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Effect of organic vis-a-vis inorganic vegetable production systems on growth, yield and quality of tomato (Lycopersicon esculentum Mill)

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Organic farming, especially of vegetables and other horticultural crops is gaining popularity world wide because of growing concern about food safety, deteriorating soil health and environmental quality due to indiscriminate use of inorganic fertilizers and other agrochemicals. Keeping this in view, a field experiment was conducted at the Central Research Farm of Indian Institute of Vegetable Research, Varanasi (82.52 °E longitude and 25.10 °N latitude) during rabi season of 2009-10 to study the effect of organic and inorganic vegetable production systems on growth, yield and quality of tomato (var. H-86). The organic system consisted of nine treatment combinations involving three doses each of farm yard manure (@ 10, 20 and 30 t ha^{-1}), poultry manure (@ 5.0, 7.5 and 10.0 t ha^{-1}) and vermicompost (@ 2.5, 5.0 and 7.5 t/ha). In case of inorganic system, the recommended dose of N, P_2O_5, K_2O (120, 60, 60 kg/ha, respectively) was applied through inorganic fertilizers (urea, single super phosphate and mureate of potash). The soil of the experimental field was Typic Ustochrept having sandy loam texture, pH_2 -7.4, EC_2 – 0.24 dSm^{-1}, organic carbon- 0.45%, available nitrogen - 178 kg ha^{-1}, available phosphorus- 22.0 kg P2O5 ha^{-1} and available potassium- 340 kg K2O ha^{-1}. The observations on plant-growth yield and yield attributing parameters were recorded periodically. To evaluate the quality of the tomato fruits, mature fruits were analyzed for total soluble solids (TSS), acidity, ascorbic acid and lycopene contents following standard analytical procedures. The results revealed that fruit yield of tomato was significantly highest (585 q ha^{-1}) with the use of poultry manure @ 10.0 t ha^{-1}. The yield obtained under inorganically fertilized plots was comparable to those recorded under 20 t $ha^{-1}$of FYM, 5.0 t $ha^{-1}$of poultry manure and 7.5 t $ha^{-1}$of vermicmpost. Similar trend was noticed with respect to growth and yield attributing characters also. The quality of tomato fruits in terms of TSS, acidity, ascorbic acid and lycopene content was found to be superior under organic system as compared to inorganic system. The highest values of TSS (4.41%), acidity (0.860%), ascorbic acid (23.30 mg $100g^{-1}$) and lycopene (3.307 mg $100g^{-1}$) were recorded under poultry manure @ 10.0 t ha^{-1}. The values of all these parameters were found to be lowest under inorganically fertilized plots. These results suggest the superiority of organic system of vegetable production over inorganic system in terms of growth, yield and quality of tomatoes.

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