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Organic Weed And Nutrient Management In Brinjal (*Solanum Melongena* L.)

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Abstract

The present experiment was conducted at Research Farm of Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra India during *kharif* season of the year 2017 and 2018 to evaluate organic weed and nutrient management in brinjal crop. The experiment was laid out in strip plot design with three replications. The main plot treatments were applied to brinjal comprised of non-chemical weed control modules different organic nutrients sources and biofertilizers as sub plot treatments which comprised of seven organic sources treatments and one plot each control treatment for comparison.

The soil of experimental field was clay loam in texture, low in available nitrogen (181.33 kg ha^{-1}), medium in available phosphorus (15.79 kg ha^{-1}) and high in available potassium (403.56 kg ha^{-1}) with 0.52 per cent organic carbon content. The soil was slightly alkaline in reaction (pH 8.17) with 0.29 dSm^{-1} electrical conductivity. The soil physical properties *viz.*, bulk density (1.33 g cm^{-3}), field capacity (36.30 %) and permanent wilting point (18.32 %), hydraulic conductivity (1.71 cm hr^{-1}) porosity (47.33 %) indicate that the soil was moisture retentive and suitable for growing brinjal crop in *kharif* season. The growth parameters *viz.*, plant height, number of primary branches plant^{-1}, number of secondary branches plant^{-1}, total number of branches plant^{-1}, number of leaves plant^{-1}, leaf area plant^{-1}, dry matter plant^{-1}, phenological parameters *viz.*, days to first flower initiation, days to first picking, number of days from first flower initiation to first fruit harvest and physiological parameters *viz.*, Absorbed PAR, photosynthetic rate, CO_2 concentration, stomatal conductance, transpiration rate, stomatal resistance, leaf temperature of brinjal were significantly higher under the weed free treatment followed by mechanical (hoeing) intercultivation and pulling of weeds at 20 days interval from 20 to 80 days after transplanting of brinjal crop during both the years of experimentation.

The yield and yield attributes *viz.*, number of fruits plant^{-1}, weight of fruits plant^{-1}, equatorial and polar diameter of fruits, fruit shape index, average weight of fruits, fruit yield significantly higher under weed free treatment followed by mechanical (hoeing) intercultivation and pulling of weeds at 20 days interval from 20 to 80 days after transplanting of brinjal crop during both the years of experimentation and on pooled mean basis.

(Key words: brinjal, organic farming, yield, growth, weed, nutrients)

Introduction

Vegetables are important constituents of the Indian diet as they are rich source of carbohydrates, proteins, vitamins, minerals, glucosinolates, antioxidants, fiber etc. Vegetables are consumed for nutrition, maintenance of health and many for their constituents for prevention of diseases. More than 70 types of vegetables are grown in our country, which generates high income and employment to small farmers particularly in peri-urban areas. Major vegetable crops grown in India are potato, onion, tomato, brinjal, cauliflower, cabbage, bean, cucumber, peas, garlic and okra. Vegetable consumption of an average Indian per day is far less (252 g) than recommended (300 g) (NNMB, 2016). Organic vegetable cultivation offers one of the most sustainable farming systems with recurring benefits and promote for long-term soil health besides sustaining stability in production by importing better resistance against various biotic and abiotic stresses. Organic vegetables fetch a premium price of 10-50 per cent higher over conventional products. There is a high demand for organic food in the domestic and international markets. Use of organic manures to meet the nutrient requirement of the crop would be an inevitable practice in the years to come for sustainable agriculture since, organic manures generally improves the physical, chemical and biological properties of soil along with increases the moisture holding capacity of the soil and thus resulting in enhanced crop productivity along with maintaining the quality of produce (Maheswarappa *et al.*, 1997). Although the organic manures contain plant nutrients in small quantities as compared to the fertilizers, the presence of growth-promoting principles like enzymes and hormones, besides plant nutrients make them essential for the improvement of soil fertility and productivity (Bhuma, 2001). A healthy biologically active soil is the source of crop nutrition. The application of an appropriate quantity of organic manures can not only sustain the yield of vegetable crops but can also enhance it. It has been estimated that in India every year 280 million tonnes of cattle dung, 273 million tonnes of crop residues, 285 million tonnes compost and 6351 million cubic meter domestic wastes are produced, which can be reused and recycled effectively to promote organic farming in India (Anon, 2017-18).

Brinjal (*Solanum melongena* L.) is one of the most common tropical vegetable grown in India. It is a versatile vegetable crop grown as a poor man's crop, adapted to different agro-climatic regions and can be grown throughout the year. It is a perennial but grown commercially as an annual crop. It is an important vegetable due to its nutritive value, consisting of minerals like iron, phosphorus, calcium and vitamins like A, B and C. Unripe fruits are used primarily as a vegetable in the country. It is also used as raw material in pickle making and dehydration industries and is an excellent remedy for those suffering from liver complaints. It is used in ayurvedic medicine for curing diabetes and also as a good appetizer. It is good aphrodisiac, cardiotonic, laxative, mutant and reliever of inflammation. Our demand by 2020 will be around 250 million tonnes of vegetables (Anon, 2017-18). In India, brinjal occupies an area of 10 lakh ha with a production of 1.87 million tonnes with average productivity of 17.96 t ha^{-1} (Anon, 2018-19). In Maharashtra, it is cultivated over an area of 68 thousand ha with a production of 11 lakh million tonnes with an average productivity of 17.00 t ha^{-1} (Anon, 2018-19).

There are several alternatives for the supply of soil nutrients from organic sources like farmyard manure, green manure, compost, vermicompost, organic cakes and biofertilizers etc., which also supplement the secondary micronutrients to crops. Soil fertility management is an important and costly cultural practice for organic vegetable growers. Complete organic production warrants the use of organic sources in plant nutrition, plant protection and all other related crop production practices. Cultivation of any crop depends on several factors and sources of nutrients are one of them. Organic sources of nutrients are less expensive and friendly to the environment. To minimize the economic return avoiding health hazards and for sustainable agriculture, the use of organic sources of nutrients should be encouraged. FYM, Vermicompost and Neem seed cake are commonly used sources of N for vegetables because they are relatively inexpensive and offer additional nutrients for soil improvement in addition to N. The use of biofertilizers in such a situation is, therefore, a practically paying proposal. P solubilizers are biofertilizers that solubilize phosphorus in soil and make it available to plants while *Azospirillum*, a heterotrophic nitrogen-fixing organism has been reported to be beneficial and economical on several crops. They improve growth and yield as well as the productivity of crops.

Materials and Methods

Field experiment entitled "Development of organic farming package for brinjal (*Solanum melongena* L.)" was conducted at Mahatma Phule Krishi Vidyapeeth, Rahuri, during two successive years *viz*., 2017 and 2018, respectively.

The experimental soil was clay loam in texture, alkaline in reaction (pH 8.17) with electrical conductivity 0. 29 dSm^{-1}. The soil was low in organic carbon (0.52 %) and available nitrogen (181.33 kg ha^{-1}), medium in available phosphorus (15.79 kg ha^{-1}) and very high in available potassium (403.56 kg ha^{-1}), respectively. The bulk density, infiltration rate, field capacity, permanent wilting point and porosity of the soil were 1.33 g m^{-3}, 8.71 cm hr^{-1}, 36.30, 18.32 and 47.33 per cent, respectively. Thus soil was suitable for growing of brinjal in *kharif* season.

The experiment was laid out in strip plot design with three replications (Fig. 3.3). The main plot treatments were applied to brinjal comprised of non-chemical weed control modules *viz.* W_1 - *Gliricidia* leaf mulching @ 5 t ha^{-1}, W_2 -Biodegradable mulch (soybean straw) @ 5 t ha^{-1}, W_3-Mechanical (hoeing) intercultivation and pulling of weeds, W_4- Control -Weedy check, W_5- Weed free (Hand weedings with 15 days interval). Different organic nutrients sources and biofertilizers *i.e. Azospirillum* and *PSB* as a (1 :1) @ 500 g 10 lit^{-1}) as sub plot treatments which comprised of seven organic sources treatments *viz.*, O_1- 100 % RDN through FYM with biofertilizers, O_2-100 % RDN through vermicompost with biofertilizers, O_3-100 % RDN through neem cake with biofertilizers, O_4-50 % RDN each through FYM and vermicompost with biofertilizers, O_5-50 %

RDN each through FYM and neem cake with biofertilizers, O_6- 50 % RDN each through vermicompost and neem cake with biofertilizers, O_7- 1/3 N each through FYM, vermicompost and neem cake with biofertilizers. The required quantity of FYM, vermicompost and neem cake was incorporated in the soil before transplanting of brinjal seedling followed by irrigation. Before application, these organic sources were analyzed for their nutrient content by using standard analytical methods indicated in (Table 3.2). The nutrient content of various organic sources (FYM, vermicompost and neem cake) are furnished below.

Organic Sources	**Nutrient content (%)**					
	2017			**2018**		
	N	**P**	**K**	**N**	**P**	**K**
Farmyard manure	0.69	0.40	0.78	0.70	0.45	0.85
Vermicompost	1.73	0.82	0.90	1.74	0.84	0.95
Neem cake	4.15	1.30	1.55	4.19	1.30	1.55

The climatic condition was favorable for crop during both the years. The total rainfall received during crop growth period was 486.9 mm and 139.2 mm in 20 and 09 rainy days and it was 8.23 and 73.59 per cent less during first and second year as compared to average annual rainfall (527 mm). But maximum and minimum temperature as well as morning and evening relative humidity was in optimum range which create congenial condition for optimum growth of crop. Transplanting was done of brinjal with 30 days old healthy seedlings at the rate of one seedlings per hill with spacing of 75 cm apart in the. Light irrigation was given immediately after transplanting. After transplanting of brinjal seedling irrigation was applied immediately for better and uniform establishment of the crop. Successive irrigations were given as and when required depending upon the climatic conditions. Total six irrigations were applied during first year and ten irrigations applied during second year of experimentation.

The moisture content of the selected sample was estimated by method (A.A.C.C., 2000).

The 5 g brinjal fruit sample was taken in separately pre-weighed moisture box, dried in oven at 105^{0}C for 5 hrs. and transferred to desiccators for cooling for 30 min. After cooling the sample was weighed. The procedure was repeated until a constant weight was obtained.

$$\text{Moisture (\%)} = \frac{(W1 - W2)}{W1 - W} \times 100$$

Where,

W_1 = Weight (g) of the box with the material before drying

W_2 = Weight (g) of the box with the material after drying

W = Weight (g) of the empty box

Total protein content of the samples was estimated by determining total nitrogen content using standard micro-kjeldhal method (A.A.C.C., 2000). Total protein content was calculated by multiplying the estimated total nitrogen content with a factor 6.25.

Total protein content of sample was calculated by formula.

$$\text{Nitrogen (\%)} = \frac{(S-B) \times N \times 14.007}{\text{Weight of sample (g)}} \times \frac{\text{Volume made (ml)}}{\text{Volume taken (ml)}} \times 100$$

Where,

S = ml of HCl required for sample titration

B = ml of HCl required for blank titration

N = Normality of HCl (0.02 N)

Protein (%) = Nitrogen (%) x 6.25

The fat content of the selected sample was estimated by the Soxhlet method of (A.A.C.C., 2000).

$$\text{Crude fat (\%)} = \frac{A - B}{\text{Weight of sample (g)}} \times 100$$

Where,

A = Weight of flask containing fat residue after evaporation of solvent (g)

B = Weight of dry empty flask (g)

The total minerals of the selected samples were estimated by the ashing method of (A.A.C.C., 2000).

$$\text{Ash (\%)} = \frac{\text{Weight of ash (g)}}{\text{Weight of sample (g)}} \times 100$$

The acidity content of the selected sample was estimated by method of (A.A.C.C., 2000).

$$\text{Acidity (\%)} = \frac{\text{Titre} \times \text{Normality of NaOH} \times \text{Volume make up} \times \text{Eq. weight of citric acid (64.04)}}{\text{Volume of sample taken for Estimation} \times \text{Volume of sample taken} \times 1000} \times 100$$

The ascorbic acid content of the selected sample was estimated by Indophenol method (Ranganna, 1986).

An aliquot (10 ml) was pipette out in a conical flask and titrated with 2, 6 dichlorophenol indophenols dye and burette reading at pink color development for 15 seconds was recorded. Ascorbic acid content in the sample was calculated in mg 100 ml as per the formula.

$$\text{Ascorbic acid (mg 100 g}^{-1}\text{)} = \frac{\text{Titre} \times \text{Dye factor} \times 0.064 \times \text{Volume made up} \times 100}{\text{Weight of sample} \times \text{Aliquot taken}}$$

Apart from this uptake of nutrients, soil studies and economics were worked out during both the years. The finding emerged from the present investigation are summarized as below with appropriate subheadings. The picking of fruit was done at physiological maturity and visual observation of the fruits. In all twelve picking during first season and fourteen picking during second season were undertaken from the net plot. Fruits from the five randomly selected plants were picked up separately for studying the various yields and yield attributes, for calculating the yield, the weight of fruits recorded from each plot was converted into t ha^{-1} and grading was worked out according to marketable size of the fruits.

The experimental data was subjected to analysis adapting data obtained on various variables were analyzed by 'Analysis of Variance' method (Panse and Sukhatme, 1985). Data analyzed by using strip plot design. Wherever, the results were found to be significant, critical difference was calculated at P=0.05 by the formula.

C.D. = S.E.m± x 2 x t at error d.f.

The pooled analysis was carried out as per the procedure outlined by Cochran and Cox (1957). The homogeneity of error variance was tested by applying the Bartlett's test.

Data on species wise weed count and weed dry weight exhibited high degree of variation. To make Analysis of Variance more valid, the data on weed count and weed dry matter were transformed using square root X+1 or log X+2 transformation depending upon extent of variability.

All the interpretation of the data in the chapter "Results and discussion" are based on F test and critical difference.

Results and Discussion

The results of the investigation "Development of organic farming package for brinjal (*Solanum melongena* L.)" conduced at Research farm of Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri during the *kharif* seasons of 2017 and 2018 are presented under following heads and subheads.

Performance of different Non-chemical weed control modules

Weed free treatment produced significantly the highest values of growth parameters but it was at par with mechanical (hoeing) intercultivation and pulling of weeds for all growth attributing characters of brinjal crop in both the treatments at 120 days after transplanting *viz.*, plant height (47.82 and 49.14), (49.00 and 52.78 cm) number of primary branches $plant^{-1}$ (9.38 and 9.57), (8.57 and 9.19), number of secondary branches $plant^{-1}$ (9.59 and 9.57), (7.77 and 8.94), total number of branches $plant^{-1}$ (18.97 and 19.14), (16.34 and 18.13), number of leaves $plant^{-1}$ (91.86 and 94.90), (89.90 and 90.43), leaf area $plant^{-1}$ (184.10 and 195.45 cm^2), (183.33 and 188.91) and dry matter of brinjal $plant^{-1}$ (96.81 and 96.95 g), (95.43 and 95.95 g) than rest of the non-chemical weed control modules during both the years of experimentation, respectively. This weed free and hoeing treatment imparts proper physical condition of soil, adequate utilization of moisture and nutrients in producing brinjal during the period of crop weed competition for moisture, space, nutrients light and CO_2 during both the years. These results are in confirmatory with those reported by Kamble (2006) and Kamboj *et al.* (2019). The increase in total branches $plant^{-1}$ due to weed control practices may be attributed to decrease in weed population that might helped in increasing the number of branches. Moreover, effective weed control increases the capacity of crop in utilizing soil moisture, light, nutrients and CO_2 in building new tissues and that may account for improving growth including total number of branches plant^{-1}. The results are in line with Tanveer *et al.* (2003). This was due to luxurious growth of brinjal, increased number of leaves per plant in weed free and in hoeing treatment due to no competition of weeds for resources as well as very least competition of weeds for all the resources due to effective control of weeds by the application hoeing and pulling of weeds. The same results were reported by Banjare *et al.* (2013).

The mean days to first flower initiation was recorded minimum in weed free treatment (42.38 and 40.71) followed by *gliricidia* leaf mulching @ 5 t ha^{-1} (43.33 and 41.43) and biodegradable mulch - soybean straw @ 5 t ha^{-1} (43.52 and 41.71). Days to first picking and number of days from first flower initiation to first fruit harvest was recorded earlier with weed free (78.71 and 76.86), (36.33 and 36.14) followed by mechanical (hoeing) intercultivation and pulling of the weeds (81.90 and 79.90), (37.19 and 37.52) during both the years of experimentation. This might be due to the reason that faster vegetative growth due to reduction in weed population and the increased availability of moisture and nutrients which also enhances the early reproductive phase thereby recording minimum period for flower initiation and 50 per cent flowering and early fruit set. These results are in conformity with the findings of Sha and Karuppaiah (2005) and Banjare *et al.* (2013).

Weed free treatment recorded significantly maximum yield and yield attributes, however it was at par with mechanical (hoeing) intercultivation and pulling of weeds the yield attributes and yield *viz.*, number of fruit plant^{-1}, (26.86, 28.05 and 27.45), (26.38, 27.19 and 26.79), weight of fruit plant^{-1} (1.737 2.133 and 1.937 kg), (1.581, 1.604 and 1.586 kg), equatorial diameter (5.96 and 5.71 cm), (5.18 and 5.51) polar diameter (6.81 and 7.19 cm), (6.43 and 6.71), average fruit weight (36.90, 37.33 and 37.12 g), (36.48, 37.00 and 36.74 g), fruit yield (20.65, 22.06 and 21.35), (18.75, 20.84 and 19.79 t ha^{-1}) during 2017, 2018 and on pooled mean basis, respectively. Weed competition affects various morphological parameters and thus finally yield. The highest average fruit weight may be attributed to lower dry matter accumulation by weeds and decrease in the weed population that helps in increasing the yield attributed which ultimately led to higher yield. This similar results are in the line with Vidyasagar *et al.* (2018 a) and Kamboj *et al.* (2019). The highest yield may be attributed to lower dry matter accumulation by weeds and decrease in their population that helped in increasing the yield attribute which ultimately led to higher yield. This similar results were confirmed with Singh *et al.* (2013) and Vidyasagar *et al.* (2018a).

Performance of different organic nutrient sources

Crop supplied with 50 % RDN each through FYM and VC with biofertilizers recorded significantly maximum growth parameters, however it was at par with 50% RDN each through FYM and NC with biofertilizers at 120 days after transplanting of brinjal crop. The maximum growth attributing characters of crop *viz.*, plant height (48.51 and 51.13 cm), (46.95 and 48.75 cm) number of primary branches plant^{-1} (8.60 and 9.73), (8.40 and 9.00), number of secondary branches plant^{-1} (8.31 and 10.17), (7.08 and 9.47), total number of branches plant^{-1} (16.91 and 19.91), (15.48 and 18.47), number of leaves plant^{-1} (84.60 and 88.87), (83.00 and 85.67), leaf area plant^{-1} (191.39 and 194.39 cm^2), (183.35 and 188.97 cm^2) and dry matter plant^{-1} (96.47 and 98.00), (94.87 and 97.27 g) than rest of the organic nutrient sources during both the years of experimentation, respectively. Moreover, vermicompost added a more amount of primary nutrients in the soil, besides supplying other essential macro and micro-nutrients compare to rest of the sources. Similar results were reported by Harish (2009) and Dhonde (2018). Application of organic nutrient sources might have helped in the plant metabolic activity through supply of such important micronutrient in the early crop growth phase, which in turn encouraged early vigorous growth and promote the total number of branches. This result was in conformity with the findings of Harish (2009), Mishra *et al.* (2018) and Dhonde (2018). This could be due to production of greater number of photosynthetically active leaves and this might have enhanced the growth and leaf area in plants. These results are in accordance with Harish (2009), Umesha *et al.* (2011), Mishra *et al.* (2018) and Dhonde (2018).

The mean days to first flower initiation was recorded minimum by application of 1/3 RDN each through FYM, VC and NC with biofertilizers (43.00 and 41.07) during both the years of experimentation. Days to first picking was recorded earlier by application of 100% RDN through NC and 50 % RDN each through FYM and VC and biofertilizers (80.47 and 79.47) during 2017 and 2018 respectively. Number of days from first flower initiation to first fruit harvest was recorded by the application of 50% RDN through FYM and NC with biofertilizers (35.93 and 35.53) during both the years of experimentation, respectively. The earliness is important in vegetable crop like brinjal. This might be due to better nutrient status of the plants which was favoured by treatments. Better stem growth would have helped to the translocation of synthesized metabolites and more quantity of available phosphorus through the xylem vessels and the accumulation of cytokines and phosphorus in these auxiliary buds would have favorable the plants to enter into reproductive phase. Similar results have also been reported by Harish (2009), Tudu (2013) and Gandhi and Sundari (2012).

Organic nutrient sources with the application of 50 % RDN each through FYM and VC with biofertilizers recorded significantly maximum fruit yield and yield attributes of brinjal *viz.*, number of fruits plant^{-1}, (25.67, 27.93 and 26.80), (25.40, 25.73 and 25.57) weight of fruits plant^{-1} (1.560, 1.769 and 1.664 kg), (1.354, 1.535 and 1.445 kg), equatorial diameter (5.67 and 5.65 cm), (5.53 and 5.22), polar diameter (7.00 and 7.60 cm), (6.67 and 7.07), average fruit weight (35.07, 35.67 and 35.37 g), fruit yield (19.82, 21.07 and 21.35), (18.24, 19.75 and 19.82 t ha^{-1}) during both the years of experimentation and on pooled mean basis, respectively.

Higher the leaf area higher will be the photosynthetic surface, which increases the photosynthetic accumulation, hence resulting in higher average fruit weight. Similarly, the increase in average fruit weight due to FYM and VC combination might be due to its beneficial effect on balanced supply and release of nutrients including secondary and micronutrients. Similar results are in line with Harish (2009) and Kashyap *et al.* (2014). This might be due to fact that VC and FYM in the presence of biofertilizers improved the physical, chemical and biological properties of soil, resulted in easy absorption of water and availability of nutrients right from beginning of growth season and contributed in better development of plant canopy. These results are in confirmatory with those reported by Harish (2009) and Kashyap *et al.* (2014). The higher yield obtained due to increase in the uptake of nutrient resulting in faster synthesis and translocation of photosynthates from source to sink as influenced in the increase in yield.

Interaction of Non-chemical weeds control modules and organic nutrient sources

Interaction effect between weed free treatment and application of 50 % RDN each through FYM and NC with biofertilizers recorded significantly higher average fruit weight over the rest of combinations and it was at par with weed free treatment with application of 50 % RDN each through FYM and VC with biofertilizers during 2017. In 2018, mechanical (hoeing) intercultivation and pulling of weeds with application of 50 % RDN each through FYM and VC with biofertilizers combination recorded significantly higher average fruit weight than rest of combinations however it was at par with mechanical (hoeing) intercultivation and pulling of weeds with application of 50 % RDN each through FYM and NC with biofertilizers and weed free with 100 % N through FYM with biofertilizers, respectively and the interaction effect of pooled mean basis between mechanical (hoeing) intercultivation and pulling of weeds with application of 50 % RDN each through FYM and VC with biofertilizers and weed free treatment with 50 % RDN each through FYM and NC with biofertilizers recorded significantly maximum average fruit weight than the rest of the combinations and it was at par with all other sources of nutrients and weed free treatment as well as mechanical (hoeing) intercultivation and pulling of weeds with application of 50 % RDN each through FYM and NC with biofertilizers combinations. The higher fruit weight in the 50 % RDN each through FYM and NC with biofertilizers treatment might have been due to accelerated mobility of photosynthates from source to sink as influenced by growth hormone released due to the organic sources of the organic nutrient sources.

The combination of weed free treatment with application of 50 % RDN each through FYM and VC with biofertilizers recorded significantly higher fruit yield of brinjal than the rest of the combinations followed by mechanical (hoeing) intercultivation and pulling of weeds and 50 % RDN each through FYM and VC with biofertilizers combination during both the years of experimentation and on pooled mean basis.

Conclusion

Weed free treatment followed by mechanical (hoeing) intercultivation and pulling of weeds at 20 days interval from 20 to 80 days after transplanting of brinjal crop recorded significantly higher magnitude of growth parameters *viz.*, plant height, number of primary branches plant^{-1}, number of secondary branches plant^{-1}, total number of branches plant^{-1}, number of leaves plant^{-1}, leaf area plant^{-1}, dry matter plant^{-1}, phenological parameters *viz.*, days to first flower initiation, days to first picking, number of days from first flower initiation to first fruit harvest and physiological parameters *viz.*, Absorbed PAR, photosynthetic rate, CO_2 concentration, stomatal conductance, transpiration rate, stomatal resistance, leaf temperature of brinjal during both the years of experimentation.

The yield and yield attributes *viz.*, number of fruits plant^{-1}, weight of fruits plant^{-1}, equatorial and polar diameter of fruits, average weight of fruits, fruit yield as well as quality parameters *viz.*, moisture, crude protein, crude fat, total ash, and ascorbic acid were significantly higher in weed free treatment followed by mechanical (hoeing) intercultivation and pulling of weeds at 20 days interval from 20 to 80 days after transplanting of brinjal crop.

Brinjal crop recorded significantly higher growth parameters *viz.*, plant height, number of primary branches plant^{-1}, number of secondary branches plant^{-1}, total number of branches plant^{-1}, number of leaves plant^{-1}, leaf area plant^{-1}, dry matter plant^{-1}, phenological parameters *viz.*, days to first flower initiation, days to first picking, number of days from first flower initiation to first fruit harvest and physiological parameters *viz.*, Absorbed PAR, photosynthetic rate, CO_2 concentration, stomatal conductance, transpiration rate, stomatal resistance, leaf temperature of brinjal due to application of 50 % RDN each through FYM and VC with biofertilizers at par 50 % RDN each through FYM and NC with biofertilizers during both the years of experimentation.

Application of 50 % RDN each through FYM and VC with biofertilizers recorded significantly maximum yield and yield attributes *viz.*, number of fruits plant^{-1}, weight of fruits plant^{-1}, equatorial and polar diameter of fruits, average weight of fruits, fruit yield and quality parameters *viz.*, moisture, crude protein, crude fat, total ash, and ascorbic acid and was at par 50 % RDN each through FYM and NC with biofertilizers and was at par 50 % RDN each through FYM and NC with biofertilizers during both the years of experimentation.

The interaction effect between the non-chemical weed control modules and organic nutrient sources recorded significantly higher magnitude of average fruit weight, fruit yield recorded significantly higher magnitude with weed free treatment and 50% RDN each through FYM and vermicompost with biofertilizers combinations during both the years of experimentations.

Based on two year experimentation, it could be concluded that cultivation of *kharif* brinjal with non-chemical weed control modules of keeping the crop weed free up to 80 days after transplanting by adapting five hand weeding (at an interval of 15 days) or four mechanical (hoeing) intercultivation and pulling of weeds between the rows (20 days interval from 20 to 80 days after transplanting) and application of 50 per cent nitrogen (50 N kg ha^{-1}) each through farm yard manure and vermicompost with biofertilizers (*Azospirillum* and *PSB*) along with organic plant protection measures found suitable organic package for higher productivity, fruit quality and sustaining soil health.

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Table 1. Quality parameters of brinjal as influenced by weed control modules and organic nutrient sources (2017)

Treatments	Moisture (%)	Crude protein (%)	Crude fat (%)	Total ash (%)	Acidity (%)	Ascorbic acid (mg.100g^{-1})
A. Weed control module						
W_1-*Gly*.leaf manuring @ 5 t ha^{-1}	91.90	1.294	0.153	0.73	0.273	13.58
W_2-Biodegradable mulch (soy. straw) @ 5 t ha^{-1}	92.68	1.305	0.161	0.73	0.264	14.83
W_3-Mech. (hoeing) intercultivation	94.10	1.343	0.188	0.82	0.253	15.60
W_4- Weedy check	88.87	1.267	0.140	0.60	0.282	11.53
W_5-Weed free	94.81	1.351	0.191	0.83	0.236	16.30
S.Em (±)	0.44	0.003	0.001	0.00	0.002	0.24
CD @ 5 %	1.45	0.011	0.004	0.02	0.009	0.81
B. Organic nutrient sources						
O_1-100 % RDN (FYM +BF)	92.01	1.307	0.165	0.73	0.271	14.02
O_2-100 % RDN (VC+BF)	92.03	1.308	0.165	0.72	0.269	14.03
O_3-100 % RDN (NC+BF)	93.67	1.308	0.166	0.72	0.260	14.01
O_4-50 % RDN (FYM+VC+BF)	94.20	1.324	0.171	0.78	0.249	15.53
O_5-50 % RDN (FYM+NC+BF)	92.33	1.317	0.169	0.77	0.261	14.80
O_6-50 % RDN (VC+NC+BF)	92.23	1.308	0.165	0.73	0.261	14.05
O_7- 1/3 RDN (FYM+VC+NC+BF)	90.84	1.313	0.166	0.73	0.261	14.13
S.Em (±)	0.46	0.002	0.000	0.01	0.002	0.28
CD @ 5 %	1.43	0.007	0.002	0.03	0.009	0.88
C. Interaction (A x B)						
Between two organic nutrient sources means at same level of weed control module means						
S.Em (±)	1.17	0.007	0.002	0.02	0.006	0.60
CD @ 5 %	NS	NS	NS	NS	NS	NS
Between two weed control module means at same level of organic nutrient sources means						
S.Em (±)	1.15	0.006	0.002	0.02	0.006	0.60
CD @ 5 %	NS	NS	NS	NS	NS	NS
Mean	92.47	1.312	0.167	0.74	0.262	14.37

Table 2. Quality parameters of brinjal as influenced by weed control modules and organic nutrient sources (2018)

Treatments	Moisture (%)	Crude protein (%)	Crude fat (%)	Total ash (%)	Acidity (%)	Ascorbic acid (mg.100g^{-1})
A. Weed control module						
W_1-*Gly*.leaf manuring @ 5 t ha^{-1}	92.13	1.299	0.155	0.75	0.277	13.70
W_2-Biodegradable mulch (soy. straw) @ 5 t ha^{-1}	93.03	1.311	0.165	0.76	0.247	14.74
W_3-Mech. (hoeing) intercultivation	94.52	1.348	0.189	0.83	0.242	15.86
W_4- Weedy check	89.86	1.266	0.141	0.62	0.285	11.67
W_5-Weed free	95.05	1.352	0.194	0.86	0.226	16.45
S.Em (±)	0.23	0.002	0.002	0.02	0.002	0.32
CD @ 5 %	0.77	0.008	0.006	0.06	0.009	1.07
B. Organic nutrient sources						
O_1-100 % RDN (FYM +BF)	92.64	1.311	0.168	0.74	0.271	14.27
O_2-100 % RDN (VC+BF)	92.56	1.311	0.167	0.75	0.260	14.23
O_3-100 % RDN (NC+BF)	93.67	1.313	0.168	0.75	0.255	14.26
O_4-50 % RDN (FYM+VC+BF)	94.13	1.326	0.173	0.81	0.236	15.47
O_5-50 % RDN (FYM+NC+BF)	92.77	1.321	0.171	0.80	0.254	14.82
O_6-50 % RDN (VC+NC+BF)	92.72	1.313	0.167	0.75	0.255	14.20
O_7- 1/3 RDN (FYM+VC+NC+BF)	91.95	1.309	0.168	0.76	0.255	14.14
S.Em (±)	0.23	0.001	0.001	0.01	0.003	0.24
CD @ 5 %	0.72	0.005	0.003	0.04	0.012	0.74
C. Interaction (A x B)						
Between two organic nutrient sources means at same level of weed control module means						
S.Em (±)	0.69	0.006	0.003	0.03	0.007	0.59
CD @ 5 %	NS	NS	NS	NS	NS	NS
Between two weed control module means at same level of organic nutrient sources means						
S.Em (±)	0.67	0.006	0.003	0.02	0.008	0.53
CD @ 5 %	NS	NS	NS	NS	NS	NS
Mean	92.92	1.315	0.169	0.77	0.255	14.48