

Pre-sowing Effects of Selected Botanicals and Organics on Plant Growth, Yield and Seed Yield of Sponge gourd (*Luffa aegyptiaca*) Seeds under Prayagraj Zone

SOUMYANETRA KHANRA*, BAZIL AVINASH SINGH, BINEETA MICHAEL BARA
AND VAIDURYA PRATAP SAHI

Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture,
Technology and Sciences, Prayagraj, Uttar Pradesh-211007, India

* soumyanetrakhanra@gmail.com

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ABSTRACT: The current research entitled "Pre-sowing effects of selected botanicals and organics on plant growth, yield and seed yield parameters of sponge gourd (*Luffa aegyptiaca*) seeds var. Alok under Prayagraj zone. A field experiment was carried out at the Field Department of Genetic and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) during *Zaid*, 2024. The experiment was laid out in Randomized Block Design (RBD), replicated thrice, consisting of 11 treatments. Seed treated with T10: Poultry manure (5%) + vermicompost (10%) recorded the higher rate of Field emergence, No. of Seeds/fruit (135.67), No. of Seeds/vine (1031.07), Seed Yield/vine (33.60 g), Seed Yield/plot (168.00 g) and Seed Yield/ ha (420.00 kg). This was followed by T9: Turmeric (1%) + vermicompost (10%) while least effective was T0: Control. Hence, the pre-sowing seed treatment with Poultry manure (5%) + vermicompost (10%) @ 8 hours could be recommended for the sponge gourd cultivation.

Keywords: Sponge gourd, Botanicals, Growth, Seed Yield

INTRODUCTION

Luffa (*Luffa cylindrica* (L.) Roem Syn. *L. aegyptiaca* Mill.), commonly called sponge gourd, loofah or dishcloth gourd, is a member of the Cucurbitaceae family. It is also known as smooth luffa, Chinese okra, climbing okra and dishcloth gourd. Some local names of sponge gourd in India are tuppadaheeraykayi (Kannada), chiknitureai (Hindi), bhol (Assamese), jhinga (Bengali), janhi (Oriya), gisoda (Gujarati), netibeerakaya (Telugu), peechinga (Malayalam) and pirkanga (Tamil) [1,2].

Most of the cucurbitaceous vegetables, including sponge gourd is usually grown in relatively small area for local consumption and hence exact area and production are unknown. Cucurbits share about 5.6 per cent of the total vegetable production of India [3]. In India, it occupies an area of about 7.21 lakh ha with production of 12.87 lakh tonnes. The productivity of this crop is 10.52 tonnes per hectare. China, Korea, India, Japan, Nepal and Central America are the top cucurbits producing countries. In India, top cucurbits growing states are Uttar Pradesh, Punjab, Bihar, Gujarat, Rajasthan, Jharkhand, Haryana and Karnataka. The fruit contains protein (0.5%),

carbohydrate (3%) and vitamin C (18 mg per 100 g) of edible portion [4]. [5] concluded that the importance of luffa increase in many fields such as medicine, environmental engineering, agriculture, biotechnology and also for food and industrial purposes (i.e., cleaning of utensils, absorber shocks, absorb sound, packing of materials, washroom sponge, use in factories as a filters, crafts making, chemical extractions and bio diesel) throughout the world.

Seed treatment involves subjecting seeds to various agents, such as physical, chemical and biological substances. This treatment not only aims to eliminate pests and disease from the seeds but also enhance their ability to control pests and diseases at the time of the germination, emergence and plant's early growth stages. Seed treatments have enhanced crop yields by protecting pests and diseases that occur before and after germination. They also ensure a consistent growth across various soil types, cultural practices and environmental conditions.

Seed priming with botanicals is a pre-sowing treatment that uses natural plant extracts or bioactive compounds

to enhance seed germination, vigor and plant growth offering benefits like improved emergence, increased yield, enhance disease resistance [6].

Priming seeds with organic manures has the potential to facilitate quick and consistent seed germination and promote plant growth [7]. Additionally, it has been observed that in some instances, this treatment can improve and stabilize the effectiveness of biological agents [8].

Our experimental approach involves subjecting germinating seed to treatments that promote robust root system development, enhance nutrient uptake and explore the possibility of substituting chemical fertilizer with Botanicals compounds and Organic manures. The aim is to maintain soil fertility and improve crop yield and quality.

MATERIALS AND METHODS

The present investigation has been performed at the Field Experimentation Center, Department of Genetics and Plant Breeding, SHUATS, Prayagraj during 2024 (Zaid). The details of the materials used and methods adopted for the conduct of the experiment are described hereunder.

Materials

Variety Alok developed by private seed sector was used in this study. The seeds for the research were procured from the local agriculture market in Prayagraj. It is suitable for cultivation in Uttar Pradesh, Madhya Pradesh, Haryana, Punjab, Chhattisgarh and Bihar.

Treatment details

The experiment was performed at the Field Experimentation Center, Department of Genetics and Plant Breeding, SHUATS, Prayagraj during 2024 (Zaid). The experiment was laid out in randomised block design (RBD) having 11 treatments (including control) and all the treatments were replicated thrice.

The treatments consist of different doses of neem cake, turmeric and poultry manure.

T1, Neem cake (3%); T2, Turmeric pest (1%); T3, Poultry manure (5%); T4, Vermicompost (10%); T5, Neem cake (3%) + turmeric pest (1%); T6, Neem cake (3%) + poultry manure (5%); T7, Neem cake (3%) + vermicompost (10%); T8, Turmeric pest (1%) + poultry manure (5%); T9, Turmeric pest (1%) + vermicompost (10%) and T10,

Poultry manure (5%) + vermicompost (10%) primed for the duration of 8 hours.] and control (un-primed).

Leaf, fruit and yield parameters were collected at harvesting time for all treatments in this experiment. All data were recorded on five plants that were chosen randomly. The recommended cultural practices were adopted to raise the crop.

Data were analyzed using WASP (ICAR- GOA) software, with the F – test determining significance at a 5% probability level and critical differences were calculated accordingly.

RESULT AND DISCUSSION

Pre – sowing seed treatment with poultry manure (5%) + vermicompost (10%) (T10) recorded significantly highest values for majority of the treatments (Table 1) It gave highest mean field emergence (92.86). The lowest mean field emergence of (70.48) was recorded by T0 (Control).

Pre – sowing seed treatment with Poultry manure (5%) + vermicompost (10%) (T10) recorded significantly highest mean vine length i.e., 51.09, 100.54 and 198.40 at 25, 50 and 75 DAS respectively . The lowest mean vine length of 45.53, 96.07 and 193.30 was recorded by T0 (Control). This is in conformation with earlier reports [9] using 80% RDF + 20% through vermicompost + PSB + azotobacter).

Highest numbers of primary branches per vine were observed in seed treated with Poultry manure (5%) + vermicompost (10%) (T10) i.e. 1.73, 2.67 and 4.87 at 25, 50 and 75 DAS respectively. Highest average leaf area (165.27) cm² was observed in T10: Poultry manure (8%) + vermicompost (10%). The lowest average leaf area 160.13 cm² was recorded by T0 (Control). The minimum amount of days to 50% flowering (25.33) was recorded with T10: Poultry manure (5%) + vermicompost (10%). (Table 2). And maximum days to 50% flowering (31.33) was recorded under T0: Control (31.33 DAS). Days to first fruit initiation clearly shows that significantly minimum days to first fruit initiation (29.00) was observed in T10 - Poultry manure (5%) + vermicompost (10%). While the maximum days to first fruit initiation was (35.67) recorded under T0 - Control. The minimum number of days to maturity (37.33) was recorded with T10: Poultry manure (5%) + vermicompost (10%). The maximum days to maturity (45.00) days recorded with T0 (control). Fruiting period data clearly shows that significantly minimum days to fruiting period were observed in T0 - Control (27.33 DAS), while the maximum days to fruiting

Table 1. Mean performance of pre- sowing seed treatment on growth and development parameters of sponge gourd

Treatment	FE (%)	VL (cm)			NPB			ALA	F 50%	FFI	DM	FP
		25 DAS	50 DAS	75 DAS	25 DAS	50 DAS	75 DAS					
T0	70.48	45.53	96.07	193.30	1.13	1.80	3.20	160.13	31.33	35.67	45.00	27.33
T1	71.90	47.59	97.07	193.36	1.40	2.20	3.53	161.73	28.00	32.33	41.00	28.33
T2	75.24	47.07	97.17	193.94	1.33	2.07	3.60	161.33	30.00	35.00	43.67	28.33
T3	83.33	49.20	97.47	194.72	1.47	2.07	3.53	162.67	30.33	34.67	43.33	28.00
T4	80.00	48.01	97.79	194.96	1.60	2.27	3.73	162.27	28.67	33.33	42.33	27.67
T5	84.76	49.47	99.27	194.72	1.47	2.00	3.73	162.87	29.00	34.00	43.67	28.00
T6	80.00	49.10	97.88	196.01	1.33	2.33	3.87	162.80	29.33	34.67	42.33	29.00
T7	88.10	47.91	98.33	196.05	1.60	2.33	4.27	162.27	28.67	33.00	40.33	29.00
T8	81.43	48.47	99.54	196.79	1.53	2.13	4.27	162.93	27.00	31.33	38.33	32.33
T9	89.52	49.75	100.13	197.50	1.67	2.33	4.67	163.87	26.67	30.00	38.33	35.00
T10	92.86	51.09	100.54	198.40	1.73	2.67	4.87	165.27	25.33	29.00	37.33	35.33
Mean	81.60	48.47	98.30	195.43	1.48	2.20	3.93	162.56	28.58	33.00	41.42	29.85
Minimum	70.48	45.53	96.07	193.30	1.13	1.80	3.20	160.13	25.33	29.00	37.33	27.33
Maximum	92.86	51.09	100.54	198.40	1.73	2.67	4.87	165.27	31.33	35.67	45.00	35.33
SEm(±)	0.02	0.57	0.46	0.54	0.08	0.11	0.15	0.61	1.05	1.04	0.88	0.64
CD (p=0.05)	0.06	1.68	1.36	1.58	0.22	0.34	0.46	1.81	3.09	3.06	2.61	1.90
CV	13.05	2.04	0.81	0.48	8.93	8.95	6.76	0.66	6.35	5.45	3.69	3.73

*FE (Field Emergence), VN (Vine Length), NB (Number of Primary Branches), ALA (Average Leaf Area), F 50 % (50 % Flowering), FFI (Days to first fruit initiation), DM (Days to Maturity), FP (Fruiting Period)

period was recorded under T10 - Poultry manure (5%) + vermicompost (10%) (35.33 DAS). These organic manure are also important for improving physical and chemical condition of the soil such as soil aeration, water holding capacity etc. and the use of inorganic fertilizers is essential for good growth and development of the plant [10]. Similar findings were reported by [11, 12, 13, 14 and 15]. Poultry manure is rich in essential nutrients such as nitrogen (N), phosphorus (P) and potassium (K) along with other micronutrients. When used in seed priming, it leads to better and faster germination rates as the seeds have more immediate access to the nutrients needed for early growth.

Number of fruits per vine clearly shows that the significantly highest number of fruits per vine was observed in T10 - Poultry manure (5%) + vermicompost (10%) (7.60) (Table 2), while the minimum number of fruits per vine (6.53) was recorded in T0: Control. Total yield per vine was found to be positively and significantly correlated with number of fruits per vine, average weight of fruit, number of seeds per fruit [16].

Highest fruit length was observed in T10 - Poultry manure (5%) + vermicompost (10%) (23.82) (Table 2). While the minimum fruit length (19.93) was recorded in T0: Control. According to [17] the maximum fruit length was recorded in plots having poultry manure and vermicompost.

Highest fruit diameter was observed in T10 - Poultry manure (5%) + vermicompost (10%) (15.31). (Table 2). While the minimum fruit diameter (12.58) was recorded in T0: Control. [18] reported that the highest results found are due to a bonus supply of nitrogen, phosphorus and potash, and the translocation of these nutrients to the fruiting nodes results in higher fruiting and fruit development.

Highest fruit yield was observed in T10 - Poultry manure (5%) + vermicompost (10%) (141.06) (Table 2). While the minimum fruit yield (112.99) was recorded in T0: Control. The balance use of organic fertilizer and inorganic fertilizer has recommended for nutrition and long term cropping. The results are in conformity with the results of [19] found that the combine use of poultry manure and urea increase the germination, flowering and other vegetative yield attributes of eggplant.

Fruit yield per vine clearly shows that the significantly highest fruit yield per vine was observed in T10 - Poultry manure (5%) + vermicompost (10%) (1.07kg). (Table 2) while the minimum Fruit yield per vine (737.84 g) was recorded in T0: Control. Fruit yield per plot clearly shows that the significantly highest fruit yield per plot was observed in T10 - Poultry manure (5%) + vermicompost (10%) (5.36) (Table 2). While the minimum fruit yield per plot (3.69) was recorded in T0: Control. It is necessary to

Table 2. Mean performance of pre- sowing seed treatment on yield and seed yield parameters of sponge gourd

Treatment	FV	FL (cm)	FD (cm)	FY (g)	FYV (g)	FYP (kg)	FYH (q)	SF	SV	SYV (g)	SYP (g)	SYH (kg)
T0	6.53	19.93	12.58	112.99	737.84	3.69	92.23	128.40	838.99	27.07	135.33	338.33
T1	6.80	21.10	13.63	125.81	855.50	4.28	106.94	129.07	877.65	28.20	141.00	352.50
T2	7.07	21.56	14.03	126.33	892.27	4.46	111.53	130.27	920.67	29.53	147.67	369.17
T3	6.87	22.10	13.61	126.78	870.58	4.35	108.82	131.20	901.00	28.67	143.33	358.33
T4	7.20	21.56	13.57	128.78	927.18	4.64	115.90	131.31	944.16	29.47	147.33	368.33
T5	7.07	22.04	14.11	127.73	902.03	4.51	112.75	132.73	938.48	29.93	149.67	374.17
T6	7.20	22.35	14.00	129.17	929.56	4.65	116.19	132.53	954.27	29.47	147.33	368.33
T7	7.13	21.73	13.78	126.61	902.88	4.51	112.86	132.40	944.67	28.87	144.33	360.83
T8	7.00	21.96	13.85	127.37	891.64	4.46	111.46	132.13	925.10	31.13	155.67	389.17
T9	7.40	22.88	14.82	137.17	1015.03	5.08	126.80	134.07	992.09	32.47	162.33	405.83
T10	7.60	23.82	15.31	141.06	1072.04	5.36	134.01	135.67	1031.07	33.60	168.00	420.00
Mean	7.08	21.91	13.93	128.26	908.78	4.54	113.06	131.78	933.46	29.85	149.27	373.18
Minimum	6.53	19.93	12.58	112.99	737.84	3.69	92.23	128.40	838.99	27.07	135.33	338.33
Maximum	7.60	23.82	15.31	141.06	1072.04	5.36	134.01	135.67	1031.07	33.60	168.00	420.00
SEm(±)	0.09	0.19	0.15	1.75	15.42	0.08	1.93	1.23	14.32	3.75	4.66	11.66
CD (p=0.05)	0.28	0.55	0.45	5.15	45.48	0.23	5.69	0.42	42.25	2.75	13.75	34.39
CV	2.30	1.48	1.89	2.36	2.94	2.94	2.94	0.55	2.66	5.41	5.41	5.41

*FV (Number of Fruits per vine), FL (Fruit Length), FD (Fruit Diameter), FY (Fruit Yield), FVW (Fruit Weight per Vine), FWP (Fruit Weight per Plot), FWH (Fruit weight per hectare), SF (Number of seeds per fruit), SV (Number of seeds per vine), YV (Seed Yield per Vine), YP (Seed Yield per plot), YH (Seed Yield per hectare)

make cautious use of organic and inorganic fertilizer for getting better crops and also sustaining soil fertility [20].

Number of seeds per fruit clearly shows that the significantly highest number of seeds per fruit was observed in T10 - Poultry manure (5%) + vermicompost (10%) (135.67) (Table 2), while the minimum number of seeds per fruit (128.40) was recorded in T0: Control. This experiment provided information about number of seeds per fruit will be increased when it will be treated with Poultry manure (5%) + vermicompost (10%) of sponge gourd seeds than other treatments. Similar findings were reported by [21].

Number of seeds per fruit per plot clearly shows that the significantly highest number of seeds per fruit per plot was observed in T10 - Poultry manure (5%) + vermicompost (10%) (1031.07) (Table 2), while the minimum number of seeds per plant (838.99) was recorded in T0: Control. This experiment provided information about number of seeds per vine will be increased when it will be treated with Poultry manure (5%) + vermicompost (10%) of sponge gourd seeds than other treatments.

Seed yield per vine clearly shows that the significantly highest seed yield per plant was observed in T10 - Poultry manure (5%) + vermicompost (10%) (33.60) (Table 2)

while the minimum seed yield per plant (27.07) was recorded in T0: Control. Seed yield per plot in T10 - Poultry manure (5%) + vermicompost (10%) was 168.00 while the minimum seed yield per plot (135.33) was recorded in T0: Control. The availability of all the nutrients to the plant, increase yield and yield parameters. Organic fertilizers are helpful in increasing yield, quality and production of crop when they are used in combination with inorganic fertilizers in a balanced proportion [22, 23].

CONCLUSION

From the current research, it could be concluded that when the seeds of sponge gourd were treated with Poultry manure (5%) + vermicompost (10%) it significantly enhanced the growth and yield parameters of the plant, making it a promising agricultural treatment. This research has implications for improving crop management and productivity, with the potential benefits to farmers and agricultural industry.

Findings are based on the research done in one season in Prayagraj (UP). Further trials may be required for considering it for the recommendations.

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