Original Research Article

Pre-sowing seed treatment with Botanicals and Organics on plant growth, yield and yield attributing traits of okra(*Abelmoschus esculentus* L.) cv.VROH-12 kashi shristi

ABSTRACT

The current global scenario firmly emphasizes the need to enhance eco-friendly agriculture practices for sustainable agriculture. Chemical agriculture has made an adverse impact of the health care of not only soil but also the beneficial soil microbial communities and the plants cultivated in these soil. This eventually has led to a high demand of botanical and organic produce by the present day health conscious society and periodic attempts are being made by farmers all over the world to depollute. Botanical and organics play vital role in increasing soil fertility and increase yield. The present study was conducted at crop research field during Kharif 2021-2022, in the Department of Genetics and Plant Breeding. To standardize the suitable pre-sowing seed treatment of okra with different concentration, distinct duration of pre-sowing seed treatments with control (without treated) were evaluated by the present study entitled "Pre sowing seed treatment with botanicals and organic on plant growth, yield and yield attributing traits of okra (*Abelmoschus esculantus* L.). cv. VROH-12 kashi shristi" the experiment was laid out in Randomized Block Design with 13treatments including control were used to study under field conditions. the results indicates that field emergence percentage, plant height at (30, 60 and at harvest), days to 50 % flowering, days to maturity, number of branches per plant, number of capsules per plant, number of seeds per capsule, length of capsule, seed yield per plant (g), seed yield per plot (g), biological yield (g), harvest index were significantly recorded highest in vermiwash @5% (12hours) followed by vermiwash (3%), beejamrutham(3%), panchagavya(3%) and neem leaf extract(5%) is used for improving growth, yield and yield attributing traits of okra .

Key words: Okra, Vermiwash, Beejamrutham, Panchagavya, Neem leaf extract, kashi shristi.

INTRODUCTION

Okra (*Abelmoschus esculentus L.*) commonly known as lady's finger or bhendi. Okra belongs to the family malvaceae. The genus Abelmoschus is Asiatic origin. Oka is often crosspollinated crop and having chromosome number 2n=130. The panchgavya, Jeevamruth and bijamruth are cheaper ecofriendly organic preparations made from cow products namely dung, urine, milk, curd and ghee. The panchgavya is an efficient plant growth stimulant that enhances the biological efficiency of crops. It is used to activate soil and to protect the plants from diseases and also increase the nutritional quality of fruits and vegetables. It is used as a foliar spray, as soil application alongwith irrigation water, seed or seedling treatment *etc.* Jeevamruth promotes immense biological activity in soil and makes the nutrients available to crop. bijamruth protect the crop from soil borne and seed borne pathogens and it improves seed germination **(Gore and Shreenivasa *etal*., 2011).**

Pre-sowing treatments of Okra seeds for ensuring their earlier, successful germination. This will help people to minimize their production cost of seedlings on a broad scale. A considerable body of evidences suggests that pre-sowing treatments strongly enhance the germination process. Seed pre-sowing treatment will modify the physiological and biochemical nature of seeds, so as to get the characters that are favorable for drought tolerant

through. Apart from using conventional farm-based products, there is an increasing demand for organic liquid formulations like panchagavya which help in quick buildup of soil fertilitythrough enhanced activity of soil microflora and fauna. Role of foliar application of panchagavya in production of many plantation crops had been well documented in India. Panchagavya, an organic product is the potential source to play the role for promoting growthand providing immunity to plant system. Panchagavya is a bio promoter with a combination of five products obtained from the cow viz; dung, urine, milk, curd, and ghee. Panchagavya acts as growth promoter (75%) and immunity booster (25%) and exactly fills the missing link to sustain the organic farming without any yield loss. Biochemical properties of panchagavya revealed that it contains almost all the major nutrientslike N,P,K and micronutrients necessary for plant and growth hormones like Indole acetic acid(IAA) and Gibberellic acid (GA) as required for crop growth as well as the predominance of fermentative microorganisms like yeast, azotobactor, phospobacteria and lactobacillus.

Neem (*Azadirachta indica, A. Juss*) is popularly known as village pharmacy as all parts of thisplant are used for curing several types of diseases. Extracts of leaves and seeds exhibit the property of antibacterial, antifungal, antiviral and anti malaria. Leaf extracts are also known to inhibit the growth of plant pathogens. Essential oil obtained from neem leaf has fungi toxicity.The Botanical treating agent and use for seed treatment. The chemical substance or active principle present in this neem leaf extract induce the protection against insect and pathogens hence the good viability and vigour of crop will be obtained.

Materials and Methods

VROH-12 kashi shristi okra seeds (*Abelmoschus esculentus L.*) variety was collected from the department of genetics and plant breeding, Sam Higginbottom University of Agriculture Science and Technology, prayagraj were used to study under field conditions during Kharif, 2021-22. The climatic conditions recorded from the university meteorological station. The mean values of temperature, relative humidity, rainfall and wind speed were 33.85^{o}C, 83%, 20.22mm, 14km/h respectively. Botanical and organic treatments were prepared as follows.

Panchagavya was prepared from cow products viz. Cow milk (5 L), ghee (1 L), curd (2 kg), cow urine (5 L) and cow dung (5 kg); these ingredients were mixed together along with 15 kg of jaggery in a circular container. The mixture was added with 10 L of water and kept as such for 30 days. Fermentation took place by making the mixture to a fine concentrate giving out the sweet odour The fermented liquid was filtered through cotton and the final volume of filtrate was made 1000 ml. The solution was stored in refrigerator. 2, 3, 5% solution was used for treatments.

Jeevamrutham was prepared by taking 250 g freshcow dung, 250 ml cow urine(old), 50 g black jaggery , 50 g pulse flour and 2.5 g live soil mixed with 5 l of water. Solution was kept for 2-7 days in shade for fermentation. Duringfermentation, the solution was stirred daily. The lid of the container should be kept loose. Afterwhich it was used for seed treatments.

Beejamrutham (Protocol given by Palekar, 2006) was prepared by using local cow dung(5kg) was taken in a cloth and bound by tape and was submerged in 20liters of water in separate container and kept stable for overnight. After 12 hours, this bundle of cow dung was squeezed thrice, 1kg of soil was dissolved in cow dung extract by stirring it well. To this 5liters of desi cow urine and lime water was added and mixed well. The seeds were immersed in beejamrutham solutions of different concentrations (2%, 5% and 10%) for 12 hours then dried

in shed and later used for study.

Neem leaf extract was prepared by collecting fresh leaves of neem plant, washed, dried under shade. The shade dried leaves were powdered using pestle and mortar. Then 30grams of leaf powder was taken using weighing balance and dissolved in 100ml of distilled water which was measured already in the beaker to make 3% leaf extract. The leaf extract was filtered by using muslin cloth to get rid of unwanted material and leaf debris. Seeds were soaked in the leaf extract at room temperature for 4hrs. the seeds were dried under shade and used for germination.

Vermiwash may be collected from the vermicompost units as a by product liquid extract. The coelomic fluid of earthworm is called as vermiwash.

Seed soaking in the solution

After preparation of solution of panchagavya, jeevamrutham, beejamrutham, neem leaf extract, vermiwash okra seeds will be soaked in required solution for 12 hours. Untreated seed is called as control. After soaking seeds for 12 hours the solution will be drained out from the beaker and presoaked will be air dried to original weight and then seed will be sown in field for occurring field observation.

Statistical Analysis

The analysis of data was worked out to test the signification tests. It was done according to the procedure of RBD for each character as per methodology suggested by Fisher(1936). The total variance and degree of freedom was partitioned into three components viz. Replication, treatment and error.

Results and Discussion

According to the findings, all the characteristics analyzed were influenced by the treatment and the different between control and the treated seeds in table:1 was entirely relevant.

Analysis of variance

The variance analysis described in Table: 1 for growth, seed yield, and yield attributing traits in okra. The analysis of variance showed that the variations between 13 treatments were importance for characters that attribute growth and yield, viz., field emergence percent, plant height (30, 60 and at harvest), days to 50% flowering, number of branches per plant, number of capsules per plant, number of seeds per plant, seed yield per plant, length of capsule, seed yield per plant, seed index, biological yield, and harvest index.

Mean performance

Mean value is defined by the ratio of the sum of the observations to the total number of observations. It avoids the variation of overall data and depends only on extreme values. The data presented in the table shows the mean performance of 13 treatments for yield and yield attributing traits of okra are as follows. Pre sowing seed treatments with maximum percentage of field emergence (91.6) was highest in T_{12}-vermiwash @ 5% followed by T1 –Panchagavya @ 1% (88.86) and found to be lowest in T_0-control(69.4) the influence of pre-sowing seed treatment on the field emergence was found to be an important and comparable finding observed by Gopakkali *et al.,* (2014) and Suchitra *et al.,* (2017).

Maximum days taken to 50% flowering with (41 days) was highest in T_{12}-vermiwash @5% followed by (47 days) by 8– Jeevamrutham @ 5% and found to be the lowest in T_0-control.the impact of pre-sowing seed treatment on days with a flowering rate of 50% was found to be important and similar observed by Forough *et al.,* (2013) and Zodape *et al.,* (2010).

Maximum plant height at (30, 60, and at harvest) was recorded highest by T_{12}-vermiwash @5% with values of (21.21cm, 85.45cm, 136.4cm) and found to be the lowest in T_0-control (18.92cm, 74.66cm, 121.43cm).

The impact of treatment with pre-sowing seeds on days to maturity was found to be significant and similar results was observed by Forough *et al.,* (2013); Zodape *et al.,* (2010); Girish *et al.,* (2011).

Number of capsules per plant (24.7) was highest in T_{12}-vermiwash@5% for 12hours and found to be the lowest in T_0-control(15.4) Similar results in the Number of capsules per plant were observed by Chauhan et al., (2009); Khan (2003).

Maximum length of pods per capsule (20.14cm) was recorded by T12 – Vermiwash @ 5% and it was followed by T8– Jeevamrutham @ 5% (17.06cm) the minimum length of capsules was recorded by T0 – Control (15.73cm). Similar results in the length of capsules were observed by GBN Jyothi et al.,(2019); Sara. F. et al., (2013); Mamatha et al., (2019).

Number of seeds per capsule (41.2) was recorded by T12 – Vermiwash @ 5% and it was followed by T10– Neem leaf extract @ 5% (40.73).Lowest seeds per capsule was observed by (35.53) and Highest seed yield per plant (20.01g) was recorded by T12 – Vermiwash @ 5% and it was followed by T10– Neem leaf extract @ 5% (19.18g), T11– Vermiwash @ 3% (17.72g). The lowest seed yield per plant was recorded by T0 – Control (12.94g). highest seed yield per plot (356.76g) was recorded by T12 – Vermiwash @ 5% and it was followed by T2– Panchagavya @ 3% (354.10g), T5– Beejamrutham @ 3% (335.13g). The lowest seed yield per plot was recorded by T0 – Control (233.15g). Similar results in the seed yield per plot were observed by Abou El-Yazied et al., (2011); Cakmak et al., (2010) Suchitra et al., (2017).Seed index (7.41) was observed highest in T_{12}-vermiwash@5% and found to be the lowest in T_0-control(514.3g)

Table. 1 Analysis of variance for growth and yield attributing characters in okra:

S. NO	CHARACTERS	MEAN SUM OF SQUARES

		REPLICATIONS (df=2)	TREATMENTS (df=12)	ERROR (df=24)
1	Field Emergence %	7.16	0.09*	0.02
2	Plant Height@ 30 DAS	0.58	1.50*	0.47
3	Plant Height@ 60 DAS	10.13	19.05*	5.76
4	Plant Height at harvest	14.05	82.57*	26.49
5	Number of Branches per plant	0.85	2.84*	0.88
6	Number of capsules per plant	0.48	26.50*	1.75
7	Days to 50% flowering	1.00	23.56*	2.33
8	Number of seeds per plant	15.46	12.39*	3.81
9	Seed yield per plant	2.59	20.77*	6.82
10	Length of capsule	2.44	3.89*	1.20
11	Seed yield per plot	6339.56	9191.14*	1125.32
12	Seed index	0.19	2.59*	0.28
13	Biological yield	2639.53	10868.78*	1565.60
14	Harvest index	0.83	101.13*	10.32

Treatments	Field emergence%	Plant height at 30 DAS (cm)	Plant height at 60DAS (cm)	Plant height at harvest (cm)	No.of branches per plant	\No. of capsules per plant	Days to 50% Flowering (days)
T0 – Control	69.4	18.92	74.66	121.43	4.6	15.4	50.66
T1 – Panchagavya 1%	88.86	19.13	77.00	122.59	6	18.93	46.33
T2 –Panchagavya 3%	86.88	19.24	77.39	126.80	5.8	16.66	43.33
T3 – Panchagavya 5%	86.11	19.78	78.16	125.32	5.9	17	44.0
T4 – Beejamrutham 1%	85.33	19.59	79.22	128.82	6.6	21.93	42.33
T5 – Beejamrutham 3%	75	19.66	78.28	122.46	6.73	17.66	46.66
T6 – Jeevamrutham 1%	77.77	19.19	76.52	124.60	5.26	16.8	46.33
T7 – Jeevamrutham 3%	83.33	20.31	79.33	123.14	5.4	21.26	42.33
T8 – Jeevamrutham 5%	85.66	19.02	78.80	123.53	6.2	16.4	47.66
T9- Neem leaf extract 3%	80.55	19.34	77.14	122.52	5.4	20.66	45.33
T10– Neem leaf extract 5%	86.11	20.27	76.68	132.11	6.6	23.2	46.66
T11 – Vermiwash 3%	72.22	20.71	78.55	136.40	7.87	17.2	42.66
T12 – Vermiwash 5%	91.6	21.21	85.45	136.44	8.00	24.7	41.33
Mean	82.73	19.72	78.24	126.64	6.16	19.07	45.08
C.V.	4.19	3.49	3.07	4.06	15.24	6.95	3.39
S.E.M	0.08	0.40	1.39	2.97	0.54	0.76	0.88
C.D. 5%	0.25	1.16	4.04	8.67	1.58	2.23	2.57
C.D. 1%	0.33	1.57	5.48	11.75	2.15	3.02	3.49
Range Minimum	950	18.92	74.66	121.43	4.6	15.4	41.33
Range Maximum	1142	21.21	85.45	136.44	8.00	24.7	50.66

Table. 2.1 Mean performance of different treatments for pre-harvest characters in okra

TREATMENTS	No.of seeds per capsule	Seed yield per plant (g)	Seed yield per plot (g)	Seed Index (%)	Biological yield	Harvest Index
T0 – Control	34.53	12.94	233.15	4.37	514.35	55.04
T1 – Panchagavya 1%	40.13	13.26	277.87	6.09	417.85	65.73
T2 – Panchagavya 3%	37	16.19	354.10	5.56	524.10	67.55
T3 – Panchagavya 5%	39.53	15.51	240.19	5.63	419.52	59.75
T4 – Beejamrutham 1%	36.6	15.68	239.52	5.07	400.19	56.89
T5 – Beejamrutham 3%	38.4	14.92	335.13	4.82	538.46	68.42
T6 – Jeevamrutham 1%	37	14.40	281.01	6.36	485.21	66.68
T7 –Jeevamrutham 3%	36.93	15.99	279.93	6.45	449.93	62.21
T8 – Jeevamrutham 5%	37.93	14.45	241.91	7.19	371.91	59.58
T9 - Neem leaf extract 3%	40.4	15.63	241.29	6.28	391.29	61.61
T10 – Neem leaf extract 5%	40.73	19.18	325.21	6.85	393.15	64.23
T11 – Vermiwash 3%	36.53	17.72	262.30	6.79	476.76	74.81
T12 – Vermiwash 5%	41.2	20.01	356.76	7.41	362.30	72.27
Mean	38.21	15.87	282.18	6.07	441.93	68.35
C.V.	5.11	12.67	14.47	8.68	8.95	5.00
S.E.	1.13	1.16	23.58	0.30	22.84	1.85
C.D. 5%	3.29	3.39	68.82	0.89	66.68	5.41
C.D. 1%	4.46	4.59	93.26	1.20	90.36	7.34
Range Minimum	34.53	12.94	233.15	4.37	362.30	55.04
Range Maximum	41.2	20.01	356.76	7.41	538.46	74.81

Table 2.2 Mean performance of different treatments for post-harvest characters in okra

CONCLUSION:

In present days use of chemical fertilizers and pesticides are being used by the farmers to get better yield of various field crops by these heavy doses of chemicals decrease the soil fertility, and cause serious health problems to the consumers in order to overcome the present situation new approaches are made by the scientists to reduce the cost of cultivation and thereby increase the fertility of soil to improve the yield of the agricultural crops by using botanical and organic seed treatments which are easily prepared from the locally available ingredients. It is concluded from the present study that the seeds of okra (kashi-shristi) treated with vermiwash @ 5% for duration of 12hours significantly enhanced the yield and yield attributing traits followed by Vermiwash @ 3% for 12 hours as compared to Control (nontreated) seeds. These recommendations are based on six months of experimentation and therefore further study is needed to arrive at valid recommendations.

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