Environment & Ecology 27 (3) : 1036—1039, 2009
 ISSN 0970-0420

Effect of Integrated Nutrient Management on Growth, Yield, its Attributes and Nutrients Uptake of Mustard Crop in Acidic Soils of Nagaland

P. K. SINGH, IMNUKSUNGBA AND S. P. KANAJUIA[1]

Department of Agricultural Chemistry & Soil Science, [1]Department of Horticulture, SASRD, Nagaland University Nagaland 797106, India

Abstract

The experiment was carried out in the experiment research farm Nagaland University at Nagaland. The experiment was laid down in 11- treatment combination with three replications under randomized block design during 2005-06. The doses consisted of N (0, 30, 45, 60 kg/ha), P (0, 20, 30 and 40 kg/ha) with azotobactor, FYM, mustard cake and vermicompost. Data revealed that all the growth and yield parameters increased with application of fertilizer with integrated approach over control. The application of integrated nutrient management recorded significantly higher over the control in respect of seed and stover yield of mustard crop. Among the treatment, treatment T_8 (50% NPK + VC at 2 t/ha) produced significantly higher seed and stover yield. Total uptake of N, P, K, and S recorded significantly higher over the control. Among the treatments, treatment T_8 recorded highest in regards to total nutrients uptake, growth, yield and its attributing parameters.

Key words : Seed yield, Stover yield, Nutrients uptake.

Integrated nutrient management (INM) is the technical and marginal components of achieving the objectives of integrated plant nutrient system (IPNS) under farm situations. Thus the objectives of INM are to ensure efficient and judicious use of all the major sources of plant nutrients in an integrated manner so as to get maximum economic yield from a specific cropping system (1). In Nagaland, the total area under oilseed production is around 61,500 ha with a production of 65,000 MT from a grass cropped area of 324,429 ha. In Nagaland with increase in population and the presence of undulating geographical areas, further expansion of cultivable approach could include the concept of INM for sustained production. The overall fertility status of the soil of Nagaland revealed from researches done earlier indicates that the three major nutrients of plants, viz. nitrogen, phosphorus and potassium are medium to low with some blocks of each district showing a high fertility rate. The soil of Nagaland, which is mostly acidic in nature, is posing the most important constraints in increasing the productivity of soils. The use of chemical fertilizers alone is augmenting the acidic nature of the soils. Thus keeping these factors in view and the subsequent prospects for adopting the new practices, the present investigation was carried out on effect of INM on yield, yield attributes and nutrients uptake of mustard crop in acidic soil of Nagaland.

Methods

The experiment was carried out in the experimental research farm of Nagaland University, at Nagaland during October 2005-06. The experiment was laid down in 11-treatment combination with three replications under randomized block design. The doses consisted of N (0, 30, 45, 60 kg/ha) P (0, 20, 30 and 40 kg/ha) with azotobactor, FYM, mustard cake and vermicompost. The yield of mustered crop was taken at maturity stage and soil samples were collected after harvesting of crop. The soil and plant samples were prepared for analysis and analyzed by standard procedure for available N (2) P (3) K (4) pH (5) and OC (4) available S . Statistical analysis was done (6).

Results and Discussion

Growth Attributes

The observations on the height, number of branches and dry matter yield of mustard plant as influenced by INM were recorded at an interval of 30, 60 and 90 DAS (days after sowing). Significantly high-

Table 1. Effect of INM on growth attributes of mustard crop.

Treatment	Plant height at DAS			No of primary branches at DAS			Dry weight at DAS		
	30	60	90	30	60	90	30	60	90
T_1	30.25	64.23	97.75	1.67	3.33	3.67	16.00	27.33	44.50
T_2	40.57	70.88	104.33	2.0	3.67	4.33	18.37	30.33	46.07
T_3	40.07	70.61	104.00	2.0	4.17	4.67	17.93	31.31	46.12
T_4	41.81	70.70	104.28	1.67	4.0	4.67	18.83	31.48	46.19
T_5	39.95	69.57	104.00	2.0	4.33	4.67	17.92	31.49	46.06
T_6	40.05	71.02	102.88	2.0	3.17	4.0	17.78	30.36	46.08
T_7	42.71	71.35	104.33	2.48	4.07	4.67	19.01	30.73	46.07
T_8	44.95	74.00	106.87	2.0	4.82	5.33	19.78	32.52	46.7
T_9	40.41	70.73	103.79	1.67	3.0	4.00	17.86	31.21	46.1
T_{10}	41.33	70.75	104.01	2.0	3.67	4.00	18.83	31.05	46.08
T_{11}	41.43	69.92	103.37	1.67	3.67	4.33	18.83	30.31	46.07
SE	0.95	1.16	1.09	0.14	0.29	0.28	0.34	0.41	0.21
CD 5%	2.11	2.58	2.43	NS	NS	NS	0.76	0.91	0.46

est height (104.88 cm at 90 DAS) was recorded with the treatment T_8 (50% NPK + VC at 2 t/ha) at interval of 30, 60 and 90 DAS, whereas minimum (97.75 cm at 90 DAS) with the control plot. Similar findings were also reported earlier (7, 8). Dahama (9) reported the superiority of VC (vermicompost) over the inorganic fertilizer in enhancing the crop performance. Dry matter weight significantly increased with different levels INM at different growth stage. The maximum dry matter (46.70 g) accumulated with the treatment T_8 (50% NPK + VC at 2 t/ha) at 90 DAS, which was significantly superior to rest of the treatments. This may be for better growth performance due to more availability of nitrogen at all critical stages of crop growth and the effective utilization of nutrient through the extensive root system. However, number of primary branches did not show any significant difference among the treatments at over the growth stages compared to the control.

Yield Attributes and Yield

Table 1 reveals that yields and yield attributes responded significant variations among the treatments over the control. Treatment T_8 (50% NPK + VC at 2 t/ha) recorded the maximum number of seeds/ siliquae (15.6) and siliquae/plant (193.77) as also observed earlier (8). This may also be due to the reason that under earlier sown crops, the temperature and other climatical parameters played a major role for growth and yield attributes (7). The test weight of seeds did not show any significant variation among

Table 2. Effect of INM on yield , yield attributes and nutrients uptake of mustard crop.

Treatment	Grain yield	Stover yield	Siliquae/ plant	Seeds/ siliquae	Test weight	Total uptake (kg/ha)			
						N	P	K	S
T_1	1349.27	5512.05	183.33	11.67	5.20	78.16	18.16	38.96	22.33
T_2	1352.12	5518.09	186.00	14.33	5.21	80.39	19.37	40.13	23.15
T_3	1352.47	5518.89	187.00	13.33	5.21	80.73	19.10	40.24	23.30
T_4	1352.62	5517.50	187.33	14.33	5.25	80.52	19.87	40.22	23.85
T_5	1351.88	5518.67	189.33	13.33	5.25	80.12	19.33	40.89	23.66
T_6	1352.72	5518.85	189.33	14.00	5.23	80.34	19.93	40.55	23.44
T_7	1353.40	5518.93	190.67	14.67	5.25	81.39	19.65	40.73	24.50
T_8	1354.45	5520.32	193.77	15.60	5.27	82.56	20.65	41.89	25.33
T_9	1352.63	5518.19	189.33	14.33	5.22	79.80	19.16	40.78	23.71
T_{10}	1352.37	5518.24	189.33	14.33	5.24	80.79	19.90	40.31	23.57
T_{11}	1352.50	5518.30	190.33	14.00	5.23	80.09	19.68	40.82	24.12
CD 5%	2.31	3.35	2.30	0.90	NS	0.93	0.62	0.62	0.53

Table 3. Effect of INM on nutrients content (%) of mustard crop.

Treatment	N content (%)		P content (%)		K content (%)		S content (%)	
	Seed	Stover	Seed	Stover	Seed	Stover	Seed	Stover
T_1	3.49	0.57	0.59	0.19	0.67	0.53	0.89	0.19
T_2	3.54	0.59	0.60	0.20	0.69	0.55	0.92	0.19
T_3	3.55	0.60	0.61	0.20	0.68	0.56	0.91	0.20
T_4	3.56	0.59	0.61	0.21	0.69	0.56	0.92	0.21
T_5	3.55	0.59	0.60	0.20	0.70	0.57	0.91	0.21
T_6	3.56	0.59	0.60	0.21	0.70	0.56	0.92	0.20
T_7	3.57	0.60	0.61	0.21	0.70	0.57	0.93	0.22
T_8	3.58	0.61	0.62	0.22	0.71	0.58	0.95	0.23
T_9	3.53	0.59	0.61	0.20	0.69	0.57	0.92	0.20
T_{10}	3.55	0.59	0.61	0.21	0.70	0.55	0.91	0.20
T_{11}	3.53	0.59	0.59	0.21	0.69	0.57	0.93	0.21
SE	0.02	0.006	0.004	0.005	0.009	0.01	0.008	0.006
CD at 5%	NS	NS	NS	NS	NS	NS	NS	NS

the treatments. This may be due to uniform absorption of nutrients and translocation of photosyntheses towards the seeds, resulting in formation of uniform seeds. Rathor and Monohar (10) also reported similar results. However, 50% NPK + VC at 2 t/ha (T_8) recorded the highest seed weight.

The response of mustard plant to the different combination of nutrient treatment recorded significant effect of seed and stover yield over the control (Table 2). The increase in yield (seed, stover) could be ascribed to the over all improvement in plant growth, vigor and production of sufficient photosynthesis through increased leaf area. The higher seed (1,354.45 kg/ha) and stover yield (5,520.05 kg/ha) were obtained from the application of 50% NPK + VC at 2 t/ha (T_8), as reported earlier (11). Sreenivas et al. (12) was also reported the beneficial effect of vermicompost in optimizing yields.

Contents and Uptake of Nutrients

The results on the influence of INM on N,P,K and S content and uptake showed that application of different nutrients in combination with organic fertilizers had no significant influence on N, P, K, and S contents in seed and stover (Table 3). Whereas, total uptake of these nutrients, was recorded significantly high in all the treatments over the control. The highest N contents of 3.581, 0.61% ; P content 0.62, 0.22% ; K content 0.71, 0.58%, and S content 0.95, 0.23%, in seed and stover, respectively were recorded. Similar results were observed earlier (13). The total uptake was recorded to be highest from the application of 50% NPK + VC at 2 t/ha (T_8).

References

1. Sarkar A. K. 2000. Integrated nutrient management for better livelihood of farmers in rain fed areas. J. Indian Soc. Soil Sci. 48 : 691—692.
2. Subbaih B. V. and G. L. Asija. 1956. A rapid procedure for the estimation of available N in soil. Curr. Sci. 25 : 259—260.
3. Bray R. H. and L. T. Kurtz. 1954. Determination of total organic carbon and available forms of phosphorus in soils. Soil Sci. 59 : 39—54
4. Jackson M. L. 1973. Soil chemical analysis, Prentice Hall of India Pvt. Ltd, New Delhi, India.
5. Richards L. A. 1954. Diagnosis and improvement of saline and alkaline soils. USDA Handbook 60, NY, USA.
6. Panse V. C. and P. V. Sukatme. 1978. Statistical methods for agricultural workers. ICAR, New Delhi, India.
7. Buttar G. S. and C. S. Aulakh. 1999. Effect of sowing date, N, and row spacing on growth, yield and yield attributes of Indian mustard. Indian J. Agron. 44 : 813—815.
8. Patel J. R. and V. B. Shelke. 1998. Effect of FYM, phosphorus and sulfur on growth, yield and quality of Indian mustard. Indian J. Agron. 43 : 713—717.
9. Dahama A. K. 2003. Organic forming for sustainable agriculture, 2nd edition. Agro Bios (India), Jodhpur, India.
10. Rathor P. S. and S. S. Monohar. 1989. Response of mustard to nitrogen and sulfur on ancillary characters and yield of mustard. India J. Agron. 34 : 333—336.
11. Sharma A. C. 1998. Response of toria (*Brassica napus* L) to phosphorus and potash in rice fields of Barak

valley zone of Assm. J. Pot. Res. 15 4 : 30—33.
12. Sreenivas C. H., S. Rao Murlidhar and M. Singh. 2000. Vermicompost : A viable component of IPNSS in nitrogen nutrition of ridge gourd. Ann. Agric. Res. 21 : 108—113.
13. Jat R. S. and S. S. Khangarot. 2001. Effect of different fertility levels on N and P uptake and economics of mustard *(Brassica juncea)* Agron. Dig. 1 : 81—82.