

Potential of Biochar, as a Substitute for Perlite in Soilless Media, for the Growth and Production of Southern Highbush Blueberry

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Relevancy

- Blueberries are a perennial crop; with plantings living 30 years or more.
- The worldwide demand for blueberries is growing, the market needs to keep up with demand or prices will rise.
- Commercial soilless medias often contain perlite and peat moss, both of which are finite resources, which are costly and not considered sustainable.
- Biochar has proven to be a sustainable alternative to both perlite and peat moss, in artificial substrates, to produce Duram Wheat, lettuce, onions, radishes, etc.
- Container blueberry production using soilless substrate is a relatively new approach with increasing interest in recent years.
- The high pH (8.0-10.0) of biochar could pose a potential risk for blueberry growth (4.5-5.5)

Treatments

- 5 different treatments of soilless media
- 2 Southern Highbush Cultivars (Jubilee and Jewel)
- Plants will be arranged in a completely randomized design and grown in 4-Liter pots for 12-weeks in a high tunnel at University of North Carolina at Pembroke.

Items	Treatment 1 (v/v)	Treatment 2 (v/v)	Treatment 3 (v/v)	Treatment 4 (v/v)	Treatment 5 (v/v)
Bark	30%	30%	40%	40%	40%
Coir	30%	30%	40%	40%	40%
Peat Moss	30%	30%	0%	0%	0%
Perlite	0%	10%	0%	10%	20%
Biochar	10%	0%	20%	10%	0%

Measurements

- Plant dry weight
- Soil solution pH and EC (estimation of soluble salt content)
- Plant nutrient content and Mycorrhizal root colonization





How to Tell if the Plant is Healthy

- Leaves are one shade of green and have no curl
- Berries produced are firm and blue
- Blue berries grow in large bunches
- Roots are wide and reach out

References

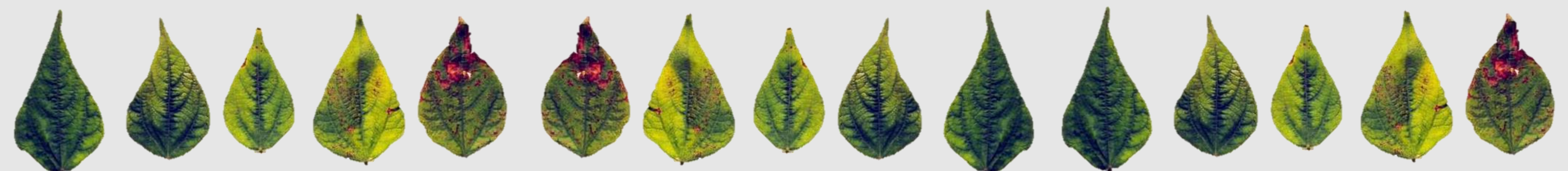
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What We Know

Blueberries	Biochar	Perlite	Peat Moss	Coconut coir
Has shallow and thin roots that grow in a matt-like structure.	Produced from agriculture waste such as wood, manure, and seed casings.	Is a volcanic glass created when obsidian is hydrolyzed.	A moss found in bogs that holds in water	Natural fiber extracted from the outer husk of coconuts.
Prefers a pH level of 4.5-5.5	Retains essential plant nutrients and water	Reusable, not renewable	Acidic (pH 4.5)	Commonly Used for Soilless Media
Prefers NH ₄ ⁻ over NO ₃ ⁻ -N, NH ₄ ⁻ is not mobile in soil unlike NO ₃ ⁻ -N.	Has a high porosity and surface area	Used as an artificial aggregate in soilless media	Takes a long period of time to grow	High water holding capacity
Sensitive to ammonium sulfate and other salts	Recalcitrant in the soil	High cation exchange capacity	High Cation Exchange Capacity	Improves drainage
				

Visual Symptoms Associated with Plant Health

Phosphorus Deficiency	Nitrogen Deficiency	Potassium Deficiency	Magnesium Deficiency	Sulfur Deficiency	Calcium Deficiency
Stunted Growth	Stunt growth	Necrotic Lesions on leaves	Interveinal necrosis on leaves	Rare in blueberries since sulfate fertilizers are commonly used	Leaves will be stunted
Darker shade of green than normal	Leaves get reddish tinge	"Salt Injury"	Red or browning of the edges of the leaves	Symptom is usually salt injury	Leaves will twist and curl inward
Leaves will get red tinge	Nitrogen Excess	Potassium Excess	Common for soil with high pH, sandy soil, or soil with high levels of potassium		Fruit firmness will be reduced
Phosphorous Excess	Increase vigor	Lower leaf production			Low soil moisture and humid conditions could effect this.
Increase of root to shoot ratio	Decrease yield and quality	Low product growth			
	Nitrogen Burn				



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A dark colored and agriculturally productive soil found in the Brazilian Amazon Rainforest with a very high carbon content.

Likely a result of composted and pyrolyzed organic waste (charcoal) additions to the soil by natives of the Amazon for over 2500 years.

The land was discovered in the 19th century and was found to be very dark and highly fertile.

Black carbon is formed from organic matter and is why the carbon content in the soil is so high. It's speculated that the black carbon contributes to the improved physical and chemical characteristics of the soil.

Terra Preta soils have a higher cation exchange capacity, pH and base saturation that surrounding soil.

