Research Progress Report
Southern Region Small Fruit Consortium

Title: Use of soil fumigants and foliar-applied phosphites to overcome replant disorders of blueberry

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Objectives: To determine whether replant disorder can be overcome by application of common fumigants or a phosphonate material (ProPhyt).

Justification: The blueberry industry in Georgia continues to grow rapidly, with substantial acreage increases on a yearly basis. However, though good sites remain for rabbiteye production, the cost of expenditures associated with purchasing new land and site preparation is substantial. Due to the age of the industry in Georgia, many plantings are now reaching the >20 year timeframe, and producers are often deciding to replant these older sites, as opposed to purchasing new land. As a result, replant disorder, a general poor growth and decline associated with both major and minor pathogens of root systems, is a likely result. Though long rotations with grasses or other cover crops may be of benefit in such situations, producers are generally not willing to take land out of production for numerous years. Limited research has been conducted to determine the benefit of various fumigants in these situations. Application of fumigants have been successfully utilized in other fruit systems to overcome replant disorder, and with the current market return for the blueberry commodity, it is likely that fumigants will provide a substantial, profitable benefit in replant sites. In addition, phosphites have more recently been found to have substantial benefit for control of oomycetes and other blueberry pathogens; foliar applications of a phosphite material may also be of benefit in overcoming replant disorder.

Methodologies: Two fumigants, Telone C-35 (61.1% 1,3-dichloropropene; 34.7% chloropicrin) and MBC-33 (67% methyl-bromide; 33% chloropicrin), and the phosphonate fungicide ProPhyt were tested for suppression of replant disorder at the Alapaha Blueberry Research Center, Alapaha, GA. After removal of established blueberry plants, fumigants were applied on 16 Apr; plots consisted of 60 ft raised plasticulture beds, with a 2.5 ft top width; centers of adjacent rows were 12 ft apart, and plant spacing was 5 ft, with each plot consisting of 12 plants; 'Vernon' and 'Alapaha' plants were transplanted on 10 May. Both untreated and ProPhyt-treated rows were also covered with plastic for a uniform comparison. ProPhyt was applied with a backpack sprayer on 14 Jun and 18 Sep. The experimental design was a split plot on a randomized complete block, and treatments were replicated four times. Main plots were varieties, and subplots were treatments. All cultural practices were in keeping with blueberry production methods commonly observed throughout the Southeast. Visual ratings were conducted on 8 Oct. No interactions were observed between variety and treatment, so data was combined across varieties for analysis. Data was adjusted through analysis of covariance (due to a row effect), and treatment means were compared with *t*-tests.

Results: Rainfall was virtually nonexistent during the summer of 2007, and high temperatures were also extreme. As a result, most plants were obviously stressed, with very few plants achieving moderate vigor and plant health, as indicated by the visual assessment ratings below. However, fumigation did result in improved plant vigor and overall plant health in a high stress year. Application of ProPhyt did not provide obvious improvements in plant health. Since phosphonates are known to work specifically on oomycete soil pathogens, this is not a major surprise in a dry year. Also, replant disorders are generally tied to a large number of known pathogens that cause acute diseases, as well as a large number of unknown pathogens which can cause chronic disease symptoms. Fumigants generally have broad-spectrum activity, so they address many more pathogens than a standard fungicide. The success of the fumigants calls into question whether nematodes may also be involved in replant issues, and though nematodes have not been considered a major threat to blueberry, they should be examined in order to rule out their interaction in a disease complex.

Treatment and rate/A	Plant health rating results*
Untreated control	1.8 a**
MBC-33 350 lb	2.2 b
Telone C-35	2.3 b
ProPhyt 6 pt	1.7 a

* Rating scale: 0 = dead plant, 1 = partial death of the plant with extreme stunting, 2 = extreme leaf discoloration (reddening and yellowing) and plant stunting, 3 = moderate reddening of leaves and plant stunting, 4 = limited symptoms and very minor leaf discoloration, 5 = healthy plant.

**Analysis of covariance-adjusted means and standard errors of four replicate plots. Means within columns followed by the same letters are not significantly different by *t*-test comparisons ($\alpha = 0.05$).

Conclusions: It would be unwise to make conclusions based on this test alone, but additional research is warranted relative blueberry replant disorder and the potential benefit of fumigation. If increased vigor results in more rapid production and higher yields, then fumigation would likely make financial sense.

Impact Statement: Virtually no research has been conducted on replant disorder of blueberry. With the maturity of the Georgia blueberry industry, many new rabbiteye varieties are replacing older, less desirable varieties. As such, producers often replant new varieties in the same locations as the old. Without extended rotations to unrelated commodities, fruits generally experience replant disorder, but again, information is lacking for blueberry. However, in a 2007 trial at the Alapaha Blueberry Research Station in Alapaha, GA, fumigation did result in improved plant vigor and overall plant health in a high stress year. Application of ProPhyt did not provide obvious improvements in plant health. Since

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