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Fly ash as growing media for pot culture of solanaceous vegetable crops for urban areas

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Abstract
The present study entitled Fly ash as growing media for pot culture of Solanaceous vegetable crops for urban areas was carried out in Horticultural Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj (Allahabad) (UP.) during the period 2018-20. A pot experiment with three solanaceous crops and different levels of soil, fly ash and FYM were studied in the present investigation are M_1 Control (Garden Soil + Compost 1:1), M_2 90% soil + 5% Fly Ash + 5% FYM M_3 80% soil + 10% Fly Ash + 10% FYM M_4 70% soil + 15% Fly Ash + 15% FYM M_5 60% soil + 20% Fly Ash + 20% FYM, M_6 50% soil + 25% Fly Ash + 25% FYM, M_7 100% Fly Ash The experiment was laid in factorial complete randomized design with seven treatments and was replicated three times of three solanaceous vegetable crops *viz.* Tomato, Brinjal and Chilli.

Keywords: fly ash, FYM, tomato, brinjal and chilli

Introduction
Fly ash can be extremely acidic (pH3-4) but usually it is extremely alkaline (pH 10-12) due to presence of hydroxides and carbonate salts of Ca and Mg. One of the best and eco- friendly alternative for fly-ash management would be to vegetate the landfill area which will serve the purpose of both stabilization and providing a pleasing landscape (Adriano *et al*., 1980; Cheung *et al*., 2000) [1, 2]. In India, fly-ash is generally highly alkaline due to low sulphur content of coal found in India and presence of hydroxides and carbonates of calcium and magnesium. Recently, fly ash has also shown inhibitory effects on root-knot nematodes (Tarannum *et al*., 2001) [4]. Fly ash can be extremely acidic (pH 3-4) but usually it is extremely alkaline (pH 10-12) due to presence of hydroxides and carbonate salts of Ca and Mg. In India, about 75% of the electricity is generated by coal-based thermal power plants, produce nearly 65 million tons/ year of fly-ash as a by product.

The coal ash can be utilized in agriculture field crops for improving soil properties and nutrient supply. In this context an in-depth understanding of the influence of fly ash on growth and yield of crops is required (Rajakumar and Patil 2019) [3].

Tomato (*Solanum lycopersicon* L.) is an important vegetable crop in India, occupies an area of 880 MT/ ha with an annual production of 18227 MT/ha and productivity of 20.7MT/ha (NHB-2013). It belongs to family Solanaceae having chromosome number (2n=24). It is a self-pollinated crop and Peru-Ecuador region is the centre of origin Laxmi *et al*., (2015) [5]. Tomato is one of the versatile crop in the world because of its fast and wide climate adaption and it is universally treated as protective food. Chillies (*Capsicum annuum* L.), a member of the family Solanaceae is an important commercial spice cum vegetable crop of India. There is no spice probably so popular as chilli and no other spice has become such an indispensable ingredient of the daily food of majority people of the world. The area under chillies in India is 805 thousand hectares with a production of 1276 thousand tonnes during the year 2011-12 (Anonymous, 2013). Chilli is one of the most important commercial crops of India, it is grown almost throughout the country. India is a major producer, consumer and exporter of chilli in the world.

Brinjal or eggplant (*Solanum melongena* L.) of the family Solanaceae is one of the important and popular vegetable crops grown in India and other parts of the world. An opposite trend was observed regarding quality of vegetables in terms of minimum crude fiber (8.87%) and higher moisture (78.90%) contents harvested from FYM treated (25 t ha^{-1}) under dense populated vegetables plants, as okra pods are found to be the best for cooking and consumption with lesser crude fiber contents. Previous findings of Dileep (2005) [6], Gopalakrishnan (2007) [7] and Tiamiyu *et al.*, (2012) [8] are in line with our results who reported that FYM increased yield and quality of vegetables providing healthy environment and good soil structure and texture. Since it is composed of mostly silt size particles, addition of fly ash to sandy soils could permanently alter soil texture, increase micro porosity and improve water retention capacity and Prabha *et al.* (2007) [9]. Its amendment in soil upto 40 per cent level brings about an increase in the growth and yield of cucumber, maize, okra, potato, tomato. The production of Fly ash, is a by-product from coal based thermal power plant (TPPs), is about 112 million tonnes (MT). Some of the problems associated with Fly a share large area of land required for disposal and toxicity associated with heavy metal leached to groundwater. Due to limited volume of the growing medium in containers, the medium should be highly fertile to supported the optional plant growth, for good production. Thus, a nutrient rich soil amendment in needed to improve the quality of the produce and 'fly ash' a waste product of seems to be a good alternative for soil amendment, which is no being promoted by the government to utilized in agricultural field.

Material and Methods

The present investigation entitled, "Fly ash as growing media for pot culture of solanaceous vegetable crops for urban areas" carried out. The details of the materials used and methodology adopted during the course of study with three solanaceous crops and different levels of soil, fly ash and FYM with treatments combustions are M_1 Control (Garden Soil + Compost 1:1), M_2 90% soil + 5% Fly Ash + 5% FYM M_3 80% soil + 10% Fly Ash + 10% FYM M_4 70% soil + 15% Fly Ash + 15% FYM M_5 60% soil + 20% Fly Ash + 20% FYM, M_6 50% soil + 25% Fly Ash + 25% FYM, M_7 100% Fly Ash.

Solanaceae is mainly a tropical family of about 75 genera and 2000 species. The more important vegetable genera are Solanum (eggplant), Lycopersicon (tomato), and Capsicum (chilli). Some genera, particularity Solanum, can be extremely poisonous and caution is advised before consumption. Tomato, (*Solanum lycopersicum*), Eggplant Chillies (*capsicum annuum*), (*Solanum melongena*) flowering plant of the nightshade family (Solanaceae), cultivated extensively for its edible fruits. Tomato plants are generally much branched, spreading 60-180 cm (24-72 inches) and somewhat trailing when fruiting, but a few forms are compact and upright. The observations were tabulated and analysed. The data were processed and subjected to analysis of variance. The 'F' test as suggested by Prof. Snendicor and Yates was used to determine significant difference between the treatments. The relation of analysis of variance of (7x3) factorial design used. Fly ash has been studied as a useful soil-amending agent with agronomic and environmental benefits. The seeds were sown on well prepared raised nursery bed and watering was done just after sowing. Necessary plant protection measures were followed while raising nursery for the control of common insect pests and diseases.

Result and Discussion

The effect of solanaceous crops and growing media and its interaction of plant height table 4.1 and fig. 4.1 at 30, 60, 90 and 120 Days after transplanting showed significant difference among all the treatments influenced by solanaceous vegetables viz., Brinjal, Tomato and chilli and growing media soil, fly ash and farm yard manure and interaction effect between solanaceous vegetables and growing media.

Among different solanaceous vegetable crops maximum plant height in tomato (22.1 cm).Whereas the minimum plant height in chilli (20.30cm) at 30 Days after transplanting Among different growing the maximum plant height (24.30cm) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (22.8) M_5:60% soil + 20% fly ash + 20% FYM. and (22.3) were found statistically at par with M_4:70% soil + 15% fly ash+ 15% FYM Whereas the minimum plant height (17.70) at 30 DAT was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum plant height (cm) at 30 DAT (25.50) was found T_6 50% soil + 25% fly ash + 25% FYM+ Tomato followed by (25.2) T13 50% soil + 25% fly ash + 25% FYM+ Brinjal and (23.8) T_5 60% soil + 20% fly ash + 20% FYM+ tomato. Whereas the minimum plant height (cm) (15.6) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + Chilli.

Among different solanaceous vegetable crops maximum plant height in tomato (38.1cm). Whereas the minimum plant height in chilli (32.4cm) at 60 DAT Among different growing the maximum plant height (39.2) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (37.9) M_5:60% soil + 20% fly ash + 20% FYM and (37.1) M_4:70% soil + 15% fly ash + 15% FYM. Whereas the minimum plant height (29.5) at 60 DAT was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum plant height (cm) at 60 DAT (42.60) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato. Further treatments, (42.0) T_5 60% soil + 20% fly ash + 20% FYM+ tomato and (41.0)T_4 70% soil + 15% fly ash + 15% FYM+ tomato were found statistically at par with (37.7) T_{13} 50% soil + 25% fly ash + 25% FYM+ brinjal. Whereas the minimum plant height (cm) (27.2) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + chilli.

Among different solanaceous vegetable crops maximum plant height in tomato (57.4cm). Whereas the minimum plant height in chilli (52.50cm) at 90 DAT Among different growing the maximum plant height (63.7) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (60.5) M_5:60% soil + 20% fly ash + 20% FYM and (56.3) were found statistically at par with M_4:70% soil + 15% fly ash + 15% FYM. Whereas the minimum plant height (46.8) at 90 Days after transplanting was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum plant height (cm) at 90 DAT (66.90) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato. Further treatments, (64.5) T_{13} 50% soil + 25% Fly Ash + 25% FYM + Brinjal were found statistically at par with T_{12} 60% soil + 20% Fly Ash + 20% FYM + Brinjal. Whereas the minimum plant height (cm) (40.5) was observed in treatment T15 Control (Garden Soil + Compost 1:1) + Chilli

Among different solanaceous vegetable crops maximum plant height in tomato (79.7cm). Whereas the minimum plant height in chilli (74.00cm) at 120 Days after transplanting Among different growing the maximum plant height (88.7) was observed in treatment M_6 50% soil + 25% fly ash + 25% FYM followed by (84.6) M_5:60% soil + 20% fly ash + 20% FYM and (80.1) were found statistically at par with M_4:70% soil + 15% fly ash + 15% FYM. Whereas the minimum plant height (66.1) at 120 Days after transplanting was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum plant height (cm) at 120 DAT (95.40) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato followed by (90.3) T_5 60% soil + 20% fly ash + 20% FYM+ tomato and (89.2) T13 50% soil + 25% fly ash + 25% FYM+ brinjal. Whereas the minimum plant height (cm) (65.8) was observed in treatment T1 Control (Garden Soil + Compost 1:1) + tomato. The effect of fly ash on plant height was may be due to the nitrogen presence in fly ash which is important for plant height.

Among different solanaceous vegetable crops maximum number of leaves per plant in tomato (38.90). Whereas the minimum number of leaves per plant in brinjal (6.8) at 30 DAT. Among different growing the maximum number of leaves per plant (30.4) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (28.9) M_5:60% soil + 20% fly ash + 20% FYM and (26.7) were found statistically at par with M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum number of leaves per plant (19.1) at 30 DAT was observed in M_1:Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of leaves per plant at 30 DAT (48.1) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato followed by (46.4) T_5 60% soil + 20% fly ash + 20% FYM+ tomato, (42.8)T_4 70% soil + 15% fly ash + 15% FYM+ tomato and (40.2) T_3 80% soil + 10% fly ash + 10% FYM+ Tomato. Whereas the minimum number of leaves per plant (4.8) was observed in treatment T_8Control (Garden Soil + Compost 1:1) + brinjal.

Among different solanaceous vegetable crops maximum number of leaves per plant in tomato (57.5). Whereas the minimum number of leaves per plant in brinjal (10.6) at 60 DAT. Among different growing the maximum number of leaves per plant (43.7) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (42.3) M_5:60% soil + 20% fly ash + 20% FYM and (40.9) M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum number of leaves per plant (32.7) at 60 DAT was observed inM_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of leaves per plant at 60 DAT (63.9) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato. Further treatments, (62.2) T_5 60% soil + 20% fly ash + 20% FYM+ tomato, (59.9) T_4 70% soil + 15% fly ash + 15% FYM+ tomato were found statistically at par with (57.9) T_3 80% soil + 10% Fly Ash + 10% FYM+ tomato. Whereas the minimum number of leaves per plant (8.4) was observed in treatment T_8Control (Garden Soil + Compost 1:1) + brinjal.

Among different solanaceous vegetable crops maximum number of leaves per plant in tomato (74.5). Whereas the minimum number of leaves per plant in Brinjal (19.4) at 90 DAT. Among different growing the maximum number of leaves per plant (58.0) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (56.6) M_5:60% soil + 20% fly ash + 20% FYM. (55.0) were found statistically at par with M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum number of leaves per plant (46.7) at 90 DAT was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of leaves per plant at 90 DAT (80.60) was found T_6 50% soil + 25% Fly Ash + 25% FYM+ tomato followed by (79.3) T_5 60% soil + 20% Fly Ash + 20% FYM+ tomato, (76.7) T_4 70% soil + 15% fly ash + 15% FYM + tomato and (74.8) T_3 80% soil + 10% fly ash + 10% FYM + tomato. Whereas the minimum number of leaves per plant (14.6) was observed in treatment T_8 Control (Garden Soil + Compost 1:1) + brinjal.

Among differen solanaceous vegetable crop maximum number of leaves per plant in tomato (91.9). Whereas the minimum number of leaves per plant in brinjal (25.5) at 120 DAT. Among different growing the maximum number of leaves per plant (71.2) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (68.9) M_5:60% soil + 20% fly ash + 20% FYM were found statistically at par with (66.7) M_4: 70% soil + 15% fly ash + 15% FYM and. Whereas the minimum number of leaves per plant (58.7) at 120 DAT was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of leaves per plant at 120 DAT (96.8) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato followed by (95.3) T_5 60% soil + 20% Fly Ash + 20% FYM+ tomato, (94.3) T_4 70% soil + 15% fly ash + 15% FYM+ tomato and (92.3) T_3 80% soil + 10% fly ash + 10% FYM+ tomato. Whereas the minimum number of leaves per plant (19.5) was observed in treatment T_8Control (Garden Soil + Compost 1:1) + brinjal.

Among different solanaceous vegetable crops maximum number of branches per plant in tomato (2.1). Further crops, V_2 Brinjal were found statistically at par with V_1 Tomato. Whereas the minimum number of branches per plant in Chilli (1.6) at 30 DAT.

Among different growing the maximum number of branches per plant (3) was observed in treatment M_6: 50% soil + 25% fly ash + 25% FYM followed by (2) M_5: 60% soil + 20% fly ash + 20% FYM were found statistically at par with (2) M_4:70% soil + 15% fly ash + 15% FYM and. Whereas the minimum number of branches per plant (1.2) at 30 DAT was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of branches per plant at 30 DAT was found (3) T_6 50% soil + 25% fly ash + 25% FYM+ tomato followed by (3)T_5 60% soil + 20% fly ash + 20% FYM + tomato and (2) T_4 70% soil + 15% fly ash + 15% FYM+ tomato. Whereas the minimum number of branches per plant (1) was observed in treatment T_8 Control (Garden Soil + Compost 1:1) + brinjal.

Among different solanaceous vegetable crops maximum number of branches per plant in tomato (4.8). Whereas the minimum number of branches per plant in Chilli (3.7) at 60 DAT. Among different growing the maximum number of branches per plant (7.00) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (5) M_5:60% soil + 20% fly ash + 20% FYM and (4) M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum number of branches per plant (2.9) at 60 DAT was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of branches per plant at 60 DAT (6) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato followed by (5) T_5 60% soil + 20% Fly Ash + 20% FYM+ tomato and (5)T_4 70% soil + 15% fly ash + 15% FYM+ tomato, (5) T_{13} 50% soil + 25% fly ash + 25% FYM+ brinjal. Whereas the minimum number of branches per plant (2) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + Chilli.

Among different solanaceous vegetable crops maximum number of branches per plant in tomato (8.6). Whereas the minimum number of branches per plant in Chilli (6.8) at 90 DAT. Among different growing the maximum number of branches per plant (10) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (9) M_5:60% soil + 20% fly ash + 20% FYM and (8) M_4:70% soil + 15% fly ash + 15% FYM and. Whereas the minimum number of branches per plant (5.3) at 90 DAT was observed in M_1: Control (Garden Soil + Compost 1:1.

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of branches per plant at 90 DAT (12.00) was found T_6 50% soil + 25% fly ash + 25% FYM + tomato followed by (10)T_5 60% soil + 20% Fly Ash + 20% FYM+ tomato and (9) T_4 70% soil + 15% fly ash + 15% FYM+ tomato, (8) T_3 80% soil + 10% Fly Ash + 10% FYM+ tomato Whereas the minimum number of branches per plant (4) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1)+chilli.

Among different solanaceous vegetable crops maximum number of branches per plant in tomato (13). Whereas the minimum number of branches per plant in Chilli (10) at 120 DAT. Among different growing the maximum number of branches per plant (13) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (12) M_5:60% soil + 20% fly ash + 20% FYM. Were found statistically at par with (11) M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum number of branches per plant (9.3) at 120 DAT was observed in M_1: Control (Garden Soil + Compost 1:1.

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of branches per plant at 120 DAT (16) was found T_6 50% soil + 25% fly ash + 25% FYM+ tomato followed by (15) T_5 60% soil + 20% Fly Ash + 20% FYM+ tomato, (14)T_4 70% soil + 15% fly ash + 15% FYM+ tomato, T_3 80% soil + 10% Fly Ash + 10% FYM+ tomato. Whereas the minimum number of branches per plant (8) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + chilli. Thus, fly ash is more beneficial to number of branches per plant of solanaceous as compared to FYM. Among different solanaceous vegetable crops maximum leaf area cm2 in brinjal (53.5). Whereas the minimum leaf area cm2 in Chilli (5.6). Among different growing the maximum leaf area cm^2 (37.2) was observed in treatment M_6: 50% soil + 25% Fly Ash + 25% FYM Further treatments, (34.2) M_5 60% soil + 20% fly ash + 20% FYM. (32.2) M_4 70% soil + 15% fly ash + 15% FYM were found statistically at par with Whereas the minimum leaf area cm2 (23.8) was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum leaf area (cm^2) (59.5) was found T_{13} 50% soil + 25% Fly Ash + 25% FYM+ brinjal followed by (58.3) T_{12} 60% soil + 20% fly ash + 20% FYM+ brinjal and (56.5) T_{11}70% soil + 15% fly ash + 15% FYM+ brinjal. Whereas the minimum leaf area (cm^2) (4.5) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + chilli. Inhibition of growth parameters was found to be more under the stress of 50%, 60% and 70% fly ash application. Among different solanaceous vegetable crops maximum number of fruit per plant in chilli (101.5). Whereas the minimum number of fruit per plant in Chilli (20.9).

Among different growing the maximum number of fruit per plant (59) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (57) M_5:60% soil + 20% fly ash + 20% FYM were found statistically at par with (54) M_4:70% soil + 15% fly ash + 15% FYM. Whereas the minimum number of fruit per plant (41) was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum number of fruit per plant (118) was found T_{20} 50% soil + 25% fly ash + 25% FYM+ chilli followed by (112) T_{19} 60% soil + 20% fly ash + 20% FYM+ chilli and (109) T_{18}70% soil + 15% fly ash + 15% FYM+ chilli. Whereas the minimum number of fruit per plant (14) was observed in treatment T_8 Control (Garden Soil + Compost 1:1) + brinjal. Reported to occur in fly ash, might also have contributed towards the poor yield of tomato at higher levels of fly ash. Phytotoxicity of theses metals to tomato has been established (Mayer, 1981; Hale *et al.,* 1985). As fly ash lacks nitrogen, its application, especially of nitrogen concentrations, resulted in severe efficiency of nitrogen in soil as well as in plant tissue, which would have been an important factor responsible for the suppressed yield. High yield have been achieved in the treatment where highest number of fruit per plant. Among different solanaceous vegetable crops maximum fruit diameter (c) in brinjal (13.9). Whereas the minimum fruit diameter (c) in Chilli (1.3). Among different growing the maximum fruit diameter (c) (7.8) was observed in treatment M_6: 50% soil + 25% fly ash + 25% FYM Further treatments, (7.5) M_5: 60% soil + 20% fly ash + 20% FYM were found statistically at par with (7.2) M_4: 70% soil + 15% fly ash + 15% FYM and were found statistically at par with M_6: 50% soil + 25% fly ash + 25% FYM. Whereas the minimum fruit diameter (c) (5.5) was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum fruit diameter (cm) (14.7) was found T_{13} 50% soil + 25% fly ash + 25% FYM+ brinjal. Further treatments, (14.4) T_{12} 60% soil + 20% fly ash + 20% FYM+ brinjal (14.4) T_{11} 70% soil + 15% fly ash + 15% FYM+ brinjal, were found statistically at par with T_8 Control (Garden Soil + Compost 1:1) + brinjal. Whereas the minimum fruit diameter (cm) (0.8) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + chilli. Among different solanaceous vegetable crops maximum average fruit weight (g) in brinjal (83.90).Whereas the minimum average fruit weight (g) in chilli (4.1). Among different growing the maximum average fruit weight (g) (46.20) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (44.3) M_5:60% soil + 20% fly ash + 20% FYM were found statistically at par with (41.6) M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum average fruit weight (g) (35.50) was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum fruit weight (93.4) was found T_{13} 50% soil + 25% fly ash + 25% FYM+ brinjal followed by (89.6) T_{12} 60% soil + 20% fly ash + 20% FYM+ brinjal and (86.3) T_{11}70% soil + 15% fly ash + 15% FYM+ brinjal. Whereas the minimum fruit weight (g) (2.9) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + chilli. Among different solanaceous vegetable crops maximum fruit yield (g) in brinjal (1774.80).Whereas the minimum fruit yield (g) in chilli (426.60). Among different growing the maximum fruit yield (g) (1458.20) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (1341.0)M_5:60% soil + 20% fly ash + 20% FYM were found statistically at par with (1194.0) M_4:70% soil + 15% fly ash + 15% FYM Whereas the minimum fruit yield (g) (730.50) was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum fruit yield per plant (g) (2356.7) was found T_{13} 50% soil + 25 fly ash + 25% FYM+ brinjal followed by (2668.3) T_{12} 60% soil + 20% fly ash + 20% FYM+ brinjal and (2017.2) T_{11}70% soil + 15% fly ash + 15% FYM+ brinjal. Whereas the minimum fruit yield per plant (g) (237.3) was observed in treatment T_{15} Control (Garden Soil + Compost 1:1) + chilli. Among different solanaceous vegetable crops maximum Ascorbic acid content (mg $100g^{-1}$) in chilli (109.0).Whereas the minimum Ascorbic acid content (mg $100g^{-1}$) in brinjal (3.60). Among different growing the maximum Ascorbic acid content (mg $100g^{-1}$) (50.40) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM followed by (47.0)M_5:60% soil + 20% fly ash + 20% FYM and (46.8) were found statistically at par with M_4:70% soil + 15% fly ash + 15% FYM and Whereas the minimum Ascorbic acid content (mg $100g^{-1}$) (38.70) was observed in M_1: Control (Garden Soil + Compost 1:1.

Among the interaction effect of different solanaceous vegetable and different growing media the maximum ascorbic acid content (mg $100g^{-1}$) (123.5) was found T20 50% soil + 25% fly ash + 25% FYM+ chilli followed by (117.1) T1870% soil + 15% fly ash + 15% FYM+ chilli. (115.4) T19 60% soil + 20% fly ash + 20% FYM+ Chilli and Whereas the minimum ascorbic acid content (mg $100g^{-1}$) (3.8) was observed in treatment T8 Control (Garden Soil + Compost 1:1) + brinjal. Respectively.

Among different solanaceous vegetable crops maximum Total Soluble Solid (^{0}B) in brinjal (6.10). Whereas the minimum Total Soluble Solid (^{0}Brix) in chilli (4.0). Among different growing the maximum Total Soluble Solid (^{0}Brix) (5.60) was observed in treatment M_6:50% soil + 25% fly ash + 25% FYM Further treatments,(5.3) M_5:60% soil + 20% fly ash + 20% FYM and (4.9) were found statistically at par with M_4: 70% soil + 15% fly ash + 15% FYM Whereas the minimum Total Soluble Solid (3.60) was observed in M_1: Control (Garden Soil + Compost 1:1).

Among the interaction effect of different solanaceous vegetable and different growing media the maximum total soluble solid (7.2) was found T_{13} 50% soil + 25 fly ash + 25% FYM+ brinjal Further treatments, (6.9)T_{12} 60% soil + 20% fly ash + 20% FYM+ brinjal and (6.4)T_{11} 70% soil + 15% fly ash + 15% FYM+ brinjal, were found statistically at par with (5.9)T_9 90% soil + 5% fly ash + 5% FYM+ brinjal. Whereas the minimum total soluble solid (3.2) was observed in treatment T_{21} 100% fly ash + chilli.

Conclusion

As population density is increasing in urban areas, people are hardly having any space for garden need to meet the daily requirement of their vegetable needs, they need to depend on the market on they can grow their own which his possible only through container gardening. Due to limited volume of the growing medium in containers, the medium should be highly fertile to supported the optional plant growth, for good production. Thus, a nutrient rich soil amendment in needed to improve the quality of the produce and 'fly ash' a waste product of seems to be a good alternative for soil amendment, which is no being promoted by the government to utilized in agricultural field. Hence a field trail entitled Fly ash as growing media for pot culture of solanaceous vegetable crops for urban areas was conducted in Department of Horticulture, SHUATS, Prayagraj

The present investigation concluded that the solanaceous vegetable crops, tomato proved to be the better for vegetative growth, fruits yield per pot and fruit quality of solanaceous vegetable crops. The result in significantly concluded that the treatment 50% soil + 25% fly ash + 25% FYM was found best in respect to vegetative growth, fruit yield and quality of solanaceous vegetable crops in pot culture. The results have shown that fly ash use provides essential nutrients in the soil for increasing crop yield.

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