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Taking a More Holistic Approach to Fungus Gnat Management

Cloudy, gray, damp weather coupled with overly damp soilless media create the perfect environment for fungus gnat outbreaks in greenhouse operations. Insecticides that target the adults can be deployed for a quick knockdown, but a more holistic program utilizing biocontrol agents may work better for growers in the long haul.

There are three major biocontrol agents (BCA) that can be utilized by greenhouse growers to control fungus gnat larvae. These BCAs include a predaceous mite, *Strateolaelaps scimitus*, the Rove beetle (*Atheta coriaria*), and a nematode, *Steinernema feltiae*. All three of these biocontrol agents can be quite effective if deployed early in the cropping cycle.

Strateolaelaps scimitus feeds on first instar fungus gnat larvae, overwintering two-spotted spider mites, and thrips pupae. *Strateolaelaps* should be introduced early in the cropping cycle prior to the fungus gnat populations become too abundant. As a rule, best results are obtained when trap counts on yellow sticky cards are less than 10 per week. Two applications of *Strateolaelaps scimitus* 2-3 weeks apart usually provides excellent control.

Atheta coriaria, the Rove Beetle is a soil dwelling insect that feeds on a wide array of small insects and mites. *Atheta* is relatively slow to establish and should be introduced into the cropping cycle early when less than 10 fungus gnat adults are being caught per week on yellow sticky cards. *Atheta coriaria* is not considered a strong biocontrol agent on its own against fungus gnats and should be used in concert with *Strateolaelaps scimitus* releases.

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Steinernema feltiae is an entomopathogenic nematode that when released into the media will seek out and enter the insect through a natural opening in the insect (mouth, anus, or spiracle). Once inside the insect the nematode releases a symbiotic bacteria into the insect's system resulting in its death in 24-48 hours. Beneficial nematodes are typically applied at a rate of 50 ml per 1100 square feet to pre-moistened media. Growers will enjoy greater success with *Steinernema feltiae* and other nematodes if they shut off fans after application (to lessen desiccation). Growers should also refrain from applying beneficial nematodes under high light conditions.

NoFly WP (*Isaria fumosoroseus* Strain FE 9901), a mycoinsecticide is labeled for controlling both adult and larval fungus gnats. NoFly works best when the relative humidity can be maintained at 80% for 8-10 hours in the greenhouse after application. Mycoinsecticides can be a very effective tool in the greenhouse, but they sometimes can kill other BCAs that have been released by the grower. Before utilizing a broad spectrum mycoinsecticide in the growing environment please consult with your BCA supplier to see if they will impact your biocontrol program.

Another bio-based product that can be used to control fungus gnats is Gnatrol WDG, (*Bacillus thuringiensis subsp. israelensis*). It can be used as a drench to control fungus gnat larvae in media and works well if it is not combined with fertilizers or fungicides containing copper or chlorine. Fungus gnat larvae must ingest the material to be killed.

Additional larvicides for managing fungus gnat larvae include azadirachtin (Azatin XL, Molt-X), cyromazine (Citation), s-kinoprene (Enstar), diflubenzuron (Grow-



Figure 1: Overwatering can lead to fungus gnat problems in the greenhouse and pythium outbreaks. (Photo by Tom Ford, Penn State Extension)



Figure 2: Yellow sticky cards should be placed at a minimum of one card per 1000 ft² and should be changed weekly. (Photo by Tom Ford, Penn State Extension).



Figure 3: Beneficial nematodes like *Steinernema feltiae* can be applied to media for controlling fungus gnat larvae. (Photo by Tom Ford, Penn State Extension)



Figure 4: Consistent overwatering as evidenced by the algal growth on the media surface will provide a great breeding ground for fungus gnats. (Photo by Tom Ford, Penn State Extension)



Figure 5: Good watering and nutrient management practices lessen the likelihood of severe fungus gnat outbreaks. (Photo by Tom Ford, Penn State Extension)

ers should not use Adept on poinsettia, hibiscus, or Rieger begonias), dinotefuran (Safari 20 SG), imidacloprid (Benefit 60 WP, Marathon 60 WP, Mallet 2F T & O, Marathon II, Marathon 1% G, nematodes: *Steinernema carpocapsae* (Millenium), *Steinernema feltiae* (Entonem, Nemasys, Nemashield, Scanmask), pyriproxyfen (Distance or Fulcrum) *Do not use on salvia, coral bells, or on some foliage plants, thiamethoxam and (Flagship 25 WG).

Insecticides for controlling adult fungus gnats include acephate (1300 Orthene TR), acetamiprid (Quasar 8.5 SL or TriStar 8.5 SL), bifenthrin (Ascertain TR, Attain TR, Talstar P, Talstar Select), canola oil and pyrethrins (Pycana), chlorfenapyr (Piston or Pylon), Cyfluthrin (Decathlon 20 WP), fenpropathin + acephate (Tame/Orthene TR), horticultural oil (SuffOil -X, Ultra-Pure Oil, etc.), imidacloprid + cyfluthrin (Discus L), permethrin (Astro), and pyrethrin (Pyganic EC 5.0 II), and pyrethrins + *Beauveria bassiana* Strain GHA (BotaniGard Maxx),

For additional information please contact the author at tgf2@psu.edu

References and Resources

1) Pundt, Leanne, et al. New England Greenhouse Floriculture Guide: a Management Guide for Insects, Diseases, Weeds and Growth Regulators. New England Floriculture, Inc., 2021-2022.

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