EFFECT OF FERTILIZER AND MOISTURE CONSERVATION PRACTICES ON PERFORMANCE OF MUSTARD (BRASSICA JUNcea L.) UNDER RAIN FED CONDITION

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Abstract: A field experiment was carried out to know the effect of fertilizer i.e. control, 40 N + 15 S, 80 N + 30 S and 120 N + 45 S kg ha\(^{-1}\) and moisture conservation practices i.e control, dust mulch created by weeding and hoeing at 25 and 35 DAS and organic mulch @ 5 t ha\(^{-1}\) of paddy straw at 25 DAS on mustard [Brassica juncea (L.) Czernj & Cosson] at students instructional farm of C. S. Azad University of Agriculture and Technology, Kanpur (U.P.), during Rabi season of 2008-09 and 2009-10. Results reveals that fertilizer 120 N + 45 S kg ha\(^{-1}\) gave significantly higher plant height, number of primary branches plant\(^{-1}\), number of secondary branches plant\(^{-1}\), dry matter accumulation plant\(^{-1}\), siliquae length, number of siliqua plant\(^{-1}\), number of seeds siliqua\(^{-1}\), 1000-seed weight, grain yield, stover yield, harvest index and protein content (%) than other levels of fertilizers i.e. control, 40 N + 15 S and 80 N + 30 S, during both years. However, the application of moisture conservation practices i.e. dust mulch creating by weeding and hoeing at 25 and 35 DAS and organic mulch @ 5 t ha\(^{-1}\) of paddy straw at 25 DAS increased growth, yield attributing characters and seed yield as well as nutrient content and nutrient uptake by mustard over control. On the basis of economics use of 120 N + 45 S kg ha\(^{-1}\) and organic mulch @ 5 t ha\(^{-1}\) of paddy straw at 25 DAS was found most profitable.

Key words: Mustard, Moisture conservation practices, Fertilizer, Nutrient and Economics.

INTRODUCTION

India is blessed with vast natural resources i.e. land, water, vegetation and climate. Soil, water and vegetation are the basic resources of the country which must be carefully conserved and judiciously utilized to sustain the food security for increasing human and live stock population. Oil seed crops are mostly grown in rain fed areas. Organic mulch is the surface barrier that is spread on the surface of any soil to prevent the loss of water through evaporation and also to keep down the weeds and damper temperature fluctuation. The mustard crop is very responsive to fertilizer application and by using different doses of nitrogen and sulphur, its gives varying result of yield.

Optimum fertilizer levels (Ram et al., 2002; Singh and Meena, 2004) and organic mulch to conserve soil moisture (Bhan et al., 1997 ; Katiyar 2000) appears to be the most considerable parameters for the yield of mustard and enhance the net profit. The present investigation was undertaken to determine the optimum dose of fertilizer and soil moisture conservation practices for the mustard.

MATERIALS AND METHODS

The field experiment was carried out in two consecutive Rabi season of 2008-09 and 2009-10 at student’s instructional farm, C.S. Azad University of Agriculture and Technology, Kanpur (U.P.). The experimental soil was sandy loam in texture, alkali in reaction (8.3 pH), low in organic carbon content (0.35%) and available nitrogen (215 kg ha\(^{-1}\)) and medium in available phosphorus (18 kg ha\(^{-1}\)), potassium (182 kg ha\(^{-1}\)) and sulphur (28 kg ha\(^{-1}\)). Twelve treatment combinations comprising four nutrient levels viz. control, 40 N + 15 S, 80 N + 30 S and 120 N + 45 S kg ha\(^{-1}\) and three moisture conservation practices i.e control, dust mulch created by weeding and hoeing at 25 and 35 DAS and organic mulch @ 5 t ha\(^{-1}\) paddy straw at 25 DAS were evaluated in factorial randomized block design with three replications. Vardan, a variety of mustard [Brassica juncea (L.) Czernj & Cosson] was sown at 14.10.2008 and 11.10.2009 at row spacing of 45 cm. Nutrients were applied in the form of urea for nitrogen; DAP for Phosphorus; MOP for potassium and gypsum for sulphur. These were applied as basal at the time of sowing in furrow. Crop was harvested on 13.02.2009 in first year and on 12.02.2010 in second year.
RESULTS AND DISCUSSION

(a) Effect of Fertilizer Levels:

Data presented in table-2 reveals that there was a significant increase in seed yield due to increment in nutrient levels. The highest seed yield of 22.25 and 21.16 q ha$^{-1}$ was obtained with 120 N + 45 S kg ha$^{-1}$ during 2008-09 and 2009-10, respectively, owing to better expression of siliqua length, number of siliqua plant$^{-1}$, number of seeds siliqua$^{-1}$, 1000-seed weight, grain yield, stover yield, harvest index and consequently gave highest net return of Rs. 25835 ha$^{-1}$ and B:C ratio of 1:2.20.

The other growth parameters such as more plant height, number of primary branches plant$^{-1}$, number of secondary branches plant$^{-1}$, dry matter accumulation plant$^{-1}$ showed the similar trends (Table 1 & 2) nutrient levels 120 N + 45 S kg ha$^{-1}$ recorded significantly higher nutrient content (N and P) and protein content (%) in seed and uptake of N, P and K than the other levels of nutrients, during both years (Table-3). This may be ascribed to better growth of plants due to more availability of plant nutrient per unit area. These results are close conforming to those of Giri et al., (2003).

(b) Effect of Moisture Conservation Practices

A significant increase in seed yield was recorded with the application of any mulch in both years. The application of organic mulch of paddy straw @ 5 t ha$^{-1}$ at 25 DAS) increased significantly more plant height, number of primary branches plant$^{-1}$, number of secondary branches plant$^{-1}$, dry matter accumulation plant$^{-1}$, siliqua length, number of siliqua plant$^{-1}$, number of seeds siliqua$^{-1}$, 1000-seed weight, grain yield and harvest index over other treatments viz: Control, dust mulch created by weeding and hoeing at 25 and 35 DAS. The similar result has been reported by Gogoi, et al. (2002); Kumar and Premi (2003) and Ghanbahadur et al (2005).

The higher seed yield of 21.63 q ha$^{-1}$ and 20.95 q ha$^{-1}$ were obtained with application of organic mulch of paddy straw @ 5 t ha$^{-1}$ at 25 DAS, during 2008-09 and 2009-10, respectively, which were significantly higher than other treatments (Table-2). Significant increase in yield and yield attributes of mustard was may be due to more conservation of water and increase in water use efficiency by the use of mulches (Table-1&2). The similar result has also been reported by Sachan et. al. (1997).

A significant increase in straw yield was recorded by increasing levels of nutrients in both years. The moisture conservation practices have also been significantly influenced the straw yield over control in both years, while there was no significant difference in straw yield among dust mulch and organic mulch.

Nutrient content (N, P and K) and protein content in seed and nutrient uptake were also increased significantly with application of organic mulch of paddy straw over control and mulch created by weeding and hoeing at 25 and 35 DAS. These results were in close confirming with those of Tiwari et al., (1992). Interaction between nutrients and moisture conservation practices was positive. More nutrient response was recorded with the use of any type of mulch than control (no mulch). The cost of cultivation was highest under paddy straw mulch treatments because of additional cost of paddy straw, but net return and B : C ratio was found highest under paddy straw mulch treatment which was significantly higher than dust mulch and control treatment.

On the basis of two year results it can be concluded that the application of 120 kg N + 45 kg S ha$^{-1}$ with organic mulch of paddy straw @ 5 t ha$^{-1}$ at 25 DAS is beneficial for mustard under rain fed conditions.

REFERENCES


