# Blueberry II

## Wednesday afternoon 2:00 pm

**Where:** Grand Gallery (main level) Room A & B

**MI Recertification credits:** 2 (1C, COMM CORE, PRIV CORE)
**CCA Credits:** CM(2.0)

**Moderator:** Mark Longstroth, Small Fruit Educator, MSU Extension, Paw Paw, MI

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| 2:00 pm | Going Organic: Is It Right for You? (Grower Panel)<br>• Joe Corrada, Moss Funnel Farms, Bangor, MI |
| 2:20 pm | Humates, Fulvates and Other Organic Additives; Any Value in Blueberries?<br>• Eric Hanson, Horticulture Dept., MSU |
| 2:40 pm | Replanting Blueberries<br>• Mark Longstroth, Small Fruit Educator, MSU Extension, Paw Paw, MI |
| 3:20 pm | Recovering from the 2014 Winter<br>• Mark Longstroth, Small Fruit Educator, MSU Extension, Paw Paw, MI |
| 3:40 pm | Creating an Organization to Represent Michigan Blueberries<br>• Joe Leduc, MBBAC, Paw Paw, MI |
| 4:00 pm | Session Ends |

Michigan Blueberry Advisory Council annual meeting will be held at the conclusion of the Blueberry session, starting at 4:15 pm.

# Potential Use of Humate and Biochar in Blueberry Production

Eric Hanson, Department of Horticulture, Michigan State University

Blueberry plants are slow growing so growers hesitate to replace old plants with improved types because establishment takes so long. Humates and biochar have been proposed as soil amendments that might shorten the establishment period. Below is a review of these materials and thoughts on their potential use in blueberries.

## Humates

Humic substances are products of the breakdown and decomposition of dead organic matter. They include several groups defined by some simple characteristics, including 1) humic acids or humates, 2) fulvic acids or fulvates, and 3) humin. Humates are large compounds than fulvates. Both can be extracted by exposing humic material to alkaline solutions (high pH). If subsequently exposed to acidic conditions, humates come out of solution whereas fulvates remain dissolved. Humins are not soluble at any pH. All are present in decomposing organic matter, including soil organic matter, compost, peat, river and marine deposits, and ancient organic deposits such as leonardite. Ancient deposits are often mined as sources of humate. Some people use the term humate to describe solid material and humic acid as material in solution. These compounds are very resistant to breakdown so they tend to be very persistent.

The benefits of organic matter additions to crop growth have been known for centuries, but it appears that some of these benefits may result from humates specifically. At high rates, humates increase the water holding capacity of soils. Humates have an extremely high cation exchange capacity (CEC) meaning nutrients with positive charges such as calcium, magnesium and potassium are adsorbed to them and retained in the root zone where they are available to the plants. Humates also can chelate metal ions including several micronutrients. Chelation can increase the availability of nutrient metals and may also protect plants from toxic levels of other metals. Humates also may benefit plants by acting like (or containing) growth regulators. Humates also contain modest levels of nutrients so they can be considered low-analysis fertilizers.

There is a confusing array of humate and/or fulvate products on the market. They include dry and liquid materials that are produced from different raw products with varying chemical characteristics. Products vary in humate and fulvate concentrations as well as other chemical qualities. Unfortunately, desired characteristics are not fully understood and likely vary with intended uses.

## Biochar

Biochar is essentially charcoal. It is produced through a process call pyrolysis, where organic or high-carbon materials are burned in a low-oxygen environment. This leaves behind stable material composed primarily of carbon. In fact, the carbon in biochar is so stable, residual life is usually

considered in hundreds or even thousands of years. Biochar can be produced from crop residues, paper mill waste, wood products, or even manure. The characteristics of the final product depend on the raw materials and pyrolysis conditions.

Potential benefits of biochar applications to soil include improved nutrient cycling and retention, soil structure and drainage, and water retention. Since biochar is so stable, benefits could be realized for many years or even centuries. Biochar has a high capiton exchange capacity. This means most nutrient adhere to particles and are less prone to leaching. Biochar also increases the water holding capacity so crops may not need to be irrigated as frequently. These benefits are most likely and sandy soils.

The chemical characteristics of biochar reflect the raw materials it is made from. Wood-based biochar tends to range from 5.0 to 7.0 in pH, are low in total salts and nutrient content, and relatively high in cation exchange capacity. Biochar derived from food waste or manure tends to be high in pH (sometimes as high as 11!) and can contain high levels of total salts as well as many plant nutrients such as potassium, calcium and magnesium.

Benefits to plant growth are expected to depend on the type of biochar, application rate, soil characteristics and crop type. Crops on a nutrient depleted soil may benefit from low rates of a high salt/high nutrient biochar, but higher rates may injure the same plants. A high pH biochar may promote growth if the soil pH is too low, but inhibit growth if the soil pH is too high. A recent review of numerous independent studies of biochar use found that crop growth responses ranged from a 40% increase to a 30% inhibition. Clearly, responses of specific crops and biochar combinations are hard to predict without conducting field studies.

## Biochar and Humates in Blueberries

Blueberries generally respond to organic matter additions, but these organic forms have not been tested in detail. David Bryla with the USDA-ARS in Corvallis, OR has begun work to determine whether newly planted blueberries respond to liquid humate injected through the trickle system. Dr. Bryla observed measurable increases in shoot and root growth by adding humates to a season-long complete nutrient fertigation program, indicating that humates may have a place in blueberry culture. Rolly Groenink from MBG-Marketing and I established two studies in the fall of 2014 to test the benefits of biochar and humate. We applied a biochar produced in the Gwinn, Michigan by Biogenic Reagents (800 or 1,600 lb per acre) and a dry humate product from LiveEarth, Emery Utah (900 or 1,800 lb). The products were incorporated prior to planting. Plant growth responses will be observed for the next few years. A number of growers have been experimenting with humates in particular. Keep in mind that the only way to judge whether these or other amendments pay for themselves is to leave untreated check areas for comparison.