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Nutritional Studies in Coriander (*Coriandrum sativum* L.) I. Total Nutrient Uptake

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ABSTRACT

Studies were conducted on total nutrient uptake in coriander (*Coriandrum sativum* L.) under d ferent levels of fertilization. The results revealed that N application significantly increased the total u take of N, P, K, Ca and Mg being highest with N_{60} followed by N_{30} and N_0 level. Similarly, P applicati also increased uptake of nutrients and the total uptake was highest at P_{60}, followed by P_{30} and P_0 lev However, in most cases of P_{30} and P_{60} rates, the uptake levels were not different significantly. K applic tion did not influence nutrient uptake significantly. Thus, for fertilization of coriander an efficient co bination comes out to be N_{60}, P_{30}, K_0. The total nutrients harvested at this level were 48.95 kg N, 12.27 P, 40.76 kg K, 24.65 kg Ca and 14.71 kg Mg per hectare for the production of 1675.84 kg grain and 2501.36 straw per hectare. It also signifies that soils of this region in Gujarat are rich in potash and therefo there is no response to its application.

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INTRODUCTION

Coriander is one of the most ancient spice known to Indian cookery and probably one of the first spice to be used by mankind, having been known as early as 5000 B. C. (Shankaracharya and Natrajan, 1971). It is an important aromatic plant of India. However, information on some important basic crop needs and production functions, which can be utilized for an optimum yield and benefit of cultivators is scanty. At the same time new varieties are being developed in this crop and their response to fertilizers had to be understood to monitor fertilization. This kind of work has been done on a number of annual crops and the work cited by Singh (1976) on various vegetable crops. Aiyadurai (1966) has earlier reviewed the work on Indian spices. Th stated that work done was very meagre a very little attention has been given to thes crops. In India, information on nutrient upta by coriander is not available except some wo has been done and reported by Rao *et* (1983) from Bangalore. The present expe ment was designed to study the effect of d ferent rates of nitrogen, phosphorus a potassium on N, P, K, Ca and Mg uptake b coriander cv. Gujarat Coriander-1 so that it c be recycled to keep the soil in good health a obtain sustained production.

MATERIALS AND METHODS

The present investigation on effect of d ferent levels of N, P, and K fertilizers nitrogen, phosphorus, potassium, calcium a

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TABLE 1

Effect of different levels of NPK fertilizers on total nutrient uptake in coriander (kg/ha).

Treatment	N uptake			P uptake			K uptake			Ca uptake			Mg uptake		
	Jagudan	Deesa	Pooled	Jagudan	Deesa	Pooled	Jagudan	Deesa	Pooled	Jagudan	Deesa	Pooled	Jagudan	Deesa	Pooled
N level (kg/ha):															
N_0	25.45	25.40	25.43	6.98	7.25	7.11	26.49	22.10	24.29	11.94	11.34	11.64	7.31	7.86	7.59
N_{30}	37.38	37.03	37.21	8.41	10.00	9.21	36.68	29.37	33.02	20.28	18.89	19.58	10.01	10.68	10.34
N_{60}	47.60	47.06	47.33	9.45	12.32	10.89	38.39	31.22	34.80	24.03	23.26	23.65	12.26	13.79	13.03
S. Em. ±	0.86	1.54	0.89	0.24	0.37	0.65	0.97	1.00	0.70	0.62	0.56	0.42	0.39	0.74	0.42
C.D. at 5%	2.57	4.61	2.54	0.71	1.10	N.S	2.89	2.98	2.00	1.86	1.68	1.21	1.15	2.21	1.20
P level (kg/ha):															
P_0	35.09	34.35	34.72	7.60	8.69	8.14	32.52	24.81	28.67	17.31	16.37	16.84	9.46	10.04	9.75
P_{30}	36.68	36.34	36.51	8.48	10.18	9.33	33.86	27.81	30.83	18.97	17.37	18.17	9.66	10.80	10.23
P_{60}	38.67	38.81	38.74	8.76	10.71	9.73	35.18	30.06	32.62	19.96	19.75	19.86	10.47	11.49	10.98
S.Em. ±	0.86	1.54	0.89	0.24	0.37	0.22	0.97	1.00	0.70	0.62	0.56	0.42	0.39	0.74	0.42
C.D. at 5%	2.57	N.S.	2.54	0.71	1.10	0.63	N.S.	2.98	2.00	1.86	1.68	1.21	N.S.	N.S.	N.S.
K level (kg/ha) :															
K_0	37.01	36.33	36.68	8.25	9.79	9.02	33.62	27.14	30.38	18.94	18.10	18.52	9.67	10.57	10.12
K_{30}	36.60	36.66	36.63	8.31	9.93	9.12	34.08	27.98	31.03	18.56	17.56	18.06	10.05	10.98	10.52
S.Em. ±	0.70	1.26	0.72	0.19	0.30	0.18	0.79	0.82	0.57	0.51	0.46	0.34	0.32	0.60	0.34
C.D. at 5%	N.S.	N.S.	N.S	N.S.	N.S.	N.S.	N.S.	N.S.	N.S	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
C.V.%	8.12	14.66	11.82	9.90	12.93	11.81	9.90	12.56	11.09	11.54	10.95	11.27	13.57	23.77	19.81
Location :															
Jagudan	—	—	36.81	—	—	8.28	—	—	33.85	—	—	18.75	—	—	9.86
Deesa	—	—	36.50	—	—	9.86	—	—	27.56	—	—	17.83	—	—	10.78
S.Em. ±	—	—	0.72	—	—	0.18	—	—	0.57	—	—	0.34	—	—	0.34
C.D. at 5%	—	—	N.S.	—	—	0.51	—	—	1.63	—	—	N.S.	—	—	N.S.
C.V.%	—	—	11.82	—	—	11.81	—	—	11.09	—	—	11.27	—	—	19.91

N.S. = Non-significant.

magnesium uptake by coriander was carried out on two locations (i) Jagudan, (ii) Deesa, Gujarat Agricultural University, Sardar Krushinagar Campus under North Gujarat conditions in *rabi* season of 1984-85. The treatments were arranged in a Factorial Randomised Block Design with four replications. The treatments consisted of all combinations of three levels of nitrogen (0, 30 and 60 kg/ha), three levels of phosphorus (0, 30 and 60 kg/ha) and two levels of potash (0 and 30 kg/ha). The gross and net plot size were 4.8 x 3.0 m and 4.2 x 2.6 m respectively.

The crop was sown on November 28 at Jagudan and on November 30 at Deesa with a seed rate of 20 kg/ha, keeping 30 cm inter-row spacing. The full amounts of P in the form of single super phosphate and K in the form of muriate of potash and half of N in the form of urea were applied in the furrow and covered with the soil. The remaining half of N was top dressed in the form of urea 40 days after sowing. The crop was harvested when more than fifty per cent of the umbels on the plants had matured and turned their colour from green to yellow. Total yield of grain and straw per net plot were recorded by weighing actual quantity of seed and straw from each net plot and the yield (kg/ha) was worked out. Plant analysis for N, P, K, Ca and Mg level was performed on various plant parts for which samples of leaves were taken at harvest, straw and grain samples were drawn after threshing and roots samples were dug-out from field soon-after harvest. The air dried samples of coriander roots, straw, leaves and seeds were ground to powder form in a wiley mill for analysis. Total in Micro-Kjeldahl digests was estimated by the method of (A.O.A.C., 1980).

An acid extract of coriander roots, straw, leaves and seed samples were prepared by digestion in triacid (HNO_3 + $HClO_4$ + H_2SO_4 10:4:1) as described by Jackson (1973). These acid extracts were analysed for P, K contents by colourimetric determination as vanadomolybdo phosphoric acid yellow colour method and by flame photometric determination method respectively and Ca and Mg by Versenate. (EDTA) titration method (Jackson, 1973). The levels of different elements in various plants parts of coriander and uptake were then workedout as per procedure of estimation.

RESULTS AND DISCUSSION

The total uptake of N, P, K, Ca and Mg were influenced by different levels of nitrogen and phosphorus fertilization but potash did not bring about any significant change on total nutrient uptake by various plant parts (Table 1). The total uptake of N, P, K, Ca and Mg by coriander increased significantly with N application being highest with N_{60} followed by N_{30} and N_0 level. These findings are in complete agreement with the findings of Chaudhari and De (1972). Juvenois and Neumann (1982), Subbaiah *et al.* (1982) and Saibhi and Randhawa (1983) in various crops. The beneficial effect of nitrogen fertilizer on nutrient uptake was also stated by Russell (1973).

Phosphorus application also increased the uptake of nutrients and the total uptake was highest at P_{60}, followed by P_{30} and P_0 level. However, in most of cases levels under P_{30} and P_{60} rates were at par statistically. The reason for higher uptake of nutrients with phosphorus application could be due to favourable effect of this element on root development for which it is known (Russel and Clarkson, 1976). The results are also supported by Singh and Singh (1971) who stated that phosphorus deficiency reduced the rate and total uptake of N. The K application did not bring about any significant

TABLE 2

Effect of different levels of NPK fertilizers on total grain and straw production and nutrients harvested (kg/ha) in coriander (average for two locations).

Sr. No.	Treatment N	P	K	Total production (kg/ha) Grain	Straw	Total	Total nutrients harvested (kg/ha) N	P	K	Ca	Mg
1.	0	0	0	799.73	1100.57	1900.30	23.23	5.78	22.72	10.99	6.42
2.	0	0	30	806.05	1192.09	1998.14	23.79	6.21	22.75	10.91	7.26
3.	0	30	0	917.04	1242.68	2159.72	26.91	7.48	23.09	11.21	7.00
4.	0	30	30	975.82	1205.11	2180.93	24.18	7.17	22.97	10.94	7.59
5.	0	60	0	970.24	1329.36	2299.60	25.28	7.25	24.87	12.96	7.61
6.	0	60	30	1074.40	1357.51	2431.91	29.17	8.78	29.36	12.83	9.63
7.	30	0	0	1287.82	1902.65	3190.47	33.09	8.17	32.24	17.93	8.77
8.	30	0	30	1266.24	1795.63	3061.87	34.88	8.74	30.51	16.30	10.62
9.	30	30	0	1383.06	1954.98	3338.04	37.11	9.43	30.75	19.88	10.03
10.	30	30	30	1409.22	2179.90	3588.53	37.87	9.42	34.86	20.81	10.31
11.	30	60	0	1416.91	2199.90	3616.81	41.05	9.51	33.91	20.19	12.05
12.	30	60	30	1423.86	2267.24	3691.10	39.24	9.96	35.88	20.38	10.29
13.	60	0	0	1610.61	2447.67	4058.28	47.68	10.56	31.77	23.13	11.54
14.	60	0	30	1518.97	2415.80	3934.77	45.61	9.39	32.00	21.78	13.88
15.	60	30	0	1675.84	2501.36	4177.20	48.95	12.27	40.76	24.65	14.71
16.	60	30	30	1505.58	2388.89	3894.47	44.02	10.19	32.58	21.53	11.73
17.	60	60	0	1590.15	2550.22	4140.37	46.77	10.69	33.34	25.73	12.98
18.	60	60	30	1758.18	2655.51	4413.69	50.92	12.21	38.36	25.05	13.33

change in total nutrient uptake by various plant part. The location had significant effect on the uptake of nutrient by Coriander in respect of phosphorus and potash only. Phosphorus being higher at Deesa and potash at Jagudan which may be a reflection of variation in soil status with reference to these nutrients.

Looking to the combined effect of applied fertilizers (Table 2) an efficient combination comes out to be N_{60} P_{30} K_0 level. The nutrients harvested at this level were 48.95 kg N, 12.27 kg P, 40.76 kg K, 24.65 kg Ca and 14.71 kg Mg per hectare for the production of 1675.84 kg grain and 2501.36 kg straw per hectare.

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