

Effect of Nitrogen, Phosphorus and Sulphur on Growth and Yield of Cress (*Lepidium sativum* L.)

N. K. Chavda, R. A. Patel*, Priya Patel and B. V. Hirpara

Department of Agronomy, B. A. College of Agriculture,
Anand Agricultural University, Anand – 388110 Gujarat, India.

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An experiment was conducted during *rabi* season of the year 2014-15 at Medicinal and Aromatic Plant Research Centre, Anand Agricultural University, Anand (Gujarat) to study the effect of nitrogen, phosphorus and sulphur on cress (*Lepidium Sativum* L.). Nitrogen significantly increase seed yields up to the level of 100 kg N/ha. Similarly, application of 80 kg P₂O₅/ha and 20 kg S/ha significantly improved growth and yield attributes and seed and stover yields. Interaction effect of N and S significantly increased number of siliquae/plant and seed yield.

Keywords: Cress, Nitrogen, Phosphorus, Sulphur.

Cress (*Lepidium sativum* L.) is a fast growing annual herb belonging to the brassicaceae family that is native to Ethiopia and introduced to Europe, Asia and USA. In Gujarat, popularly known as Asaliyo. It has been used widely in different parts of the world for its wide therapeutic application. Plant and seeds are considered one of the popular medicinal herbs used world wide as a good mediator for bone fracture healing in the human skeleton and also used as a remedy for dysentery, diarrhea and skin disease caused by impurity of blood. The major constraint limiting production of crop is poor fertility status of soil. An optimum supply of nitrogen is important for vigorous growth and development of plants. The importance of phosphorus application to cruciferous oil seed crops has been recognized since long. It promotes plant growth, enhance the yield and also help in root development. Oil

seed crop, in general, respond more to sulphur application which is expressed on the yield and quality produce. Studies on direct effect of N, P and S fertilization on cress crops have been found to be helpful in economizing fertilizer use without any adverse effect on soil fertility and crop yield. Very little work has been carried out to study the requirement of nitrogen, phosphorus and sulphur by the cress crop in middle Gujarat condition. The present investigation was therefore, planned and conducted.

MATERIALS AND METHODS

An experiment was conducted at Medicinal and Aromatic Plant Research Centre, Anand Agricultural University, Anand (Gujarat) during *rabi* season of the year 2014-15. The soil of experimental field was loamy sand in texture, having low in organic carbon, nitrogen, phosphorus and sulphur and medium in potash. The treatments comprising four levels of nitrogen (60, 80, 100

* To whom all correspondence should be addressed.
E-mail: nileshkchavda21@gmail.com

and 120 kg/ha), three levels of phosphorus (0, 40 and 80 kg/ha) and two levels of sulphur (0, 20 kg/ha). The experiment was laid out in randomized block design (Factorial) with three replications. Calculated quantity of N was applied through urea in two splits. Entire quantity of P and S was applied as a basal at sowing time through diammonium phosphate and gypsum respectively. Cress was sown on November 6th, 2014 with seed rate of 3 kg/ha.

RESULT AND DISCUSSION

Effect of nitrogen

Data presented in Table-1 indicated that application of 120 kg N/ha recorded significantly higher plant height (120.84 cm) and number of branches/plant (19.20). Application of 100 kg N/ha recorded significantly higher seed yield (1653 kg/ha) of cress but it was statistically at par with application of 80 kg N/ha and 100 kg N/ha. Significantly higher stover yield (kg/ha) of cress was recorded under application of 120 kg N/ha, which was also statistically at par with application of 100 kg N/ha. Possible reason might be that the application of N increases size of cells, meristemic activities and formation and function of protoplasm, which consequently increase the crop

growth. The increased crop growth improves the yield components and finally the seed yield (Premi and Kumar, 2004). These results are substantiated with Choudhary *et al.* (2010) and Kumari and Patel (2013) in cresscrop.

Effect of phosphorus

Growth and Yield attributes and yield of cress were significantly increased with P application. Application of 80 kg P₂O₅/ha recorded significantly higher plant height (118.48), branches/plant (18.97), siliquae/plant (1157), seed yield (1647 kg/ha) and stover yield (5649 kg/ha) of cress. Increase in these parameters due to P could be ascribed to the overall improvement in plant growth, vigour and production of sufficient photosynthetes. The results corroborate the work of Punia *et al.* (1993) in mustard crop.

Effect of sulphur

Significantly the highest plant height (117.33), number of branches/plant (18.67), number of siliquae/plant (1234), seed yield (1636 kg/ha) and stover yield (5592 kg/ha) of cress was recorded under application of 20 kg S/ha. The improvement in crop growth and yield attributes with sulphur application could be ascribed to its pivotal role in regulation of the metabolic and enzymatic processes including photosynthesis and respiration which reflected in increased yield,

Table 1. Effect of nitrogen, phosphorus and sulphur levels on growth, yield attributes and yield of cress

Treatments	Plant height at harvest(cm)	Number of branches/plant	Days to maturity	Number of siliquae/plant	Seed yield (kg/ha)	Stover yield (kg/ha)
Nitrogen levels (N)						
N ₁ : 60 kg/ha	106.64	17.00	102.29	855	1367	5075
N ₂ : 80 kg/ha	113.83	18.01	105.10	1168	1586	5349
N ₃ : 100 kg/ha	117.77	18.52	106.66	1214	1653	5514
N ₄ : 120 kg/ha	120.84	19.10	110.03	1159	1583	5744
SEm ±	1.77	0.34	0.90	18.93	35	115
CD at 5 %	5.04	0.97	2.57	53.90	100	327
Phosphorus levels (P)						
P ₁ : 0 kg/ha	110.17	17.17	106.05	996	1388	5127
P ₂ : 40 kg/ha	115.66	18.33	104.61	1145	1606	5477
P ₃ : 80 kg/ha	118.48	18.97	107.40	1157	1647	5649
SEm ±	1.53	0.29	0.78	16.39	30	99
CD at 5 %	4.36	0.84	NS	46.68	86	283
Sulphur levels (S)						
S ₁ : 0 kg S/ha	112.21	17.64	105.35	964	1459	5250
S ₂ : 20 kg S/ha	117.33	18.67	106.69	1234	1636	5592
SEm ±	1.25	0.24	0.64	13.39	23	81
CD at 5 %	3.56	0.68	NS	38.11	71	231

Table 2. Interaction effect of nitrogen and sulphur on number of siliquae/plant of cress

N x S	Number of siliquae/plant			
	N ₁	N ₂	N ₃	N ₄
S ₁	782	928	1050	1051
S ₂	928	1364	1377	1261
SEm. ±		26.78		
CD at 5 %		76.23		

Table 3. Interaction effect of nitrogen and sulphur on seed yield of cress

N x S	Seed yield (kg/ha)			
	N ₁	N ₂	N ₃	N ₄
S ₁	1285	1449	1526	1576
S ₂	1450	1723	1779	1591
SEm. ±		50		
CD at 5 %		141		

and positive response to gypsum application for easily available sulphatesulphur and due to its higher solubility. Similar views were expressed by Tomaret *et al.* (1997), Jaggi and Sharma *et al.* (1997), Kumar *et al.* (2002) and Rana *et al.* (2005) in Indian mustard.

Interaction effects (N x S)

Interaction effect between nitrogen and sulphur levels was found significant with respect to number siliquae/plant and seed yields of cress. Significantly higher number of siliquae/plant (1377) and seed yields (1779 kg/ha) of cress was noted in treatment combination of N₃S₂ (100 kg N/ha + 20 kg S/ha). Significantly lowest number of siliquae/plant (782) and seed yields (1285 kg/ha) of cress was noted under treatment combination of N₁S₁ (60 kg N/ha + 0 kg S/ha). The maximum yield responses of cress to N and S were observed only when the availability of N and S was in approximate balance, application of nitrogen alone suppressed the seed yield, whereas S alone produced no seed yield response. Similar result were expressed by McGrath and Zhao (1996) in Indian mustard.

CONCLUSION

From the above results, it can be concluded that for securing higher seed yield of cress, it is advisable that cress crop should be fertilized with nitrogen @ 100 kg N/ha, phosphorus @ 80 kg P₂O₅/ha and sulphur @ 20 kg S/ha.

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