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EFFECT OF ROW SPACING ON THE YIELD OF MUSTARD (*BRASSICA JUNCEA*) UNDER RAINFED CONDITIONS

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The effects of five row spacings (15.0, 22.5, 30.0, 37.5 and 45.0 cm) and broadcast on the yield of mustard (*Brassica juncea*), variety Rya L-18, were studied on clay loam soil under rainfed conditions at the research farm of the Barani Agricultural College, Rawalpindi. Prolonged drought spell prevailed during the growth period of the crop. The yield was observed at 15cm, 22.5cm, 30cm, 37.5cm, 45cm, wide rows and broadcast. The 15-cm apart row gave higher yield of mustard as compared to widely spaced rows.

Key words: Mustard, Rainfed, Row cropping

INTRODUCTION

In Pakistan, mustard (*Brassica juncea*) and rape seed (*Brassica compestris*) rank second to cotton (*Gossypium* spp) seed among oilseed crops in terms of acreage as well as edible oil production. These crops contribute to about 30% of the total edible oil production in Pakistan. Domestic production of edible oils meets only 19 percent of the total requirements and the latter is increasing by 11 percent annually. At present, about 0.66 million tonnes of edible oil are being imported at the cost of Rs. 10,454 million [1]. In order to reduce the burden on imports, it is necessary that domestic production of oilseeds be increased. This can be achieved either by increasing the area under oil seed crop or by increasing the per acre yield of the crop. There is a great potential for increase in per acre yield under rainfed conditions.

In the Punjab Barani Tract, mustard is sown either mixed with wheat or alone by broadcast which fetches low yields. Row sowing has given higher yields in mustard like in many other crops. Patil and Dee [3] studied the effect of row spacing under dry farmed conditions on rape-seed in India and found that wide spacing increased the yield of rapeseed and reduce water use. Weiss [5] found little difference in yield in 12cm apart rows and broadcasting. He recommended that widths of 18-24cm were optimum provided there was no vigorous weed growth. In the irrigated areas of Punjab 50-cm row width is recommended for mustard sowing. However, no specific information is available about the response of the crop under rainfed conditions. The present study was conducted to determine an optimum row spacing for mustard in barani area with an average rainfall of 750 mm.

MATERIALS AND METHODS

A field experiment on mustard was conducted during 1983-84 at the experimental farm of the Barani Agricultural College, Rawalpindi, on a clay loam, alkaline calcareous soil. The data on some of the physico-chemical properties of the soil are given in Table 1. The land was fallow prior to the sowing of the crop. Raya L-18, a high yielding variety of mustard, was sown at the end of September 1983 in the soil moisture preserved from summer rains. The treatments were replicated thrice following a randomized complete block design with a net plot size of 8m x 2m. After the preparation of the seedbed, urea and diammonium phosphate were applied at the rate of 23kg N and 23 kg P per acre basis. The fertilizer was mixed into the soil by ploughing. Five row spacings, i.e. 15.0, 22.5, 30, 37.5 and 45cm were compared. These row spacings were also compared with broadcast, a conventional and more popular method of sowing among the farmers. Row sowing was done with a hand drill.

Table 1. Physico-chemical charchteristics of the soil.

Texture	Clay loam
pH	7.3
Total soluble salts (Saturated paste)	0.8m mhos/cm
Organic matter	0.8%
Available phosphorus (Olsen's method)	4.5 ppm
Exchangeable potassium	48 ppm

Soil moisture level of the experimental field was determined at different timings during the growing period (Fig. 1).

Whereas the rainfall record has indicated that about 200 mm of precipitation was received during the growth period of the crop, a prolonged drought prevailed from mid-October 1983, to mid-February 1984. The crop was harvested ob April 17, 1984 and the yield data were analyzed statistically.

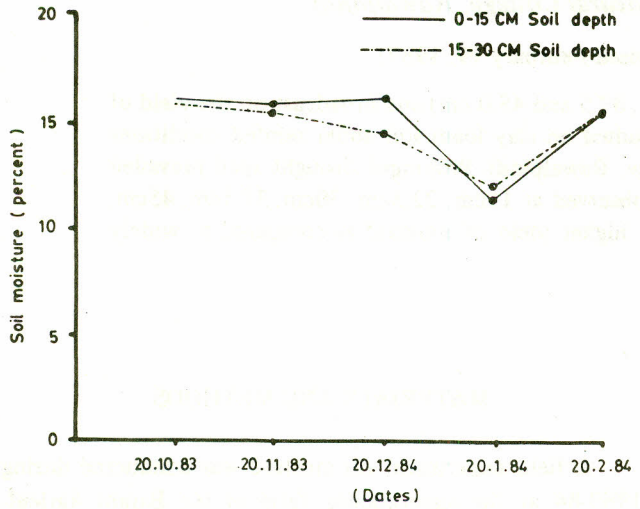

Fig. 1. Soil moisture content at two depths during the growing season of mustard

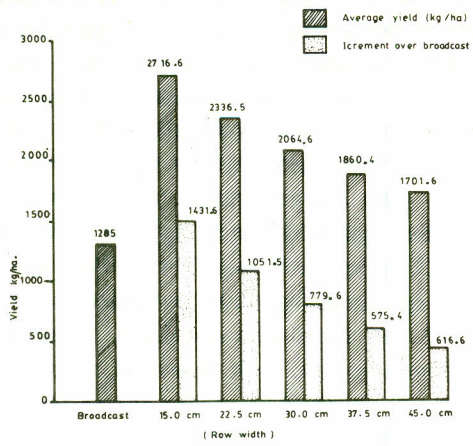

Fig. 2. Effect of row spacing and broadcast in the yield of mustard.

RESULTS AND DISCUSSION

Planting mustard in 15cm rows gave the highest average yield as compared to the other row spacing (Fig. 2), though the yield was not significantly different from the 22.5cm row spacing treatment. The yield increased with decrease in row spacing from 45cm to 15cm. There was no significant difference between 15cm and 22.5cm spacings. The lowest yield increased due to different row spacings over the broadcast ranged from 417 kg/ha in the case of 45cm to 1432 kg/ha in the case of 15cm rows. Similar results were obtained by Khan and Meginnis [2] from plant population studies in 1983-84 at National Agricultural Research Centre, Islamabad. They found that a reduction in row spacing caused an increment in the yield.

Soil moisture data show that a prolonged drought prevailed during the growing season of the crop in the area. Furthermore, lower soil layers also showed lower moisture content but remained within the available range. The behaviour of the mustard crop with respect of drought and low soil moisture contents showed that the crop tolerated the moisture stress and could have extracted water from the lower soil layers. Similar results were reported by Weiss [5] who stated that close crop canopy intercepted a large percentage of solar radiation, increased photosynthesis and reduced evapotranspiration losses. In addition to improvement in light interception, Timmons *et al.* [4] showed that the highest water use efficiency in soyabean was obtained with 20cm wide rows as compared to the conventional row spacings of 76-102cm.

From the study, it is evident that row spacing affected the grain yield of mustard and that narrow row spacing significantly increased the yield. The increase in yield could be attributed to (a) greater plant population, (b) dense stand which promoted more uniform plant distribution, flowering and ripening; and (c) close crop canopy intercepted a large percentage of solar radiation increasing photosynthesis and reducing evaporation losses.

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