Scenes from the 2010 Virginia Biological Farming Conference
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Enhancing Biological Control by Natural Enemies

Andy Hankins, Extension Specialist at Virginia State University, and Coordinator of the Virginia Biological Farming Conference
- Reviewed by Mark Schonbeck

When we learned at the last minute that our scheduled speaker for this session, Karen Kester of Virginia Commonwealth University, was unable to be with us, Conference Director Andy Hankins pulled out a powerpoint presentation he uses for other presentations on organic pest management, and did an excellent job of pinch-hitting. He shared practical and up to date information on major vegetable pests, their natural enemies, and organic control strategies. Some of the worst pest problems generated lively discussion.

Throughout the talk, Andy emphasized the importance of providing habitat and food for predators and parasites of crop pests. Winter legume and grain cover crops, mulches and crop residues, and flowering plants with accessible pollen and nectar – especially flowers in the carrot (umbel) and sunflower (composite) families – are important for attracting and supporting insect allies. Overwintered or spring plantings of radish, cilantro, and other carrot family provide early season nectar, and some plants like sweet potato, kenaf, and peony have extrafloral nectarines on stems and leaf stalks that can provide nectar when the plants are still vegetative.

Low growing habitat plants, especially yarrow and crimson clover, harbor small generalist predators such as minute pirate bug and bigeyed bug, which feed on pest eggs and soft bodied pests like aphids, thrips, spider mites, and small caterpillars. Ground beetles (carabids) and spiders live in mulch and low growing vegetation, and consume a wide range of pests.

Adult phases of many specific parasites and some predators of insect pests depend on nectar sources. For example, syrphid (hover) fly adults feed on composite or umbel flowers, while their larvae (maggots) consume insects. Both adult and larval stages of predators like ladybeetles and lacewings can subsist on protein-rich pollen when prey is scarce.

Several pests that have become resistant to conventional pesticides, including harlequin bug, tarnished plant bug, sweet potato whitefly, cucumber beetle, and squash bug, have met their match in the organic pest control arsenal. Andy noted that the new biorational pesticide spinosad, which is approved by the National Organic Program (NOP) for use on organic farms, is effective on these pests and on hard-shelled beetles. *[However, spinosad should be used with discretion to minimize risk of pests becoming resistant to this material as well – ed.]* Bigeyed bug consumes eggs and young nymphs of tarnished plant bug. Cleome, a flower in the brassica family, can serve as an effective trap crop for tarnished plant bug, harlequin bug, and other plant-eating stink bugs; once infested, the cleome is either burned or sprayed with a NOP-allowed insecticide.

Andy recommended diatomaceous earth, neem oil, and floating row covers (hoops are not essential) to protect eggplant against flea beetles. Row covers must be removed after several weeks to allow pollination and to cultivate for weed control. At this stage, the large plants are less likely to become decimated by the flea beetle. However, farmer and VABF member Marlin Burkholder noted that flea beetles can damage eggplant flowers and prevent fruit set; he uses the Surround™ clay coating after removing row covers to repel the pests.

Whiteflies in the greenhouse can be controlled by highly specific parasitic micro-wasps in the *Encarsia* genus. It is important to determine which whitefly species is present, and order the correct *Encarsia*. Yellow sticky traps are used to monitor for whitefly, and insectaries that market *Encarsia* species will identify the whitefly and ship the right parasite. When asked about field crops, Andy stated that he was not aware of field use of these parasites against whitefly.

Wireworm can damage sweet potato by boring into the edible root. Andy recommended a three year rotation to prevent the buildup of this pest, which is the larval stage of the click beetle.

Sweet corn can be affected by crows, cutworms, cane borer, European corn borer, and corn earworm. The last two also burrow into tomato and pepper fruits. A species of *Trichogramma* wasp can control the European corn borer.

The adults moths of the corn earworm fly up the coast from Florida each season; thus, corn earworm cannot be controlled by crop rotation. However, early plantings of sweet corn can "miss" the pest by maturing before the first adults arrive, tight-husk varieties suffer less earworm damage, and treating green silks with a Bt-oil mixture can control earworm on later plantings. Johnny's Selected Seeds carries a "zealator" device for injecting the Bt-oil into the tips of ears for greater efficacy.

Squash vine borer (adult is a wasp-like clear-wing moth) can be controlled by spraying the base of plants with Bt, or injecting Bt into stems. Andy noted that, at Virginia Tech's Kentland Agricultural Research Farm, farmscape plantings (diverse mix of flowering plants in strips through field) reduced vine borer; apparently some of the insects attracted to the farmscape eat vine borer eggs before they hatch and burrow into stems.

Spinosad works on squash bug. But in addition lady beetles and carabid ground beetles, promoted by farmscaping, can help keep squash bug populations down. Andy suggested using either 'Blue Hubbard' squash as a trap crop, or setting out trap boards, to draw squash bugs together, then killing them with a blow torch. He noted that watermelon does not suffer from either squash bug or squash vine borer, but occasionally has problems with aphids or cucumber beetles. Cucumber and cantaloupe are susceptible to the bacterial wilt carried by cucumber beetle. Corn rootworm is the larva of cucumber beetle; thus, proximity of cucurbit plantings to corn in space or in the rotation can aggravate cucumber beetle problems.

Recent reports that milky spore is no longer effective against Japanese beetle were discussed, and alternatives were suggested. *Typhia* wasp, common in tulip poplar trees, is an important natural enemy. Multiflora rose can act as a trap crop, and beetles can be knocked down early in the morning with a soapy water spray.

Andy mentioned several other biological and biorational pest controls that organic farmers can use. Beneficial nematodes have shown some promise against soilborne pests, including larval and pupal stages that live in the soil; however sufficient control is not consistently achieved, and the technology requires more research and refinement. Beneficial nematodes require water films in which to move and protection from direct sunlight; they should be applied in the evening to moist soil.

Two-spotted spider mite can be controlled with a predatory mite, *Neioselius*, which can live on pollen when pest mites are not present. A parasitic wasp in the genus *Trichogramma* can control asparagus beetle. *Beauvaria bassinana* is a fungal pathogen that works on thrips, aphids, whiteflies, and some other insect pests. Horticultural oils and insecticidal soap are effective against aphids, mealy bugs, and other soft bodied insects.