

Methodology for monitoring pests of orchards

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MONITORING

- The proper identification and monitoring of pests is the foundation of integrated pest management
- Monitoring is necessary to detect the presence of pests so that action can be taken before infestations become damaging
- Several tools are available to monitor pest arthropods
- Orchard managers and plant protection staff will benefit from knowing which pests typically attack their crops

MONITORING

- As a minimum, a scouting program consists of weekly, random examination of a limited number of plants in each section of the orchard

MONITORING

- To visual examination, hard-to-see insects and mites can be detected by striking foliage or flowers toward your hand on onto a plain surface
- Color sticky cards, and pheromone traps can be used to monitor certain pest groups
- To monitor pests can be used degree days and phenological indicators

VISUAL INSPECTION OF LEAVES AND OTHER PLANT PARTS

- The underside of leaves is infestation by mites, whiteflies, plant bugs, lace bugs and leafhopper
- Winged insects will fly when disturbed of shoots
- Mites, eggs and larvae of insects is necessary to examine the underside of the leaf with a hand lens (at least 10x)
- When mite infestations are detected is important to monitor the presence of predatory mites, ladybird beetles, minute pirate bugs and other predators

VISUAL INSPECTION OF LEAVES AND OTHER PLANT PARTS

- Characteristic of leafminers species is the shape of the mine, and whether it initiates on the upper or lower leaf surface
- Females of many leafminer species can produce a stippling damage on leaves with their ovipositor
- To help indentify the certain beetles and other pests can be used the feeding damage

VISUAL INSPECTION OF LEAVES AND OTHER PLANT PARTS

- Small beetles produce small „shot holes” on the leaf; larger beetles produce large holes and can skeletonize the leaf, leaving only the leaf vein
- Adults of weevils have small mandibles, allowing them to feed only on the leaf edge, which leaves characteristic notches

VISUAL INSPECTION OF LEAVES AND OTHER PLANT PARTS

- Piercing-sucking insects as leafhoppers, lace bugs and plant bugs cause yellowing and sometimes malforming of the leaf
- It is important to detect the presence of these pests early, and not wait for the damage
- Yellow sticky cards and visual examination can be used to monitoring piercing-sucking insects and other flying insects
- Scales can be found in bark crevices, twig crotches, leaf vein or other location on the plant

VISUAL INSPECTION OF LEAVES AND OTHER PLANT PARTS

- Aphids infestations often originate on the growing points of plants
- Most thrips feed on pollen, and can be first detected in flowers
- Wood boring beetle and moth larvae produce holes in trunks and limbs from which sawdust and frass (extrument) are expelled

VISUAL INSPECTION OF LEAVES AND OTHER PLANT PARTS

- Feeding damage and in some cases the frass of pests is characteristic and can be used to diagnose a problem, when the pest is not immediately detected – lacebugs, thrips
- Whiteflies, aphids, soft scales and mealybugs produce honeydew, a sugar-rich excretion which makes leaves sticky and shiny. A fungus called sooty mold grows in honeydew, turning the leaf surface black

STRIKING THE PLANT TO DISLOGE SMALL INSECTS - BEAT-SHEET METHOD



- Striking of foliage and flowers to a white surface can reveal the presence of tiny and cryptic pests, such as leafhopper, plant bug and lace bug nymphs

Suction sampling

- Suction sampler



Monitoring with traps

- Sticky traps/cards in four colors: yellow, blue, green and white
- Roll sticky traps without pheromone lure in two colors: yellow and blue
- Panel traps with pheromone lure



Monitoring with traps

- Delta, wing type or diamond traps with pheromone lure in two colors: white and red
- Water pan traps
- Light traps
- Bucket traps



YELLOW STICKY CARDS

- Can be placed in trees vertically, to monitor a range of pests and facilitate their early detection
- Yellow cards should be placed toward the top of the plant canopy and be changed every week
- Used to detect adult stage of flying insects such as: leafhoppers, thrips, whiteflies, fungus gnats, shoreflies, leafminer adults, winged aphids

YELLOW STICKY CARDS

- If monitoring for soil adult insects, the cards should be placed horizontally and close to the soil
- It is important remember that yellow sticky cards are also attractive to beneficial insects such as parasite wasps, ladybirds and syrphid flies

BLUE STICKY TRAPS

- Used to detect low thrips population because the blue color is more attractive than yellow

TREE BAND STICKY TRAP

Insects that walk up and down trees as females of winter moths become entangled in the glue and are collected



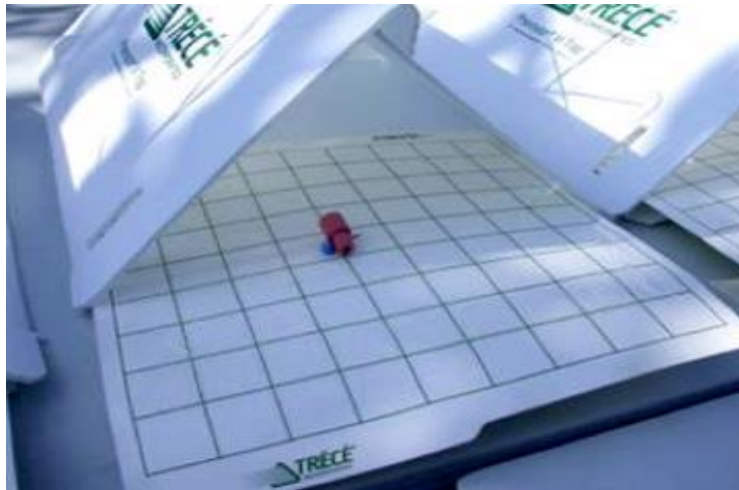
Panel traps

- Used to monitoring populations of bark feeding insects

YELLOWJACKET TRAPS



PHEROMONE TRAPS - DELTA TRAPS



- Females attract males by releasing chemicals called sex pheromones
- Synthetic versions of pheromone attractants are available for many pest insects and are used in traps for monitoring
- Some pheromones often attract more than one species, and so the scout to be able to identify the trapped male moths

PHEROMONE TRAPS - WING TRAPS



- Pheromone traps only indicate that a pest species is present in the area
- They usually cannot be used for estimating densities of pests, damage to plants or the need to spray

WATER PAN TRAPS

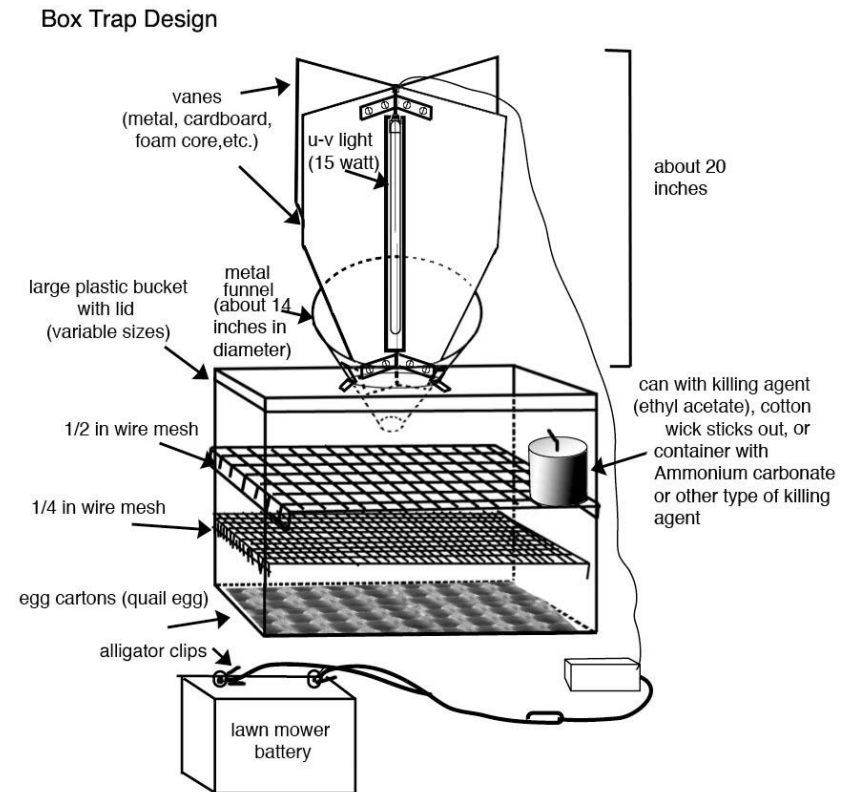
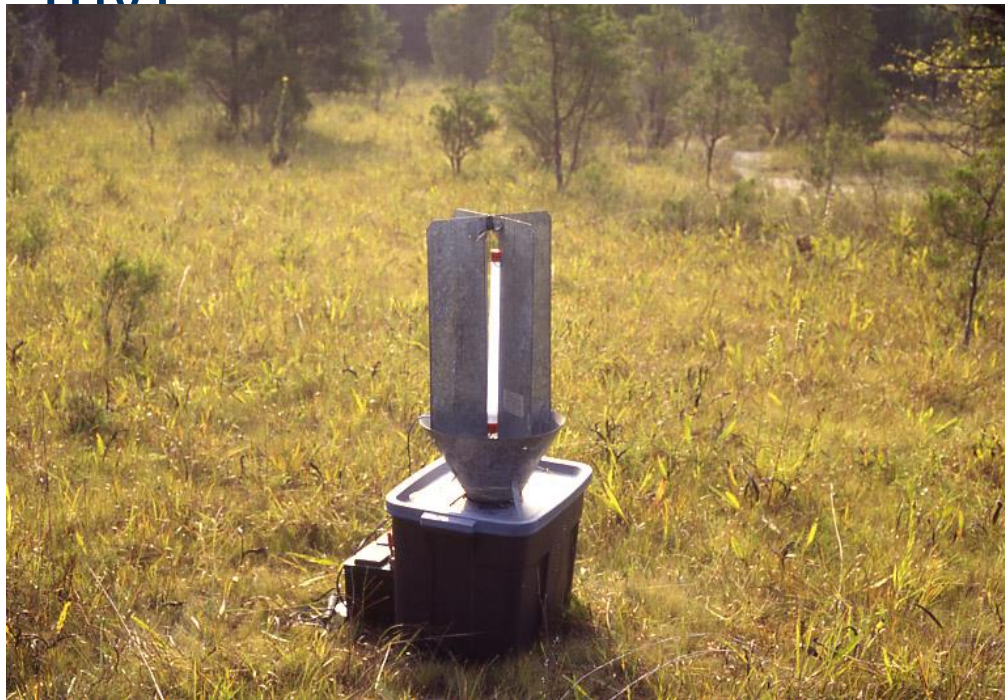


Figure 3. Water trap — *Piège à eau*.



LIGHT TRAPS

- Ultraviolet light (uv)



BUCKET/FUNNEL TRAPS



BAIT TRAPS

- Drosinal is a trap for monitoring of Spotted Wing Drosophila (SWD) - *Drosophila suzukii*. The lure contained in Drosinal is based on food-grade ingredients with proven high attractiveness. The construction and colour scheme of the trap enhance the monitoring performance of the product



INDICATOR PLANTS

- Most pests have strong preferences to feed on certain species or varieties of plants
- This host preference can be used to facilitate detection of pests in orchards

DEGREE DAYS

- The term degree day refers to the average amount of heat that are an above a baseline temperature over (10 degrees for codling moth) a twenty-four hour period
- This information can be used to monitor pests because the development rate of insects is determined directly by temperature
- Information on degree day accumulation can be used to calculate when action such as insecticide application or monitoring should be initiated for a given insect species

PHENOLOGICAL INDICATORS

- Phenology is the study of the relationship between climate and recurring biological phenomena

Thank You for Your attention

