The Impact of Mineral Particle Film on Blackberry Diseases and Insects, and Primocane Fruit Quality and Yield

Project Type:
Research and Education Project
Region: Southern
State: Arkansas**:**

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Summary/Abstract

Blackberries are an important fruit crop in Arkansas. Although the majority of varieties that are grown are traditional floricane-fruiting varieties, there is an interest in using primocane-fruiting types to provide berries at a time of year (late summer, early fall) when market prices are at a peak. Unfortunately, there is little information available on managing diseases and insect pests on plants that are fruiting at this time of year. In addition, high late summer temperatures can have a negative impact on primocane-produced fruit production and quality. The use of mineral particle films such as kaolin clay (Surround WP®) to lower leaf temperatures and protect plants from solar injury has been suggested as a way to enhance primocane fruit production. Experiments will be established on two commercial farms in northern and central Arkansas, (Sta-N-Step Farm near Fayetteville, AR, and Gillam Farms of Arkansas, near Judsonia, AR, respectively) and in eastern Texas to evaluate the effects of mineral particle film applications during the late season on blackberry production and on arthropod pests and diseases. Experiments at all three sites will be randomized complete blocks with four replications of each of the following treatments: 1) Surround WP® applied weekly during July-September; 2) Surround WP® applied weekly plus conventional integrated pest management practices; 3) No Surround WP® but use conventional integrated pest management practices, and 4) No Surround WP® and no disease or insect control. Leaf temperatures will be monitored in all plots throughout the season. In addition, plots will be monitored for spotted wing drosophila, broad mites, spider mites and stink bugs, and weekly inspections and severity ratings will be made for anthracnose, cane blight, rosette, or other diseases. Fruit yield as well as quality will be measured by weekly inspections of 10 random berries for anthracnose, grey mold, and SWD larval infestation and weekly berry yield, marketable yield and total berry yield. Grower inputs will be recorded during the two years of the study and a spreadsheet-based interactive sustainable enterprise budget for blackberries based on best practices for production in the sUS (Rodriguez et al., 2015a) will be used to determine the economics of the system. Outreach and outcome evaluation will be through traditional dissemination methods including fact sheets, videos, and field days, with novel digital strategies. Digital strategies proposed to re-purpose and expand the reach of these methods include:uaex.edu dedicated web page/presence, Twitter feeds and Periscope video broadcasts (during project implementation and crop monitoring), and live/real-time interactive webinars and a virtual field trip to deliver educational content and engage participants in proof-of-concept analysis and active learning.

Objectives/Performance Targets

Objective 1: Three farms (Gillam, Moss Springs, Sta-N-Step) will plant and/or manage 96 Prime-Ark 45 blackberry plants. Plot set up, treatment application and data collection will be supervised by Sanders at Gillam Farm, Kirkpatrick at Moss Springs, and Johnson at Sta-N-Step. At each location, treatments will be in a randomized complete block design (four replications). Plots will consist of six individual plants. Treatments will include: 1) mineral particle film (Surround® WP) applied weekly or as needed during July-September; 2) Surround® WP applied weekly or as needed plus conventional integrated pest management practices; 3) No Surround® WP but use conventional integrated pest management practices, and 4) No Surround® WP and no disease or insect control. When temperatures are expected to exceed 90°F, plants will be whitewashed with Surround and re-applied as needed. Surround® WP will be applied using a backpack sprayer at a rate of 50 lb/acre to whitewash plants. One leaf temperature micro sensor will be installed in each plot immediately prior to the first Surround® WP spray each season, with continuous hourly monitoring of leaf canopy temperature to continue through harvest. Ambient and leaf temperatures will be compared among treatments.

Objective 2: Sanders at Gillam Farm, Kirkpatrick at Moss Springs, and Johnson at Sta-N-Step will monitor treatment plots and decide when growers should apply recommended conventional pest management practice (2015 Midwest Small Fruit and Grape Spray Guide; Anonymous, 2015). These pest management decisions will be made by plot: using biweekly monitoring of baited traps for spotted wing drosophila (SWD) flies, leaves for broad mites and spider mites, fruit clusters for stink bugs, general plant inspection for other insect pests; and record severity ratings for presence of anthracnose, cane blight, rosette, or other diseases. During harvest, 10 random berries per plot will be collected and inspected for presence/severity of anthracnose and grey mold, and the percentage of berries infested by SWD recorded.

Objective 3: Economic Feasibility of Primocane Fruiting Blackberries: Personnel of Johnson, Kirkpatrick, and Sanders will assist their respective growers with harvest and obtain by grower location weekly records of labor, plot inputs, berry yield, marketable yield, total berry yield and berry sales. This information will be provided to Popp who will conduct grower budget analyses. University of Arkansas researchers have developed a spreadsheet-based interactive sustainable enterprise budget for blackberries based on best practices for production in the southern US (Rodriguez et al., 2015a). This tool and others developed by Popp et al. (2013) and Rodriguez et al. (2014; 2015b, c) are similar to traditional paper or electronic budgets in that they present an estimate of revenues, costs and net returns. However, multiple features included in these new tools enhance their decision-support capabilities as compared to traditional budgets. Example data (based on University of Arkansas experimental farm data) for all production practices, use levels and costs have been preloaded into the tool but any/all of it can be changed to better reflect the circumstances on any farm; the budgets are automatically recalculated to reflect these changes. All tools can be used for organic or conventional practices and both in-field and tunnel systems. Third, most traditional tools estimate budgets for one acre and one calendar year. In these new tools, users can estimate revenues, costs and returns across multiple years and can set the production area to any size. Fourth, these tools include addition components that allow a user to: 1) estimate the breakeven (price and yield) points, 2) conduct sensitivity analyses related to changes in costs and returns, and 3) calculate the probability of obtaining a positive net present value (NPV) over time.

These tools will be used to estimate the potential economic returns associated with the use of mineral particle film within the production management strategies. In year 1, the interactive sustainable blackberry budget will be revised to accommodate any production practices or equipment that are not currently included in the tool.

The experimental production data (farm size, yields and input use/quantities/timing) provided biweekly by the collaborating producers across both years will be entered into the relevant tool to calculate revenues, costs and returns and risks. Using the tools, sensitivity analyses will be conducted to determine the range of production practices, input costs, yields and farm size results.