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Integrated nutrient management on the productivity of *Brassica* spp. and its residual effect on the succeeding green gram crop

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ABSTRACT

To evaluate the direct effect of manuring on the productivity of different varieties of rapeseed and mustard and its residual effect on succeeding green gram crop a field experiment was conducted at the Bidhan Chandra Krishi Viswa Vidyalaya during 2002–03 and 2003–04. The experiment was laid out in a Factorial Randomised Block Design with four varieties of rapeseed and mustard and four manurial treatments. The green gram (variety-B-1) was grown after rapeseed and mustard without fertilizer application. Results revealed that mustard varieties showed vigorous growth and long duration (110 days) as compared to rapeseed variety (90 days duration). Higher number of siliqua/m^2 (33.1%), heavy seed weight (99.4%) and grain yield were recorded in mustard varieties than that of rapeseed variety whereas number of seed/siliqua (25.13) and oil content (38.11%) were more in rapeseed as compared to mustard (12.74, 37.85%, respectively). Maximum number of siliqua/m^2 (4154), 1000 grain weight (4.99 g), grain yield (1.48 t/ha), net economic return (Rs. 21082/ha) and return per rupee investment (Rs. 1.98) was obtained when mustard variety kesari-100 received 100% N/ha as straight fertilizer. Maximum grain yield of green gram was recorded (127 kg/ha) where mustard variety Swarna received 25% N as straight fertilizer along with 75% N as FYM.

Rapeseed and mustard are two important edible oilseed crop of Indo-Gangetic plains which occupies about 23% of total oilseed area and contributes 25% of total oilseed production of the country. Though the productivity of *Brassica* oilseed spp. is increasing gradually but it is for below the International level of 3.9 t/ha as obtained in Germany. One of the reasons for low yield is the lack of physiologically efficient plant type. Besides improved variety, maximization of yield is not possible with the application of inorganic fertilizers only. Organic manure is required both in terms of soil health and proper utilization of inorganic fertilizers.

With this idea is view the present experiment has been conducted to evaluate the yield potentiality of different varieties of rapeseed and mustard when fertilized with inorganic and in conjunction with organic manure.

MATERIALS AND METHODS

Experiment was conducted for two years (2002–03) and (2003–04) on a sandy loam entisol neutral soil having 0.071% N, 0.78% organic carbon, 24.26 kg available P_2O_5/ha and 178-34 kg/ha available K_2O at the Bidhan Chandra Krishi Viswavidyalaya located at 22.93^{0}N latitude and 88.53^{0}E longitude at an altitude of 9.75 m rear above sea level receiving 1500 mm rainfall per

annum. The experiment was laid out in a factorial randomized block design with two levels of factor (*Factor A*-three mustard varieties Swarna, Sarasi Swarna and Kesari – 100 and one rapeseed variety-B-9 (Benoy) and *Factor-B*-Four levels of manuring viz. F_1=100% Nitrogen through straight fertilizer, F_2=25% N as straight fertilizer and 75% N through FYM, F_3=50% N through straight fertilizer + 50% N through FYM and F_4=75% N as straight fertilizer + 25% N through FYM.) in three replicates in 4 m × 5 m plot size. All the plots of rapeseed and mustard were received 80 kg N, 40 kg P_2O_5 and 40 kg K_2O/ha. Nutrient content of applied FYM was 0.42% N, 0.20% P_2O_5 and 0.45% K_2O. After mustard green gram was sown without any fertilizer application. Rapeseed and mustard crops were sown sometimes on 27 October in both 2002 and 2003. Rapeseed variety was harvested sometimes first week of February and that of mustard on 15 February in both the years. Weeding was done twice manually. Total two irrigations were given at 30 and 60 days after sowing to mustard crops. Leaf Area Indices (LAI) was calculated as per the method suggested by Radford (1967). Green gram was sown just after harvest of mustard in both the years.

RESULTS AND DISCUSSION

Effect of variety on rapeseed and mustard crop –

In general the mustard varieties were more vigorous and long duration (110 days) than rapeseed variety (96 days). Higher number of (Table 1) siliqua/m^2 (33.1%) and heavy (Table 1) seed weight (99.4%) were recorded in mustard varieties than that of rapeseed variety (B-9) where as number of seed/siliqua (Table 1) in B-9 variety was almost double (25.13) as compared to mustard variety (12.74). Pradhan *et al.* (1994) reported that RW-351 had higher number of siliqua/plant (230.39) than B-9 (94.23) and B-85 (175.54) while B-9 had higher number of seeds/siliqua (20.17) than B-85 (10.76) and RW-351 (10.76). Influence of yield components reflected on seed yield of oilseed. Maximum seed yield (Table 2) of mustard varieties (1.18 to 1.30 t/ha) was recorded as compared to rapeseed variety (1.08 t/ha). The percentage of oil in oilseed of B-9 was slightly (Table 2) higher (38.11%) as compared to mustard varieties (37.73 to 38.04%). treatment differences due to variety were significant. Both net return per hectare and return per rupee investment were maximum in mustard variety, Swarna (Rs. 8,880.9/ha and Rs. 1.81, respectively). Pradhan *et al.* (1994) reported similar trend of results.

Effect of manuring on rapeseed and mustard crop

Rapeseed and mustard varieties when fertilized with 100% N as straight fertilizer (Table 1 & 2) influenced to produce maximum number of siliqua/m^2 (3895), number of seeds/siliqua (16.29), 1000 seed weight (4.15 g) and ultimately the seed yield (1.37 t/ha) and percentage of oil in oilseed (39.92%). It was closely followed by the treatment having 75% N as straight fertilizer along with 25% N as FYM (36.40, 16.4, 4.13 g, 1.26 t/ha and 38.68%, respectively).

Effect of interaction between variety and manuring on rapeseed and mustard crop.

Maximum number of siliqua/m^2 (4154), heavy grain weight (4.99 g/100

seed) highest grain production (1.48 t/ha) seed, net return (Rs. 21082/ha) and return per rupees investment (Rs. 1.98) were recorded when mustard variety, Kesari-100 was fertilizer with 100% N as straight fertilizer and it was closely followed by that of 25% N as straight fertilizer along with 25% N as FYM (4050, 4.96 g and 1.32 t/ha, Rs. 8712/ha and Rs. 1.79, respectively).

Residual effect of manuring and variety of Brassica on the grain yield of greengram.

Maximum grain yield of green gram (Table 2) was recorded (127 kg/ha) where mustard crop variety Swarna was fertilizer with 25% N as straight fertilizer along with 75% N as FYM. Minimum yield was shown where rape and mustard crop received 100% N as straight fertilizer (90.38 kg/ha).

REFERENCE:

Radford P. J. 1967. Growth analysis formulae-their use and abuse. *Crop Sci.* **7** : 171-175.

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Table 1 Effect of variety and manurial treatments on growth and yield attributes of rapeseed and mustard (mean of 2001-02 and 2002 03)

Treatments	Plant height at 90 DAS (cm)	Dry matter accumulation (g/m^2)	LAI at 60 DAS	CGR during 75-90 DAS (g/m^2/day)	Siliquae/m^2 (Number)	Seeds/siliqua (Number)	1000 seed weight (g)
Variety (V)							
V_1-B 9	111.4	350.5	1.92	6.12	2911	25.13	2.36
V_2-Swarna	182.3	428.0	3.35	7.96	3876	11.75	4.77
V_3-Sarasi Swarna	175.6	422.5	3.28	9.64	3867	12.43	4.41
V_4-Kesari-100	187.7	495.0	3.53	9.05	3880	14.04	4.94
Mean	164.5	423.9	3.02	8.19	3641	15.85	4.12
S.Em $\pm$	1.91	6.62	0.04	0.20	0.346	0.346	0.058
C.D. (P=0.05)	5.51	18.84	0.11	0.61	0.998	0.998	0.174
Manurial Treatments (F)							
F_1-100% N as Urea	179.2	477.3	3.69	6.97	3895	16.29	4.15
F_2-25% N as Urea+75%N as FYM	171.9	387.6	2.48	8.44	3353	15.25	4.07
F_3-50% N as Urea+50%N as FYM	173.0	403.3	2.84	8.22	3569	15.50	4.12
F_4-75% N as Urea+25%N as FYM	176.4	426.9	3.39	9.16	3640	16.40	4.13
Mean	175.2	429.9	3.09	8.20	3641	15.85	4.12
S.Em $\pm$	1.91	6.62	0.04	0.20	0.346	0.346	0.058
C.D.(P=0.05)	NS	18.84	0.11	0.61	0.998	0.998	NS

Table2 ***Effect of variety and manurial treatments on yield and economics of rapeseed mustard and its residual effect on greengram yield (mean of 2001-02 and 2002-03)***

Treatments	Oilseed yield (t/ha)	Oil content (%)	Residual greengram yield (kg/ha)	Net profit (Rs./ha)	Return /Rupee Investment
Variety (V)					
V_1-B 9	1.08	38.11	92.78	5186	1.47
V_2-Swarna	1.26	38.04	110.47	7962	1.74
V_3-Sarasi Swarna	1.18	37.48	91.48	8089	1.73
V_4-Kesari-100	1.30	37.73	102.58	10981	1.77
Mean	1.21	37.84	99.32	8055	1.68
S.Em $\pm$	0.05	0.337	0.40		
C.D. (P=0.05)	NS	0.972	1.16		
Manurial Treatments (F)					
F_1-100% N as Urea	1.37	39.92	96.38	11929	1.84
F_2-25% N as Urea+75%N as FYM	1.05	35.65	110.66	5328	1.49
F_3-50% N as Urea+50%N as FYM	1.14	37.03	106.15	6938	1.65
F_4-75% N as Urea+25%N as FYM	1.26	38.68	92.24	8023	1.73
Mean	1.21	37.84	99.32	8055	1.68
S.Em $\pm$	0.05	0.337	0.40		
C.D.(P=0.05)	1.15	0.972	1.16		