Seed Orchard Pest Management

Interior Spruce—*Picea engelmannii x glauca*

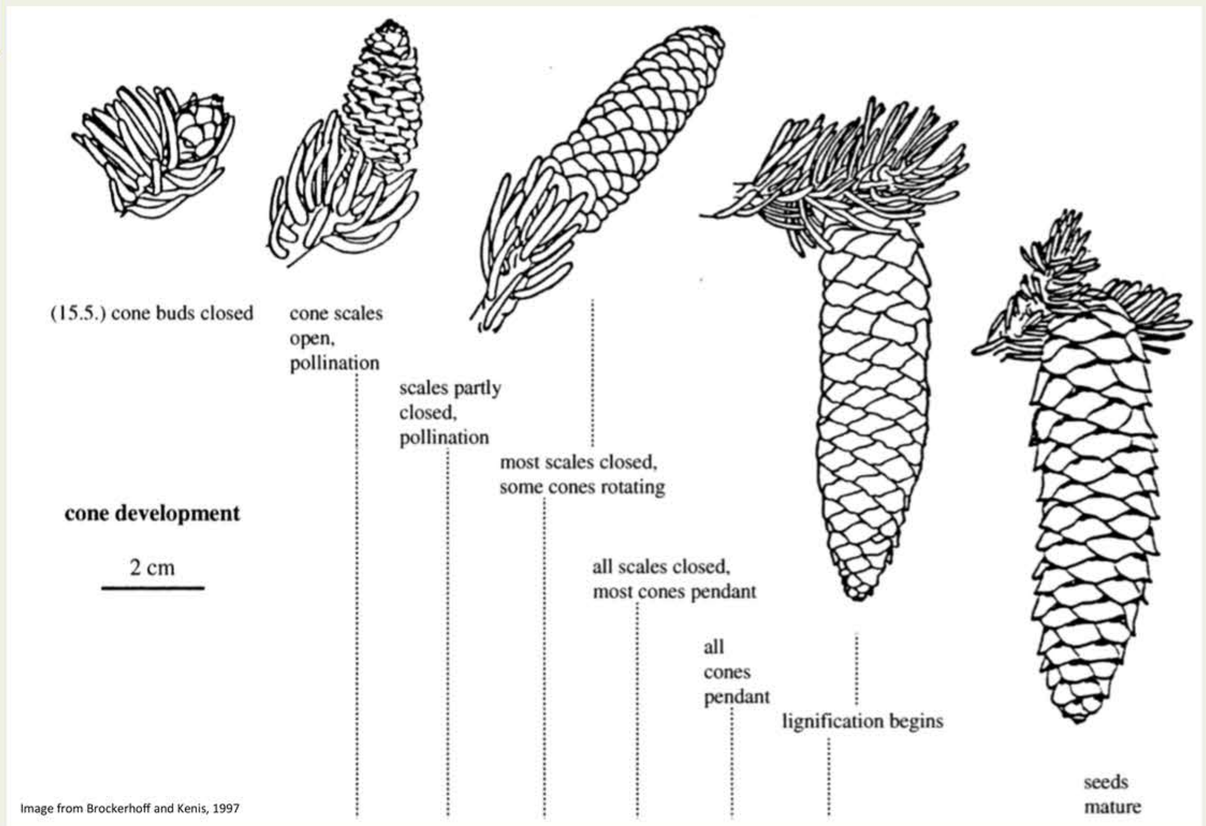
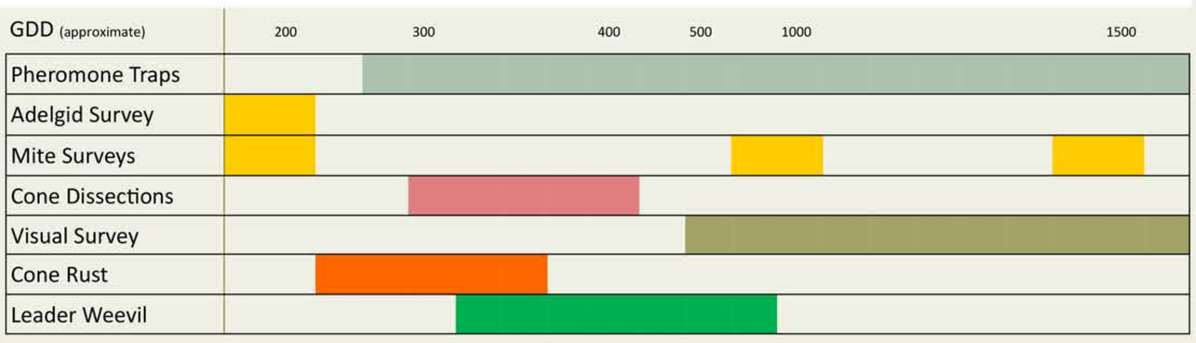


Image from Brockerhoff and Kenis, 1997



Pheromone traps

Traps are used for detection of flying adult *Dioryctria abietivorella*

- Traps should be placed at GDD of 250 —300
- 6 traps/orchard provides excellent information on pest presence
- Placed in the top 1/3 of tree whenever possible, and close to cones. Using a trap hanger and a pole can aid in trap placement
- Monitor minimum of once per week
- Lures should be changed every 6-8 weeks
- Sticky trap bottoms should be changed when the trap is greater than 50% covered with insects or debris
- Trap catch can be used to time visual surveys or application of non-systemic insecticides

Dioryctria abietivorella adults (W. Strong)

Mites and Adelgids

- Surveys identify both the level of pest in the orchard as well as the current life stages.
- Magnification is needed, collecting samples for microscope examination is recommended
- Treatments for these pests must be timed to coincide with active, un-protected life stages
- Care must be taken with treatment to avoid eliminating natural predators of these pests which can result in population explosions

Above: *Adelges cooleyi* (left) Eggs and Crawlers and (right) nymphs beginning to wool-up (W. Strong)

Above: Spruce Spider Mite (*Oligonychus ununguis*) (adult with eggs—W. Strong), can have up to 8 generations per year and populations can grow very quickly

Top: (left) Spruce Rust Mite adults and (right) eggs on spruce needles; Bottom: shoot showing symptoms of rust mite damage (J. Corrigan)

Cone Dissections

- The goal of cone dissections is to get an early picture of the populations of pests that lay eggs in the cones in time to make management decisions.
- Ideally done at when approximately 50% of cones have closed and again when 90% of cones have closed, each orchard should be surveyed independently
- 25 cones collected from throughout the orchard should be opened and observed

Spruce Cone Maggot—*Strobilomyia neanthracina*

Strobilomyia neanthracina egg on a dissected cone scale (D. Manastryski)

Early instar ***Strobilomyia neanthracina*** larva on a spruce cone (W. Strong)

Spruce Seedworm—*Cydia strobilella*

Cydia strobilella egg on a dissected cone scale (D. Manastyrski)

Spruce Cone Axis Midge —*Kaltenbachiola rachiphaga*

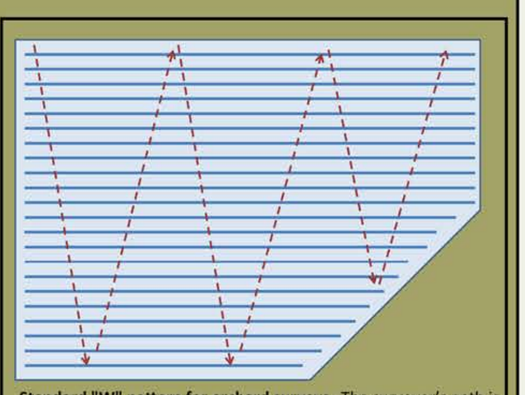
Kaltenbachiola rachiphaga eggs on spruce conelet (W. Strong)

Management and Control

- **Treatment is recommended when >0.3 eggs/cone of *Strobilomyia* and *Cydia* combined are found**
- **Application of systemic pesticides is currently the only management option for *Strobilomyia, Cydia* and *Kaltenbachiola* in crops**
- **Dimethoate-based products are the only registered and effective option**
- **Crop harvest or sanitation picking can be effective in lowering populations of these pests**
  - ***Cydia* and *Kaltenbachiola* overwinter in the cone and sanitation picks can be conducted after harvest through to late winter**
  - ***Strobilomyia* exits the cone to pupate in the duff layer in mid-summer so sanitation picks for this pest must occur by the end of June or early July to be effective**

Visual Surveys

- These surveys provide information on pest damage in orchard
- Begin once cones are pendant or 2 weeks after first *Dioryctria* trap catch
- Should be conducted weekly in orchards that are being managed for crops, in particular when early-season treatment with systemic insecticide has not been used
- Unknown damage can be sampled to be looked at under a microscope or magnifier



Standard "W" pattern for orchard surveys -The surveyor's path is indicated by the dashed line. The number of passes should be determined in advance and spaced approximately evenly. Sample collection or observations should be distributed evenly along the path of travel.

Above: Spruce cone with signs of damage from *Strobilomyia* (W. Strong)

Below: Spruce budworm feeding on cones—note the characteristic white spots on its back (W. Strong)

Clockwise from right: Early instar *Dioryctria* larva; *Dioryctria* frass and webbing on spruce cone cluster; Early signs of Dioryctria feeding on a cone (all photos - W. Strong).

Early infestation signs will include small entry holes, minute frass and minor surface feeding damage. Small larvae may be visible on surface of cones