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Effect of fertilizer and organic manure on yield attributes of guava (*Psidium guajava* L.) under *Casuarina equisetifolia* based agri-silvi-horti system in sodic soil

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Abstract

The experiment was conducted during 2021-23 at the Agroforestry farm, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P). The experimental site situated at (26° 27' N latitude and 82° 12' S longitude) which is 42 km away from Ayodhya on Ayodhya -Raibarely road, at 113m elevation from sea level. Effect of fertilizer and organic manures on growth and yield performance of guava (*Psidium guajava*) and turmeric (*Curcuma longa* L.) under *Casuarina equisetifolia* based agri-silvi-horti system in sodic soil". Experiment was laid on randomized block design (RBD) with three replications and nine repeat treatment combination consisted T₁ control, T₂ Recommended dose of NPK (120 kg N, 80 kg P₂O₅, 80 Kg K₂O ha⁻¹), T₃ 100% Vermicompost (recommended dose, 6 t ha⁻¹), T₄ 75% NPK (recommended dose) + 25% Vermicompost, T₅ 50% NPK (recommended dose) + 50% Vermicompost, T₆ 100% Farm Yard Manure (recommended dose, 20 t ha⁻¹), T₇ 75% NPK (recommended dose) + 25% Farm Yard Manure, T₈ 50% NPK (recommended dose) + 50% Farm Yard Manure and T₉ 25% NPK (recommended dose) + 75% Farm Yard Manure. that the application of NPK (120 kg N, 80 kg P₂O₅, 80 Kg K₂O ha⁻¹) produced significantly maximum number of fruit/plant (223), number yield/plant (42.00 Kg) and total Yield (6.594 tonnes/ha.) under *Casuarina equisetifolia* based agri-silvi-horti system in sodic soil.

Keywords: Fertilizer, organic manure, guava, fruit yield

Introduction

Agroforestry research based on promising tree species for a particular agro-climatic zones, the agroforestry systems is characterized for different climatic zones. It provides a unique opportunity to combine the twin objectives of climate change adaptation and mitigation. On-farm integrated farming systems study using holistic approach promises 6.8 times increase in improved farming systems with value of household consumption (produced within the farm) increasing by 51.4% (Gangwar and Ravishankar, 2015) [4].

Guava (*Psidium guajava* L.), a member of family Myrtaceae, native to tropical America, the apple of the tropics, is one of the most common fruits in India. It claims to be the fourth most important fruit in area and production after mango, banana and citrus. It has attained a respectable place and popularity amongst the dietary list of common people in our country owing to its nutritious, deliciousness, pleasing flavour and availability for a longer period during the year at moderate price. It has great demand as a table fruit and raw material for the processing industries, and to earn good foreign exchange (Purseglove, 1977) [8]. Being very hardy, it gives an assured crop even with very little care. Its cost of production is also low because its requirements for fertilizer, irrigation and plant protection are comparatively low. Therefore, it is an ideal fruit for high yield, nutritional security and economic boost as well as (Rathore, 2022) [9].

In fruit production, India ranks second after China and its share in the world production of fruit is about 13%. Recent estimate reveals that India has about 6480 thousand hectares of land under the cultivation of different fruits with a total annual production of 92846 thousand

Metric tons and productivity of 14.33 Metric tonnes/hectare of the total area under fruits.

Guava (*Psidium guajava* L.) is distributed throughout the tropics and is predominantly a desert fruit, with appreciable vitamin C content (35-42 mg/100 g). The nutrient value of thiamine, potassium and dietary fiber is also significant. Guava is a good source of firewood. Green fruits, seeds and leaves have effective vermicides and insecticide properties. It has been reported that leaves, shoots, bark and root have medicinal properties (Morton, 1987) [6]. The unripe fruit is astringent, and a drastic purgative is the root. It can be planted as a shade tree and can also be grown with arable crops of short duration.

Materials and Methods

The experiment was conducted during 2021-23 at the Agroforestry farm, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P). The experimental site situated at (26° 27' N latitude and 82° 12' S longitude) which is 42 km away from Ayodhya on Ayodhya - Raibarely road, at 113m elevation from sea level. Experiment was laid on randomized block design (RBD) with three replications and nine repeat treatment combination consisted T₁ control, T₂ Recommended dose of NPK (120 kg N, 80 kg P₂O₅, 80 Kg K₂O ha⁻¹), T₃ 100% Vermicompost (recommended dose, 6 t ha⁻¹), T₄ 75% NPK (recommended dose) + 25% Vermicompost, T₅ 50% NPK (recommended dose) + 50% Vermicompost, T₆ 100% Farm Yard Manure (recommended dose, 20 t ha⁻¹), T₇ 75% NPK (recommended dose) + 25% Farm Yard Manure, T₈ 50% NPK (recommended dose) + 50% Farm Yard Manure and T₉ 25% NPK (recommended dose) + 75% Farm Yard Manure.

The observation recorded during the investigation was tabulated and statistically analyzed to draw a valid conclusion. The data were analyzed according to the standard procedure "Analysis of Variance" (ANOVA) as described by Gomez and Gomez (1976). The significance of treatment was tested by 'F' test (Variance ratio). Standard error of mean was computed in all cases. The results thus obtained were presented using suitable diagram wherever needed.

The difference in the treatment mean were tested by using critical difference in the treatment where 'F' test showed significant difference (CD) at 5% level of probability by the following formula:

$$S.E.m. \pm = \sqrt{\frac{EMS}{n}}$$

C.D. at 5% = S.E.m. ± × √2 × t value at 5% of error (a) degree of freedom

Result and Discussion

Data presented in the Table and depicted Fig. During both the years and in the pooled data of two years, number of fruit per plant was significantly influenced. Table revealed that in two years pooled data of various treatment combinations had significant effect on number of fruit per plant under *Casuarina equisetifolia* based Agri-silvi-Horti system. The maximum number of fruit per plant was observed in T₂ (170.85) followed by T₄ (138.61) while minimum yield per plant was recorded in T₁ (80.50) under *Casuarina equisetifolia* based Agri-silvi-Horti system. Similar results were reported by Singh *et al.* (2023) [10] reported highest number of fruits (194.30) in guava when applied with 100% RDF in guava.

Yield/plant (Kg) of Guava under under *Casuarina equisetifolia* based Agri-silvi-horti system

Data presented in the Table and depicted Fig. During both the years and in the pooled data of two years, yield per plant (Kg) was significantly influenced. Table revealed that in two years pooled data of various treatment combinations had significant effect on yield per plant (Kg) under *Casuarina equisetifolia* based agri-silvi-horti system. The maximum number yield per plant (Kg) was observed in T₂ (41.00 Kg) followed by T₄ (37.16 Kg) while minimum yield per plant was recorded in T₁ (26.05 Kg) under *Casuarina equisetifolia* based Agri-silvi-horti system. Similar results were reported by Sharma *et al.* (2018) recorded maximum fruit yield (21.74 kg/tree) in guava when applied with RDF 100% + vermicompost + biofertilizers (Azotobacter + PSB @ 100 g/tree) followed by the application of RDF 100% + FYM, RDF 100% + vermicompost, RDF 100% + FYM + Azotobacter + PSB, RDF 100% + Azotobacter + PSB whose fruit yield was 20.41, 20.62, 21.11, and 20.89 kg/tree respectively whereas minimum fruit yield was observed with control (13.38 kg/tree).

Table 1: Effect of fertilizer and organic manure on yield attributes of guava (*Psidium guajava* L.) under *Casuarina equisetifolia* based Agri-silvi-horti system

Treatments	Number of fruit per plant			Fruit Yield (kg)			Total Yield (tones)		
	2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
T ₁	180.00	187.00	183.5	26.00	28.10	27.05	4.31	4.66	4.490
T ₂	206.00	213.00	223.00	39.00	40.45	42.00	6.47	6.71	6.594
T ₃	192.00	195.00	193.50	31.95	33.12	32.53	5.30	5.49	5.400
T ₄	200.00	201.00	200.50	37.15	38.16	37.65	6.16	6.33	6.250
T ₅	198.00	199.00	198.50	34.17	35.10	34.63	5.67	5.82	5.749
T ₆	191.00	193.00	192.00	29.00	30.75	29.87	4.81	5.10	4.959
T ₇	194.00	196.00	195.00	34.70	35.85	35.27	5.76	5.95	5.855
T ₈	196.00	198.00	197.00	33.17	34.75	33.96	5.50	5.76	5.637
T ₉	194.00	197.00	195.50	32.16	33.20	32.68	5.33	5.51	5.424
Mean	196.00	199.22	197.61	33.25	34.67	33.96	5.48	5.70	5.595
SE(m) ±	0.873	0.901	0.648	0.276	0.278	0.174	0.075	0.074	0.044
C.D. at 5%	2.639	2.725	1.960	0.834	0.841	0.527	0.227	0.225	0.133
CV (%)	1.288	1.222	0.916	1.436	1.443	0.906	1.400	1.382	0.820

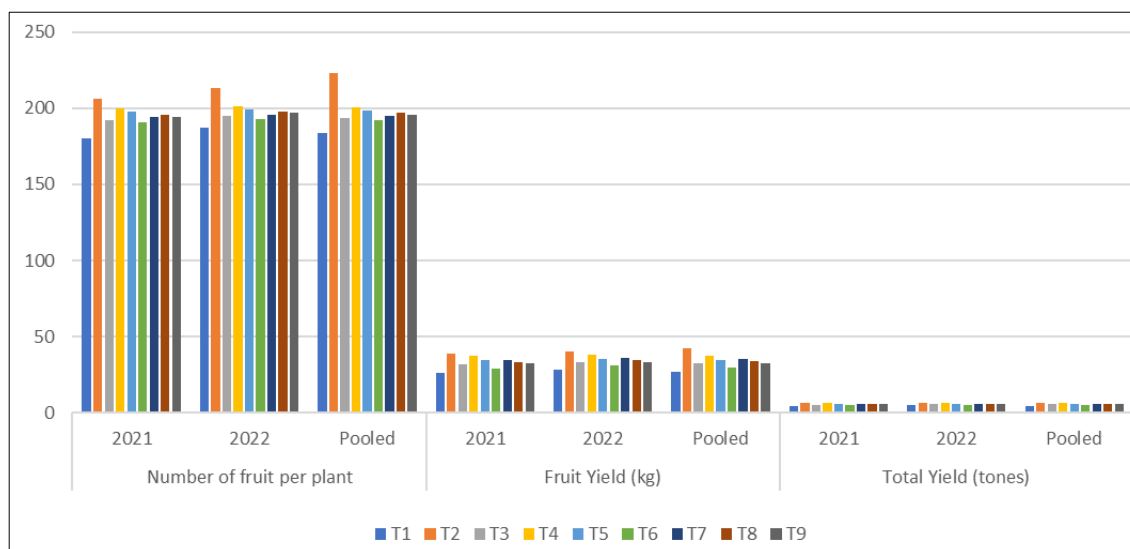


Fig 1: Effect of fertilizer and organic manure on yield attributes of guava (*Psidium guajava* L.) under *Casuarina equisetifolia* based agri-silvi-horti system

Total Yield (tonnes) of Guava under *Casuarina equisetifolia* based agri-silvi-horti system

Data presented in the Table and depicted Fig. During both the years and in the pooled data of two years, total Yield (tonnes) was significantly influenced. Table revealed that in two years pooled data of various treatment combinations had significant effect on total Yield (tonnes) under *Casuarina equisetifolia* based agri-silvi-horti system. The maximum total Yield (tonnes) was observed in T₂ (11.31 tonnes) followed by T₄ (10.32 tonnes) while minimum total Yield (tonnes) was recorded in T₁ (7.31 tonnes) under *Casuarina equisetifolia* based agri-silvi-horti system. Similar results were reported by Barne *et al.* (2013) ^[1] conducted a trial on the effect of different combinations of organic, inorganic manures and biofertilizers on yield and quality of guava during 2010-11 and reported that the highest fruit yield (26.54 kg/tree) was observed in five year old guava plants received with 10.15 tonnes RDF 100%+ 250 g Azotobacter + 250 g PSB/plant.

Conclusion

Based on the above finding, it is concluded that the application of NPK (120 kg N, 80 kg P₂O₅, 80 Kg K₂O ha⁻¹) produced significantly maximum number of fruit/plant (223), number yield/plant (42.00 Kg) and total Yield (6.594 tonnes/ha.) under *Casuarina equisetifolia* based agri-silvi-horti system in sodic soil.

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