EVALUATION OF ADVANCED RAPESEED (BRASSICA NAPUS L.) LINES UNDER RAINFED CONDITIONS OF KHYBER PAKHTUNKHWA

Zahid Saleem, Javed Iqbal, Sabir Gul Khattak, Niaz Muhammad
Zahid Iqbal and Muhammad Khan*

ABSTRACT

Present study was conducted during 2012-13 at two different locations of KPK, Pakistan i.e. Mingora and Kohat to assess the growth and yield response of five different rapeseed lines (No-29-47, 99 CBN-027, SPS-1, AUP-03-11 and SPS-2). There was significant difference in various entries of rapeseed regarding days to flowering. The maximum days to 50% flowering (123 days) were recorded for line No. 29-47 at ARS Mingora but the same line took minimum days (94) for 50% flowering at BARS, Kohat while days to maturity ranged between 182 and 189 at both the locations. Grain yield for various rapeseed entries had significant difference from one another at different locations. The highest grain yield (2499 kg/ha) was noted for SPS-1 at BARS, Kohat while minimum grain yield (805 kg/ha) was recorded for AUP-03-11 at BARS, Kohat.

KEYWORDS: Brassica rapa; Brassica napus; canola; agronomic characters; flowering; maturity; grain yield; Khyber Pakhtunkhwa, Pakistan.

INTRODUCTION

Rapeseed (Brassica rapa and B. napus) and mustard (B. juncea) are the important crops of Brassica group grown as oilseed crops in Pakistan. These have remained one of the major sources of oil in the sub-continent for centuries. Rapeseed and mustard contain 44-46% good quality oil. In addition, its meal has 38-40% protein that has a complete profile of amino acids including lysine, methionine and cystine. The meal from canola type rapeseed varieties is an excellent feed for animals and birds especially poultry. The improvement in processing and refining techniques have enabled to extend the use of rapeseed and mustard oil as cooking medium, salad ingredient, shortening and in margarine. Recent development of canola types to mustard further enhanced the use of mustard oil for edible purpose. The brassica crops are mostly cultivated on soils having pH 7.0 - 8.0 (1).
Rapeseed (*Brassica napus* L.) being traditional oilseed crop of Pakistan is grown over large area in all four provinces of the country under both irrigated and rainfed conditions (8).

In Pakistan, it is grown over an area of about 0.23 million hectares but its production per unit area is merely 803 kg per hectare which is very low as compared to other countries. European countries have a yield level of 3500 kg/ha, Canada 3200 kg per hectare and Australia 2000 kg per hectare (2). Pakistan is facing chronic edible oil shortage. Domestic production of edible oil from all traditional and non-traditional oilseed crops is only sufficient to meet about one fourth of local demand, remaining requirement is met through heavy imports (3). There are many factors responsible for low yield, but the most important one is the non-availability of high yielding varieties. It is, therefore, imperative to develop improved varieties of Brassica to bridge the gap between local production and import of edible oil in the country (9).

The study was conducted for screening of advance lines of rapeseed from different institutes for adaptability under barani conditions of Kohat and Mingora divisions.

**MATERIALS AND METHODS**

Present study was conducted at Barani Agriculture Research Station, Kohat, Khyer Pakhtunkhwa, Pakistan during rabi 2012-13 to assess growth and yield response of five different rapeseed lines (No. 29-47, 99CBN 027, SPS-1, AUP-03-11 and SPS-2) under rainfed conditions at two locations Mingora and Kohat. Experiment was laid out in RCBD with three replications having plot size of 5 x 1.2 m at both two locations. Fertilizer was applied @ 80:58 N: P₂O₅ kg/ha before sowing. Data collected on following parameters were analyzed statistically using LSD at 0.05 percent probability level.

- Days to 50 percent flowering were calculated by observing when 50 percent plants bear flowers.
- Days to 50 percent maturity were calculated by observing when 50 percent pods color change to brown.
- For grain yield two central rows were harvested and grain weight was calculated.

Relative maturity ratings are the average number of days from seeding to swathing. The actual number of days to reach maturity depends on local climate and to some extent on management practices.
RESULTS AND DISCUSSION

Days to 50% flowering

Data analysis revealed significant differences among the advance lines at 0.05 probability level regarding days to flowering. The maximum days to 50% flowering (123 days) were recorded for entry No. 29-47 at ARS, Mingora but the same entry took minimum days (94) to 50% flowering at BARS, Kohat. This may be due to relatively low temperature at Mingora as compared to Kohat. This difference in results could be justified by differences in the weather conditions especially total amount of precipitation. Days to flowering is directly related to maturity of the crop. Early maturing varieties flowered earlier while the late maturing lines flowered later. Similar results have already been reported by Govil et al. (7).

Flowering time is not only of scientific interest but it is also important in agriculture, because its modification may enable to extend the geographical range of brassica crop (10). High heritability values were observed for initial flowering, 50% flowering, plant height, siliqua length, harvest index, 1000-seed weight, seeds per siliqua and seed yield per plant. High genetic advance is another parameter to assess the expected improvement in a character by hybridization and selection (4). Fig. 1 showed that all the entries took more days to flowering at Mingora than Kohat. This difference may be due to different climatic conditions of both the locations.

![Fig. 1. Mean performance of advanced rapeseed lines for days to 50% flowering evaluated at BARS, Kohat and ARS, Mingora during 2012-13.](image-url)
Days to maturity

The data (Table 1) showed that all the entries took more days to maturity at Mingora (Fig. 2) which may be due to low temperature of Mingora. The rapeseed genotypes tested did not differ significantly for days taken to maturity. These results are supported by previous findings (11).

The accumulation of temperature or growing degree days (GDDs) has a major influence on days to maturity for canola. In short and mid-season zones of western Canada, maturity range for B. napus varieties is 95 to 125 days depending on the heat accumulation during growing season within any particular year (2).

![Mean performance of advanced rapeseed lines for days to maturity evaluated at BARS, Kohat and ARS, Mingora during 2012-13.](image)

Grain yield

Data on grain yield (Table 1, Fig. 3) indicated that various rapeseed entries had significant difference from one another at different locations. The highest (2499 kg/ha) and lowest grain yield (805 kg/ha) was recorded for SPS-1 and AUP-03-11, respectively at BARS, Kohat. This difference in seed yield could be due to genetic variations attributed and quantitative nature of the character. Similar findings have also been reported by earlier researchers (5, 6, 11, 21). Difference in yield of the same line at different locations may be due to soil characteristics because when soil N content is inadequate, N addition increases seed yield significantly in rapeseed (6).

Table 1. Mean values for days to flowering, days to maturity and grain yield of advance rapeseed lines evaluated at different location during 2012-13.

<table>
<thead>
<tr>
<th>Entries</th>
<th>Days to 50% flowering</th>
<th>Days to maturity</th>
<th>Grain yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kohat</td>
<td>Mingora</td>
<td>Kohat</td>
</tr>
<tr>
<td>No-29-47</td>
<td>94e</td>
<td>123a</td>
<td>182</td>
</tr>
<tr>
<td>99 CBN-027</td>
<td>95e</td>
<td>121ab</td>
<td>184</td>
</tr>
<tr>
<td>SPS-1</td>
<td>94e</td>
<td>121ab</td>
<td>185</td>
</tr>
<tr>
<td>AUP-03-11</td>
<td>103d</td>
<td>121ab</td>
<td>181</td>
</tr>
<tr>
<td>SPS-2</td>
<td>111c</td>
<td>120b</td>
<td>184</td>
</tr>
<tr>
<td>LSD at 0.05%</td>
<td>2.397</td>
<td>N.S</td>
<td>566</td>
</tr>
</tbody>
</table>

Fig. 3. Mean performance of advanced rapeseed lines for grain yield (kg/ha) evaluated at BARS, Kohat and ARS, Mingora during 2012-13.

CONCLUSION

It can be inferred from the results that SPS-1 performed better at Kohat, whereas AUP-03-11 performed better at Mingora. Hence advance line SPS-1 with highest yield is recommended for barani areas of Kohat division and AUP-03-11 for upper areas like Mingora.

REFERENCES


Received: January 26, 2014    Accepted: December 10, 2014