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NITROGEN MANAGEMENT THROUGH FERTIGATION SCHEDULING IN OKRA [*ABELMOSCHUS ESCULENTUS* (L).MOENCH.]

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ABSTRACT:

During summer 2007-08 the investigation was taken up at PDC, SDAU, Sardarkrushinagar (North Gujarat) on "Fertigation scheduling in okra [*Abelmoschus esculentus* (L). Moench.]." Nine treatment combinations involving three levels of N (100, 80 and 60 % RDN) and three intervals of nitrogen application through drip irrigation (one, two and three week's) along with control (farmers practices) were tested in randomized block design replicating four times. The soil of experimental field was loamy sand, low in organic carbon , medium in available P and K. Fertigation of 100% RDN standing at par with 80% RDN, brought significant improvement in plant height, number of branches per plant, length and girth of fruit at each picking and number of fruits per plant. Fertigation with 60% RDN was found as good as that of farmers practice. In case of fruit yield, fertigation of 100% RDN ranked at top recording significantly highest yield but it remained at par with 80% RDN. The fruit yield was increased linearly with increase in levels of N from 60 to 100 %. Fertigation of 60% N realized equal yield as that obtained under farmers practice. Among the intervals of fertigation, one week interval was found superior registering higher values of plant height, number of branches per plant, length and girth of fruit at each picking and number of fruits per plant. Similarly one week interval fertigation achieved highest fruit yield (7283 kg/ha) which was 12.23 and 14.51 % higher than two and three weeks interval. From economic point, fertigation of 100% RDN at weekly interval was found more profitable than rest of the treatments. Thus, fertigation enhanced yield and profit over farmers practice.

KEY WORDS: *Fertigation, Okra, Nitrogen*

INTRODUCTION:

"Green revolution" is one of the greatest successes achieved by our country, however, even after attaining self-sufficiency in food grains; India still faces the challenge of malnutrition. Malnutrition results from a combination of several factors, lower intake of vegetables being one amongst them. It is universally accepted that vegetables are rich and comparatively cheaper sources of proteins, carbohydrates, vitamins, minerals and dietary fibers. Hence, in India, nutritional security can be achieved only when enough vegetables are produced and

consumed. India is second largest producer of vegetables in the world. Annual vegetable production is 93.92 million tones realized from 6.25 million hectares of land. India has traditionally been the largest producer of okra in the world. The world's total production of okra is 4.90 million tonnes of which India alone accounts for about 71 per cent. India produces around 3.5 million tonnes from 0.36 million hectares of land with productivity of 9.72 t ha^{-1}. Okra is one of the important fruit vegetable crop of Gujarat covering 41502 hectares areas with the production of 365863 M.T. during the year 2007-2008. In North Gujarat, Banaskantha rank first in area (3100 ha) and production (35650 M.T.) during the year 2007-08. High yielding and input responsive varieties possessing superior quality fruits are available in the country but their production potential has remained unrealized mainly due to inefficient system of irrigation and fertilizer application along with low use efficiency.

In Gujarat, total 48068 ha area covered under drip irrigation system during 2007-08. Wherein Banaskantha, Gandhinagar, Kachchh, Mehsana, Patan and Sabarkantha districts occupied 717, 447, 2369, 663, 517 and 3520 ha area, respectively. Fertigation is the application of water-soluble solid/liquid fertilizer uniformly and more efficiently directly in the root zone, which tends to fertilizer saving as it is possible to have a control through drip irrigation system. Besides this, fertilizers can be supplied to the crop in amount, forms and at times when crop is needed. Liquid fertilizers are more suitable for fertigation but they are too expensive in comparison to solid fertilizers. Therefore, commercially available completely soluble solid fertilizers are used. Time interval for application of fertilizer along with its quantity is required to be determine to harvest potential yields of this crop during summer season under drip irrigation system. Meagre information is available on these aspects so far as North Gujarat is concerned. Therefore, the present study was carried out on "Fertigation scheduling in okra [*Abelmoschus esculentus* (L). Moench.]." An experiment was conducted at Plasticulture Development Center, Regional Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, during summer season of 2007-08 with following objectives.

Objectives:

(1).To find out optimum dose of nitrogen for okra crop as fertigation. (2). To determine optimum scheduling for application of nitrogen as fertigation. (3). To workout economics

MATERIALS & METHOD:

A field experiment was conducted at Plasticulture Development Center, Regional Research Station, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, during summer season of 2007-08. The soil was loamy sand in texture, low in available nitrogen and

available phosphorus and high in available potash. Nine treatment combinations involving three levels of Nitrogen (N1: 100% RDN, N2: 80% RDN, and N3: 60% RDN), three interval for application of Nitrogen levels (T1: 1 week interval,T2: 2 week interval and T3: 3 week interval) were tested in Randomized Block Design with four replications. The seed of Okra variety Gujarat Okra-2, developed during 1999 by Vegetable Research Scheme, Gujarat Agricultural University, Anand, was sown in the last week of February, in paired rows opened with the help of pick axe as per row spacing (*i.e.,* 30 cm between two rows and 60 cm between two pairs).Full dose of phosphorus 60 kg/ha and 30 per cent nitrogen were applied before sowing as basal dose under drip irrigation system and remaining quantity of nitrogen was applied as fertigation.

RESULTS & DISSCUSSION:

The results revealed that plant height, number of branches per plant, length and girth of fruit at first, middle and last picking and number of fruits per plant were significantly higher due to application of nitrogen through drip system at 100 per cent RDN but it was at par with treatment receiving 80 per cent RDN through drip system. More or less equal values of all these characters were recorded under control (Farmers practice) as recorded in application of 60 per cent RDN through drip. Fruit yield of okra increased with an increase in application of nitrogen from 60 to 100 per cent RDN as fertigation. Significantly the higher fruit yield (6888 kg/ha) was registered under 100 per cent RDN applied as fertigation, but it was at par with 80 per cent RDN (6374 kg/ha). Application of 100 per cent RDN as farmer's method produced statistically equal yield as produced in 60 and 80 per cent RDN when applied through drip. The results obtained in the present study are in accordance with results reported by Kadam *et al.* (2006) and Patel (2007).

Application of N at an interval of one week through drip recorded higher values of plant height, number of branches per plant, length and girth of fruit at first, middle and last picking and number of fruits over two and three week interval of N application as well as band application in check basin method of irrigation. Significantly the highest fruit yield was recorded with one week interval of N application as fertigation (7283 kg/ha). Two and three week interval of N application recorded lower fruit yield than that of one week interval which was 6060 kg/ha and 5832 kg/ha, respectively. Frequent application of nitrogen through drip proved its superiority over its band application in conventional method of irrigation with respect to fruit yield per hectare. These results are in conformity with findings of those reported by Patel (2007). In fertigation, due to synchronization of water and nutrient supply with the crop demand, both water and fertilizer use efficiencies are improved and the adverse

impact of over fertilization may be avoided. Besides this, on coarse textured sandy soils leaching of nitrogen can be avoided.

Application of 100 per cent RDN through drip system at an interval of one week recorded maximum net profit of (Rs.53958 ha^{-1}) and BCR value of (1 : 2.31), which was closely followed by application of 80 per cent RDN at an interval of one week as a fertigation (Rs.50,813 ha^{-1}) and BCR value of (1 : 2.22).

CONCLUSION:

On the basis of one year experimentation it can be concluded that in drip irrigation system, for securing maximum fruit yield of okra (Gujarat Okra-2) along with higher net realization, crop should be fertilized with 80 per cent of RDN (96 kg N/ha) to applied at an interval of one week in six equal split through drip system as fertigation starting from 13 days after sowing.

Alternatively, even 60 per cent of RDN applied at an one week interval in four equal split through drip system as fertigation can produce higher fruit yield of okra as compared to 100 per cent RDN applied in check basin method of irrigation (50 % basal + 50 % at 30 DAS and starting of flowering in two equal split).

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Table: 1. Growth, yield attributes, yield and economics of okra as influenced by different treatments.

Treatment	Plant height (cm)	No. of branches/ plant	Length of fruit (cm)			Girth of Fruit (cm)			No. of Fruits per plant	Fruit yield (Kg/ha)	Net realization (Rs./ha)
			First	Middle	last	First	Middle	last			
Nitrogen levels (N)											
N_1 : (100 % RDN)	126.3	3.38	13.4	14.7	15.1	4.45	4.58	4.82	11.4	6888	45943
N_2 : (80 % RDN)	120.6	3.12	13.1	14.4	15.0	4.41	4.50	4.64	10.8	6374	41328
N_3 : (60 % RDN)	105.2	2.47	12.1	13.3	13.9	4.01	4.03	4.01	9.6	5913	37161
S.Em.±	3.54	0.11	0.31	0.31	0.31	0.09	0.08	0.09	0.37	263.01	-

C.D. at 5 %	**10.34**	**0.31**	**0.91**	**0.91**	**0.91**	**0.26**	**0.24**	**0.27**	**1.10**	**767.72**	**-**
Time of Application (T)											
T_1 : (One week interval)	129.6	3.35	13.4	14.7	15.2	4.33	4.58	4.90	11.8	7283	49927
T_2 : (Two week interval)	118.1	3.02	13.0	14.3	15.0	4.33	4.41	4.44	10.6	6060	38328
T_3 : (Three week interval)	104.5	2.59	12.1	13.4	13.8	4.21	4.12	4.13	9.6	5833	36177
S.Em.±	3.54	0.11	0.31	0.031	0.31	0.09	0.08	0.09	0.37	263.01	-
C.D. at 5 %	**10.34**	**0.31**	**0.91**	**0.91**	**0.91**	**0.26**	**0.24**	**0.27**	**1.10**	**767.72**	**-**
Control Vs. Rest	98.3	2.10	10.1	10.2	11.1	3.78	3.60	3.78	8.3	5471	37108
S.Em.±	5.61	0.18	0.52	0.53	0.55	0.15	0.14	0.16	1.10	462.32	-
C.D. at 5 %	11.51	0.37	1.08	1.09	1.13	0.31	0.30	0.33	2.27	948	-
N x T	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	-
C.V. (%)	**10.46**	**12.39**	**8.36**	**7.68**	**7.41**	**7.27**	**6.49**	**7.26**	**12.30**	**14.25**	**-**