AGRICULTURAL RESEARCH FOUNDATION
INTERIM REPORT
FUNDING CYCLE 2015 – 2017

TITLE: Benefits of Organic and Humic Acids for Production of Berry Crops

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SUMMARY: Recently, we discovered that application of humic acids to blueberry resulted in more plant growth during the first two years after planting than eleven other fertilizer treatments. The effects of humic acids on root growth were particularly apparent and resulted in 46% to 75% greater root dry weights than conventional fertigation, granular fertilizers, slow-release fertilizers, or a control treatment that lacked humic acids but contained exactly the same nutrients as the humic acid treatment. We also observed significantly more cane growth with humic acids in a new planting of red raspberry. Humic acids are clearly beneficial during establishment of these crops. However, we have no scientific information to date on the effects of humic acids in mature, fully-productive plants. Therefore, we are continuing to conduct field experiments applying humic acids to mature berry plantings and are comparing the results to conventional fertilizer applications.

OBJECTIVES: The objective of this project is to evaluate the effects of humic acids on yield and fruit quality (berry size, firmness, Brix, titratable acidity) in blueberry, blackberry, raspberry, and cranberry. We will also determine how humic acids affect the soil conditions (pH, nutrients, organic matter content, bulk density, infiltration, water holding capacity, and soil microbial activity) in each crop.

PROCEDURES: The research on blueberry is being conducted in a mature 0.6-acre field of 'Bluecrop' located at the Oregon State University Lewis-Brown Horticulture Research Farm in Corvallis, OR. The main plots include a combination of two irrigation methods, micro-sprinklers (to simulate sprinklers) and drip (two laterals per row with 0.25-gph pressure-compensating emitters spaced every 18 inches), each with and without potassium phosphite for root rot control. The subplots include 1) humic acids (22% humic acids + ammonium sulfate fertilizer), 2) humic acids nutrient management program (12.5% humic acids + N, P, K, B & Zn fertilizers), 3) a control for the humic acids treatment (ammonium sulfate fertilizer only) and 4) a control for the humic acids nutrient management program treatment (N, P, K, B & Zn fertilizers only). A total of 150 lbs/acre of N was applied to each treatment using a triple-split application (April, May, and June) of granular fertilizer banded on each side of the row in the sprinkler plots and weekly fertigation (mid April to late July) with liquid fertilizer through the irrigation system in the drip plots. Humic acids were banded using a sprayer every 2 weeks (sprinklers) or applied weekly by fertigation (drip). Irrigation was scheduled based on estimates of crop evapotranspirtation (ET) obtained from the AgriMet website. Similar treatments were

established in a commercial field of 'Meeker' raspberry in Lynden, WA and in commercial beds of 'Stevens' cranberry in Bandon, OR. We also plan to establish additional experiments in commercial blueberry fields this spring.

Aboveground plant growth was assessed by counting the total number of new shoot flushes in each plant every month from May to September. To assess root growth, root cores were collected during the two peaks of root growth (late-June and late-August). Two root cores were collected from one plant per plot, one in each side of the bed, and divided into three depths (0-10 cm, 10-20 cm, and 20-30 cm). The roots were washed from the cores, scanned, and analysed using root imaging software to determine total root length and average root diameter in each sample. Ripe fruit was hand-harvested three times and weighed to determine the total marketable yield in each treatment plot. A subsample of fruit was counted and weighed to determine average berry weight, and then measured for diameter and firmness using a firmness tester. Frozen berry samples were analyzed for soluble solids (Brix) using a refractometer and for titratable acidity using acid titration method. The ratio of Brix to acidity was calculated to determine the sugar to acid ratio in each treatment (a flavor metric). Leaf samples were collected in early-August for nutrient analysis, and soil samples were collected in late September for analysis of pH and extractable nutrients.

SIGNIFICANT ACCOMPLISHMENTS TO DATE:

New plantings. The application of humic acids to a new planting of blueberry resulted in 46% to 75% greater root dry weights than conventional fertigation, granular fertilizers, slow-release fertilizers, or a control treatment that lacked humic acids but contained exactly the same nutrients as the humic acid treatment. We also observed significantly more cane growth with humic acids in a new plantings of red raspberry and cranberry.

Mature plantings. So far, we found no differences among the treatments in the total number of new shoot flushes produced over the first growing season of mature blueberry, raspberry, and cranberry plantings. We also found no difference in marketable yield or fruit quality (berry weight, berry diameter, firmness, soluble solids (brix), and sugar to acid ratio). We were not surprised by this result, given the size and maturity of these plants (large carbohydrate and nutrient reserves). We will continue to apply and monitor the treatments for at least another 2 years. Over 1,000 root cores were collected last year. We are carefully hand wash the cores and are scanning them at high resolution using a flat-bed scanner. This is a time-consuming process that is expected to be completed this spring. We will also complete the analysis of the leaf and soil samples this spring.

ADDITIONAL FUNDING RECEIVED DURING PROJECT TERM: Additional funding for the project was received from Northwest Center for Small Fruit Research ($96,441).

FUTURE FUNDING POSSIBILITIES: A new proposal for the project was submitted to the USDA NIFA Specialty Crop Research Initiative.