GAU Res. J. 1990. 15 (2) : (1-5)

Effect of Nitrogen and Phosphorus Levels on Growth and Yield of Onion (*Allium cepa* L.) Cultivar Pusa Red

J. J. Patel and A. T. Patel

Regional Research Station, Gujarat Agricultural University, Sardar Krushinagar

ABSTRACT

A Field experiment was laid out in rabi seasons of three years (1979-81) with a view to find out t optimum dose of nitrogen and phosphorus for obtaining maximum yield of onion bulbs. The treatme combinations comprised of five levels of nitrogen (0, 30, 60, 90 and 120 kg/ha) and three of phosphor (0,30 and 60 kg/ha) were evaluated in randomised block design replicated four times in all seasons. T results revealed that the differences in yield of bulbs due to levels of nitrogen were found to be significar However, it remained unaffected by varying levels of phosphorus. The nitrogen dose of 100 kg/ha w found to be the optimum for securing high yield of onion bulb per hectare.

(Received on 17th March, 198

INTRODUCTION

Essentially onion occupies a unique position in medical prescriptions, being used for curing of number of diseases like cough, jaundice, phytoncides etc. Onion as an essential oil which is used in killing bacteria and protozoa. Highly pungent types of onion are used for manufacturing the savce, canned soups etc.

Onion is an important vegetable crop grown throughout India in all types of soils. Many research workers have reported that the actual amount and the type of fertilizers required depend upon soil type, climate and also variety of the crop. An onion yielding 100 quintals per hectare removes about 30 kg of nitrogen from the soil. Roy and Chaudhary (1950) suggested an application of 40 kg N/ha when gave the best results in respect of yield of cauliflower. Raza and Shaikh (1972) observed that the onion required 60 kg N/ha for getting higher yield of bulbs/ha. The experiments conducted by Rahman *et al.* (1978) and Balasundaram *et al.* (1983) at various places indicated that the higher onion bulbs production was associated with nitrogen and potash applications. The moderate response was obtained by the application of phosphorus (Balasundaram *et al.*, 1983).

MATERIALS AND METHODS

The field experiments were conducted in san loam soil at the Vegetable Research Farm, Gujar Agricultural University, Sardar Krushinagar duri rabi seasons of the years 1979 to 1981 to evalua 15 combinations comprising of five levels nitrogen (0, 30, 60, 90 and 120 kg N/ha) and thr levels of phosphorus (0, 30 and 60 kg P_2O_5/h Site was changed every year. The fertility status the experimental site during each year in respect available nitrogen was 260.0, 225.5 and 275 kg/ha during 1979-80, 1980-81 and 1981-82 yea respectively while available phosphorus was 52. 58.4 and 67.5 kg/ha and available potassium w 369.5, 336.0 and 322.6 kg/ha respectively. Tl trial was laid out in a randomised block design wit four replications. The net plot size was 4.32 m Four week old seedlings were transplanted at 15 c × 15 cm spacing. The entire quantity of P_2O_5 an half the dose of N were applied as a basal dressing i the form of superphosphate (single) and amoniu sulphate respectively. Remaining half the quantit of nitrogen was given 45 days after transplanting i the form of urea. Ten plants were tagged in eac treatment plot for recording the ancillar observation. The crop in all received 10, 12 and 1 waterings in the years 1979, 1980 and 1981 in rab

on, respectively. The bulbs of onion variety
red from net plots were dug out, dried in the
for 21 days and weighed. The data were
ected to statistical analysis as per Panse and
natme (1967).

RESULTS AND DISCUSSION

The bulb yield data (Table-1) indicated
eased yield with increase in dose of nitrogen
n 0 to 90 kg/ha. The differences in yield of
os due to nitrogen levels were found to be
ificant in all the three years as well as in pooled
lts.

The maximum bulb yield of 294.9 q/ha was
ained with 90 kg N/ha which was significantly
erior to rest of the levels. These results are in
eement with those reported by Rahman *et al.*
78) and Balasundaram *et al.* (1983). There was
difference in yield between 90 and 120 kg N/ha.
e response of nitrogen was guardratic and was
best fitted to curves (Fig.1) defined by equations as indicated below :

$$Y = a + bx + cx^2$$
$$= 128.89 + 3.11\ x + -0.015X^2$$

Where Y = Expected yield in q/ha at X unit of nitrogen

X = Unit of nitrogen (one unit = one kg of nitrogen)

The computed (pooled data) economic optimum dose of nitrogen was 100.13 kg/ha with corresponding onion bulb yield of 297.11 q/ha.

The results further revealed that the differences in yield of onion bulbs were not found to be significant due to levels of phosphorus in all the years of investigation as well as in pooled data also. The non-significant effect of P fertilization is attributed to medium to high status of the soil for available phosphorus.

An interaction (N × P) was found to be non-significant in individual year as well as in pooled analysis (Table 2).

BLE 1

fect of nitrogen and phosphorus levels on yield (q/ha) of onion bulbs.

reatments	*Year*			*Mean*
	1979	*1980*	*1981*	
N_0	80.44	42.64	267.59	130.22
N_{30}	121.13	75.82	424.68	207.21
N_{60}	127.51	126.84	534.88	263.08
N_{90}	138.31	162.01	583.41	294.88
N_{120}	130.78	206.41	535.88	291.09
S. Em.	19.10	19.68	47.43	8.08
C.D. at 5%	54.70	56.69	135.42	22.62
P_0	114.69	127.37	455.51	232.53
P_{30}	115.91	122.98	493.21	237.37
P_{60}	128.30	118.41	479.75	242.99
S. Em.	14.90	15.28	36.81	6.26
C.D. at 5%	N.S.	N.S.	N.S.	N.S.

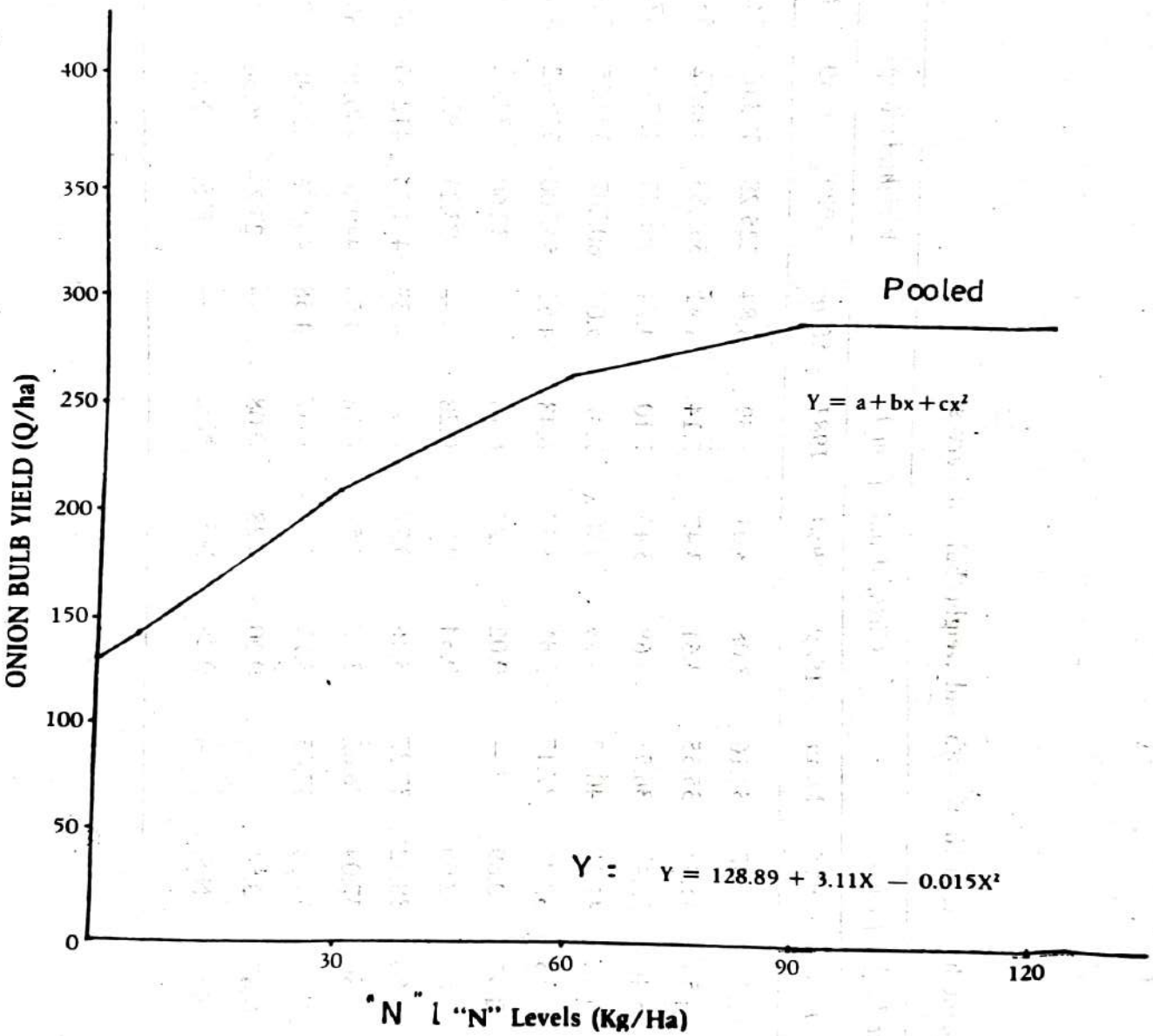


Fig. 1. Response of N on onion bulb yield

TABLE 2

Effect of N and P levels on plant height, girth of bulb and weight/bulb at harvest.

Treatments	Plant height (cm)				Girth of bulb (cm)				Weight/bulb (g)			
	1979	1980	1981	Mean	1979	1980	1981	Mean	1979	1980	1981	Mean
N_0	34.50	32.93	35.07	34.16	3.08	3.04	3.39	3.84	225.28	173.67	340.00	246.31
N_{30}	36.35	34.53	35.87	35.55	3.61	3.47	6.14	4.41	363.83	346.92	539.58	416.78
N_{60}	36.05	35.40	37.47	36.51	3.69	3.43	7.10	4.74	596.83	477.00	676.58	553.47
N_{90}	40.84	39.40	41.33	40.52	3.93	3.90	7.37	5.07	607.07	593.75	741.25	647.36
N_{120}	38.70	35.53	37.27	37.17	3.81	3.37	6.48	4.55	537.00	520.42	680.83	579.42
S. Em.	1.06	0.57	0.69	—	0.02	0.29	0.10	—	32.60	34.06	69.29	—
C D at 5%	3.03	1.63	2.00	—	0.34	0.83	0.28	—	93.25	97.43	172.21	—
P_0	37.98	35.80	38.32	37.37	3.46	3.27	6.45	4.39	451.35	412.35	678.35	514.15
P_{30}	37.45	35.36	37.04	36.62	3.67	3.54	6.56	4.59	440.40	430.30	691.25	520.65
P_{60}	37.78	35.12	38.24	37.05	3.75	3.51	6.47	4.58	452.26	424.40	608.75	495.14
S. Em.	0.82	0.67	0.54	—	0.10	0.28	0.08	—	25.25	26.38	46.70	—
C D at 5%	N.S.	N.S.	N.S.	—	0.28	N.S.	N.S.	—	N.S.	N.S.	N.S.	—

As regard to height of plant, girth of bulb and weight per bulb (Table 2), it was observed that the differences in all these characters were significant due to graded doses of nitrogen during all the three years of the investigation.

There was increase in all the characters with the increase in level of nitrogen from 0 to 90 kg/ha. The similar trend was observed in pooled mean also. An application of nitrogen above 90 kg/ha did not appear to be beneficial in enhancing the yield of bulb/ha.

The effect of phosphorus levels was found to be non-significant in all the three years in respect of plant height and weight/bulb (Table 2) while, significant differences were observed in girth of bulb only in the year 1979 indicating significant superiority of 60 kg P_2O_5/ha over that of no application (PO).

Effect of interaction N × P was not found to be significant on all these characters in any year of experimentation.

REFERENCES

Balasundram, O. S., A. Ramakrishnan, C. Kailasam and C. Paulraj (1983). Optimizing fertilizer rates for bellary onion. *Indian J. Agric. Sci.*, **53** : 1022-25.

Rahman, S., M. R. Talukdar and A. H. Miah (1978). Effect of Nitrogen, Phosphorus and Potash on the bulb size and yield of onion. *Fide Hort. Abstr.* **48** : 481 (Abstr. No. 5439).

Reza, S. H. and Z. U. D. D. Shaikh (1972). Optimum dose of N. P. K. Fertilizer for maximum production of onion. *Hort. Abstr.* **43** : 515 (Abstr. No. 617).

Roy, R. S. and B. Chaudhary (1950). Effect of fertilizers on the yield of cauliflower. *Indian J. Hort.* **8** : 70 : 72.

Panse, V. G. and P. V. Sukhatme (1967). Statistical Methods for Research Workers. I. C. A. R. New Delhi.