MEDIEVAL PEST MANAGEMENT

This class will cover cultural methods of controlling pests, identification & support of beneficial insects, herbal repellents, and other methods of pest management.

BENEFICIAL INSECTS

- **What makes insects beneficial**?
  - **Pollinator** – Pollinate our flowers & our vegetables
    - Bees, flies, butterflies, etc
  - **Predator** – Hunt & kill/eat other insects
  - **Parasitoids** – lay eggs on other insects as host & larvae kill host

Predatory Insects

Insect	Larvae or Adult	Predator to
Assassin Bugs	Both	Flies, caterpillars, beetles', mosquitoes, etc
Aphid Midge (Aphidoletes aphidimyza)	Larvae only	Aphids
Braconid & Chalcid Wasp	Larvae only	Aphids
Damsel Bugs & Damsel Flies	Both	Larvae eat mosquito larvae & aquatic insects Adults eat flies, mosquitoes, moths, some beetles & caterpillars
Dragonflies	Both	Larvae eat mosquito larvae & aquatic insects Adults eat flies, gnats, mosquitoes, swarming ants, termites, moths and other flying insects
Ground Beetles, Calosoma		Referred to as Caterpillar Hunters
Hoverflies	Adults	Aphids & Thrips
Lady Beetles	Both	Wide range: caterpillars, aphids, thrips, & soft-bodied insect
Green Lacewing	Larvae	Voracious feeders: aphids, insect eggs, thrips, mealybugs, immature white flies & small caterpillars
Paper Wasp	Larvae	Caterpillars, flies, spiders & beetle larvae Love tansy, caraway, fennel & plants w/ tiny flowers
Praying Mantis	Both	Moths, flies, roaches, beetles, crickets, aphids, grasshoppers, mosquitos
Robber Flies	Both	Larvae eat eggs, other larvae & small arthropods Adults prey on flying insects
Spiders	Adult	General Predators
Syrphid Flies	Larvae	Aphids, thrips, whiteflies & small caterpillar

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- **Parasitoid Insects**
  - Over 70,000 different parasitoid species of wasps & Flies
    - Fairyflies (wasps)
    - Megarhyssa wasps
    - Trichopoda pennipes attacks squash bugs & stink bugs
    - Cotesia wasp attach tobacco horn worm
    - Tiphia wasp attacks white grubs

There isn't much written about pest control in medieval manuscripts, so the supposition is that while the gardens had pests, our ancestors knew how to deal with them.

We do see many bugs in manuscripts: ladybirds, bees, spiders, butterflies, etc.

MEDIEVAL PEST MANAGEMENT TECHNIQUES

- *Crop rotation* -planting the same crop in the same spot year after year makes it easier for insects to not only find the crop but for those that lay larvae, the soil will become ladened with the larvae/eggs.
  - Also do not plant same species in the same area (i.e. curcubitas)

- *Cover Crops* – as known as 'green manure' is typically a winter planting of an annual crop
  - Plants from legume family help restore nitrogen to the ground and are considered a nitrogen fixer's plant
    - Chickweed, hairy vetch, clover and alfalfa
  - Other options are rye, mustard & buckwheat
  - The thicker thatch crops provide habitat for larval stages of many insects like hoverflies, lady beetles, lacewings, and ground beetles
  - Also helps retain moisture in the soil which helps the beneficial worms in the soil
    - Worms provide vermicompost to the soil thereby enriching the organic matter

- *Debris removal*
  - Remove any infected leaves or whole plant as soon as possible
  - Remove whole plant at end of season and remember to plant a different species next or following year

- *Garden Structures*
  - Cloches can be used to cover plants to protect them from flying insects that will lay larvae on the plants
    - Keep in mind the size of the pest
  - Cloth can be used to protect plants from pests
    - Keep cloth light weight to increase air flow & water flow
    - Use natural materials or garden netting
    - Keep cloth OFF of plants
      - Use stakes or hoops that are taller than the plants' finished size
      - Must be impenetrable to small insects
  - A modern approach would be a sticky trap around plants

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- ***Water management***
  - Use common sense here
  - No standing water… water needs to flow to reduce the possibility of insects.
    - Keep in mind that it won't stop them so think about beneficial insects & fish

- ***Companion Planting*** – helps boost plants health, improves yields, & helps reduce pests
  - Basil – deters thrips/hornworm on tomatoes; aphids/beetles for peppers; fleas
  - Borage – attracts pollinators
  - Calendula – attracts hoverflies, lacewings, & parasitic wasps
  - Cosmos – attracts predatory insects
  - Dill – great insectaries & host plant
  - Fennel – great insectaries
  - Lavendar – pollinators but deters some insects
  - Marigolds – deters nematodes, whiteflies & beetles
  - Mustards – many bugs are not fans and will not bother it
  - Nasturtiums – deters aphids, squash bugs & whiteflies
  - Onions & Chives – deters aphids
  - Sweet Alyssum – attracts hoverflies

- ***Pest Tolerant Plant Varieties***
  - Look for varieties that pests do not like
    - Johnny's seeds

HERBAL REPELLANTS

- Most of the repellants seem to be focused on in the home & on the person
  - Aconite: paste for rats
  - Basil: Fleas
  - Bay: scent for insect repellant
  - Garlic: discourages aphids & mites
  - Fireweed (Epilobium or Chamaenerion angustifolium) – burning deters flies & gnats
    - Zone 2-7
  - Hellebore: paste for rats
  - Horehound: soaked in milk for fleas
  - Lavendar (Lavandula): deter mosquitoes & flies
  - Mint: ants & small pests
    - Can take over as spreads via rhizomes
  - Marjoram: lice & small insects
  - Pennyroyal: fleas & rodents
  - Rosemary: moths & other insects
  - Rue: smell repels insects & cats
  - Wormood (Artemisa vulgeris): moths, fleas & beetles
  - Tansy (Tanecetum vulgare): insect repellent
- There is some evidence that gardeners used smoke not only with bees but to create a protective barrier around plants
  - Mugwort or juniper were smoked

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PEST ISSUES

The key here is what is your tolerance threshold?

- Some pests support the natural ecological system of a garden
- Keep in mind that NO bad pests may also mean NO good bugs
    - Needed for pollination
    - Insecticides are indiscriminate no matter how carefully applied

MOST COMMON PESTS

- ***Ants*** – Keep in mind that ants do cultivate the soil. Natural methods take longer to work (cayenne pepper, herbs, DE, etc.)
- ***Aphids*** cause leaf curl due to sucking of sap of plant. Secrete 'honeydew' which promotes black sooty mold growth
    - Ants protect aphids
    - Will see aphids as clusters or yellow or black small dots on plants
    - High nitrogen levels cause aphids to rapidly multiply
    - **CONTROL METHODS:** – Ladybugs, Green Lacewings, aphid midges & braconid/chalcid wasps; removal of plant or part of plant; high powered water; cut back on fertilizer use (use compost, seaweed, etc.); insecticidal soap; horticultural oils
- ***Caterpillars*** – a lot of varieties eat all kinds of plants. Keep in mind many caterpillars will only eat their host plants and do turn into pollinators
- ***Cabbage Looper*** (Trichoplusia ni)- prefer cruciferous plants
    - Moth lays eggs on plant and the larvae eats the plants
    - Overwinters in a cocoon in debris so clean up all old materials
    - **CONTROL METHODS:** handpick off larvae & eggs; can try high powered water spray; cover rows completely; plant tolerant varieties (see below); remove all old plants in fall; control weeds as can overwinter on weeds; insecticidal soaps or Bacillus thuringiensis spray; trap craps like nasturtium, lettuce, spinach, beets, parsley, potatoes & tomatoes
    - Green Winter Cabbage, Savoy Cabbage, Savoy Chieftain Cabbage and red cabbage
- ***Cucumber beetle*** – likes all Cucurbita plants & fruits. Bacteria wilt will cause the plant to die
    - Black head w/ wings covered in either green w/ 12 black spots or alternating black & yellow stripes.
    - Overwinter in brush and weeds
    - Beetles are active when above 70 degrees F
    - Eggs laid near plants & larvae will feed on plant roots w/ adults emerging midsummer
    - 2 to 3 generations a year
    - **Control Methods:** use row covers, trap crops, plant tolerant varieties, delay planting
- ***Cut worms*** a caterpillar that turns into a Moth, they tend to attack seedlings severing stems at or below soil level or strip all leaves
    - **CONTROL METHODS:** place 3" collar around seedling w/ 1/2" in ground; trap of 1/2tsp cornmeal/bran meal in circle around stem; clean up all debris & cultivate soil to 8" depth
- ***Grasshoppers***
    - **CONTROL METHODS:** frogs, toads, birds, skunks, yellow jackets and hornets; Parasitic protozoa "NOLO Bait" or insecticidal soap
- ***Plum Curculio*** – beetle that lays larvae in stone fruits when young, serious pest for peaches as both larvae & adults feed on fruits

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- **CONTROL METHODS:** shake infested tree w/ something to catch them under tree/best done early in day; remove all fallen fruits; cultivate soil around tree in early spring will destroy pupating larvae on ground; do not use insecticides until after flower petals drop

- ***Slugs & Snails***
  - **CONTROL METHODS:** Remove by hand; 5" grit barrier around plant (DE, builder sand, nut hulls, eggshells); copper strip around plant; beer traps
- ***Squash Vine Borer*** (***Melittiacucurbitae***) is a beetle that lays its larvae in the ground or in the stem of Cucurbita plants
  - **CONTROL METHODS:** Remove & destroy; Bacillus thuringiensis into infected stem; cover stems w/ soil to promote roots making shorter vines; pull infected plants immediately; remove all plants at end of season (throw away); row covers
- ***Spider Mites*** – sometimes easier to see damage then the mites
  - **CONTROL METHODS:** spray the plant w/ high powered water; insecticidal soap; horticultural oil sprays
  - *If you have rose rosette which is caused by mites, pull and burn or throw away the rose bush.*
- ***Tomato Fruit worm*** – feeds on many different plants (cotton, corn, tomatoes)
  - **CONTROL METHODS:** Remove/dispose of infected fruits immediately; support parasitic wasps; use Diatomaceous earth to kill larvae; separate food sources.
- ***Tomato Horn Worm*** is a Five-Spotted Hawk Moth (***Manduca quinquemaculata***)
  - Use tomatoes as host plants but anything in the Solanaceae family

THINGS TO CONSIDER

Attract Beneficial Insects (predators, parasitoids & pollinators

- Focus on attracting beneficial insects
  - Flowers in the yellows, blues & purples are favorites of many bees & other pollinators
    - Catmint
    - Lavendar
    - Salvias
    - Daisies
    - Meadowfoam (poached egg plant)
    - Hyssop
  - Lemon Balm (*Melissa officinalis*) was rubbed on bee hives to attract swarming bees
- When planting flowers for insects, different insects prefer different flower shapes
  - Bees do not like double blossoms (lots of petals) as it is hard for them to get to the pollen

DEBRIS CLEANUP

- Avoid trimming up perennials & grasses/shrubs as our beneficial insects lay on these. Wait to cut back until late February/March

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APPLYING PRINCIPLES TO GARDEN DESIGN

When applying these principles to your garden design, consider:

- How much room do you have in each bed?
- How big does each plant get (including any companion plantings)?
- If you plant a perennial plant, how big is its 'finished' size?
    - Rosemary can get to be 4'-5' tall and that wide
    - Lavendar can spread to be nearly the same as rosemary
- When planting perennial companions, remember to review each year what does best near it as some plants may keep away necessary insects like hoverflies
- Structures:
    - If you make them permanent, remember to rotate crops
    - If not permanent, how easy is it to store the equipment each year?

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