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Effects of NP Combinations on the Seed Yield and Oil Contents of Mustard (*Brassica juncea*)

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Abstract: The field experiment was conducted at Student Farm, Sindh Agriculture University, Tandojam, Pakistan Three varieties (Early Raya, P-53/48-2 and S-9) and six NP combinations (Control, 50-15, 75-30, 100-45, 125-60 and 150-75 Kg NP ha⁻¹) were applied to observe their effect on mustard seed yield and oil content. The results revealed highly significant differences for yield and oil content of varieties, NP levels and their interactions. NP fertilizer at the rate of 150-75 Kg ha⁻¹ significantly increased all the crop traits. Among the varieties, S-9 produced higher seed yield whereas, oil content was higher in Early Raya.

Key words: Brassica, varieties, NP, yield, oil

INTRODUCTION

Despite of fast increasing demand for edible oils in the country, the production has been stagnant which meets only about 35% of total requirement. To boost up the present level of mustard, it become necessary to regulate proper package of technology besides other agronomic factors. The balance application to major nutrients like N and P plays vital role in the stability of oil production with the introduction of high yielding varieties of mustard because our soils are deficient in nitrogen and phosphorus due to continuous growing of various crops. The nitrogen is major nutrient element for improving of phosphorus which provide lush green color to the plant due to increase in chlorophyll, whereas, phosphorus is necessary for young and fast growing tissues and perform a number of functions related to growth, development, photosynthesis and utilization of carbohydrates. Reauz *et al.*^[1] reported that fertilizer containing nitrogen and phosphorus gave a larger increase in the yield of rape than wheat. Dembinaki *et al.*^[2] cited that phosphorus dose upto 180 kg ha⁻¹ increased yield and oil content in winter rape. Bhan^[3] reported that the average seed production was high when 40-80 kg nitrogen, 30-60 kg phosphorus and 40 kg potassium per hectare were applied. Singh and Rathi^[4] reported that increase in nitrogen significantly increased the crop yield. Mudhalkar and Ablawat^[5] reported that N significantly increased the growth and yield components with highest rate of NP combinations. Ali and Rehman^[6] reported that increasing rates of N upto 160 kg ha⁻¹ progressively increased the growth and yield components. Scarisbrick

et al.^[7] reported that all the growth and yield components were increased with increasing nitrogen 100, 130 and 200 kg ha⁻¹. Keeping in view the above facts, the present study was carried out to determine the impact of various combinations of NP on the seed yield and oil content of various mustard varieties under Tandojam conditions.

MATERIALS AND METHODS

The field experiment was laid down to study the effect of NP combinations on the seed yield and oil content of mustard at Sindh Agriculture University, Tandojam, Pakistan. The experiment was arranged in Randomized Complete Block design, replicated four times. The treatments were: NP combinations (kg ha⁻¹) = 0-0, 50-15, 75-30, 100-45, 125-60 and 150-75 and varieties = Early Raya, P-53/48-2 and S-9.

The row to row and plant to plant distance was maintained at 45-15 cm, respectively. The full dose of phosphorus with half dose of nitrogen were applied at the time of sowing whereas, the remaining nitrogen was applied into two equal splits at flowering and grain formation respectively. All the required practices were made uniformly. Soxhlet apparatus determined the oil content.

RESULTS AND DISCUSSION

The results demonstrated that pods per plant, seeds per pod, seed yield and oil content percentage were highly significantly affected by varieties, NP combinations and their interactions. Maximum yield

Table 1: Mean yield, yield contributing traits and oil content of mustard varieties as affected by various combinations of NP fertilizer and their interaction

Pods per plant				
NP Fertilizer combination (Kg ha ⁻¹)	Varieties			Mean for Fertilizer
	Early Raya	P-53/48-2	S-9	
0 - 0	290.20	240.20	350.18	293.53
50 - 15	350.00	300.12	400.20	401.88
75 - 30	400.15	345.17	460.33	401.88
100 - 45	430.20	365.20	485.15	426.85
125 - 60	485.90	399.20	530.30	471.80
150 - 75	495.15	400.15	550.00	481.77
Mean for varieties	408.60	341.67	462.69	-----
	Fertilizers (F)	Varieties (V)	F x V	
S.E.	4.96	3.05	8.59	
LSD(5%)	9.97	6.05	17.26	
LSD(1%)	13.29	9.39	23.02	
Seeds per pod				
NP Fertilizer combination (Kg ha ⁻¹)	Varieties			Mean for Fertilizer
	Early Raya	P-53/48-2	S-9	
0 - 0	7.35	5.45	8.30	7.03
50 - 15	8.35	7.30	10.00	8.55
75 - 30	8.90	7.75	10.35	9.00
100 - 45	9.00	7.90	10.70	9.20
125 - 60	9.20	8.40	11.00	9.53
150 - 75	9.50	8.63	11.15	9.76
Mean for varieties	8.72	7.57	10.25	-----
	Fertilizers (F)	Varieties (V)	F x V	
S.E.	0.11	0.08	0.19	
LSD(5%)	0.23	0.16	0.39	
LSD(1%)	0.30	0.21	0.52	
Seed yield (kg ha⁻¹)				
NP Fertilizer combination (Kg ha ⁻¹)	Varieties			Mean for Fertilizer
	Early Raya	P-53/48-2	S-9	
0 - 0	1000.15	700.30	1100.20	933.55
50 - 15	1320.10	880.50	1600.00	1260.20
75 - 30	1390.00	900.35	1685.50	1325.28
100 - 45	1483.15	990.30	1730.00	1401.15
125 - 60	1500.00	1000.00	1800.00	1433.33
150 - 75	1590.40	1100.15	1820.10	1503.55
Mean for varieties	1377.30	928.60	1622.63	-----
	Fertilizers (F)	Varieties (V)	F x V	
S.E.	35.43	25.05	61.37	
LSD(5%)	71.22	50.36	123.35	
LSD(1%)	94.96	67.14	164.47	
Oil content (%age)				
NP Fertilizer combination (Kg ha ⁻¹)	Varieties			Mean for Fertilizer
	Early Raya	P-53/48-2	S-9	
0 - 0	34.00	33.00	32.10	33.03
50 - 15	37.80	37.30	36.00	37.03
75 - 30	38.20	38.00	37.15	37.78
100 - 45	39.98	39.56	38.85	39.46
125 - 60	41.00	40.00	39.00	40.00
150 - 75	43.50	42.30	40.15	41.98
Mean for varieties	39.08	38.36	37.21	-----
	Fertilizers (F)	Varieties (V)	F x V	
S.E.	0.90	0.70	1.71	
LSD(5%)	1.90	1.40	3.44	
LSD(1%)	2.65	1.87	4.59	

contributing traits were recorded in variety S-9 except oil content, which was higher in Early Raya.

Further data demonstrated that, both yield contributing traits and oil content progressively increased with increase in NP levels and were maximum with highest NP combination (150-75 kg ha⁻¹). Furthermore, results demonstrated that variety S-9 with 150-75 NP combination significantly displayed satisfactory performance for all the yield traits except oil content which was maximum in variety Early Raya with same NP combination (Table 1).

Similarly, Ali and Rehman^[6] reported that increasing rates of N upto 150 and 160 kg N ha⁻¹ progressively increased all the growth and yield traits. Kandil^[8] observed that highest NP application significantly increased plant height, dry matter, pod number, seed yield and oil content. Mondal and Ghaffar^[9] noted great improvement in growth and yield traits with increasing NPK rates. Singh and Rathi^[4] observed highest yield with 160 kg ha⁻¹. Dembinaki *et al.*^[2] reported that P upto 180 kg ha⁻¹ increased the yield and oil content. It is concluded that varieties S-9 and Early Raya can be successfully grown with the application of 120-60 or 150-75 NP Kg ha⁻¹ for seed and oil potential.

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