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Response of vermiwash, vermicompost and NPK on growth and yield of okra (*Abelmoschus esculentus* L.) cv. VRO 6

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Abstract
The present investigation entitled "Response of Vermiwash, Vermicompost and NPK on growth and yield of okra [*Abelmoschus esculentus* (L.) Monech]" was conducted with 13 treatment combinations of NPK, Vermicompost and Foliar spraying of Vermiwash in Randomized Complete Block Design with three replications. Seeds of Okra, cv. VRO.-6 were sown on plot size of 3.6m X 3.0 m. The row to row and plant to plant spacing was maintained at 60 cm and 30 cm, respectively hence each plot accommodated 60 plants. The observations were recorded treatment wise by selecting 5 random plants. The growth, yield and economics of the treatment were worked out. The treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) recorded maximum plant height (16.10cm., 115.40cm. and 163.19 cm.) at 30, 60 and 90 DAS, nodes per plant (19.66), internodal length (6.04cm.), leaves per plant (23.66) at 90 DAS and branches of 2.46 and 4.13 per plant at 60 and 90 DAS respectively. The earliest flowering in 35.58 days was recorded under treatment T10 (Vermicompost @ 5t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS) and late flowering was recorded with treatment T13 (Rec. NPK 150:80:100). The treatment T10 (Vermicompost @ 5t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS) recorded the maximum 4.93 nodes to first flowering. Days taken to 50 % flowering (43.50days) and first picking (45.23 days) was observed in T10 (Vermicompost @ 5t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS) showed earliness. Number of flowers (19.66) and fruits per plant (18.66) was recorded in treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS). The maximum fruit length (17.96cm), fruit girth (17.03mm) and fruit weight (18.16g) was recorded with the application of Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS. The maximum net return of Rs 38484/ha was found in treatment T11 (Rec. NPK + Vermiwash (soil treatment) +3 foliar spray at 1 week interval after 30 DAS) and cost benefit ratio is 2.01.

Keywords: Okra, vermiwash, vermicompost, NPK

Introduction
Indian agriculture has been traditionally dependent on organic manurial sources, but the share of these sources in total nutrients supply has been drastically curtailed with the introduction of intensive agriculture, which demands heavy nutrient availability. However, energy crisis resulted into high price index of chemical fertilizers coupled with their limited availability. Fertilizer cost, soil health, sustainability and pollution have led to a renewed interest in the use of organic manures. Organics play a vital role in maintenance of physical and biological condition of soil and supply macro and micro nutrients to crops besides maintenance of humic substances in soil [1]. Neither organic manures nor chemical fertilizer alone can achieve the yield sustainability separately under intensive farming. Their integrated use may help in improving soil health, productivity and quality of vegetable crop like okra. No doubt modern agriculture is based on the use of organic manures, which play a major role for producing good quality with higher production of okra from per unit area. There is a need to seek alternate sources of nutrient which could be a cheaper and eco-friendly so that farmers may be able to reduce the investment made on fertilizer along with maintaining good soil environmental conditions leading to ecological sustainable farming. Organic manure like vermicompost, compost, FYM and poultry manure etc. are very popular among the farmers and can easily be produced. Okra or Ladies finger, which is also known as 'Bhindi', is one of the important vegetable crops in India [1]. It is grown throughout the tropical and sub-tropical regions and also in the warmer parts of the temperate regions.

The nutritional value of 100g of edible okra is characterized 1.9g protein, 0.2g fat, 6.4g carbohydrate, 0.7g minerals and 1.2g fibers. Okra has a good potential as a foreign exchanger crop and accounts for 60% of the export of fresh vegetables. The major okra producing states are U.P., Bihar, Orissa, West Bengal and Andhra Pradesh. Nutrition plays a very important role in growth and productivity of okra. Nowadays, use of inorganic and organic nutrient sources is playing significant role in horticulture. It plays a major role for producing good quality and high yield per unit area. Vermiwash is an indispensable part of vermicompost, which is a watery extract of earthworms. It is basically a combination of secretion and wash of earthworms, present in the medium, honey brown in colour. It is a nutrient rich liquid produced by earthworms, feeding on organic waste material and plants residues. It is also nontoxic and eco-friendly, which arrests bacterial growth and forms as a protective layer for their survival and growth. Vermiwash contains NPK, Ca and hormones such as Auxins, Cytokinins, some other secretions and many useful microbes like heterotrophic bacteria, fungi etc. The quality of Vermiwash produced by earthworms depends on the vermicompost that is used. Vermiwash is a mixed culture containing soil bacteria mixed and an effective strain of earthworms. Earthworm has efficiency to consume all type of organic rich waste material including vegetable waste, industrial waste and other organic waste [2]. Vermicomposting refers to the production of plant nutrient excreta of worms. The present study in okra entitled "Response of Vermiwash, vermicompost and NPK on the growth and yield of okra [*Abelmoschus esculentus* (L.) Moench]" has been carried out with the objectives to quantify the economics of different treatments and to find out the optimum nutrient treatment combination for better growth and yield of okra.

Material and Methods

The experiment was carried out during Kharif season and the experimental detail of treatments comprised of 13 treatments are presented in Table 1 (A)

Table 1(A): Detail of treatments and check used in the study

S. No.	Treatment symbol	Detail of treatments
1.	T1	Rec. NPK+ Vermiwash 1 spray at 1 week interval after 30 DAS
2.	T2	Rec. NPK+ Vermiwash 2 spray at 1 week interval after 30 DAS
3.	T3	Rec. NPK+ Vermiwash 3 sprays at 1 week interval after 30 DAS.
4.	T4	Rec. NPK+ Vermiwash 4 sprays at 1 week interval after 30 DAS.
5.	T5	Rec. NPK+ Vermiwash 5 sprays at 1 week interval after 30 DAS.
6.	T6.	Vermicompost@5t/ha + Vermiwash 1 spray at1 week interval after 30 DAS
7.	T7.	Vermicompost@5t/ha + Vermiwash 2 spray at1 week interval after 30 DAS
8.	T8	Vermicompost@5t/ha + Vermiwash 3 sprays at 1 week interval after 30 DAS.
9.	T9	Vermicompost@5t/ha + Vermiwash 4 spray at 1 week interval after 30 DAS.
10.	T10	Vermicompost@5t/ha + Vermiwash 5 sprays at 1 week interval after 30 DAS.
11..	T11.	Rec. NPK+ Vermiwash (Soil treatment) + 3 foliar sprays at 1 week interval after 30 DAS
12.	T12.	Vermicompost @5t/ha + Vermiwash (Soil treatment) + Vermiwash 3 foliar sprays
13	T13.	Recommended NPK (150:80:100)

Statistical Methodology

The data obtained in respect of all the characters has been subjected to the following statistical analyses:

Mean: Arithmetic mean or simple mean of a set of observation is their sum divided by the number of observation, *e.g*, the arithmetic mean x of n observation x_1, x_2, x_3…….,x_n is given by $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$. In case of grouped data, $\bar{x} = \frac{1}{\sum_{i=1}^{n} f_i}\sum_{i=1}^{n} f_i x_i$ where x_i's are the mid values of the classes and f_i's are the respective frequencies. Among the three means viz. arithmetic mean (AM), geometric mean (GM) and harmonic mean (HM), AM is most widely used for its simplicity in calculation and explanation.

Analysis of Variance

The data based on the mean of individual plants selected for observation were statistically analysed to find out overall total variability present in the material under study for each character and for all the populations. The first and foremost step is to carry out analysis of variance to test significance of difference among the populations. The skeleton of analysis of variance used was as follows:

Table 1(B): ANOVA for Randomized Complete Block Design

Source of variation	d. f.	Sum of square	Mean sum of square	F value
Replication	r-1	RSS	RMS	RMS/EMS
Genotypes	g-1	GSS	GMS	GMS/EMS
Error	(r-1)(g-1)	ESS	EMS	-
Total	rg-1	TSS	-	-

Where,
r = Number of replications
g = Number of genotypes
d.f. = Degrees of freedom
RSS = Replication Sum of Square
GSS= Genotype Sum of Square
ESS = Error Sum of Square
TSS = Total Sum of Square
RMS = Replication Mean Sum of Square
GMS = Genotype Mean Sum of Square
EMS = Error Mean Sum of Square

A significant value of F test indicates that the test differ significantly among themselves which requires computing C.D.

$$C.V. = \frac{\sqrt{EMS}}{GM} X100$$

$$SEm\pm = \sqrt{\frac{E\,M\,S}{r}}$$

$$S\,E_{diff} = \sqrt{\frac{2EMS}{r}}$$

CD at 5% prob. level = SE diff x $t_{5\%}$ (table value)
where,
c.v. = Coefficient of variation
SEm± = Standard error of means
S E diff = Standard error of difference
GM = Grand mean
C.D. = Critical difference
t 5% = Table value at 5% probability level.

Results and Discussion

In present experiment the plant height was recorded at 30, 60 and 90 DAS. The average plant height at successive stages of growth is depicted in the Table 2. The data clearly indicated that the plant height of okra responded significantly to different treatments of Vermiwash, vermicompost and NPK at all the growth stages under present studies. The treatment combination of T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) was recorded maximum plant height 16.10 cm, 115.40 cm and 163.19 cm at 30, 60 and 90 DAS, respectively, followed by T4 Rec. NPK + Vermiwash 4 spraying at 1week interval after 30 DAS] 15.86 cm, 106.58cm and 145.21cm at 30, 60 and 90 DAS, respectively and which were at par. As regards the application of vermicompost applied @5 t/ha along with 5 spray of Vermiwash showed significant among the level of vermicompost and plant height of 143.90 cm. was recorded at 90DAS [4, 5]. Soil application of vermicompost had not showed significant effect on plant height as compaired to same level of fertilizer and vermicompost along with 3 spray of Vermiwash. While, the lowest plant height of 12.20cm, 69.14cm and 110.23cm was recorded in treatment T6 (vermicompost @ 5 t/ha + Vermiwash 1 sprays at 1week interval after 30 DAS) at 30, 60 and 90 days after sowing, respectively [3]. The nodes per plant were recorded at 90 DAS and are presented in Table 2 At successive stages of growth i.e. 90 DAS, nodes per plant significantly increased by the various treatment combinations of vermicompost and recommended doses of NPK along with spraying of Vermiwash. The maximum number of nodes per plant (19.66) was recorded under treatment combination of T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) as compared to other treatments under study. While, the lowest number of nodes per plant (15.33) was noted under treatment T6 (vermicompost @ 5 t/ha + Vermiwash 1 sprays at 1week interval after 30 DAS) at 90 DAS. Whereas three spray of Vermiwash with same level of vermicompost showed superiority but it was statistically at par. Soil application of Vermiwash had not showed any significant effect on number of nodes per plant at 90DAS. The data clearly indicated that the internodal length at 90DAS of okra plants responded significantly to various treatment combinations of vermicompost, recommended doses of NPK and spraying of Vermiwash under study is depicted in Table 2. Among the various treatment combinations, the maximum internodal length 6.04 cm. was observed at 90DAS under treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) at 90 days after sowing. The level of foliar spray of Vermiwash had no significant effect when applied with RDF. While the minimum internodal length 4.71 cm was exhibited in T6 (vermicompost @ 5 t/ha + Vermiwash 1 sprays at 1week interval after 30 DAS) treatment at 90 DAS. The mean number of leaves per plant of different treatments of organic and inorganic sources of nutrients is given in Table 2 which was recorded at 90 days after sowing. The number of leaves per plant of okra increased significantly with the different spraying treatments of Vermiwash when applied with vermicompost and recommended doses of NPK. The maximum number of leaves per plant 23.66 under treatment T5 closely followed by T4 (23.33). The minimum leaves value of 18.93 per plant was noted under treatment T6 (vermicompost @ 5 t/ha + Vermiwash 1 sprays at 1week interval after 30 DAS) which was statistically at par with 2,3,4 spray of Vermiwash when applied along with 5 tonnes Vermicompost/ha [6, 7]. The number of branches per plant was recorded at 30 DAS. The plant of okra was mono-stem thus, indicating no branches in any treatments. The mean branches per plant at 60 and 90 DAS has been presented in Table 2. With regards to different treatments, the number of branches per plant was significantly affected at 60 and 90 DAS. Maximum branches of 2.46 and 4.13 per plant was noted in treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) at 60 and 90 days after sowing respectively as compared to treatments. While, lowest branches of 0.94 and 2.06 per plant were recorded under the treatment T6 (vermicompost @ 5 t/ha + Vermiwash 1 sprays at 1week interval after 30 DAS) at 60 and 90 DAS respectively. The increasing number of Vermiwash spray did not showed any significant effect on braches per plant. The days taken to first flowering was recorded and have been presented in Table 2. The days taken to first flowering was significantly influenced due to various treatments of Vermicompost, recommended doses of NPK and spraying of Vermiwash. The earliest flowering 35.58 days was recorded under treatment T10 (Vermicompost @ 5 t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS). However, late flowering 38.84 days was noted in T13 (Rec. NPK 150:80:100) as compared to other treatments. The nodes to first flowering were recorded treatment wise and the mean value are depicted in Table 2. Data clearly indicated that the increasing spraying number from one to five foliar sprays of Vermiwash increased to first flowering significantly. Treatment T13 (Rec. NPK 150:80:100) recorded the maximum nodes to first flowering 4.93 as compared to other treatment. Whereas, the minimum nodes to first flowering 4.20 was found under treatmentT10 (vermicompost @ 5 t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS). The data indicated that the days taken to 50% flowering were significantlyaffected by different treatments of Vermicompost, recommended doses of NPK and spraying of Vermiwash [9-11]. It was depicted in Table 2. The earliest 50% flowering (41.00 days) was recorded in T10 (Vermicompost @ 5t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS) and late (43.50 days) from T13 (Rec. NPK 150:80:100). The data for various treatments with respect to the days taken to first picking are summarized in Table 2. The earliest first picking (45.23 days) was recorded under treatment T10 (Vermicompost @ 5t/ha + Vermiwash 5 sprays at 1week interval after 30 DAS) and late picking (49.54 days) was observed in T13 (Rec. NPK 150:80:100). The flowers per plant were recorded and have been presented in Table 2. Data indicated that the maximum flowers of 19.66 per plant was recorded in the treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) followed by T4, T11, T3 and T2 which were at par with each other. Whereas, the minimumflowers per plant (15.53) was noted in treatment T6 (Vermicompost @5t/ha + Vermiwash 1 spray). The increasing number of spraying of Vermiwash increased the

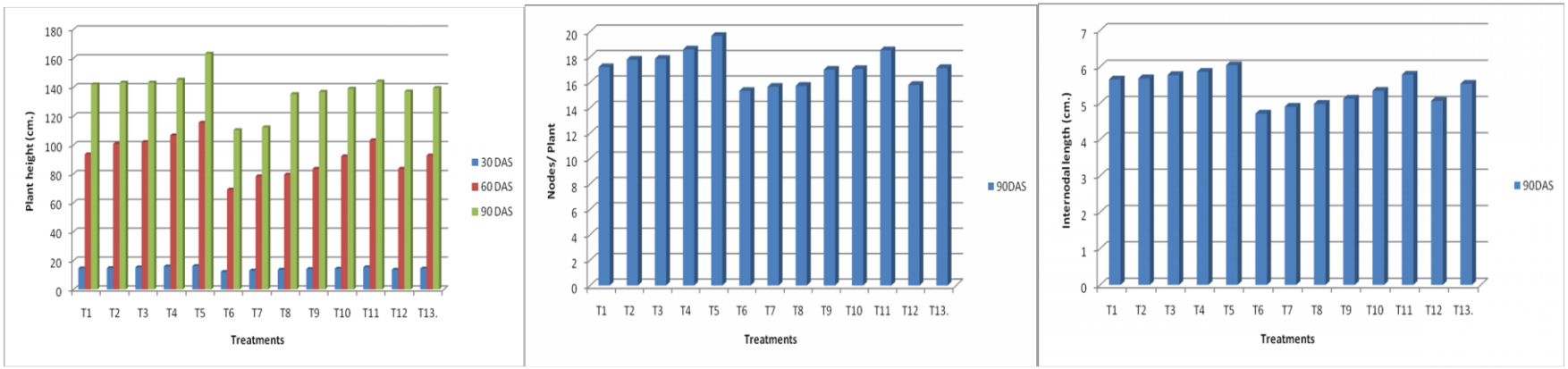
number of flower per plant in combination of Rec. NPK or Vermicompost @ 5t/ha. The number of fruits per plant was recorded treatment wise and the mean values are depicted in Table 2. The application of Vermiwash in combination with recommended dose of NPK and Vermicompost @ 5t/ha showed significant differences in number of fruit per plant. The maximum fruits per plant (18.66) was recorded in the treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) followed by T4, T11, T3 and T2 which were at par with each other. Whereas, the minimum number of fruits per plant (10.60) was noted in treatment T6 (Vermicompost @5t/ha +Vermiwash 1 spray) [12, 13]. The mean fruit length was significantly affected by the different spraying treatments of Vermiwash in combination of Vermicompost is given in Table 2. The maximum fruit length of 17.96cm, 17.58cm and 17.36cm were noted under the treatment combinations of T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS), T 4 (Rec. NPK + Vermiwash 4 sprays at 1 week interval after 30 DAS) and T11 (Rec. NPK + Vermiwash Soil treatment) + 3 foliar spray at 1week interval after 30 DAS), respectively and were found at par with each other. While, lowest fruit length of 15.27 cm was recorded under in treatment T6 (Vermicompost @5t/ha + Vermiwash 1 spray). The data for various treatments with respect to the fruit girth indicated that the treatment give the significant impact on the characters are summarized in Table 2. Maximum fruit girth 17.03mm, 16.96mm, 16.61mm, 16.60mm and 16.27mm were recorded under the treatments T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS), T4 (Rec. NPK + Vermiwash 4 sprays at 1 week interval after 30 DAS)and T11 (Rec. NPK + Vermiwash(Soil treatment) + 3 foliar spray at 1week interval after 30 DAS), T3 (Rec. NPK + Vermiwash 3 sprays at 1 week interval after 30 DAS), T2 (Rec. NPK + Vermiwash 2 sprays at 1 week interval after 30 DAS) respectively and were at par. However, the minimum fruit girth (15.27mm) was observed in T6 (Rec. NPK 150:80:100). The fruit weight was increased significantly by the various treatments of Vermicompost and recommended doses of NPK applied recommendation with spraying of Vermiwash on okra is given in Table 2. Application of treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) recorded maximum fruit weight (18.16 g), T4 (Rec. NPK + Vermiwash 4 sprays at 1 week interval after 30 DAS) which recorded 17.43 g fruit weight. Therefore, minimum fruit weight (13.86 g) was recorded in T6 (Rec. NPK 150:80:100). The fruiting span was recorded and have been presented in Table 2.The fruiting span increased significantly with increasing number of foliar spray of Vermiwash. The maximum fruiting span 48.86 days were recorded in treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS). However, the treatment T6 (Rec. NPK 150:80:100) recorded lowest fruiting span (42.63 days) as compared to other treatmen The data for various treatments with respect to the fruit yield per plant are summarized in Table 2 Significant increase in the fruit yield per plant was observed due to application of different treatments of vermicompost, recommended doses of NPK and spraying of Vermiwash. Maximum fruit yield of 144.66, 141.66 and 137.22 g per plant were recorded under the treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS), T4 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) T11 (Rec. NPK +Vermiwash (soil treatment) + 3 foliar sprays at 1 week interval after 30 DAS) respectively and which were at par with each other. While, minimum fruit yield per plant (95.66 g) was obtained with the treatment T6 (Rec. NPK 150:80:100). The yield of any crop is the final index of the experiment which indicated the success or failure of any treatment. With this view, the fruit yield of okra was recorded. The data for the fruit yield per plot under different treatments were recorded and converted into fruit yield per hectare (q) [14-16]. The fruit yield per hectare as af fected by different treatments is presented in Table 12manalysis of variance showed that okra fruit yield per hectare (q/ha) was significantly affected due to different treatment combination of vermicompost, recommended doses of NPK and spraying of Vermiwash. Significantly maximum fruit yield (53.67, 52.54, 50.91 q/ha) were obtained under the treatments treatment T5 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS), T4 (Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS) T11 (Rec. NPK +Vermiwash (soil treatment)+ 3 foliar sprays at 1 week interval after 30 DAS), respectively and which were at par. However, the lowest fruit yield (35.69 q/ha) was observed in treatment T6 (Rec. NPK 150:80:100). [14-16].

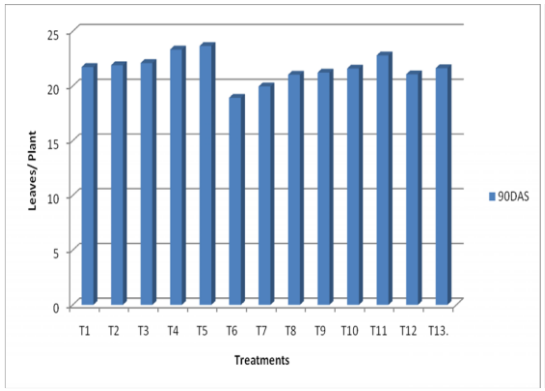
Table 1: Economics of different treatments for okra

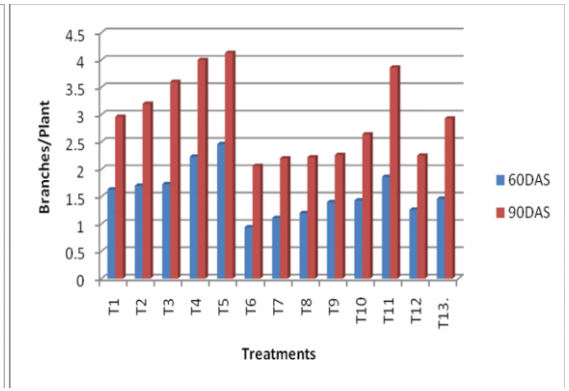
Treatment symbol	Treatments	Fruit yield (q/ha)	Gross income (Rs/ha)	Expenditure (Rs/ha)	Net income (Rs/ha)	C:B ratio
T1	Rec. NPK+ V W 1 spray	69.65	69650	51100	18550	1.36
T2	Rec. NPK+ V W 2 sprays	72.79	72790	54400	18390	1.33
T3	Rec. NPK+ V W 3 sprays	74.18	74180	41126	33054	1.8
T4	Rec. NPK+ V W 4 sprays	78.81	78810	54176	24634	1.45
T5	Rec. NPK+ V W 5 sprays	80.47	80470	44426	36044	1.81
T6	VC@5t/ha + V W 1 spray	53.55	53550	27926	25624	1.91
T7	VC@5t/ha + V W 2 spray	55.68	55680	64152	-8472	0.86
T8	VC@5t/ha + V W 3 spray	56.33	56330	31226	25104	1.8
T9	VC@5t/ha + V W 4 spray	62.71	62710	44500	18210	1.4
T10	VC@5t/ha + V W 5 sprays	66.41	66410	41200	25210	1.61
T11	Rec. NPK+ V W (Soil treatment) + 3 foliar sprays	76.31	76310	37826	38484	2.01
T12	VC@5t/ha + V W (Soil treatment) + V W 3 foliar spra	62.25	62250	47800	14450	1.3
T13.	Rec NPK (150:80:100)	69.09	69090	34526	34564	2

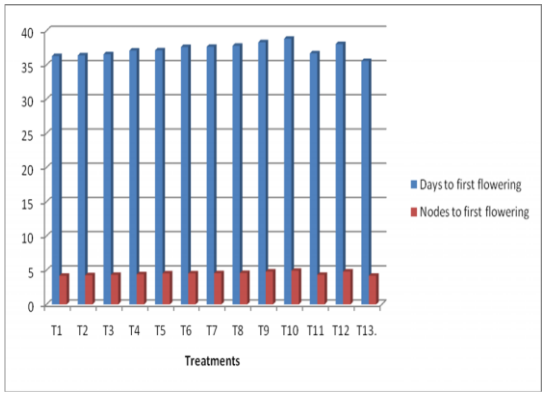
Table 2: Different growth and yield attributes as influenced by different treatments of Vermiwash, Vermicompost and NPK on okra.

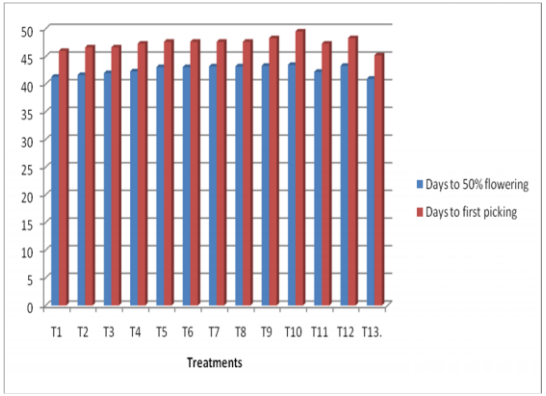
Treatment symbol	Treatments	Plant height (cm)			Nodes per plant90 DAS	Internodal length (cm) 90 DAS	Leaves per plant 90 DAS	Branches per plant		Days to first flowering	Nodes to first flowering	Daysto 50% flowering	Days to first picking	Flowers per plant	Fruits per plant	Fruit length (cm)	Fruit girth (mm)	Fruit weight (g)	Fruiting spans	Fruit yield per plant (g)	Fruit yield per ha. (q)
		30 DAS	60 DAS	90 DAS				60 DAS	90 DAS												
T1	Rec. NPK+ V W 1 spray	14.56	93.50	141.86	17.20	5.65	21.73	1.63	2.96	38.32	4.8	43.33	48.33	17.2	16.16	17.16	16.2	15.53	46.40	125.03	46.47
T2	Rec. NPK+ V W 2 sprays	14.73	100.73	143.10	17.80	5.68	21.9	1.7	3.2	38.06	4.8	43.33	48.33	17.8	16.2	17.24	16.27	15.63	47.3	130.66	48.53
T3	Rec. NPK+ V W 3 sprays	15.26	101.96	143.16	17.86	5.77	22.1	1.73	3.6	37.66	4.56	43.02	47.66	17.86	16.4	17.27	16.6	16.66	47.53	133.33	49.46
T4	Rec. NPK+ V W 4 sprays	15.86	106.58	145.21	18.60	5.86	23.33	2.23	4	37.63	4.53	43.1	47.66	18.6	17.56	17.58	16.96	17.43	48.8	141.66	52.54
T5	Rec. NPK+ V W 5 sprays	16.10	115.40	163.19	19.66	6.04	23.66	2.46	4.13	37.14	4.53	43.1	47.66	19.66	18.66	17.96	17.03	18.16	48.86	144.66	53.67
T6	VC@5t/ha + V W 1 spray	12.20	69.14	110.23	15.33	4.71	18.93	0.94	2.06	37.1	4.4	42.43	47.63	15.53	10.6	15.27	15.27	13.86	42.63	95.66	35.69
T7	VC@5t/ha + V W 2 spray	13.10	78.30	112.15	15.66	4.9	19.96	1.11	2.2	36.7	4.33	42.23	47.33	15.66	14.6	15.66	15.44	13.9	44.13	100.42	37.14
T8	VC@5t/ha + V W 3 spray	13.60	79.46	135.23	15.73	4.98	21.03	1.2	2.22	36.4	4.26	41.66	47.33	15.73	14.7	15.92	15.7	14.28	44.46	101.33	37.55
T9	VC@5t/ha + V W 4 spray	14.06	83.50	136.73	17.00	5.12	21.23	1.4	2.26	36.3	4.2	41.33	46.66	17.01	14.8	16.39	15.87	14.73	45.03	112.66	41.85
T10	VC@5t/ha + V W 5 sprays	14.36	92.06	138.96	17.06	5.34	21.6	1.43	2.64	35.58	4.2	41.01	45.23	17.06	16.03	16.43	15.87	14.9	45.63	119.33	44.31
T11	Rec. NPK+ V W (Soil treatment) + 3 foliar sprays	15.33	103.23	143.90	18.53	5.78	22.8	1.86	3.86	37.8	4.6	43.02	48.33	18.53	17.13	17.36	16.61	17.4	48.4	137.22	50.91
T12	VC@5t/ha + V W (Soil treatment) + V W 3 foliar sprays	13.65	83.50	137.06	15.80	5.06	21.07	1.26	2.25	36.57	4.33	42	46.66	15.8	14.71	16.38	15.83	14.4	44.66	112.33	41.54
T13.	Rec NPK (150:80:100)	14.40	92.66	139.37	17.13	5.53	21.63	1.46	2.93	38.84	4.93	43.5	49.54	17.13	16.15	16.79	16.14	15.03	46.33	124.02	46.06
SEm±		0.843	2.163	1.431	0.76	0.259	0.48	0.253	0.386	0.56	0.09	0.36	0.3	0.76	0.7	0.42	0.25	0.49	0.65	6.167	2.261
C.D. at 5%		NS.	6.571	4.348	2.21	0.787	1.3	0.769	1.174	1.703	0.27	1.06	0.89	2.21	2.04	1.24	0.72	1.44	1.99	18.73	6.86

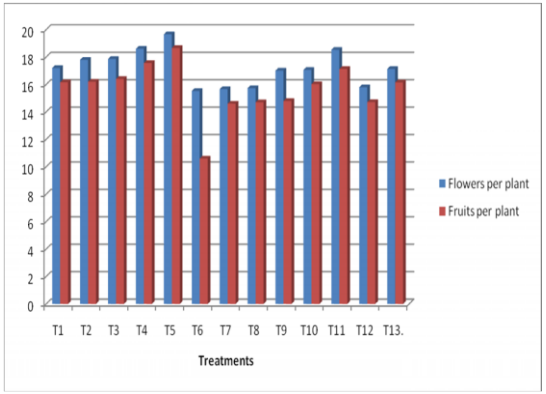


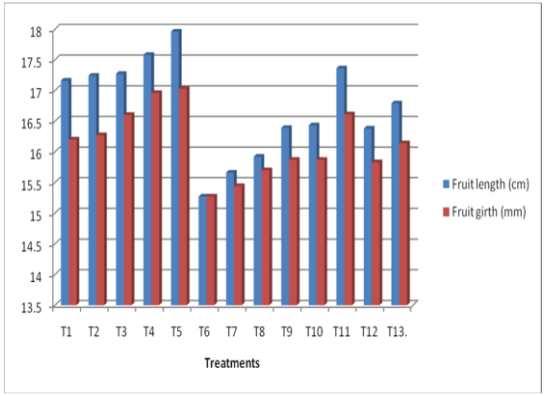

Leaves/ Plant
90DAS
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments

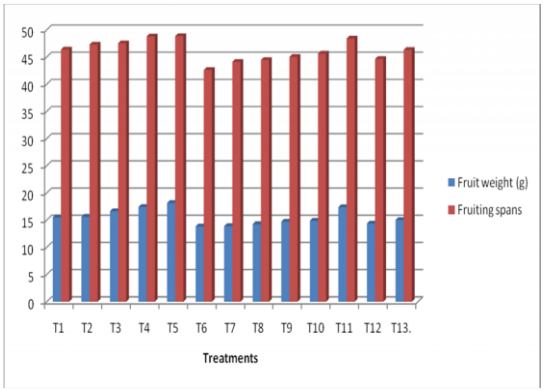

Branches/Plant
60DAS
90DAS
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments

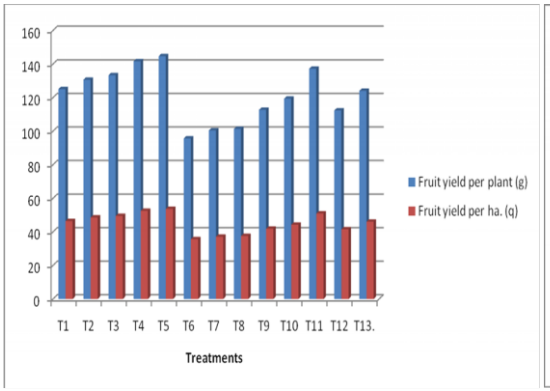

Days to first flowering
Nodes to first flowering
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments

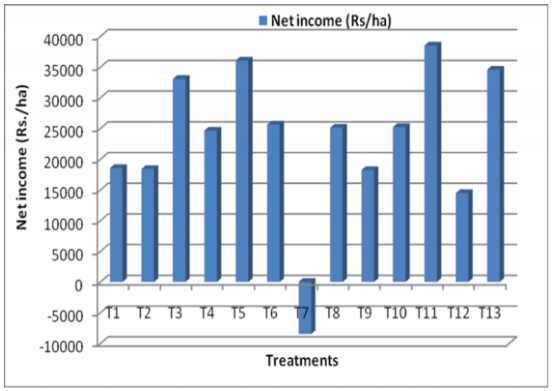

Days to 50% flowering
Days to first picking
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments


Flowers per plant
Fruits per plant
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments


Fruit length (cm)
Fruit girth (mm)
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments


Fruit weight (g)
Fruiting spans
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments


Fruit yield per plant (g)
Fruit yield per ha. (q)
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13.
Treatments


Net income (Rs/ha)
Net income (Rs./ha)
T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13
Treatments

Conclusions

On the basis of present investigation it is concluded that the okra cv. VRO-6 responded well in terms of growth, yield ad net profit to application of Rec. NPK + Vermiwash 5 sprays at 1 week interval after 30 DAS. It produced tallest plant, having more number of nodes, internodal length, number of leaves as well as maximum number of branches per plant. The same treatment having the potential to produce higher fruit yield q/ha. Application of recommended dose of NPK + Vermiwash as soil treatment with 3 foliar sprays of Vermiwash at 1week interval after 30 DAS fetched maximum net return and C:B ratio as comparison to other treatments.

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