







Presentation Order

- Emerald Ash Borer
- Brown Marmorated Stink Bug
- Grubs (June Bug larvae)
- Slugs
- Leather Jackets (Cranefly larvae)
- Aphids
- Lilly Beetle

Lady Bugs

- European Fire Ants
- Native Nova Scotia Butterflies
- Bumble Bees
- Dragon Flies
- Asian Citrus Psyllid

Emerald Ash Borep Agrilus planipennis

- Adult female lays 100's of eggs in bark of Ash.
- Eggs hatch in 2 weeks. Larvae bore into new wood and feed until fall. Overwinter in sapwood.
- Adult emerges in warm weather forming D-shaped exit holes.
- Migrate(fly up to 0.8km)
- Very Invasive species (Asia).

- Threatens all North American Fraxinus genus (Ash trees)
- Spread in infected firewood
- Has not reached NS but moving from US/Ontario.



emerald Ash Borer



- Eleven-year cycle: from introduction to large-scale ash death
- Chemical control: TreeAzin
 - Only known effective treatment (must be applied by Arborist (every 2 years)
- Possible biological control: parasitoid wasps:
 - Tetrastichus planipennisi
 - Oobius agrili
 - Spathius agrili
- Precautions:
 - Do not bring in wood from infected regions
 - Assess number and health of Ash trees on property
 - Avoid new plantings of Ash trees

Brown marmorated stinkbug Halyomorpha halys

- Agricultural pest lay eggs on underside of leaves
- Affect 400 fruit, vegetables, ornamentals.
- Appearance: shield shaped body, 17 mm (5/8") long, mottled brown/grey.
- White bands antennae and abdomen
- Native to China, Japan, Korea and Taiwan.
- Accidentally introduced into the US 1990's from China







Brown Marmorated Stink Bug

- Do not confuse with native beneficial Stink bugs
- Not found in NS yet, but in Ontario
- Watch for it and report if found to Agriculture Canada
- Overwinter in buildings release foul smell
- Possible biological control parasitic wasp Trissolcus halyomorphae - lay eggs in eggs of Stink bug

Chemicals not effective



Eggs & Nymphs







Adult Male



Adult Female

GPubs of the June Bug Phyllophaga

- Other common names:
 - White Grub
- Seasons:
 - All growing season
- Stages of life
 - Live in soil for 3 years, then emerge as June bugs;
- Natural predators:
 - Skunks, raccoons, crows, parasitic nematodes, some small flies.
 - http://www.gov.ns.ca/nse/pests/docs/whitegrub.pdf



Large white /brown grubs up to 4 cm (1.5in) long. Live in top layers of soil. Generally easy to see in dug soil. Can rarely be seen on the surface of wet lawns.

June Bug Grubs

- Benefits / Problems in garden
 - Lives in the soil and eats soft roots. If present in large numbers may kill plants
- Plants Affected:
 - Potentially most soft rooted plants , potato tubers, lettuce etc
 - Lawns are choice, due to dense matt of edible roots
- How to tell if they are in your garden and how to remove them
 - Brown patches in lawn, plants going brown progressively as grubs advance.
 - In veg garden, mechanical removal by digging soil and picking.
 - Bury cut potato tubers to attract grubs.
 - Saturating lawn with water and raking might lift them to the surface;
 - Biological Control by parasitic nematodes.
 - Professional chemical treatment



- Confined to moist environment, most active after rain and at night
- Hermaphrodites: lay 30 transparent eggs 1/8"in diameter in hole inground ~ every 10 days
- Easily moved to new garden by transplants, garden equip, and bottom of footwear
- Natural predators
 - birds, reptiles, frogs, toads



Soft ,slimy legless bodies ranging from white, brown, grey, black prone to dessication moving on secreted layer of mucus.

Pests to agriculture/horticulture - feeds on organic material, foliage, fungi - crop more vulnerable to rot, disease, and poor asthetics



- Controls

 - chemical-metaldehyde is toxic
 - organic -iron phosphate baits, beneficial nematodes (phasmarhabditis herma phrodita)

- Deterrents

 copper, crushed egg shells, electronic slug fence, caffeine-based sprays, seaweed

- Eliminate

 diatomaceous earth, salt, beer/yeast traps, lava rock, collection devices ie plywood, orange halves

- Helpful hints

- water in morning, reduce amount of foliage on ground, in fall remove all leaf debris

START EARLY AND BE RELENTLESS



Leatherjacket Larvae of the Crane Fly

Other common names: -Leatherback bugs -Leatherjacket slugs Season: Oct - May/June Stages of life: -Adult Crane fly deposits eggs in early autumn.

eggs in early autumn. -Eggs hatch in 2-3 weeks. -Larvae feeds on decaying plant tissue from Oct to June -Rest until pupation completed



COLOR: GRAY-BROWN LENGTH: 4 CM NO LEGS OR OBVIOUS HEAD



Leatherjacket Larvae of the Crane Fly



Problem:

Larvae eat the roots & stems of grasses & small plants in flower beds & vegetable gardens.

- *To locate larvae in your garden:* Lift damaged turf or dig ground around affected area.
- Natural Predators:

Crows, Magpies, Rooks & Starlings











Leatherjacket



NON CHEMICAL CONTROL

Pathogenic Nematodes (worms)

Application: Aug to Oct. Apply on moist soil (evening or overcast) Minimum temperature of soil 12 C

OR

Cover area with black plastic sheet at night in damp conditions. Peel back sheet *(slowly)* in morning and collect up the surfaced leatherjackets.

CHEMICAL CONTROL

Imidacloprid Insecticide (Lawns only) Application: Early autumn - as directed



- Other common names:
 - plant lice, greenflies
- Seasons:
 - Eggs overwinter, females hatch in spring & summer, males mate in fall with females
- Stages of life:
 - Egg, nymph, adult
- Natural predators or prey:
 - Lady beetle larvae, parasitic wasps, spiders



Small, pear shaped bugs with long antennae on head; green, white, yellow, red, grey, black or brown in colour; tubes on abdomen that produce a spray warning when aphid is threatened



- Benefits / Problems in garden
 - Uses its needle-like mouth piece to suck sugary sap from plants; too many aphids on one plant can stunt its growth or causing wilting
- Plants Affected (hurt/helped)
 - Vegetable plants, annuals, perennials, trees and shrubs; most feed on only one type of plant
- How to tell if they are in your garden and how to remove them
 - Found on stems, hiding under leaves, often with ants nearby
 - Can hose them off with water, pick them off, prune off or use insecticidal soap
- Other notes, behaviours, etc.



- Secrete a clear sticky sweet liquid called honeydew which attracts ants

Lily Beetle Lilioceris Lilii

- Other common names:
 - Scarlet Lily Beetle
 - _ Red/leaf Lily Beetle
- Seasons:
 - Spring through to winter
- Stages of life:
 - Overwinter in soil or plant debris.



- Size: 6-9 mm in length
- Color: Bright scarlet red & underside legs, eyes, antennae and head are black.
- Large eyes, slim neck & wide abdomen.

Lily Beetle Liliocepis Lilii

- In spring they feed on young lily leaves and mate.
- Female lay eggs on underside of lily leaf.
- Eggs hatch in 6 days.
- Feed up to 24 days.
- Borrow into ground until they emerge as adults.
- Natural predators or prey: None



Lily Beetle



- Problems in garden
 - Damage to leaves & flowers which leaves plants weak & susceptible to *Lily Grey Mold*.
- Plants Affected
 - Ornamental Lilies (Lilium)
- How to remove Lily Beetles
 - Regular hand picking and crushing of eggs & larvae. Can also be drowned in soapy water.
 - General leaf beetle insecticides can be effected however toxic to bees & other insects.

Lady Bug Harmonia axyridis

- Other common names:
 - ladybird beetles, lady beetles
- Seasons:
 - Spring through fall
- Stages of life: Adult, larvae, pupa, egg
- When threatened, ladybird beetles in general, and this one in particular, exude a foul-smelling and tasting liquid from their leg joints.







Ladybugs are universally recognized as beneficial insects, consuming large numbers of aphids and other small, sapsucking insects, as well as pollen.

Widely sold for aphid control

•

- Easily identified, Ladybugs should be allowed to enjoy your garden as they will work hard to keep it free of critters.
 - There are at least twelve domestic species of Lady bugs in Nova Scotia and an additional three or four introduced species.



European Fire Ants

Myrmica Rubra Linnaeus

Also known as Fire Ants, Red Ants and Stinging Ants

If found on your property, please call one of: HRM Corporate Call Centre: 490-4000 NS Museum of Natural History Species Id: 424-6455 Canadian Food Inspection Agency: 426-2110

- The European Fire Ant is an invasive, exotic species that is a nuisance pest for people.
- Generally speaking, M. Rubra worker ants are very small (4 to 5 mm) and reddish-brown. The queen is a little larger. They aggressively defend their territory and readily sting humans and pets in their foraging area.
- They nest in decaying logs or soil, and under rocks and debris.
- It appears the ants spread two ways. One way is by "colony budding" into adjacent areas where a group of ants, including the queen, moves from the original colony and establishes a new nest nearby.
- They are also spread by human transport of nests from infested areas (soil, decaying logs, potted plants etc.).

Potential Impacts

- Due to their nest habits and their aggressive behavior, European Fire Ants present serious problems for homeowners.
- They are capable of stinging anything that gets too close to their nest. The sting is very painful, likened to a hornet sting, and some people may also be allergic.
- In high densities, they can decrease the value of property and present a danger to people and pets.
- In addition, European Fire Ants have been reported to be responsible for decreases in the diversity of native species of ants and other insects in the Northern U.S.
- To avoid the spread of this insect, it is important to thoroughly check soil, mulch and plants for fire ants before transporting them from known infected areas.

The only natural predators I could find are **phorid flies** and **armadillos** (anteater's cousin). Oddly enough, the flies are more effective than the armadillos. Both are native to the southern states and couldn't survive here. It seems the best way to control these pests are to discourage nesting areas or use bait. HRM discourages the use of pesticides unless the ants pose a risk to health, livestock or property.

Examples of Baits

1/8 teaspoon (0.5g) 1% Boric Acid 1 tablespoon (10g) corn syrup Water

Read and follow all safety directions listed on borax container Mix together borax and icing sugar Add enough water to make a thick slurry

OR

1 part Borax 19 parts icing sugar Water **Read and follow all safety directions listed on boric acid container** Mix together boric acid and corn syrup Dilute with water (1 part bait to 2 parts water) to form a solution

Place small amount of solution in bait stations (small covered plastic containers, with holes cut out near the top to allow ants to enter and exit; mark "Ant Bait" on containers)

CHARACTERISTICS OF THE EUROPEAN FIRE ANT:

- Two backward-pointing spines on the middle body section, visible only with a magnifying glass.
- The constricted "waist" has two segments: most native species have only one.
- 3. Capable of inflicting a painful, burning sting.
- Build nests in soil under rocks, wood, or other debris. Nests are NOT large soil mounds.
- Usually very abundant with 10-12 nests in a 10 ft x 10 ft area.

Our native ants share some of these features. If you have small, red ants with the above characteristics, their identity should be verified.

Locations in Nova Scotia

As of 2009, populations of the European Fire Ant are known in the Summit Street and Jubilee Road area of peninsula Halifax and in Spryfield, Lower Sackville, Abercrombie, and Stellarton. I couldn't find what time of year they're present, but an educated guess would be after the ground is thawed.



• Other families within the order Lepidopter which includes Papilionoidea:

- the *skippers* (Hesperioidea)
- the *moth-butterflies* (Hedyloidea)
- and Moths

Seasons:

Flight season: Spring to fall depending on species

Stages of life:

egg, larva, pupa and adult.

Natural predators or prey:

- wasps, ants, parasitic flies, birds, snakes, toads, rats, dragonflies,
- few countries see the butterfly as a delicacy. Mexico, Africa and Southeast Asia.

For more info, see website below

http://novascotiabutterflies.ca/index.html

Butterflies

Benefits / Problems in garden

- The butterfly plays an important role in ecosystems, acting as a pollinator,
- a food source and an indicator of the ecosystem's well being.

Plants Affected (hurt/helped)

- Butterflies and moths may damage a wide variety of plants depending
- on there stage of life and species.

How to tell if they are in your garden

They fly by ⁽³⁾

• Misc.

• There are over 73 species of butterflies and moths native to Nova Scotia







Bumblebees

Bombus sp.

There are over 100 different species of bees in Nova Scotia



Honeybees build large nests & are domesticated (for honey & beeswax, & pollinators for crops)



Bumblebees are medium to large & nest in ground (often in abandoned rodent dens)

Digger bees make single burrows in sandy/gravelly soil



Leafcutter bees are small (fly size or smaller) & nest in holes in wood





Mason bees make compartments of mud in their nests, in hollow reeds or holes in wood



Sweat bees are small & get nickname from landing on people to collect the salt from our skin .

Stages of a Bumblebees life

- Bumblebees are seasonal & queens live underground over winter
- In spring, a queen emerges, feeds on spring flowers & searches for location to start a colony







- Queen collects pollen, forms it into a lump that she lays her first brood of 7+ worker eggs on
- Pupation takes ~ 21 days (eggs hatch into larvae, go thru several stages, turn into pupae)
- This first group takes over pollen & nectar collection while the queen lays successive broods of worker eggs
- By mid-summer, a colony contains 20-100 workers & produces males & queens.
- New queens leave nest & mate, & dig 5-10 cm into the soil for hibernation.
- In autumn the remainder of the colony declines & dies

Bumblebees

Benefits in garden & ecosystem

- Pollinators (flowers, fruits & vegetables)
- Honeybees are used on large scale as pollinators
- Native bees may be 4x as effective as honey bees

Problems in garden

- Stinging Of more than 3500 types of bees, most don't sting (honeybees & bumblebees do)
- Mining/digging bees burrow into ground/lawns but do not cause damage, may aerate
 How to supp





How to support bee populations

- Native plants (Black-eyed Susan, Goldenrod, Purple Coneflowers, Sunflowers & Asters)
- Flat head flowers (yarrow, Queen Anne's
- Lace, tansy, dill & parsley)
- Bloom through spring, summer & fall
- Plant in clumps
- Colors *blue, purple, violet, white, & yellow* Leave flowering weeds (clover)
- Provide a water source
- Leave bare patches of earth
- Maintain a ["]wild space" near your garden Don't use pesticides (even herbicides)

Dragonfly Many Species: Suborder Anisoptera

- Did not find any other common names
- Seasons:
 - Found during summer months.
- Stages of life:
 - The eggs are laid near or in water . Hatched into larvae and can live beneath the water from 2 months up to 5 years. Once an adult, they live only about a month during which they mate.
- They are a natural predator and they eat mosquitoes, and other small insects like flies, bees, ants, wasps and very rarely butterflies.



Has large multifaceted eyes, 2 pairs of strong transparent wings & elongated body. Has 6 legs and can move in 6 different directions. They hold their wings out to the side at rest. They come in different colors, red, blue, silver grey.

Dragonfly

Dragonflies feed on mosquitoes and their larva, other small insects found in water, spiders, moths.

This helps to control pest infestation, and as they eat mosquitoes they help decrease malaria.

- They do not sting or bite, and provide great visual appeal with their colors and flights.
- They also indicate a fresh water body.

- I could not find any info of any problems with them.
- They do not cause any issues with soil, or any plants.

Asian Citrus Psyllid

Diaphopina citri

Native to Australasia

- Not present in Nova Scotia
- Brasil since 1940s; India since 1700s
- Infested half of Florida's citrus trees since 2005; \$4.54 billion damage
- Lifecycle
 - Eggs on shoots and leaves emerging from buds
 - Wingless nymphs feed on soft growth and develop into adults on the plant
 - Drinks sap from trees
 - Up to 40 000 bugs per tree





Asian Citrus Psyllid

- Vector for devastating citrus disease
 - Huanglongbing: "The End of Orange Juice"
 - Citrus greening in Florida, California
- Disease transmitted by a bacterium that lives within the psyllid via feeding
 - Candidatus Liberibacter
 - Infects plant circulatory system; no sugar from canopy to roots
- Chemicals: 99% not effective enough
- No North American predators
 - Importing parasitic wasps to California



