The Entomology Research Laboratory

What have we been up to in 2019?

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Bringing In Un-BEE lievable Beneficials to Your Production Areas

Fig. 1. Habitat hedge in full bloom.

This is the 3rd year of establishing habitat hedges to attract beneficial insects at greenhouse and nursery locations around Vermont. Habitat loss and widespread use of chemical insecticides are contributing to declines in beneficial insects, such as pollinators and predators and parasites that help keep pest populations in balance. Some beneficials play a role in both pest management and pollination. For example, many syrphid flies are pest-fighting pollinators. As adults, they pollinate and feed on pollen and nectar. The larvae of many species are predators of aphids and other pests. The general public has become very interested in establishing pollinator gardens. Commercial plant producers can serve as good role models by planting flowering hedges (Fig.1) around their facilities to provide enticing habitats for these beneficials and reduce their pest problems too, are reduce pesticide use. Hedges were a mixture of annuals directly seeded or transplanted, including cosmos, sunflower, plains coreopsis, Indian blanket, blue cornflower, zinnia, ageratum, *Verbena bonariensis*, sweet alyssum and hero yellow marigolds. Several beneficials were observed visiting these plantings such as syrphid flies, the predatory bug *Orius*, small parasitic wasps, lady beetles, assassin, ambush and damsel bugs and tachinid fly parasites. Alyssum was the most attractive and easiest plant to grow among all those we tested. For more information, there are several presentations at the webpage below that describe this project in detail. This project continues. *If you are a Vermont grower and want to be a part of this project in 2020, please contact us!*

Landscape IPM Webpage: https://www.uvm.edu/~entlab/Landscape%20IPM/LandscapeIPM.html

Efficacy of Entomopathogenic Fungi against Winter Ticks

Fig. 2. A cluster of winter tick larvae questing during the fall.

Winter ticks, *Dermacentor albpictus*, can cause significant mortality to moose calves across the southern portion of their North American range. We have been evaluating the efficacy of fungal-based, bio-pesticides containing *Metarhizium anisopliae* and *Beauveria bassiana* to suppress the summer, off-host, larval stage of winter ticks prior to their fall questing period (Fig. 2) and recruitment to moose. We found winter tick larvae are susceptible to commercially available and experimental isolates of *Metarhizium anisopliae* and *Beauveria bassiana*. Density dependent exposure to *M. anisopliae* was most efficacious and resulted in 37-100% mortality within 7-15 days. Our current results demonstrate the promise of using *M. anisopliae* fungal strains to suppress winter tick larvae. Please view this following articles for more information. **VT Digger:** https://vtdigger.org/2019/10/16/uvm-researcher-seeks-to-target-moose-killing-ticks-with-fungi/ **UVM Today:** https://www.uvm.edu/uvmnews/news/naturally-occurring-fungi-could-curb-moose-tick-plague-uvm-entomologists-find

Granular Formulations of *Beauveria bassiana* (ERL836) against Thrips

Fig. 3. ERL 836 GR trials against WFT in marigold pots (L) and onions (R).

A *Beauveria bassiana* isolate (ERL836) collected in the US by UVM scientists has been formulated and commercialized by a company in South Korea. We tested the efficacy of this product in greenhouse caged trials with marigolds against western flower thrips and in onion field trials against onion thrips (Fig. 3). Our hope is that sufficient data on the efficacy of this product will be collected to facilitate registration of the product in the US. Additional treatments, Botanigard® and the chemical pesticide, Radiant® SC were included in the experiment to compare efficacies among currently registered products. This experiment is in the early stages of developing suitable treatment rates so results are not yet available.

Ultraviolet Light for Management of Western Flower Thrips

UV light (100–280 nm) is radiation that can penetrate the outer membranes of organisms to damage cells causing behavioral changes or mutations. When insects are exposed to short wavelengths of UV light, normal orientation, navigation, feeding and reproduction can be disrupted. The smaller the insect, the more susceptible they are. We are testing the effect of UV light exposure on western flower thrips (WFT) as an IPM tool. The key to devising practical and effective methods of using UV light safely is to determine the relationship between the UV dose (light intensity x duration of exposure) and impact on the pest and plant. In the laboratory we tested the effect of different UV dosages on the survival of adult and immature WFT. We found UV light killed 100% of the larvae and adults after 15 and 60 min of exposure, respectively, but that amount of UV exposure could also damage plants. However, the dosage needed to kill over 50% of the WFT was shorter when mortality was assessed 24, 48 and 30 hours after exposure. In addition, we noticed abnormal behavioral changes among some of the adults that survived. We believe that though UV exposure may not kill the all of the adults, it may reduce their egg laying and feeding. Work is underway to test that. But what about the impact of these levels of UV on ornamental plants? We tested the effect of different dosages of UV on vegetative and flowering stages of five plant species (roses, African marigolds, *Portulaca*, mums and *Calibrachoa*). Little to no damage from UV exposure sufficient to kill WFT occurred for any of plant species except for *Portulaca* which recovered within 3 weeks.

Saffron, A New High-Value Crop for Diversified Farmers

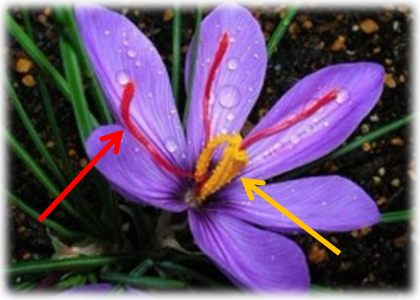

Fig. 4. Saffron is the stigmas (red arrow) of a fall-blooming crocus. The stamens (yellow arrow) are sold as food coloring.

Saffron (*Crocus sativus L.*) is the most expensive spice in the world, with a retail price of over $5,000/lb. It is commonly used as a culinary spice, but also may have medicinal properties which increases its economic value. Saffron is made from the flower stigmas (Fig. 4). It is adapted to arid/semi-arid areas and reported to tolerate temperatures to -4°F. When UVM scientists started their research in 2015, they assumed safforn might not survive the cold Vermont winters, so they began by growing it in high tunnels – in plastic milk crates and in raised beds. We obtained saffron yields averaging 0.88 – 1.39 grams/m^2, much greater than those from other traditional saffron-growing regions. For the past 2 years we worked with growers to assess saffron yield and corm survival of field-grown saffron in coldhardiness zones 5a, 4b and 4a. One year after planting the corms, we determined the average number of saffron flowers/24 ft^2. Our results were: Zone 5a: 242 flowers (1.71 times more than 2017); Zone 4b: 393 flowers (4 times more than 2017); Zone 4a: 290 flowers (2.7 times more than 2017). One farmer in zone 4b harvested 1,147 flowers from the 24 ft^2. This is enough to produce 24.78 lb./acre (11,240 gr, which is worth over $28,000). Growers are currently getting $25-75/gram for locally grown saffron. Saffron is an emerging high-value crop diversified growers should consider to boast their crop revenues. To learn more, visit our **Saffron Website**: https://www.uvm.edu/~saffron/

Do You Struggle with Pest Issues in Greenhouse Ornamentals & High Tunnels?

We can help ***YOU!*** The VT Greenhouse IPM One-on-One Program works with growers to encourage use of IPM for **greenhouse ornamentals** and **high tunnels**. Individualized, goal-oriented educational programs provide hands-on learning tailored to your unique interests, skill levels and needs. Growers say participating in the program gave them greater confidence to identify and manage pests and they transferred this knowledge to co-workers. If you're a Vermont grower and want to take part, contact us or fill out the *"Part of the Action"* form. If you are challenged with pests and how to manage them, view the handout "*Critical Questions to Consider to Help Manage Persistent Pest Problems & Attracting and Sustaining Aphid Natural Enemies in High Tunnels'* in your folder.

Greenhouse IPM: https://www.uvm.edu/~entlab/Greenhouse%20IPM/UVMGreenhouseIPM.html
High Tunnels: https://www.uvm.edu/~entlab/High%20Tunnel%20IPM/HighTunnelIPM.html

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