Wise Water Use
7. Plan for Problems



## Characteristics of Healthy Soil



- Good percentage of organic matter
- Active with microorganisms
- Has good air and water holding capacity

## How to Build Healthy Soil

Add  
Organic  
Matter !!!



## Organic Matter



- OM is partially decomposed remains of soil organisms and plant life.
- OM binds soil particles together and retains both air and water to prevent drought stress and eliminate the need for excessive watering
- OM absorbs and stores plant nutrients so that your plants stay healthy
- OM provides food for microorganisms that combat soil diseases

## Sources of Organic Matter



1. Compost
2. Aged Manure
3. Mulch
4. Cover Crop

## Compost



**The best source of compost, ecologically speaking, is from your own compost pile**

## Composting Council of Canada Website



To learn more about composting you can check the Composting Council of Canada Website at

<http://www.compost.org/>

## Double Digging



Double digging is a method of deep soil preparation in which the soil is fertilized with organic matter and is loosened to a depth of 60 cm (2 feet).

## Why Double Digging?



- Double Digging creates deeper, stronger root systems that make plants more resistant to drought.
- Drought stress has been shown to dramatically increase insect problems
- Excessive watering has been shown to dramatically increase disease problems

## Double Digging



1. Dig a trench, 1 ft wide, and 1 ft deep
2. Using the digging fork, loosen the subsoil on the bottom of the trench.
3. Turn a strip of topsoil 1 ft wide and deep into the first trench, mixing in compost, and filling the first trench completely, forming a 2nd trench next to it
4. Loosen the subsoil below the second trench,
5. Repeat

## Mulch



- Mulching your flower and vegetable beds will drastically reduce the amount of time spent weeding, watering and fighting pests.
- Mulch, like double digging, and building soil, will help prevent pest problems caused by drought stress and excessive water applications.

## Right Plant, Right Place

- Make sure that you know a plant's requirements before you put it into your garden.
- If a plant is not happy where it is planted it will be a constant source of pest problems



## Choose Your Plants Wisely

- "Right Plant, Right Place" by Nicola Ferguson is a great book to add to your collection
- Look for Disease Resistant cultivars
- Older "Heritage Varieties" are often disease resistant, otherwise they would not have been desirable to keep in the days before synthetic pesticides

## Choose Plants That Attract Beneficial Insects



Plants that have clusters of tiny flowers attract insects that will prey on your pest insects

**Umbelliferaceae  
or Apiaceae Blossom**

## Beneficial Insects





## Examples of Apiaceae Beneficials



Parsley, Dill, Fennel, Carrot, Queen Anne's Lace, Angelica, Caraway, Chervil, Anise, and Eryngium are good examples of members of the Apiaceae Family

## Other Beneficial Plants



- **Achillea filipendula** – yarrow
- **Helianthus maximiliani** – perennial sunflower
- **Tagetes tenuifolia** – lemon gem marigold

## Crop Rotation



To prevent disease problems don't plant crops of the same family in the same place

- |  |  |
|--|--|
| ▪ Beans and peas   | ▪ Peppers, tomatoes, potatoes, eggplant, |
| ▪ Onions, leeks, garlic  |  |
| ▪ Kale, cauliflower, cabbage, brussel sprouts, rutabaga, turnips, radishes |  |

## Wise Water Use

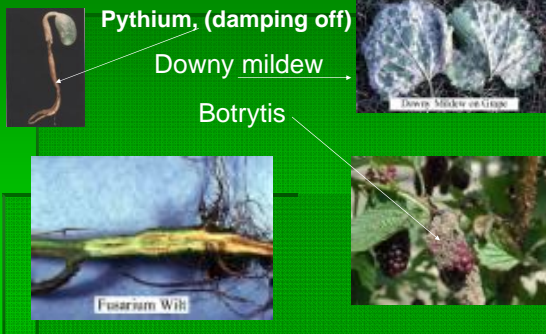
- More plants are killed from improper watering than from pest problems
- Many pest and disease problems are CREATED by improper watering.



## Watering Mistakes

1. Overhead watering
2. Watering anytime after 11:00 am
3. Watering too little too frequently
4. Not building soil with water holding capacity
5. Not mulching
6. Watering too little

## Some Water borne Plant Diseases



## Watering Best Practices to prevent disease probs

- Water the soil immediately surrounding the plant, not the foliage to prevent disease spores from germinating.
- Water as early in the day as possible
- Water deeply, then allow soil to slowly dry out, this creates deep roots and healthy drought resistant plants.
- Use OM and Mulch to help retain moisture and prevent plant stress and disease
- Check water daily, but only water when needed.

## Plan for Problems



- Know your plants and which insects and diseases to be prepared for
- Prepare a strategy ahead of time to prevent panic sprays
- Add OM to build healthy soil, full of microorganisms that will feed your plants a steady supply of nutrients and moisture to prevent plant stress
- Water wisely to prevent plant stress and disease

## A Perfect World

In a perfect world prevention would be all we would need to eliminate pest problems...in our world, however, problems may still occur...what can we do if our prevention isn't perfect?



## Evaluate



1. Evaluate your pest problem rationally
2. Identify the pest properly
3. Get to know the life cycles of the pest you are dealing with, and the life cycles of possible predators
4. Make a list of alternative ways to deal with the pest
5. Choose the least invasive method

## Evaluate Rationally



- Is the plant getting what it needs? enough food, water, sun, nutrients, good soil? If not it will not matter how many pests you destroy they will return and you will have to do it again and again
- If the plant is getting what it needs and is still experiencing pest problems again and again do you really wish to keep the plant?

## Identify the Pest Properly

KNOW  
YOUR  
ENEMY!!!!

KNOW  
YOUR  
ALLIES!!!!



## The Garden's #1 Most Unwanted: Aphids



## Aphidius



The female wasp injects an egg into the aphid with her ovipositor.

Aphids may continue feeding and reproducing for several days

Larvae hatch and start to eat the aphid from the inside.

Aphidius adult in 14-21 days through a round hole at the rear of the aphid mummy.

One female wasp lays about 350 eggs, mostly within 5 days

## Slug Damage



## Root Weevil



## Know your bugs!

Root Weevil

Ground Beetle





## Root Weevil Life Cycle

- Larvae hatch from eggs laid in the soil and spend the winter eating plant roots.
- In mid-spring, they mature, climb up the stem of the plant and chomp on leaves, usually at night.
- Most root weevil species are all female so they reproduce by cloning in the summer.

## Cutworm Damage



5. Cutworm Damage and Mature Cutworm in Sugarbeets



Favorite Hosts include  
Beans, Corn, Asparagus,  
Tomatoes

## Cranefly

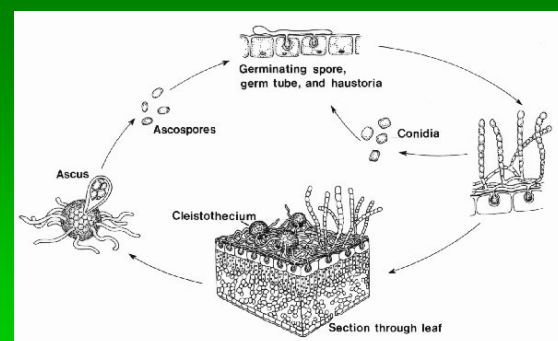


## Diseases

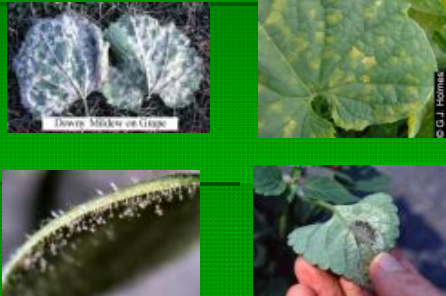
If you learn about common plant diseases you will be less likely to confuse simple environmental, mechanical or nutritional problems with disease organisms.



## Powdery Mildew



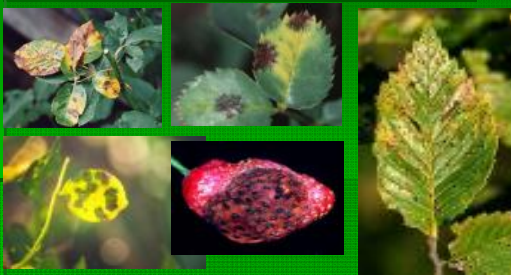
## Downy Mildew



## Botrytis



## Blackspot



## General Disease Control

- Get rid of your leaf blower – they blow disease spores up from the ground unto your plants
- Get rid of your overhead watering – it splashes disease spores up from the ground unto your plants
- Water in the morning so that the plant leaves dry quickly
- Keep plant debris , especially diseased debris cleaned out from under the plants

## The Weed Pests



## Weed Control

- Make sure seed and mulches do not contain weed seeds.
- Compost manures to reduce weed seeds.
- Prevent weeds from producing seed. Pigweed can produce 250,000 seeds and a barnyardgrass produces 1 million seeds. **Many weed seeds persist indefinitely in the soil.** 4 years of intensive management may reduce some weed seed populations by 90 percent.
- Try corn gluten to prevent weed seed germination.
- Keep cutting weeds back to weaken roots.



## Solve the Problem – The Steps

1. Identify the pest correctly
2. Identify the stage of the life the pest is in
3. Identify appropriate predators around that could assist you and how to attract them
4. Identify any environmental factors that could have weakened the plant and identify the remedy.
5. Wash the plant off, or prune off damaged tissue and watch it for a while
6. Try to determine what would happen if you did nothing else

## Take appropriate action

If it becomes obvious that this is indeed a serious pest problem that will only get worse if you ignore it, try using the least harmful method to attack it

## Least Harmful Methods

1. Environmental Control – Move the plant, feed or water it
2. Mechanical Control – Squash, squish, wash off, pinch off, prune
3. Predator Control – Buy or attract
4. Trap – Catch and release, catch and kill
5. Repellent Spray – nettle, horsetail tea
6. Spray to Kill – Soap, Tobasco, Tobacco, Sulfur,

## Aphid Control

- Aphids prey on plants stressed out from over-fertilizing and incorrect watering, so do your best to boost your plants' health.
- Squash
- Wash
- Prune
- "Knock Back" Spray with Soap
- Introduce Predators



## Slugs Like Beer



- Slugs and snails will drown in containers of liquid in which they can enter but cannot escape.
- Room temperature beer is a favorite
- Beer serves as an attractant. Simply, this means that slugs cannot resist the smell of beer so they crawl into your trap and drown.

1. Water in the morning. Soil will dry by night, depriving the slugs of needed moisture when they come out to feed. Studies have shown this method to be as effective as classic trap-and-destroy techniques--reducing slug damage by up to 80 percent.
2. Provide habitat for predators such as toads, birds, turtles and salamanders.
3. Erect a fences of copper stripping around your planting beds. Just make sure you get all the slugs out of the area before you put up the fences; otherwise, you'll trap the pests inside.

## Root Weevil Control



1. Patrol the area around the stem and bottom of the plant at night with a flashlight in early and mid spring
2. Place a white cloth under your plant in the evening or early morning and shake the leaves to catch adults.
3. Place a board under the plant. Check under the board for hiding adults and scrape them off into a bucket of soapy water.
4. Place a wrapper around the trunk of the plant and coat it with "Tanglefoot." The wrapper should be at least 6" wide.

## Beneficial Nematodes

- Beneficial nematodes go after the larvae in the soil and are a safe & natural method of controlling black vine weevil. A few things are critical in order to get good control:
- Timing & Temperature - Beneficial nematodes require a soil temperature of at least 60 F to work. Gardeners often miss the critical period in the spring since the weevil larvae pupate fairly early, before the soil warms. The late summer and early fall is the best time to apply nematodes.
- Moisture - The root zone around the plant must be moist since nematodes don't swim and require water to carry them through the soil. Water the area before and after application.

## Cutworm Control

1. Mix moistened bran with molasses and BTK Sprinkle the mixture over the soil about a week before you plant. You will reduce the population.
2. Install a protective collar (1" aboveground, 1" below) around each seedling or transplant. Good collars include foil and paper-towel rolls
3. Encourage predators, especially toads and birds.
4. Plant dill, alyssum, yarrow or cosmos to encourage parasitic wasps, which prey on cutworm larvae.

## Crane Fly Control



- Keep your lawn healthy
- Disrupt crane fly habitat and promote a healthy root system by aerating and thatching
- Leatherjackets love soggy lawns. Keep your lawn well drained or plant something else in waterlogged areas.
- Robins, starlings, parasitic nematodes and ground beetles search and destroy leatherjackets. Avoid using pesticides that could poison your allies.

## Understand the Role of Insects and Plant Disease

- Pest insects and plant disease are nature's initial step in turning environmentally or genetically weak plants into compost
- A plant that is stressed by nutrient deficiencies or unfavorable environmental conditions is the first to fall prey to pests or diseases

## Natural Pest Control



- Feed your soil to grow more sturdy plants
- Know each plant's most favorable environmental conditions and strive to provide them
- Eliminate drought stress as much as possible
- Try to avoid overhead sprinklers, especially late in the day when leaves will stay wet
- Provide a good environment for predator insects
- Eliminate all pesticides

## The Plan: to plan ahead... we're here already!!!!

- Plan to regularly build and feed your soil
- Plan to provide the very best conditions for your plants
- Plan for things to go wrong, that way you will be ready
- Plan to encourage a healthy diversity in your gardens and your garden's soil
- Keep records

## THE END..

of pesticides, herbicides, fungicides,  
petroleum based fertilizers

### THE BEGINNING...

of a full out effort to insure that we put back  
what we take from the soil, and from the  
planet in the best ways we can

of a serious search for and sharing of  
answers that resonate with nature