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Response of Mustard to N, P and K Under Irrigated Conditions on Farmers' Fields in Mehsana District of Gujarat

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ABSTRACT

The field experiments conducted under irrigated conditions at various locations in North Gujarat indicated that the yield of mustard variety "T-59" was significantly increased with each successive increase in N levels upto 60 kg N/ha. The effectiveness of applied nitrogen further enhanced by supplementing it with phosphorus (20 as well as 40 kg P_2O_5/ha) in the form of S S P as compared to nitrogen alone. The response to potash was significant at 20, 40 and 60 kg/ha only in presence of N_{60} P_{40} combined level. The highest grain yield of mustard was obtained from the treatment N_{60} P_{40} K_{60} with Rs. 6.17 as net profit per rupee invested.

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INTRODUCTION

Of the nine oilseed crops grown in the country mustard (Brassica juncea (L) (Zern & Coss.) assumes significant in the national economy by occupying position in area and porduction next to groundnut. Due to its low inputs and water requirement as well as better remunerative prices as compared to wheat, the farmers are attracted towards its cultivation in North Gujarat. Hence the area under this crop in Mehsana district has increased under irrigated condition. The average yield of mustard for state is 1079 kg/ha and for North Gujarat is 876 kg/ha. This indicated that there is a possibility of increasing the production of mustard in North Gujarat by adopting balance use of fertilizer. With this and in view, the experiments on cultivators' fields were conducted in Mehsana district (Gujarat) to study the response of mustard to the appilcation of nitrogen, phosphorus and potash.

MATERIALS AND METHODS

The experiments were conducted on mustard variety 'T-59' in different zones on randomly selected blocks, villages, cultivators and fields in Mehsana district of Gujarat State for six years from 1980-81 to 1985-86 in *rabi* season under All India Co-ordinated Agronomic Research Project (I.C.A.R.). The whole district was divided into four agriculturally homogeneous zones by suitably combining continuous talukas, taking into consideration homogenity in respect of climate, soil, cropping system, rainfall, irrigation facilities etc. The soil samples were collected prior to conducting the experiments from 0-15 cm depth from randomly selected fields and analysed for nutrient status. Texturally the soils were sandy loam. The initial soil PH, organic carbon and electric conductivity ranged from 7.5 to 8.6, 0.11 to 0.89 per cent and 0.22 to 0.65 mmhos/cm at 25°C respectively. The available N, P and K ranged

TABLE 1

Economics and yield of mustard as influenced by levels of fertilizers.

Year	No. of trials	N 0 P 0 K 0	N 20 P 0 K 0	N 40 P 0 K 0	N 60 P 0 K 0	N 20 N 20 K 0	N 40 P 20 K 0	N 60 P 20 K 0	N 40 P 40 K 0	N 60 P 40 K 0	N 60 P 40 K 20	N 60 P 40 K 40	N 60 P 40 K 60	C.D.
1980-81	38	1248	1489	1587	1630	1622	1653	1738	1830	1851	1969	2049	2098	98
1981-82	39	1150	1368	1478	1627	1455	1607	1733	1714	1884	1980	2052	2101	41
1982-83	21	819	957	1036	1085	1053	1221	1261	1294	1363	1495	1522	1548	70
1983-84	22	833	1082	1259	1429	1102	1462	1606	1499	1633	1777	1817	1864	83
1984-85	24	613	785	982	1092	976	1172	1301	1284	1450	1540	1625	1707	55
1985-86	21	727	844	984	1111	1127	1287	1418	1426	1622	1685	1813	1875	86
Over all Mean	165	965	1154	1283	1389	1284	1445	1554	1559	1680	1787	1860	1912	31
Increase yield over control	—	—	189	318	424	319	480	589	594	715	822	895	947	—
Response per kg nutrient	—	—	9.45	7.95	7.07	7.98	8.00	7.36	7.43	7.15	6.85	6.39	5.92	—
% increase in yield over control	—	—	16.38	24.79	30.52	24.84	33.22	37.90	38.10	42.56	46.00	48.12	49.53	—
Cost of fertilizer (Rs/ha)	—	—	106.52	213.04	319.56	262.78	369.30	475.82	525.56	632.08	677.08	722.08	767.08	—
Value of additional yield (Rs/ha)	—	—	945	1590	2120	1595	2400	2945	2970	3575	4110	4475	4735	—
Net profit (Rs/ha)	—	—	838	1377	1800	1332	2031	2469	2444	2943	3433	3753	3968	—
Net profit per rupee invested	—	—	8.87	7.46	6.63	6.07	6.50	6.19	5.65	5.66	6.07	6.20	6.17	—

Sources	Price Rs/kg
Urea	2.45
S. Phosphate	1.25
M. Potash	1.35
Mustard	5.00

from 148 to 378, 8 to 59 and 150 to 650 kg/ha, respectively. The following twelve treatments were tested in a randomized block design.

T_1 - N_0 P_0 K_0	T_7 - N_{60} P_{20} K_0
T_2 - N_{20} P_0 K_0	T_8 - N_{40} P_{40} K_0
T_3 - N_{40} P_0 K_0	T_9 - N_{60} P_{40} K_{20}
T_4 - N_{60} P_0 K_0	T_{10} - N_{60} P_{40} K_{20}
T_5 - N_{20} P_{20} K_0	T_{11} - N_{60} P_{40} K_{40}
T_6 - N_{40} P_{20} K_0	T_{12} - N_{60} P_{40} K_{60}

The N, P and K were applied in the form of urea, *single superphosphate* and muriate of potash, respectively. All the phosphorus and potash, and half of nitrogen were applied by driling just before sowing of mustard and rest of the nitrogen was topdressed after about three weeks from sowing at first irrigation.

RESULTS AND DISCUSSION

The results to 185 trials presented in Table-1 indicated that the response to nitrogen application was significant at each level. It increased significantly with increasing levels of N from 20 to 60 kg N/ha. These results are in confirmity with those obtained by Roy *et al.* (1981) and Kumar (1982). The increase in yield due to 20, 40 and 60 kg N/ha over control was 19.58, 32.95 and 43.94 per cent respectively. The response in terms of per kg of nitrogen applied decreased with the increasing dose of nitrogen (Kapur *et al.*, 1984). It was 9.45, 7.95 and 7.07 kg mustard grain yield/kg of N at 20, 40 and 60 kg/ha respectively. The response was positively correlated with net profit of Rs. 838, 1377 and 1800 per hectare while negatively correlated with net profit per rupee invested as Rs. 8.87, 7.46 and 6.63 respectively. The highest net profit per rupee invested was obtained when 20 kg N/ha was applied.

The response to P application in the form of S S P was significant over corresponding N levels. The response was increased with increasing levels of P from 20 to 40 kg P_2O_5/ha. Significantly highest response (715 kg/ha) was obtained from P_{40} in presence of N_{60} with net gain of Rs. 2943/ha which was significantly superior over N_{20} P_{20}, N_{40} P_{20}, N_{60} P_{20} and N_{40} P_{40} treatments. These results are in agreement with those reported by Parkash and Verma (1981) and Shekhawat *et al.* (1972).

The response to potash was also studied. It increased the yield with increasing levels of K from 20 to 60 kg K_2O/ha, the differences being significant at each level. The increase in yield due to 20, 40 and 60 kg K_2O/ha with N_{60} P_{40} over control was 46.00, 48.12 and 49.53 per cent respectively. The net profit per rupee invested for N_{60} P_{40} K_{20}, N_{60}, P_{40}, K_{40} and N_{60} P_{40} K_{60} was Rs. 6.07, 6.20 and 6.17 respectively.

It could be concluded that the highest grain yield of mustard was obtained when fertilized at the rate of 60-40-60 kg NPK/ha, where phosphorus was applied in the form of S S P.

REFERENCES

Kumar, P. R. (1982). Strategy for rapeseed, mustard production. *Indian Fmg.* **32** (8) : 43-47.

Prakhash Vir and B. S. Verma (1981). Effect of nitrogen, phosphorus and row spacing on yield, yield attributes and oil content of rainfed mustard. *Indian J. Agron.* **29** (1) 37- 41.

Roy, V.; Maiti, S. and Chatterjee, B. N. (1981). Growth analysis and fertilizer response of varying Indian mustard *Indian J. Agric. Sci.* **51** (3) : 173-180.

Shekhawat, G. S.; Mehta, U. R. and Bhandari, B. V. C. (1972). A note on response of mustard to NPK fertilizers in South Western Rajasthan. *Indian J. Agron.* 17 : 367-68.