

Original Research Article

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## Quality of Oilseed *Brassica* as Influenced by Planting Techniques and Genotypes

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### ABSTRACT

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#### Article Info

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A field experiment was conducted at GBPUAT, Pantnagar during *rabi* season of 2014–15 to assess the influence of planting techniques on oil and protein quality of *Brassica* genotypes. The experiment was designed and laid out in split plot arrangement taking planting method in main-plots and *Brassica* species in sub-plots with 3 replications. The planting methods significantly influenced the oil content (%), oil yield and protein yield. Conventionally sown crop resulted in higher oil content (%), however, oil yield was significantly higher in transplanted crop. Among the three genotypes, Pant Shweta resulted in significantly higher oil content over the other two genotypes.

### Introduction

Plant density is one of the most effective agronomic factors for determining the yield which is individually affected by cultivar and climatic conditions as well as production system (Zandi *et al.*, 2011). This statement holds true for most of the production system involved in crop production. Rapeseed & mustard belonging to family Brassicaceae is one of the most important oilseed crop of

India which caters the oil requirements of large population in the country. The productivity of *Brassica* Sp. is highly dependent on various biotic and abiotic stresses which also influence the area and production of oilseed *Brassica*. To reduce losses from such kind of stresses scientist and researchers are continuously in developing new techniques so that maximum output can be harvested from minimum inputs in an eco-friendly and sustainable manner. Delay in

sowing time is one of the major causes that negatively influence the productivity of rapeseed and mustard. This problem can be overcome by adopting the transplanting technique in rapeseed and mustard crop. Khan *et al.*, (1990) also showed that transplanting could be a better option under late sowing in barley and triticale crop. However the success of transplanting is area specific and need to be studied in a detailed manner.

## Materials and Methods

A field experiment was conducted during the *rabi* season of 2014–15 at N. E. Borlaug Crop Research Centre of GB Pant University of Agriculture & Technology, Pantnagar (29° N, 79°29 E' and 243.83 m amsl) to assess the effect of planting methods and genotypes on the oil and protein quality of rapeseed-mustard. The soil of the experimental site was silty clay loam with pH 7.2, organic carbon 0.81%; and 261, 21.3 and 231 kg/ha of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O, respectively. The experiment consisted of 12 treatments, having four planting techniques (90 cm × 60 cm transplanting, 60 cm and 60 cm transplanting, 75 cm and 75 cm transplanting, and the conventional planting) in main-plots and 3 *Brassica* genotypes [*Brassica juncea* cv. 'Kranti', *B. carinata* cv. 'RP 09' and *B. rapa* ssp. yellow *sarson* cv. 'Pant Shweta'] in sub-plots was laid out in split-plot design with 3 replication. Seedlings were raised out in black polythene bag and were transplanted manually at 15 day's stage at required spacing. Crop was fertilized uniformly with 120:40:20 kg/ha of N, P and K, respectively. Half of the nitrogen along with full amount of phosphorous and potassium was applied at the time of sowing as basal. The remaining nitrogen was top dressed in 2 equal splits. The oil content in seed was determined by Soxhlet extraction method taking petroleum ether as a solvent. The oil content was reported on per cent basis. The oil yield was computed by

multiplying the oil content value with seed yield as per treatment and the oil data were presented in kg ha<sup>-1</sup>. Protein content in seed was determined by multiplying nitrogen content in seed (percentage) by a factor 6.25. The crude protein (Protein yield) was calculated by multiplying seed yield with protein content in seeds i.e. % Protein = % N (Total N in seeds) 6.25.

## Results and Discussion

The data related to oil content, oil yield, protein content and protein yield is presented in Table 1. Oil content was significantly influenced by different planting geometries and genotypes. Significantly higher oil content was observed in conventionally planted over all the other transplanting geometries. However, no significant difference was observed among the various transplanting geometries in terms of oil content. Among the different *Brassica* genotypes, Pant Shweta (*B. rapa*) produced significantly higher oil content over the other two genotypes. This difference may be due to varietal effect. Shukla and Kumar (1992) at Pantnagar also observed that mustard variety Vardan had the highest oil content in comparison with Krishna, Kranti, Rohini, Varuna, and Pusa Bold. The oil yield was influenced significantly by different planting geometries and genotypes, and remained maximum in the transplanted crop. Transplanting at 60x60 cm significantly produced higher oil yield over the other planting geometries. Transplanting at 90x60 and 75x75 cm remained on a par but significantly superior over the conventional sown crop. The more oil yield per hectare in transplanted crop was a resultant of the seed yield and the oil content, and both of these components were influenced by plant growth and yield attributing characters. The reduction in oil yield and seed yield under conventional planting was recorded due to less time and

space for growth and development of crop. Among the various genotypes, RP-09 produced the highest oil yield being significantly superior over the other two

genotypes. In spite of having the maximum oil content, Pant Shweta could not compete with the other two genotypes in terms of oil yield owing to its inferiority in seed yield.

**Table.1** Quality parameters viz. Oil content (%), protein content (%), oil yield (kg ha<sup>-1</sup>) and protein yield (kg ha<sup>-1</sup>) of oilseed *Brassica* as influenced by transplanting geometry

Treatments	Oil content (%)	Protein content (%)	Oil yield (kg ha <sup>-1</sup> )	Protein yield (kg ha <sup>-1</sup> )
Planting geometry (cm)				
90x60 Transplanting	40.0	19.9	640.7	316.2
60x60 Transplanting	40.4	19.8	976.1	475.6
75x75 Transplanting	40.2	19.9	643.1	316.4
Conventional	41.0	19.6	483.3	231.7
SEm±	0.18	0.08	17.4	7.34
CD (P = 0.05)	0.6	NS	60.2	25.4
Genotypes				
<i>B. juncea</i> (Kranti)	38.7	19.9	639.2	328.5
<i>B. carinata</i> (RP-09)	40.7	19.1	914.1	429.3
<i>B. rapa</i> (Pant Shweta)	41.7	20.4	504.1	247.2
SEm±	0.19	0.18	13.5	6.52
CD (P = 0.05)	0.6	0.5	40.6	19.5

The higher oil yield in case of RP-09 was due to the fact that RP-09 produced more seed yield, increasing the oil yield thereby. The varietal differences in oil yield have also been reported by Kumar *et al.*, (1996) and Singh and Singh (1998). Different planting geometries did not differ significantly for protein content in seeds Protein content in seed was higher in transplanted over the conventionally planted crop. Among the different transplanting geometries maximum protein content and yield was observed in 60x60 cm transplanting. Pant Shweta remained significantly superior over the other two genotypes in case of protein content. Protein yield was significantly influenced by the planting geometries and genotypes. Among the four planting geometry, transplanting at 60x60 produced significantly higher protein yield over the other geometries. Among the various genotypes, RP-09 produced the highest protein yield being

significantly superior over rest of the genotypes which is be due to higher seed yield. Significantly lower protein yield was observed in case of yellow *sarson* variety Pant Shweta. Gangwar and Kumar (1986) reported in *toria* that higher protein content in seed was recorded at lower levels on plant density. With the results obtained during the course of investigation it could be concluded that the transplanting of *Brassica carinata* (RP-09) at 60x60 cm could be beneficial in the *tarai* region of Uttarakhand. As the investigation was carried out for one crop season only, it needs to be repeated for at least one more season for reconfirmation of the results.

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