

Washington Red Raspberry Commission Progress Report for 2017

Project No: 3455-6642 (0640)

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

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Reporting Period: This report presents data from 2017, when the experiment was first initiated.

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) plugs. Our main accomplishments for 2017 include: 1) Established our spring- and fall-planted trials in grower-cooperator fields in May and Aug. 2017, respectively; 2) Collected data as planned (additional data on plant moisture status, soil gravimetric water content, photosynthetic rates, mulch tensile strength, and plant and soil macro- and micro-nutrient content were also collected); and 3) Extended project information through: (a) one field day held at Enfield Farms in Sept. 2017; (b) five presentations held at regional events, (c) two published newsletter articles, and (d) three extension project fact sheets (in preparation; all available at: <http://smallfruits.wsu.edu/articles-and-publications-on-bdms-in-raspberry/>). Information from this study demonstrates that both biodegradable (BDM) and polyethylene plastic (PE) mulches are promising tools to manage weeds and improve TC establishment. Yield and preliminary cost/benefit data will be collected in 2018, when the spring planting produces its first crop. This project is the first to investigate BDM and PE mulch application in florican raspberry production and is one of the few studies that evaluates plastic mulches in a perennial fruit production system. Results will contribute information about the viability of BDM and PE mulch application in perennial fruit production systems to both commercial farming operations and the scientific community.

Results: Preliminary results indicated weed incidence was reduced in mulched plots compared to the bare ground control in both trials. In the spring-planted trial, BDM degradation started on 15 Aug., but was minimal by early fall. Primocane height was greater in mulched treatments relative to the bare ground control within one month of establishment in both trials. Primocane number was also greater in mulched treatments compared to bare ground from Aug. onwards in the spring-planted trial; it is too soon after plant establishment to measure differences in primocane number in the fall-planted trial. Soil temperature under mulches was higher than bare ground from the beginning of both trials. The average soil volumetric water content in the spring-planted trial from 26 May to 30 Aug. was greatest for soil covered with PE followed by BDMs and the bare ground control. There were no root lesion nematodes (RLN) found in soil prior to treatment application at both trial sites. Samples collected in Oct. from the spring-planted trial showed average soil and root densities of RLN in BDM-treated plots were 142 and 67 RLN/g/root and 100 g of soil, respectively; densities in the bare ground treatment were 44 and 5 RLN/g/root and 100 g of soil, respectively. These differences were not significant. Soil densities in the fall-planted trial ranged from 0-22 RLN/50 g soil and did not differ due to treatment.

Publications/Outputs:

Newsletter articles

- DeVetter, L.W. and C. Benedict. 2017. Exploring biodegradable plastic mulches in red raspberry. Growing Produce. <<http://www.growingproduce.com/fruits/berries/exploring-biodegradable-plastic-mulches-in-red-raspberry/>>.
- Zhang, H., L.W. DeVetter, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. Application of biodegradable plastic mulches on tissue culture red raspberry. WSU Whatcom Ag. Monthly: Volume 6 Issue 9. < <http://extension.wsu.edu/wam/application-of-biodegradable-plastic-mulches-on-tissue-culture-red-raspberry/>>.

Factsheets

- Zhang, H., L.W. DeVetter, C. Miles, C. Benedict, S. Ghimire, and E. Scheenstra. 2017. Application of biodegradable plastic mulches on tissue culture red raspberry. Washington State University Extension Project Factsheet.
- Zhang, H., L.W. DeVetter, C. Miles, and S. Ghimire. 2017. Dimensions and costs of biodegradable plastic mulches and polyethylene for raspberry production. Washington State University Extension Project Factsheet (in review).
- DeVetter, L.W., C. Miles, and I. Zasada. 2017. Fumigation and biodegradable plastic mulch application. Washington State University Extension Project Factsheet.

Presentations

- Zhang, H. (presenter), L.W. DeVetter, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. The application of plastic biodegradable mulches on tissue culture red raspberry. Washington Small Fruit Conference. 29 Nov. 2017. Lynden, WA. Oral presentation.
- Zhang, H. (presenter) and L.W. DeVetter. 2017. Application of plastic biodegradable mulches on tissue culture red raspberry. Iowa-LEAD group of visiting agricultural professionals. 17 Nov. 2017. Mount Vernon, WA. Oral presentation.
- L.W. DeVetter (presenter), H. Zhang, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. Application of biodegradable mulches in red raspberry. Orchard Vineyard Supply Workshop. 11 Nov. 2017. Lynden, WA. Oral presentation.
- Zhang, H. (presenter), L.W. DeVetter, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. Application of biodegradable plastic mulches on tissue culture red raspberry. WSU NWREC presentation to a group of students from British Columbia. 30 Sept. 2017. Mount Vernon, WA. Oral presentation.
- Zhang, H. (presenter), L.W. DeVetter, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. Application of biodegradable plastic mulches on tissue culture red raspberry. WSU Island County Master Garden Program. 23 Sept. 2017. Coupeville, WA. Oral presentation.
- Zhang, H. (presenter), L.W. DeVetter, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. Application of biodegradable plastic mulches on tissue culture red raspberry. BDM Field Day. 11 Sept. 2017. Lynden, WA. Oral presentation.
- Zhang, H. (presenter), L.W. DeVetter, C. Miles, S. Ghimire, C. Benedict, and I. Zasada. 2017. Application of biodegradable plastic mulches on tissue culture red raspberry. 2017 WSU NWREC Summer Field Day. 11 July 2017. Mount Vernon, WA. Oral presentation.