Int.J.Curr.Microbiol.App.Sci (2017) *6*(2): 1343-1347

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 2 (2017) pp. 1343-1347**
Journal homepage: http://www.ijcmas.com

Original Research Article http://dx.doi.org/10.20546/ijcmas.2017.602.152

Effect of Different Nutrient Combinations on Yield and Quality of Mustard Varieties (*Brassica juncea* L.)

Samar Pal Singh[1]*, R.A. Singh[2], Vimal Raj Yadav[1], Sumit Chaudhary[1] and Amit Kumar[3]

[1]Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand-263 145, India
[2]Agronomy, N.D.U.A&T, Faizabad, U.P-224 229, India
[3]IARI, New Delhi, India
**Corresponding author*

Keywords

Mustard, Varieties, Nutrient combinations, Seed yield.

Article Info

Accepted:
22 January 2017
Available Online:
10 February 2017

A B S T R A C T

A field experiment was conducted at N.D.U.A&T, Faizabad, U.P., to assess the response of mustard varieties (*Brassica juncea* L.) to different nutrient combinations under late sown condition during winter (*rabi*) season of 2011-12. Application of 120 kg N+60 kg P_2O_5+40 kg K_2O+40 kg sulphur+5 kg Zn+0.2% Bo spray before flowering (F_5) recorded significantly higher plant height (except 30 DAS), primary branching and yield over rest of the treatments but remained at par with 120 kg N+60 kg P_2O_5+40 kg K_2O+40 kg S+5 kg Zn (F_4). However, significantly higher oil content was recorded with 120 kg N+ 60 kg P_2O_5+40 kg K_2O+40 kg S+5 kg Zn+0.2% Bo spray before flowering over rest of the treatments but remained at par with 120 kg N+60 kg P_2O_5+40 kg K_2O+ 40 kg S and 120 kg N+60 kg P_2O_5+40 kg K_2O+40 kg S+5 kg Zn. Among the different varieties, Narendra Rai-1 being at par with Vardan recorded significantly higher plant height (except 30 DAS), primary branching as well as yield and oil content over Narendra Ageti Rai- 4.

Introduction

Indian mustard (*Brassica juncea* L.) is one of the most important winter oilseed crops and India is the third largest rapeseed-mustard producer in the world after China and Canada with 11.12% of world's total production (DRMR, 2012-13). Rapeseed- Mustard is the second most important oilseed crop in India after soybean and accounts for nearly 20-22% of total oilseeds produced in the country. Mustard seed is grown with a different consumption pattern in the country, Indian mustard is mainly used for extraction of mustard oil while black mustard is mainly used as a spice (Anonymus, 2015). Improved varieties plays a crucial role in raising the seed yield of the crop. Development of HYV's of mustard has been one of the major concern of the scientists because use of the improved varieties alone accounts for 15-20% increase in productivity. This is probably because of their altered morphology which results into efficient utilization of water, nutrients and radiation. The fertilizers have played a prominent role in increasing the oil seed production, balanced fertilization is the key to achieve higher production and increase nutrient use-efficiency. Use of optimal dose of primary, secondary and micro nutrients

ensure better and sustainable yield, while correcting some of the nutrients deficiencies.

A field experiment was carried out during winter (*rabi*) season of 2011-12 at Agronomy Research Farm, N.D.U.A&T, Faizabad (U.P.). The soil of the experimental site was silt loam in texture having pH 7.9 and EC 0.33 dS/m. The organic carbon content, available N, P and K (kg/ha) of the soil were 0.32%, 180.40, 18.4, 290, respectively. The experiment was laid out in Randomized Block Design (Factorial) having 15 treatment combinations with three replications. The treatments include- three varieties- Vardan (V_1), Narendra Rai-1 (V_2), Narendra Ageti Rai-4 (V_3) and nutrient combinations (kg/ha).- 120 kg N + 60 kg P_2O_5 + 40 kg K_2O (F_1), 120 kg N + 60 kg P_2O_5 + 40 kg K_2O + 40 kg sulphur (F_2), 120 kg N + 60 kg P_2O_5 + 40 kg K_2O + 5 kg zinc (F_3), 120 kg N + 60 kg P_2O_5 + 40 kg K_2O + 40 kg sulphur + 5 kg zinc(F_4), 120 kg N + 60 kg P_2O_5 + 40 kg K_2O + 40 kg sulphur + 5 kg zinc + 0.2% Boron spray before flowering (F_5). The row to row and plant to plant spacing were maintained at 30 and 20 cm, respectively. The crop was fertilized with a uniform dose of N, P and K at 120 kg, 60 kg and 40 kg/ha, respectively. The specific quantity of S, Zn and B fertilizers were applied based on treatment at 40 kg S, 5 kg Zn/ha and 0.2 % B spray before flowering. Half dose of N along with full doses of P, K, S and Zn were applied as basal dressing. Remaining dose of N was applied through top dressing after 25-30 DAS and 0.2% B spray at before flowering. Height of the five randomly selected plants was measured with the help of meter scale from soil surface to the apex. Number of primary branches were counted from five randomly selected plant at 60, 90 DAS and at harvest and the mean values were taken. Oil content was estimated by oxford analytical new part 4000 nuclear magnetic resonance (NMR). The new part analyzer operates on the principle of NMR to determine the concentration of mobile hydrogen protein with the oil content in mustard. The harvesting of crop was done when 75% pods turned yellowish brown and moisture content in seed was around 40%.

Different nutrient combinations had significant effect on plant height at all the stages except 30 DAS (Table 1). Significantly higher plant height was recorded under F_5 nutrient combinations as compared to rest of the treatments except F_4 which was at par at 60, 90 DAS and at harvest stage of mustard crop. Minimum plant height was obtained under F_1 nutrient combinations at all crop growth stages. This might be due to adequate availability of nitrogen, phosphorus, potassium, sulphur, zinc and boron which attributed to better nutritional environment for absorption and their beneficial effect causing accelerated rate of photosynthesis, assimilation, cell division and vegetative growth and ultimately resulted in an increased plant height. These results are in close conformity with those of Rana *et al.,* (2008). The plant height not affected significantly due to mustard varieties at 30 DAS. Mustard variety Narendra Rai-1 performed significantly better than Narendra Ageti Rai-4 and remained at par with Vardan at 60, 90 DAS and at harvest stage of crop growth. The probable reason might be attributed to genetic characters of Narendra Rai-1. Similar results were also reported by Kumar *et al.,* (2000) and Chaplot *et al.,* (2012). The interaction effect of nutrient combinations and varieties had non-significant effect on plant height of mustard crop.

Different nutrient combinations had significant effect on higher number of primary branches/plant at all stages (Table 2). Significantly higher number of primary branches/plant were recorded under F_5 nutrient combinations as compared to rest of the treatments except F_4 which was at par at

60, 90 DAS and at harvest stages of mustard crop. This might be due to sufficient supply of required nutrients and soil environments under this treatment F_5.

Table.1 Plant height (cm) of mustard as influenced by nutrient combinations and varieties

Treatment	Days after sowing			At harvest
	30	60	90	
Nutrient combinations				
F_1	17.80	62.10	120.66	128.92
F_2	19.31	67.34	133.81	145.11
F_3	18.80	65.59	132.58	139.53
F_4	19.81	69.08	145.21	155.15
F_5	20.59	74.07	152.52	162.97
SEm±	0.76	2.25	4.57	5.86
CD (P=0.05)	NS	6.5	13.25	16.96
Varieties				
V_1	19.00	66.74	138.52	148.01
V_2	20.42	71.68	147.92	158.05
V_3	18.36	64.49	124.42	132.94
SEm±	0.59	1.74	3.54	4.54
CD (P=0.05)	NS	5.04	10.26	13.14
F x V	NS	NS	NS	NS

Table.2 Number of primary branches/plant as influenced by nutrient combinations and varieties

Treatment	Days after sowing		
	60	90	At harvest
Nutrient combinations			
F_1	4.87	6.55	6.57
F_2	5.49	7.37	7.39
F_3	5.27	7.09	7.10
F_4	5.87	7.88	7.90
F_5	6.16	8.28	8.30
SEm±	0.18	0.25	0.30
CD (P=0.05)	0.54	0.72	0.86
Varieties			
V_1	5.60	7.52	7.54
V_2	6.01	8.03	8.05
V_3	5.02	6.75	6.77
SEm±	0.14	0.19	0.23
CD (P=0.05)	0.41	0.56	0.67
F x V	NS	NS	NS

Table.3 Oil content (%) and Seed yield (q/ha) as influenced by nutrient combinations and varieties

Treatment	Oil content (%)	Seed yield (q/ha)
Nutrient combinations		
F_1	34.67	14.10
F_2	40.67	15.77
F_3	36.33	15.32
F_4	40.67	18.10
F_5	41.33	19.57
SEm±	1.55	0.55
CD (P=0.05)	4.48	1.59
Varieties		
V_1	39.40	16.91
V_2	40.80	17.79
V_3	36.01	15.01
SEm±	1.20	0.43
CD (P=0.05)	3.47	1.23

The availability of nutrient in adequate amount resulted sufficient formation of photosynthates, which promote the metabolic activities, accelerated cell division and formation of meristematic tissues, ultimately enhanced the number of branches. These results are in conformity with the findings of Kumar *et al.,* (2000) and Mandel and Sinha (2002). Mustard variety Narendra Rai-1 performed significantly better than Narendra Ageti Rai-4 and remain at par with Vardan at 60, 90 DAS and at harvest stages of crop growth. The similar results were also reported by Chaplot *et al.,* (2012). The interaction effect of nutrient combinations and mustard varieties had non-significant effect on primary branches/plant of mustard crop.

Oil content in mustard seed was affected significantly due to nutrient combinations (Table 3). Significantly higher oil content (41.33%) was recorded under F_5 nutrient combinations as compared to rest of the treatments except to F_2 and F_4 which were at par. Minimum oil content (34.67%) was recorded under F_1 treatment. The increased oil content with sulphur may be due to synthesis of more glucosides, which produces sulphur rich amino acids like cysteine and methionine, thioglucoside and synthesis of amino acids ultimately increased the oil content in seed. Similar results also were observed by Shankar and Meena (2015), Singh *et al.,* (2012) and Verma *et al.,* (2012).

Oil content significantly influenced due to different varieties of mustard. Mustard variety Narendra Rai-1 was recorded significantly higher oil content (40.80%) as compared to Narendra Ageti Rai-4 (36.01%), while it was at par with Vardan (39.40%) which might be due to genetic characters of varieties. These results are in accordance with Kumar (2000) and Singh (2012). Seed yield was affected significantly due to nutrient combinations and. significantly higher seed yield (19.57 q/ha) was recorded under F_5 nutrient combinations as compared to rest of the treatments except F_4 which was at par. The differences in seed yield under F_2 and F_3 treatments were found non-significant. The increase in seed yield under adequate nutrient supply might be ascribed, mainly due to the combined effect of nutrients. Higher number of siliquae/plant, more number of seed/siliqua and higher 1000-seed weight, which was the result of better translocation of photosynthates from source to sink. N+P+K+S+Zn+Bo stimulate siliquae setting, seed formation and oil synthesis in seed of mustard when use in

combination and these increases the biological, seed and stover yield of mustard. Similar findings were also reported by several workers (Verma *et al.*, 2012; Shankar and Meena, 2015 and Patel *et al.*, 2012).

Seed yield was affected significantly due to different varieties. Mustard variety Narendra Rai-1 was recorded significantly higher seed yield (17.79 q/ha) as compared to Narendra Ageti Rai-4 (15.01 q/ha) and at par with Vardan (16.91 q/ha). This might be attributed to the higher number of branches/plant, number of siliquae/plant, number of seeds/siliqua, test weight and over all vigourus growth of plant. The similar results were also reported by Chaplot *et al.*, (2012).

Thus, it can be concluded that among different nutrient combinations, F_5 treatment (120 kg N+60 kg P_2O_5+40 kg K_2O+40 kg S+5 kg Zn+0.2% Boron spray before flowering) and among varieties, Narendra Rai-1 were found to be most effective for attaining higher plant height, more primary branches/plant, seed yield and oil content in mustard crop.

References

Anonymus. 2015. Mustard seed survey report. *Religareonline.com/research/ Disclamer_rcl.html.*

Chaplot, P.C., Amita, V. and Kumar, R. 2012. Effect of balanced fertilization and agrochemcials on growth, yield attributes and yield of mustard varieties. 3rd International Agron., Con., Nov., 26-30, New Delhi, pp. 1110-1111.

DRMR (Directorate of Rapeseed and Mustard Research). 2014. Area, production and productivity of rapeseed and mustard.

Kumar, R., Singh, D. and Singh, H. 2000. Growth and yield of *Brassica* species as influenced by sulphur application and sowing dates. *Indian J. Agronomy,* 47 (3): 417-21.

Mandel, K. G. and Sinha, A. C. 2002. Effect of integrated nutrient management on growth, yield, oil content and nutrient uptake of Indian mustard (*Brassica juncea* L.) in foothills soils at eastern India. *Indian J. Agronomy*, 47(1): 109-13.

Patel, D. B., Patel, J. B. and Patel, J. A. 2012. Integrated nutrient management for higher productivity and profitability of mustard. Extended Summaries Vol. 3: 3rd International Agronomy Congress, Nov. 26-30, New Delhi, India.pp. 1016-1017.

Rana, N.S., Dhyani, B.P., Vivek and Chaudhary, S. 2008. Effect of S, Zn and Bo fertilization mustard (*B. juncea*). National Symposium on "New Paradigms in Agronomic Research" at NAU, Navsari Gujarat, November, 19-21, 2008, extended summaries, pp. 157-158.

Shankar, B. and Meena, K.C. 2015. Nutrient management for enhancing the productivity of Indian mustard (*Brassica juncea*). *Adv. Appl. Res.,* 7(1): 36 – 41.

Singh, K.N., Panotra, H., Singh, P., Singh, P. and Singh, G. 2012. Effect of sulphur and potassium nutrition on yield and quality of brown sarson in temperate region of Kashmir. Extended Summaries Vol. 2: 3rd International Agronomy Congress, Nov. 26-30 New Delhi. pp.229-230.

Verma, C.K., Prasad, K. and Yadav, D.D. 2012. Studies on response of sulphur, zinc and boron level on yield, economics and nutrient uptake of mustard (*Brassica juncea* L.). *Crop Res.*, 44(1 and 2): 75-78.

How to cite this article:

Samar Pal Singh, R.A. Singh, Vimal Raj Yadav, Sumit Chaudhary and Amit Kumar. 2017. Effect of Different Nutrient Combinations on Productivity and Quality of Mustard Varieties (*Brassica juncea* L.) under Late Sown Condition. *Int.J.Curr.Microbiol.App.Sci.* 6(2): 1343-1347.
doi: http://dx.doi.org/10.20546/ijcmas.2017.602.152