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Effect of integrated nutrient management on yield and yield attributing characters in okra and its residual effect on succeeding crop radish

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Abstract

A field experiment to study the effect of integrated nutrient management on okra (*Abelmoschus esculentus (L.) Moench*) and its residual effect on succeeding crop radish (*Raphanus sativus L.*) was conducted during kharif, 2004 and winter season 2004-05, respectively at the Deparment of Horticulture, College of Agriculture, Bikaner. The results revealed that application of inorganic fertilizers @ 60:30:30 kg N,P,K q ha^{-1} and vermicompost @ 6 t ha^{-1} significantly increased the number of pickings, fruit weight, length and diameter of fruit, fruit yield/ plot and fruit yield (q ha^{-1}) in okra, while root length, width of root, weight of root and root yield q ha^{-1} in succeeding crop radish.

Key words : *Okra, radish, nutrition, crop sequence*

Introduction

Okra (*Abelmoschus esculentus (L.) Moench*) is one of the important summer and rainy season vegetable crop of Rajasthan. It is rich in its nutritive value and has medicinal importance. Okra is specially valued for its tender fruits. It is rich in vitamin, calcium and potassium and other minerals. It has been reported to have an average nutritive value (ANV) of 3.21, which is higher than tomato, and most of the cucurbits except bitter gourd (Grubben, 1977).

Okra- radish crop sequence can be beneficial for the vegetable growers under arid irrigated condition of Bikaner. Radish growing on residual effect of applied Vermicompost and fertilizers to okra can add more benefit to the vegetable growers. Both the crops are highly responsive to applications of essential plant nutrients viz., N, P and K. The yield potential of high yielding varieties of crops can be obtained only with optimal nutrient supply and other input management. These are applied through inorganic fertilizers to meet crop nutrients requirements.

Now a days, organically produced vegetables are fetching good market price and people are aware regarding adverse effects of excessive use of inorganic fertilizers and pesticides, which are causing health hazards. In view of above, there is urgent need to find out the effect of application of nutrients through organic source on growth, yield and quality and also on integrated nutrient management for minimizing the requirement of inorganic fertilizers. Vermicompost is becoming very promising source of nutrients of organic origin. Keeping the above considerations in view, an experiment was carried out to find out the effect of integrated nutrient management on okra and its residual effect on succeeding crop of radish.

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Materials and Methods

The experiment was conducted at Research farm, College of Agriculture, Bikaner during *kharif* season, 2004 and residual crop of radish during *rabi* season 2004 - 2005. The varieties of okra and radish were VRO-6 and Japanese white, respectively. The experiment was carried out with four levels of inorganic fertilizers viz., control (F_0), 30:15:15 (F_1), 60:30:30 (F_2) and 90:45:45 kg N, P and K per hectare (F_3) and four levels of Vermicompost viz., 0 (V_0), 3(V_1), 6(V_2) and 9(V_3) tonnes per hectare using randomized block design with three replications. Sowing of okra was done on August 18, 2004 in well prepared field in plots size of 3m x 3m. The soil of the experimental field was loamy sand in texture and slightly alkaline in reaction. The soil was poor in organic carbon (0.08%) and low in available nitrogen (63.24 kg ha^{-1}), phosphorus (9.60 kg ha^{-1}) and medium in available potassium (148.62 kg ha^{-1}). The field was fertilized to supply

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nitrogen (urea) according to treatments in two split doses one at the time of sowing and another at 30 days after sowing. Phosphorus, potassium and Vermicompost were applied at the time of sowing of the crop. The observations on number of pickings, fruit weight, length of fruit at first picking, fruit diameter at first picking, fruit yield per plot and fruit yield per hectare were recorded. The yield of fruit per plant was recorded at each picking and subsequently pooled to work out total yield of okra. In *rabi* season, in same field, radish was grown as the residual crop following same layout plan as okra. Sowing of seeds of radish was done on December, 4, 2004 and harvesting of roots of radish was done from February, 10, 2005 to February, 22, 2005. Root length, width and root weight of radish were recorded at the time of harvest.

Results and Discussion

The present investigation revealed that application of fertilizers up to 60:30:30 N, P and K kg ha^{-1} showed significant increase in yield attributes i.e. number of pickings, fruit weight, length of fruit and diameter of fruit (Table 1). The observations are in conformity with findings of Abdul and Aarf (1986) and Chattopadhyay and Sahana (2000) in okra.

Application of different levels of Vermicompost up to 6 t ha^{-1} significantly increased the fruit yield, number of pickings, fruit weight, fruit length, fruit diameter and fruit yield q ha^{-1} in okra. The results are in agreement with the findings of Kalambasa (1996) and Alexive and Rankov (1997) in tomato. On succeeding residual crop, it was observed that application of fertilizers up to 60:30:30 N, P and K kg ha^{-1} to preceding okra significantly increased the root yield of succeeding radish. Similar trend was recorded with increasing levels of Vermicompost. The interactions effects between Vermicompost and fertilizers levels on all parameters under study were found non significant and hence these have not been given. Difference due to levels of N, P and K were found in yield and its attributing characters could be due to over all improvement in plant growth which might be due to increased availability of nutrients and in turn might have helped in pod formation and ultimately increased the yield. Similar findings have been reported by Rao and Subramaniam (1991) in okra.

Net return and B : C ratio of okra significantly differed with 60:30:30 kg N, P and K ha^{-1} compared to control and 30:15:15 and remained at par with 90:30:30 kg N, P and K ha^{-1}. Application of increasing levels of Vermicompost up to 6 t ha^{-1} significantly increased length and width of the fruits, number of pickings in okra and it was statistically at par with 9 t ha^{-1}. In radish, fertilizer application up to 60:30:30 kg N, P and K ha^{-1} significantly increased net return and B:C ratio whereas Vermicompost application up to 6 t ha^{-1} applied to okra significantly increased net return and B : C

Table 1. Effect of integrated nutrient management on yield and yield attribiutes of okra and radish (q ha^{-1})

Treatments	Okra								Radish					
	NOP	FW (g)	FL (cm)	FD (cm)	FY/ Plot	FY/ q ha^{-1}	NR Rs.	BC	RL (cm)	RW (cm)	RW (g)	RY q ha^{-1}	NR Rs	B:C
V_0	7.2	6.6	6.59	0.95	6.14	68.26	46594	2.14	17.30	3.47	111.76	161.86	37734	3.49
V_1	7.9	8.3	8.27	1.17	7.69	85.49	59323	2.25	18.93	3.79	139.30	189.47	46016	4.25
V_2	8.4	9.1	9.12	1.31	8.45	93.92	63252	2.06	20.05	3..95	158.72	208.88	51840	4.79
V_3	8.6	9.4	9.44	1.35	8.78	97.50	62342	1.77	20.14	4.03	162.01	212.35	52882	4.89
SEm±	0.19	0.18	0.18	0.02	0.17	1.93	5543.9	0.20	0.38	0.07	5.35	5.53	4762.19	0.43
CDat5%	0.55	0.54	0.54	0.06	0.50	5.58	5586.90	0.21	1.09	0.22	15.47	15.99	4799.04	0.44
F_0	6.9	6.8	6.82	0.97	6.35	70.50	43217	1.59	17.82	3.55	111.57	166.51	39127.0	3.61
F_1	7.8	7.8	7.81	1.13	7.25	80.56	52461	1.88	19.05	3.80	139.94	189.93	46155.0	4.26
F_2	8.6	9.2	9.19	1.30	8.54	94.87	66077	2.33	19.72	3.92	154.31	204.31	50469.0	4.66
F_3	8.8	9.6	9.61	1.36	8.93	99.29	69755	2.41	19.84	3.96	160.97	211.81	52719.0	4.87
Sem±	0.19	0.18	0.18	0.02	0.17	1.93	5543.90	0.20	0.38	0.07	5.35	5.53	4762.19	0.43
CD at 5%	0.55	0.54	0.54	0.06	0.50	5.58	5586.90	0.21	1.09	0.22	15.47	15.99	4799.04	0.44

NOP = Number of picking, FW= Fruit weight, FL= Fruit length, FD= Fruit diameter, FY= Fruit yield, NR= Net return, BCR= Benefit cost ratio, RL= Root length, RW= Root width, RY= Root yield

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ratio of succeeding radish and okra radish crop sequence. The increase in the yield with the application of Vermicompost might be due to the fact that Vermicompost application significantly increased the total number of fruits and increased weight of fruit. Vermicompost provide adequate supply of macro and micronutrients to the metabolic activities of plants. Indirectly it increases the photosynthetic activities of plants and ultimately number of picking increased which improved the yield of okra. These findings are in agreement to those reported by Senthil and Sekar (1998) in okra and Kalambasa et al. (1998) in radish.

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