

Pre Sowing Seed Treatments of Panchagavya, Jeevamruth, and Leaf Extract of Neem on Growth, Yield and Yield Attributing Traits of Okra (*Abelmoschus esculentus* L.) Phule Utkarsha

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ABSTRACT

The study was undertaken during the *kharif* season of 2021–22 to evaluate the “Effect of pre-sowing seed treatments with selected organic fertilizers on the growth, yield and yield-attributing traits of okra (*Abelmoschus esculentus* L.) variety Phule Utkarsha.” The experiment was conducted at the Field Experimentation Center, Department of Genetics and Plant Breeding, Naini Agricultural Institute, SHUATS, Prayagraj, Uttar Pradesh. The soil of the site was sandy loam with moderate water-holding capacity, a pH between 7.0 and 8.0, and nutrient availability of

125 kg/ha nitrogen, 75 kg/ha phosphorus, and 62.5 kg/ha potassium. The trial was arranged in a Randomized Block Design (RBD) with thirteen treatments, including a control, each replicated three times. T₀-Control, (T₁, T₂, T₃ and T₄ Panchagavya - @1%, 3%, 5% and 7%), (T₅, T₆, T₇ and T₈ Jeevamruth 1%, 3%, 5% and 7%), (T₉, T₁₀, T₁₁ and T₁₂ Neem Leaf Extract @ 1%, 3%, 5% and 7%) respectively. The results indicated that seed treatment with Jeevamruth at 7% (T₁₃) performed superior to all other treatments. It recorded the highest field emergence (33.55%), plant height at 30, 60 and 90 DAS (35.76 cm, 96.40 cm and 124.73 cm, respectively), and earlier flowering (50% flowering at 53.33 days). The treatment also produced fewer days to maturity (110.67), maximum number of branches per plant (9.53), highest 1000-seed weight (69.67 g), greater number of capsules per plant (42.27), maximum seed yield per plot (0.97 kg), and the highest biological yield (389.67 g). However, the harvest index (41.75%) did not differ significantly from the other treatments.

Keywords Okra, Phule Utkarsha, Panchagavya, Jeevamruth, Neem leaf extract.

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INTRODUCTION

Okra (*Abelmoschus esculentus* L.), commonly known as bhindi or lady’s finger, is among the most widely consumed vegetables in India, with its origin traced

to Ethiopia and Sudan in North-East Africa, and has been highlighted for its ethnomedicinal, pharmacological, phytochemical, and pharmaceutical profiles (Chowdhury *et al.* 2019). In the Western Hemisphere, its edible fruit is widely grown or naturalized as a horticultural plant in the tropics and subtropics. It is hairy at the base and has 10 to 25 cm (4 to 10 inches) in height. Fruit is eaten only when tender and unripe.

A total of 6219 million tons of the crop has been produced in India on an area of 511 hectare with an average productivity of 12.0 tons per hectare (Anonymous 2019). The leading producer is Andhra Pradesh, followed by West Bengal. In Gujarat, okra is cultivated on about 36,740 hectares, producing nearly 480, 690 million tons, with an average productivity of 11.6 million tons per hectare (Anonymous 2019).

Due to hard seedness in okra, the percentage of seeds germination is relatively low, current research is done to overcome the low germination problem in okra using the pre-sowing seed treatment techniques were used by a number of various workers. The treatments given to the seeds before sowing, in which seeds are allowed to imbibe water to start pre-germinative metabolic processes but are insufficient for radical protrusion. The activity of many enzymes involved in the mobilization of food reserves is triggered (Adhikari & Shrestha 2020). A number of pre-sowing seed treatments have shown better seedling performance and crop establishment, and ultimately increased yield in several crops (Mohammadikenarmereki 2014).

The recent awareness on harmful and everlasting ill effects on human beings due to indiscriminate usage of chemical seed treatments, among seed producers and consumers has paved way for going back to human friendly, eco-friendly and traditional agriculture. The use of organics and botanicals as crop health tonics are attractive, due to the increasing need for eco-friendly and safe in seed production. Organic seed treatments viz., treatment with Panchagavya, Jeevamruth and botanicals provides resistant to high temperature and low moisture especially in semi-arid tropics. It promotes faster germination and stronger seedlings, which boost crop yield, particularly in developed nations. (Makhaye *et al.* 2021). It maintains

the hormonal imbalances right from the emergence of the seedling to the attainment of harvestable maturity in the primed seeds. It integrates the biological and physiological aspects of the growth, disease control and increase in yield (Mishra *et al.* 2020). Seed treatment with the neem leaf extract and its use in agriculture is increasing extensively because of beneficial effects on plants (Bhatshwar *et al.* 2020).

Hence, present study were undertaken to determine the effect of different pre-sowing seed treatments of Panchgavya, Jeevamruth and Neem leaf extract on growth, yield and yield attributing traits of okra.

MATERIALS AND METHODS

A field experiment was conducted to determine the effect of different pre-sowing seed treatments of Panchgavya, Jeevamruth and Neem leaf extract on growth, yield and yield attributing traits of okra (*Abelmoschus esculentus* L.). The experiment was conducted at Field Experimentation Center, Dept of GPB, SHUATS, Prayagraj (UP) during *kharif* season (2021). The experimental area situated at latitude 25.35°N and longitude 82.25°E at an altitude of 78 m above mean sea level, the soil is sandy loam in texture with moderate water holding capacity having pH of 7.0 to 8.0 which is suitable for cultivation of okra. A Randomized Block Design (RBD) was adopted with thirteen treatments, including a control, each replicated three times. The seeds of okra variety (Cv Phule Utkarsha) were used as a sowing material. The seeds were treated with Panchagavya, Jeevamruth and Neem leaf extract at 1%, 3%, 5% and 7% concentrations respectively for 8 hrs. The treated seeds were shade dried up to its original seed moisture content. The seeds of different treatments were sown separately on well prepared plot by maintaining all the field standards and agronomic practices. The desired observations were recorded during different crop growth stages viz., Field emergence rate (%) (4th, 7th, 10th), Plant height (cm) at (30, 60, 90 DAS), Days to 50% Flowering, Number of branches per plant, Days to Maturity, 1000 seed weight, Number of capsules per plant, Seed yield per plant (g), Seed yield per plot (g), Seed yield per hectare (q/ha), Biological yield (g) and Harvest index (%). The recorded data were analyzed statistically as applicable to RBD using the

technique designated by Panse and Sukhatme (1967).

Growth attributes

RESULTS AND DISCUSSION

The analysis of variance showed that all the observed parameters of okra were significant at the 5% probability level, as summarized in Table 1. The mean performance of different treatments on growth and yield attributes of okra is presented in Table 2.

Rate of field emergence among the treatments varied significantly with the treatment T₈-Jeevamruth @ 7% recorded the rate of field emergence of 33.55 amongst the treatments and was found to be maximum, while the T₀- Control recorded the minimum emergence of 27.86 respectively. Rate of field emergence of at par treatments T₄- Panchagavya 7% 32.40 were found to be as respectively. Plant height at 30 DAS

Table 1. Analysis of variance for different treatments on growth, yield and yield attributing traits of okra. *Indicates significant at 5% level.

Characters	Rate of field emergence	Plant height at 30 DAS (cm)	Plant height at 60 DAS (cm)	Plant height at 90 DAS (cm)	Days to 50% flowering	Days to maturity	Number of branches per plant
Replication (df=2)	1.34	0.52	2.79	38.30	0.53	0.54	0.05
Treatments (df=12)	10.23*	28.08*	44.16*	27.42*	2.64*	30.44*	1.78*
Error (df=24)	1.60	0.60	1.72	12.28	0.37	12.79	0.04

Table 1. Continued.

Characters	Number of capsule per plant	1000 seed weight (g)	Seed yield per plant (g)	Seed yield per plot (kg/ha)	Seed yield per hectare (q/ha)	Biological yield (g)	Harvest index (%)
Replication (df = 2)	1.06	1.56	0.79	0.00029	11.58	720.30	0.12
Treatments (df = 12)	8.1*	11.91*	42.59*	0.023*	89.98	2341.99*	9.67
Error (df = 24)	1.34	2.11	14.91	0.029	11.43	385.77	6.07

Table 2. Mean performance on effect of seed treatment on growth, yield and yield attributing traits of Okra. *Indicates significant at 5% level.

Treatments	Rate of field emergence	Plant height at 30 DAS (cm)	Plant height at 60 DAS (cm)	Plant height at 90 DAS (cm)	Days to 50% flowering	Days to maturity	Number of branches per plant
T ₀	27.86	25.20	82.20	113.33	56.67	120.00	6.87
T ₁	28.87	29.07	87.33	118.00	54.35	114.00	7.67
T ₂	31.39	30.48	86.00	118.80	54.67	112.00	7.27
T ₃	31.03	28.16	88.68	120.77	55.67	113.67	7.73
T ₄	32.40	35.11	93.00	121.82	54.33	111.00	8.60
T ₅	27.97	32.33	87.23	117.87	55.00	116.00	7.27
T ₆	28.24	31.76	86.24	120.57	55.33	112.33	7.27
T ₇	31.39	32.06	91.10	122.01	55.33	115.33	7.53
T ₈	33.55	35.76	96.40	124.73	53.33	110.67	9.53
T ₉	30.66	26.88	88.43	115.63	55.00	119.67	7.93
T ₁₀	31.39	27.95	85.48	118.77	55.00	118.00	8.27

Table 2. Continued.

Treatments	Rate of field emergence	Plant height at 30 DAS (cm)	Plant height at 60 DAS (cm)	Plant height at 90 DAS (cm)	Days to 50% flowering	Days to maturity	Number of branches per plant
T ₁₁	31.76	31.40	88.80	120.57	55.33	112.00	8.33
T ₁₂	28.87	30.52	83.30	122.33	55.67	112.33	9.00
Grand mean	30.41	30.52	88.02	119.63	55.07	114.38	7.94
F test	S	S	S	S	S	S	S
SEm	0.73	0.45	0.76	2.02	0.35	2.06	0.13
SEd	1.03	0.63	1.07	2.86	0.50	2.92	0.18
CV	4.16	2.54	1.48	2.92	1.11	3.12	2.75
T value	2.06	2.06	2.06	2.06	2.06	2.06	2.06
CD	2.13	1.31	2.21	5.90	1.03	6.03	0.37

Table 2. Continued.

Treatments	1000 seed weight	Number of capsule per plant	Seed yield per plot (kg)	Seed yield per hectare (q)	Biological yield (g)	Harvest index (%)
T ₀	63.33	32.40	0.68	41.82	293.33	38.51
T ₁	65.00	35.07	0.76	46.46	317.33	39.53
T ₂	66.33	34.13	0.75	46.13	320.67	38.94
T ₃	67.67	35.73	0.80	49.25	350.00	38.00
T ₄	68.67	40.80	0.92	57.04	352.33	43.72
T ₅	63.67	35.33	0.74	45.85	296.67	41.70
T ₆	67.00	38.67	0.85	52.79	348.00	40.94
T ₇	66.33	40.40	0.89	54.62	352.33	41.84
T ₈	69.67	42.27	0.97	59.89	389.67	41.75
T ₉	64.67	33.33	0.71	43.90	300.33	39.51
T ₁₀	64.33	38.67	0.82	50.72	347.33	39.42
T ₁₁	64.00	39.87	0.84	51.98	347.33	40.40
T ₁₂	67.00	40.80	0.90	55.70	347.67	43.27
Grand mean	65.97	37.50	0.82	50.47	335.62	40.58
F test	S	S	S	NS	S	NS
SEm	0.84	1.34	0.03	1.95	11.34	1.42
SEd	1.19	1.90	0.04	2.76	16.04	2.01
CV	2.21	6.19	6.61	6.70	5.85	6.08
T value	2.06	2.06	2.06	2.06	2.06	2.06
CD	2.45	3.91	0.09	5.70	33.10	4.15

was reported it shows that the plant height varied significantly among the treatments with the mean of 30.5 cm. Among the treatments, treatment T₈-Jeevamruth 7% recorded the maximum height of 35.76 while T₀- Control recorded lowest height of 79.00% respectively. The treatment T₄-Panchagavya 7% recorded the at par height of 35.11 cm. Treatment T₈-Jeevamruth 7% recorded the maximum height of 96.40 while the minimum height of 82.20 cm was

shown by the treatment T₀ - Control respectively. The performance of the treatments T₄- Panchagavya 7% and T₇- Jeevamruth @ 5% for were found at par with 93.00 and 91.10 height 60 DAS respectively. Plant height of 124.73 cm was recorded with the treatment T₈- Jeevamruth 7% and T₀ - Control shown 113.33 cm which was found to be minimum amongs the treatments respectively. The treatment T₄-Panchagavya 7% recorded the height of 121.82 cm and found to

be next with the treatment T_8 .

Treatment T_8 -Jeevamruth 7% recorded the least number of days for 50% flowering of 53.33 days and treatment T_0 control took maximum number of 56.67 days for 50% flowering respectively. The treatment T_4 -Panchagavya 7% took 54.33 days for 50% off lowering and found to be at par. Treatment T_8 -Jeevamruth 7% recorded the least number of days taken for maturity of 110.67 days and treatment T_0 control took maximum number of 120 days for maturity respectively. The treatment T_4 -Panchagavya 7% took 111 days for maturity and found to be at par with the treatment T_8 .

Yield attributes

Treatment T_8 -Jeevamrutha 7% found maximum 9.59 and T_0 -Control shown 6.86 cm which was found to be minimum amongst the treatments respectively. The treatment T_{12} -Neem leaf extract 7% recorded the number of branches 9.05 and found to be next with the treatment T_8 .

Treatment with treatment T_8 -Jeevamrutha 7% found maximum 69.67 and T_0 -Control shown 63.33 which was found to be minimum amongst the treatments respectively. The treatment T_4 -Panchagavya 7% recorded the 1000 seed weight 68.67 and found to be next with the treatment T_8 these results were in positive approach with the earlier research findings of Rai *et al.* (2022).

Seed treatment with treatment T_8 -Jeevamruth 7% found maximum 42.27 and T_0 -Control shown 32.40 which was found to be minimum amongst the treatments respectively. The treatment T_4 -Panchagavya 7% recorded the number of capsules per plant 40.80 and found to be next with the treatment T_8 . Treatment T_8 -Jeevamruth 7% found maximum 161.69 g and T_0 -Control shown 112.92 g which was found to be minimum amongst the treatments respectively. The treatment T_4 -Panchagavya 7% recorded the seed yield per plant 154.01 g and found to be next with the treatment T_8 . Treatment T_8 -Jeevamruth 7% found maximum of 1.53 g. Treatment T_8 -Jeevamruth 7% found maximum 0.97 kg and T_0 -Control shown

0.68 kg which was found to be minimum amongst the treatments respectively. The treatment T_4 -Panchagavya 7% recorded the seed yield per plot 0.92 kg and found to be next with the treatment T_8 .

Treatment T_8 -Jeevamruth 7% found maximum 59.89 q and T_0 -Control shown 41.82 q which was found to be minimum among the treatments respectively. The treatment T_4 -Panchagavya 7% recorded the seed yield per hectare 57.04 q and found to be next with the treatment T_8 . Treatment T_8 -Jeevamrutha 7% found maximum 389.67 g and T_0 -Control shown 293.33 g which was found to be minimum amongst the treatments respectively. The treatment T_4 -Panchagavya 7% recorded the seed yield per hectare 352.33 g and found to be next with the treatment T_8 . Treatment T_8 -Jeevamruth 7% found maximum 43.72 and T_0 -Control shown 38.00 which was found to be minimum amongs the treatments respectively. The treatment T_4 -Panchagavya @ 7% recorded the harvest index and found to be next with the treatment T_8 .

CONCLUSION

The present investigation was carried out to evaluate the “Pre sowing seed treatments of panchagavya, jeevamruth, and leaf extract of neem on growth, yield and yield attributing traits of okra (*Abelmoschus esculentus*) (Phule Utkarsha L.)”. From the findings of this study, it is evident that most of the treatments differed significantly from the control in terms of growth and yield attributes, except for the harvest index. Among the tested treatments, T_8 (Jeevamruth @ 7% for 8 hrs) consistently produced the best results, recording superior growth and yield performance. Similarly, T_4 (Panchagavya @ 7% for 8 hrs) also showed encouraging outcomes and can be considered a potential seed treatment option for okra. In contrast, the untreated control (T_0) exhibited the lowest vigor and yield, while treatments such as T_1 (Panchagavya 1% for 8 hrs) and T_9 (Neem leaf extract for 8 hrs) showed responses comparable to the control. Since these conclusions are based on observations from a six-month study, further long-term investigations are necessary before making definitive recommendations.

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