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Effect of nitrogen, phosphorus and sulphur fertilization on growth and yield of mustard (*Brassica juceae* Coss)

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ABSTRACT

A field experiment was conducted during the winter season of 2004-2005 at Agricultural Research Farm, Allahabad. The experiment consisted of three factors namely nitrogen (80 and 100 kg ha^{-1}) and sulphur (10, 20 and 30 kg ha^{-1}), phosphorus (40 and 60 kg ha^{-1}) with blanket application of potash at 40 kg ha^{-1}. Highest plant height and maximum plant dry weight was recorded with higher doses of these factor. Also, more number of siliqua/plant, seed/siliqua and the test weight was also recorded with higher levels of these factors which ultimately resulted in higher seed yield.

Key words : Tropical sugarbeet, Hybrids, Nitrogen, Yield, Integrated nitrogen management.

INTRODUCTION

Indian mustard responds to nitrogen (Joshi *et al.*, 1998) phosphorus and sulphur fertilization and also shows a role in promoting seed-yield and other ancillary characters. Since, very limited information is available on these aspects under agro-climatic conditions. The present investigation was carried out to study nitrogen, phosphorus and sulphur on seed yield of Indian mustard.

MATERIALS AND METHODS

The field experiment was conducted during the *rabi* season of 2004-2005 at Agricultural Research Farm, Allahabad. The soil was sandy loam in texture, having 180.50, 58.60 and 348.65 kg ha^{-1} available N, P and K, respectively. The sulphur level of the experimental site was 0.00014%, which was quite below the critical limit for mustard crop. The experiment was laid out in factorial R.B.D. with N, P and S with three replications. The treatments consisted of 2 levels of Nitrogen (80 and 100 kg ha^{-1}), phosphorus (40 and 60 kg ha^{-1}) and sulphur (10, 20 and 30 kg ha^{-1}) with blanket application of potash at 40 kg ha^{-1}. Urea, S.S.P. and elemental sulphur were used as source of N, P and S, respectively. 'Varuna' ('T 59') Indian mustard was sown using 4 kg ha^{-1} seed at spacing of 40 cm x 10 cm and first irrigation was given at 30 days after sowing.

RESULTS AND DISCUSSION

Response of nitrogen:

Application of nitrogen significantly increased the plant height, dry weight, number of branches/plant at harvest. The plant height increased progressively up to 100 kg N ha^{-1}, but significantly over its preceding level up to 80 kg N ha^{-1}.

The increase in the growth character described above may be ascribed to the fictional role of N in the plant body. The chief function of N is multiplication and cell elongation and tissue differentiation. With adequate supply of N the plants grow tall, produce more branches and ultimately greater production of dry weight ha^{-1}. The findings confirm the observations of Rathor and Manohar (1989).

The number of siliquae/plant, number of seeds/siliqua, test weight, seed yield and straw yield increased significantly by N 100 kg ha^{-1} over the N 80 kg/ ha^{-1}. It might be due to improved availability of nitrogen through urea. Siliquae/plant increased significantly with increasing level of N, the N_{100} resulted in maximum sliliquae/plant. The length of siliqua was also maximum with N_{100} and significantly superior to just preceding level. The results confirm the findings of Chauhan and Paroda (1995).

Response of phosphorus:

Application of 60 kg P_2O_5 ha^{-1} significantly improved plant height, number of branches/plant, number of leaves/ plant, dry weight of plant over the 40 kg P_2O_5 ha^{-1} (Table 1). This may be because of the fact that phosphorus encourages the cell division and cell elongation in the meristematic region of the plant, besides helping in nitrogen fixation, thereby resulted in improved growth and development of the plant. The results are in close conformity with the findings of Dubey and Khan (1993).

The increase in the vegetative growth owing to P_2O_5 application resulted in the production of more siliquae/ plant and improved the test weight. Maximum seed yield (30.93 q/ ha^{-1}) was recorded with application of 60 kg P_2O_5 ha^{-1} maximum straw yield (59.44 q ha^{-1}) was also

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