

Biochar suitable substrate for soilless hydroponic tomatoes

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As the use of soilless, hydroponic growing methods becomes more prevalent among crop producers, researchers are looking for new materials that can help growers save money, produce healthy plants, and contribute to sustainable practices. The authors of a study in the October 2015 issue of *HortScience* say that biochar, a charcoal-like material produced by heating biomass in the absence of oxygen, can help "close the loop" when used as a substrate for soilless, hydroponic tomato production. "This method could provide growers with a cost-effective and environmentally responsible green-waste disposal method, and supplement substrate, fertilizer, and energy requirements," said the study's corresponding author Jason Wargent.

Wargent and colleagues Samuel Dunlop, Marta Camps Arbestain, and Peter Bishop performed experiments in which they compared the performance of tomato crop green-waste biochar as a soilless [substrate](#) with pine sawdust for hydroponic tomato production. They also evaluated mixtures of biochar and sawdust at different ratios.

The scientists used tomato crop green waste consisting primarily of vines and also the stem clips and string used to train tomato vines during the production cycle. This non-plant waste accounted for about 7.5% of the waste dry weight - the study acknowledges that this level of non-plant waste could be diluted further. Substrates were prepared consisting of biochar, sawdust, or mixtures of the two materials, and then tomato plants were grown in the different substrates for 110 days. After harvesting, the plants were evaluated for substrate physical and chemical properties, along with plant growth, leaf nutrient content, and biomass.

"The properties of biochar produced from tomato crop green waste were generally as would be expected," the authors said. "Tomatoes grown in substrates containing or consisting entirely of

biochar did not differ significantly in terms of growth, yield, or fruit quality to those grown in pine sawdust." The researchers said substrates containing or consisting entirely of biochar also exhibited "acceptable" water-holding and aeration characteristics.

"The results of our study support the concept of creating a closed loop system whereby biochar produced from tomato crop green waste is used as a substrate for soilless, hydroponic [tomato production](#)," said the scientists.

They added that biochar used as a soilless substrate could have considerable advantages for greenhouse tomato growers. "For example, turning tomato crop green waste to biochar would divert 10-60 t·ha⁻¹ of green waste away from landfill each crop cycle. If the assumption is made that the green-waste biochar is produced at 550 °C, it would meet 13% to 50% of the grower's substrate requirements, on a per-hectare basis."

More information: The complete study and abstract are available on the ASHS *HortScience* electronic journal web site: hortsci.ashspublications.org/c.../50/10/1572.abstract

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