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Improvement of elephant dung as soilless substrate for tomato cultivation under protected house conditions

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Abstract

Plant growth and yield are better in soilless substrates than soil media. Elephant dung is an underutilized bio-waste which contains many important minerals required for plant growth. Therefore, a study was conducted to compare plant growth and yield responses of tomato in elephant dung based soilless substrates in Faculty of Agriculture, University of Ruhuna, Sri Lanka under protected house condition. There were six treatments as T1(coco peat 100%/ control), T2(elephant dung 100%), T3(elephant dung 75% + coco peat 25%), T4(elephant dung 50% + coco peat 50%), T5(elephant dung 75% + half burnt paddy husk (HBPH) 25%) and T6 (elephant dung 50% + HBPH 50%) replicated in five times and laid out with Completely Randomized Design (CRD). pH, electrical conductivity, water holding capacity (WHC) and substrate height reduction were recorded at the end of the experiment. As vegetative parameters plant height and number of leaves per plant were recorded while days taken to 50% flowering and total fruit weight per plant were measured as reproductive parameters. Data were analyzed using ANOVA and mean comparison was done by Dunnett's test at 5% probability level. Significantly the highest (7.5) and lowest (5.8) pH values were recorded in T2 and T1, respectively. EC values of T1 and T6 were not significantly different. The highest (2.85 dS/m) and lowest (1.38 dS/m) EC values were reported in T1 and T5, respectively. T2 showed the significantly highest WHC (47.06%) comparing to T1(28.64%). The significantly highest substrate height was recorded in T1(20.12cm) and the lowest was recorded in T2(7.96cm). There was no significant difference among T1 and T6 in plant height. The significantly highest plant height was recorded in T1(76.08cm) and T6(67.56cm) while representing the lowest value from T2(45.12cm). When compared to T1(12.8), significantly the lowest number of leaves at 50% flowering stage were recorded in T2(10.8) and T3(11.6). When compared to T1(43), T2 has taken significantly longest days (47) to 50% flowering. There was no significant difference between T1(1090.72g) and T6(913.56g) in total fruit weight per plant. T3(287.64g) showed the lowest among the treatments. Partially decomposed (two weeks after excretion) elephant dung can be improved by adding 50% HBPH in volume basis to obtain better growth and yield of tomatoes.

Keywords: Elephant dung, Improvement, Soilless substrate, Tomato

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