

Washington Red Raspberry Commission Progress Report for 2018 Projects

Project No: 3455-6642 (0640)

Title: Application of Biodegradable Mulches in Tissue Culture Red Raspberry: Impacts on Weed Control, Parasitic Nematodes, and Crop Growth

Personnel: L.W. DeVetter (PI), C.A. Miles, S. Ghimire, I. Zasada, and C. Benedict. H. Zhang is the PhD student funded on this project.

Reporting Period: This report presents data from 2018.

Accomplishments: The overall goal of this project is to develop knowledge and practical strategies to manage weeds while improving establishment and yield in commercial red raspberry planted as tissue culture (TC) transplants. Our main accomplishments for 2018 include: 1) Collecting all data as planned (additional data on plant moisture status, photosynthetic rates, soil removed during mulch removal, and plant and soil macro- and micro-nutrient content were also collected); and 2) Extension of project information through 2, 4, 1, 4 and 4 presentations held at international, national, regional, state, and local levels, respectively. Publication of project information also occurred through one international proceeding article and a scientific article is in review. This project is the first study to investigate PE mulch and BDMs application in florican raspberry production and is one of the few studies that evaluate plastic mulches in a perennial fruit production system. Information from this study demonstrates that both polyethylene (PE) mulch and biodegradable plastic mulches (BDMs) managed weed and improved TC transplant establishment and fruit yield.

Results: 1) *Spring-planted trial:* PE mulch was removed by the grower in mid-March while BDMs still remain in the field. Primocane emergence on 5 July 2018 was greatest in the bare ground (BG) control and lowest in Bio360 0.5 and PE, while all remaining treatments were similar. There were no differences in primocane height and number in September 2018 across all treatments and the average primocane height and number for all treatments was 126 inches and 6 primocanes/plant, respectively. Yield was determined from 13 harvests during harvesting season. Average total fruit yield was 34% greater across all mulched treatments relative to the BG control. There were no differences in average berry size among treatments. In September 2018, soil treated with PE mulch had greater root lesion nematode (RLN) population densities than soil treated with Novamont 0.5. Root population densities of RLN were higher for plants treated with PE mulch relative to BASF 0.6 and BG control. 2) *Summer-planted trial:* BDMs were removed in mid-March as they were torn by winds during the winter while PE mulch still remains in the field. PE mulch managed weeds compared to the BDMs and BG control and had higher primocane growth than the BG control in September 2018. There were no differences in RLN populations among treatments and RLN population densities remained low across all treatments from the samples collected in May and October 2018.

Publications/Outputs:

Scientific articles:

- Zhang, H., C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Polyethylene and biodegradable plastic mulches improve growth, yield, and weed management in floricane red raspberry. *Scientia Horticulturae*. *Submitted*.

Proceeding:

- Zhang, H., C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Application of biodegradable plastic mulches in small fruit production. Horticultural Growers' Short Course 2018 Proceedings. Lower Mainland Horticulture Improvement Association. Pp. 34-37.

Presentation:

A. International

- DeVetter, L.W (presenter), H. Zhang, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2018. Application of biodegradable plastic mulches in small fruit production. Lower Mainland Horticulture Improvement Association/Pacific Agriculture Show Grower Short Course. Abbotsford, British Columbia, Canada.
- Miles, C. (presenter), H. Zhang, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Application of biodegradable mulch in red raspberry production. Ontario Fruit and Vegetable Conference, Niagara Falls, Canada.

B. National

- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Promoting productivity and on-Farm efficiencies in tissue culture red raspberry system through biodegradable plastic mulches. American Society for Horticultural Science (ASHS). Washington, D.C.
- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Promoting productivity and efficiencies in summer planted Tissue culture floricane raspberry using biodegradable plastic mulches. Poster presentation. ASHS. Washington, D.C.
- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Biodegradable plastic mulches in floricane red raspberry. Biodegradable mulches SCIR meeting. Spokane, WA.
- Zhang, H., C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Application of biodegradable plastic mulches in floricane red raspberry planted as tissue culture transplants. Poster presentation. North American Blackberry & Raspberry Association. Ventura, CA.

C. Regional

- DeVetter, L.W (presenter), H. Zhang, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2018. Plastic biodegradable mulches for improved establishment in caneberry. Southeast Regional Fruit & Vegetable Conference. Savannah, GA. Invited Presentation

D. State

- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Increasing raspberry productivity with plastic mulches. Washington Small Fruit Conference. Lynden, WA.
- DeVetter, L.W (presenter), H. Zhang, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2018. Application of biodegradable plastic mulches in red raspberry. WSU Pomology Class. Mount Vernon, WA.
- DeVetter, L.W (presenter), H. Zhang, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2018. Application of biodegradable plastic mulches in red raspberry. WSU Agricultural and Food System 201 Class (Systems skills development for agricultural & food systems). Mount Vernon, WA.
- DeVetter, L.W. (presenter), H. Zhang, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2018. Application of biodegradable plastic mulches in red raspberry. Orchard Vineyard Supply Lynden Growers Meeting. Lynden, WA. Invited Presentation

E. Local

- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Application of biodegradable plastic mulches on tissue culture red raspberry. WSU NWREC Field Day. Mount Vernon, WA.
- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter (co-presenter). 2018. Application of biodegradable plastic mulches on tissue culture red raspberry. Anacortes Science Cafe. Anacortes, WA. Invited Presentation
- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Application of biodegradable plastic mulches on tissue culture red raspberry. Seattle Tree Fruit Society. Seattle, WA. Invited Presentation
- Zhang, H. (presenter), C. Miles, S. Ghimire, C. Benedict, I. Zasada, and L.W. DeVetter. 2018. Application of biodegradable plastic mulches on tissue culture red raspberry. Burlington-Edison High School. Burlington, WA. Invited Presentation