

Abstract

The Effect of Biochar from Rice Husks on Evapotranspiration, Vegetative Growth and Fruit Yield of Greenhouse Tomato Cultivar Anna F1 Grown in Two Soil Types

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Biochar made from crop residues has been shown to improve soil texture, soil porosity and soil structure. It can enhance fertilizer utilization, reduce leaching losses and hence improve nitrogen supply for plant growth. Utilization of biochar in preparation of potting substrates can enhance growth and yields of greenhouse tomato. A study was carried out to test the influence of rice husks biochar on substrate properties, growth and yield of greenhouse tomato. The experiment was carried as a factorial in completely randomized design with two factors: four biochar levels and two soil types, replicated three times. The biochar levels were volume ratios of 0 biochar: 1 soil (0Biochar), 0.25 biochar: 0.75 soil

(0.25Biochar), 0.5 biochar: 0.5 soil (0.5Biochar) and 0.75 biochar: 0.25 soil (0.75Biochar). The two soil types used were the well drained deep red friable soil and imperfectly drained dark brown clay soil obtained from the University farm. Tomato Anna F1 was grown in four-liter plastic pots containing about 3 kg of soil-biochar mixture. Data were collected on the plant growth parameters of plant height, number of leaves per plant and plant dry weight upto the 8th - 9th week after transplanting, when fruit ripening began. The chlorophyll index of the leaves were measured using the SPAD meter. At harvesting, fresh weight and number of the fruits were determined. Incorporating biochar into potting substrate at 0.25-0.75 levels significantly increased evapotranspiration during early vegetative growth. This was indicative of biochar changing substrate properties mainly through significant reduction of bulk density and possibly increasing porosity. Biochar levels of 0.25-0.75 resulted in significant increases in vegetative growth and fruit yield of tomato. Adding biochar to the pot substrate increased tomato plant height, plant dry weight and fruit fresh weight by 2134%, 50-64% and 49%-56%, respectively. The increase in vegetative growth and fruit yield at 0.25-0.75 biochar levels was attributed to the positive effect of biochar on substrate physical properties. Plant height and number of leaves per plant had a significant linear relationship whose slope, the rate of increase in plant height with increase in number of leaves was not influenced by biochar levels. Biochar enhanced growth without changing the ratio of plant height to number of leaves of tomato. It is concluded that incorporation of biochar made from rice husks at 0.25 level can enhance greenhouse production in both red and clay soils.

Key words: Bulk density, Dry weight, Fresh fruit weight, Number of leaves, Plant height