Blueberry Tip Midge

Emerging Insect Pest

Becky Gumbrewicz

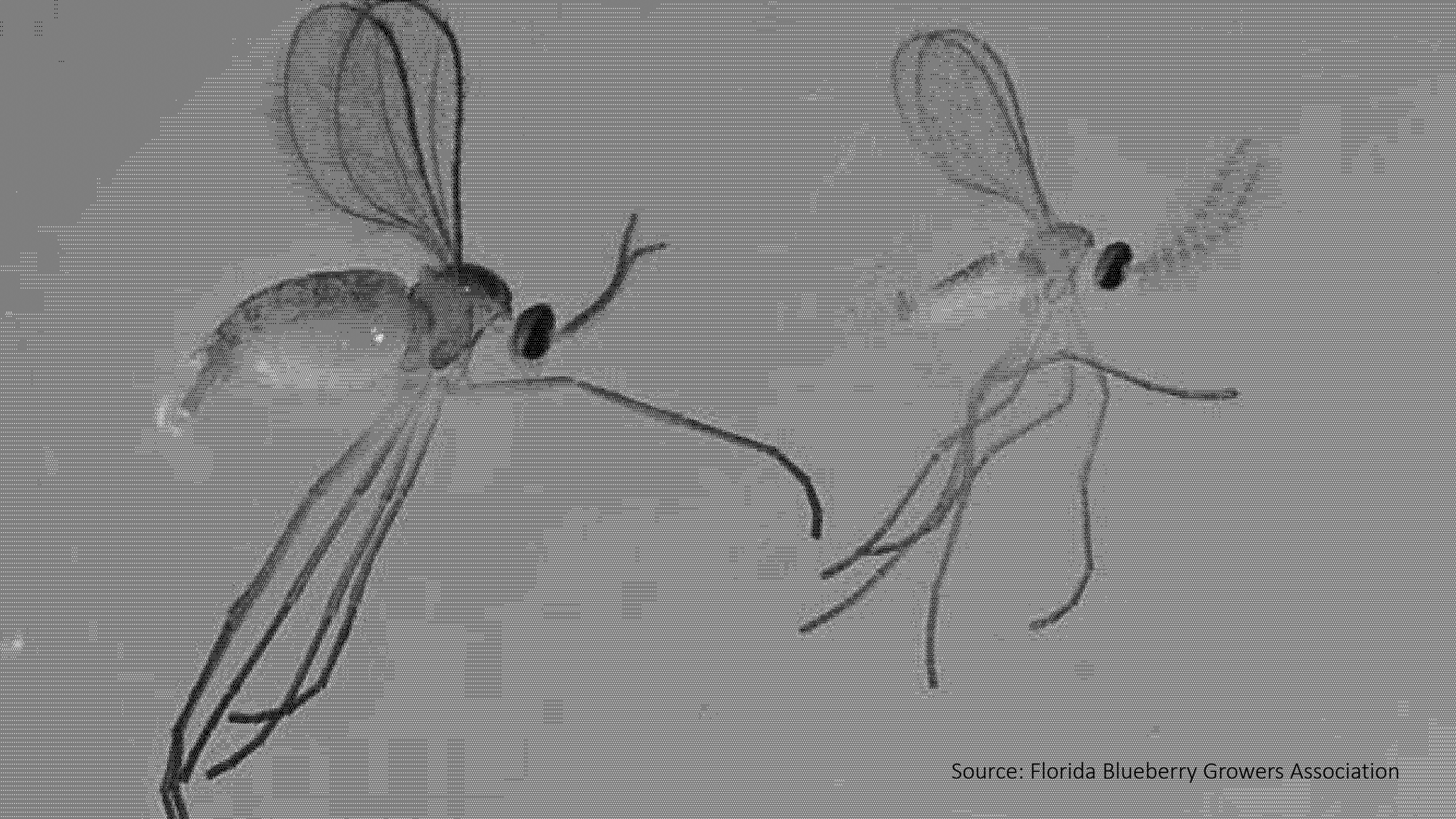
M.S. Candidate

School of Food and Agriculture

University of Maine

Outline

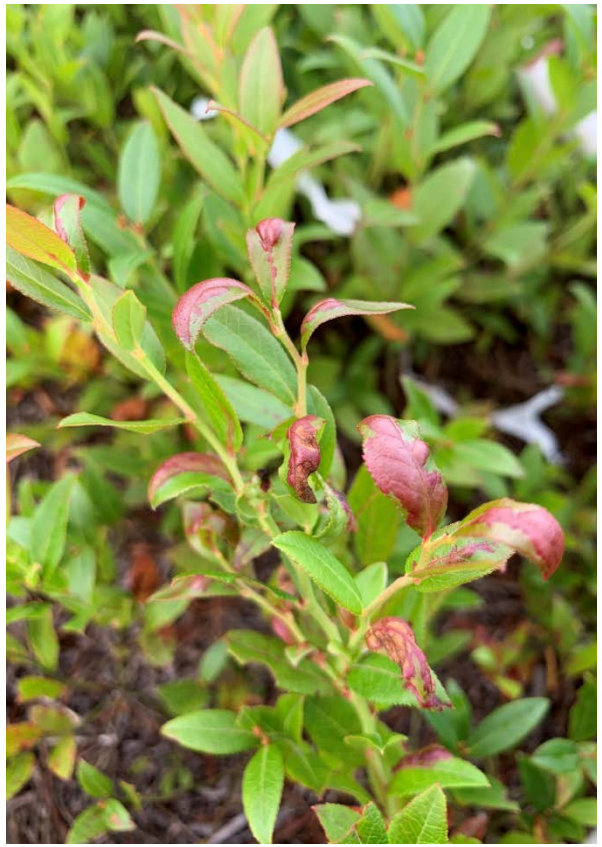
- *Description & Identification*
- *History*
- *Life Cycle*
- *Impacts*
- *Research*



Source: Florida Blueberry Growers Association




Tip Midge



Red Leaf

Thrips

Thrips

Source: University of Maine Cooperative Extension

Description

- *Dasineura oxycoccana*

- Mosquito-like fly
- Adults 1-3 mm
- *Vaccinium* species
- Deposits eggs in terminal ends of blueberry stems
- Leaf galls, excessive branching
- Prune year

Source: Oscar E. Liburd, University of Florida

History

- Native to North America
- 1990s – Southern U.S. blueberry pest
- 2003 – Discovered in Maine
  - Increasing populations
- Cryptic species (Fitzpatrick et al. 2013)

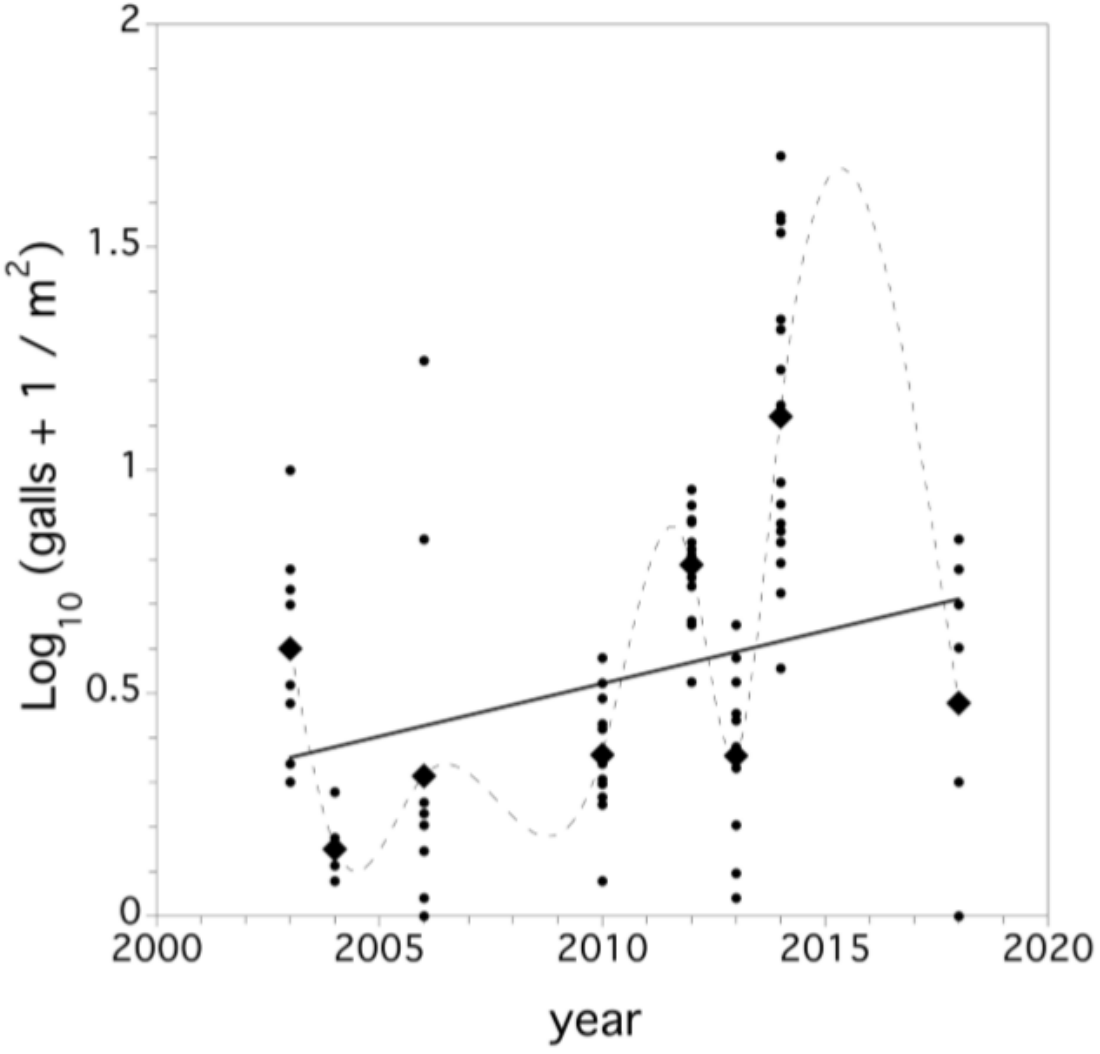


Fig. 3. Population increase of blueberry gall midge, as reflected by logarithm (base 10) transformed gall-infested stems in pruned fields (solid line is least square regression, dashed line is a cubic spline fit to the data). Filled circles are individual field mean gall-infested stem densities, and diamonds are mean field densities for each year.

Source: Collins and Drummond 2019

Life Cycle

- Adults emerge May-June, temperature dependent
- Females lay eggs on terminals leaves

- Eggs hatch within 3 days
- 3 larval instars, feed on new growth (~10 days)

- Last instar pupates and overwinters in soil

Source: University of Maine Cooperative Extension

Total Development Time: 2-3 weeks

Impact to the Crop

- Found in both cycles, primarily prune
  - Kill meristem tissue in buds
  - Reduce flower buds & flower viability
  - Inability to support heavy crop

- Management
  - Degree day model
  - Bowl trap monitoring
  - Delayed burns
  - Insecticides

Source: Washington State University Whatcom County Extension

Tip Midge: Nutrient Management

- Fertility programs
  - Increases vegetative growth, food resources, habitat
  - Increases TM presence in wild blueberry fields (Bernays and Chapman 1994; Reekie et al. 2009; Yarborough et al. 2017)
- Timing
  - Spring: nitrogen-rich plant tissue
  - Late summer: fibrous, less nitrogen-rich, more tannins (Fitzpatrick 2008; Scriber and Slansky 1981)

Source: Washington State University Whatcom County Extension

UMaine Research

- Nutrient & Pest Management Experiment
- Goals
  - Investigate different rates & timings of organic treatment applications
  - Improve nutrient availability

Methods – Organic Farm Treatments

Foliar Fertilizer	Seacrop 16, North American Kelp Rate: 41 oz./242 gallon H_2O/acre Claims: seed germination, root development, bloom set, flower and fruit size, chlorophyll content, plant vigor…etc.	Prune Crop
Chicken Manure	Cheep Cheep 4-3-3, North Country Organics Two rates: 25 lbs./1000 ft^2 and 50 lbs./1000 ft^2 or 1089 lbs./acre and 2178 lbs./acre Claims: slow release, less leaching, higher tolerance of stressful conditions	Prune
Soil	Coast of Maine Cobscook Blend Two rates: 7.5 yd^3/acre and 15 yd^3/acre Claims: all-purpose, increases water retention, conditions and aerates soil, contains blueberry compost	Prune
Mulch	Dark brown bark mulch, Mark Wright Disposal Two rates: 7.5 yd^3/acre and 15 yd^3/acre.	Prune
Compost	University of Maine Blend Two rates: 7.5 yd^3/acre and 15 yd^3/acre.	Prune

Compost rates: Mark Hutchinson, University of Maine Extension Educator (personal communication, June 18, 2019)

Project Objectives

Nutrient Management	Evaluate MOFGA-approved nutrient inputs Collect leaf and soil samples before and after application Measure blueberry height, number of buds/flowers, blueberry cover, biomass, yield and total treatment cost
Pest Management	Evaluate disease, insect, and weed severity Measure ***tip midge*** effects on wild blueberry in control plots vs. treatment plots

Acknowledgements – Thank You!

- Advisory Committee:
  - Lily Calderwood
  - Ellen Mallory
  - YongJiang Zhang
- Wild Blueberry Growers
- Wild Blueberry Team
- UMaine Cooperative Extension
- School of Food and Agriculture
- Northeast SARE Programs

Literature Cited

Bernays, E.A. and R. F. Chapman. 1994. Host-plant Selection by Phytophagous Insects. Chapman & Hall, New York.

Collins, J. A. and F. A. Drummond. 2019. The Blueberry Gall Midge (Diptera: Cecidomyiidae): A Recent Pest of Wild Blueberry (Vaccinium angustifolium; Ericales: Ericaceae) and Its Impact on Potential Yield. Journal of Economic Entomology 112(3):1151-1161.

Collins, J.A., F. A. Drummond, and D. Yarborough. 2017. Blueberry tip midge, Fact sheet No. 208. University of Maine Cooperative Extension, Orono, ME, U.S.A. 26 August 2019. https://extension.umaine.edu/blueberries/factsheets/insects/208-blueberry-tip-midge/

Fitzpatrick, S. M. 2008. Insect life histories in fruit, shoot and root environments of cranberry and blueberry. In IX International Vaccinium Symposium 810 (pp. 231-250).

Fitzpatrick, S. M., R. Gries, G. Khaskin, D. A. Peach, J. Iwanski, and G. Gries. 2013. Populations of the gall midge Dasineura oxycoccana on cranberry and blueberry produce and respond to different sex pheromones. Journal of chemical ecology 39(1):37-49.

Reekie, M., K. MacKenzie, and B. Lees. 2009. The biology and pest potential of cranberry tipworm (Diptera, Cecidomyiidae) on wild blueberry. Acta Horticulturae. 810:401–410.

Roubos, C. R., and O. E. Liburd. (2010). Pupation and emergence of blueberry gall midge, Dasineura oxycoccana (Diptera: Cecidomyiidae), under varying temperature conditions. *Florida Entomologist*, *93*(2), 283-290.

Scriber, J. M., and F. Slansky Jr. 1981. The nutritional ecology of immature insects. Annual review of entomology, 26(1), 183-211.

Yarborough, D.E., F. Drummond, S. Annis, and J. D'Appollonio. 2017. Maine wild blueberry systems analysis. Acta Horticulturae. 1180:151-160.