INTRODUCTION

Groundnut is a Kharif cash crop grown on well drained

Agriculture is the mainstay of Pakistan’s economy and
majority of the population is directly or indirectly
dependent on this sector. Although some advancement
have been made in agriculture, like self-sufficiency in
wheat and cotton in particular, still there exists chronic
shortage of a very important constituent of human diet
i.e. edible oil has persisted unabated for the last two
decades. Thus, country is constrained to import edible
oil in large quantities.

Currently area under cultivation is 223 thousand acres
with total production of 136 thousand tons oilseed and
52 thousand tons oil which is much lower than the
developed countries of the world. Increasing the
production of the crop through horizontal expansion has
a limited scope in our country due to competition with
other crops. Some efforts could be put forth to increase
production through vertical expansion, which can be
achieved by planting hybrids/improved varieties and
management practices (Sarwar et al., 2004).

Canola is a member of the Brassica family and has
become one of the most important sources of vegetable
oil in the world. Its oil also has potentially developed in
the bio-diesel market. In addition to oil production, the
leaves and stems of canola provide high quality forage
matter because of their low fiber and high protein
content (Wiedenhoeft and Bharton, 1994) and can be
milled into animal feeds (Banuelos, et al., 2002).

CANOLA (Brassica napus L.) is a specific type of rape seed
associated with high quality oil and meal. It has
less than 2% erucic acid and its meal has less than 30 µg of
glucosinolates. It contains 40-45% oil and 36-40%
protein. Oil and meal are now very acceptable as
alternatives to soyabean oil and meal (Amin and Khalil,
2005; Muhammad, et al., 2007).

There are a number of factors which can be explored for
boosting the local edible oil production and feed for 180
million people of Pakistan. One the most important
factor is the use of hybrids/improved cultivars with high
production potential and vigor may enhance the yield of
the crop (Blum, 2004). Canola crop, being high oil
contents and productivity has the potential to a bridge
the gap between local production and consumption.
Rapeseed/mustard oilseed crops have a same land and water requirement. So it may not be difficult for the farmers in adapting and management practices of canola crop.

Rapeseed and mustard are the conventional oil seed crops of Pakistan and rank second after seed cotton in oil production in the country. Improved cultivar and good management are important tools, which have geared production in many countries of the world. In addition to many other factors responsible for achieving higher yields, cultivars with higher yield potential and a wide range of adaptability to adaphic and climatic conditions is essential for increasing yield per unit area, ultimately boosting up total production. In recent years, many canola varieties have been imported and cultivated in Pakistan but their yield potentials and production technologies have yet not been explored.

The selection of suitable variety always plays a vital role in achieving high yield of a crop (Sana et al., 2003). There are certain variations in some physiological and agronomic parameters such as plant height, Pod length, Number of seed per pod, Number of pods per plant, 1000 seed weight, leaf area index, crop growth rate and total dry matter accumulations among various canola cultivars. Brassica juncea produced significantly higher yield and yield components than B. napus genotypes. Seed oil content was higher in Brassica napus while the levels of erucic acid and glucosinolates were lower in B. napus than in B. juncea (Iqbal et al., 2008).

Cheema et al (2001), studded comparative growth and yield performance of 6 (six) Brassica varieties observed significantly differences among the plant height, number of branches plant\(^{-1}\), number of pods plant\(^{-1}\), 1000 seed weight, seed yield kg ha\(^{-1}\) and harvest index and non significant difference observed in number of seeds pod\(^{-1}\).

Inayat et al (2009), evaluated rapeseed genotypes for yield and oil quality under rained condition of district Mansehra, observed significant differences in plant height, inflorescence length, pedicle length, pod length, number of seeds pod\(^{-1}\), number of pods plant\(^{-1}\), 1000seed weight, yield plant\(^{-1}\), yield kg ha\(^{-1}\) and oil % among the genotypes.

Cheema et al (2012), Evaluated various canola cultivars under Agro – ecological condition of Faisalabad reported significant differences among the varieties in leaf area index, total dry matters accumulation, crop growth rate (CGR), yield and yield components. So keeping in view the yield potential of cultivars, the present study was planned to compare the production potential and quality traits of different Brassica varieties to yield under agro-ecological conditions of Quetta.

**MATERIALS AND METHODS**

Studies pertaining to comparative yield performance of seven Brassica varieties were carried out at the Agriculture Research Institute Sariab Quetta during spring 2014. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications using net plot size of 8m x 5m. The treatments comprised of V\(_1\) ((Sultan Raya) V\(_2\) (BARD – 1), V\(_3\) (Dunkled ), V\(_4\) (CON II), V\(_5\) (Chakwal Raya), V\(_6\) (19 – H) and V\(_7\) (Canola Raya). The crop was sown on 6\(^{th}\) March 2014 using a seed rate of 5 kg ha\(^{-1}\) in 45 cm spaced rows on a well prepared seed bed, with single row hand drill. Nitrogen and phosphorus in the form of urea and triple super phosphate were applied @ 90 kg N ha\(^{-1}\) and at 60 kg P ha\(^{-1}\), respectively. Whole of the phosphorus and 1/3 of nitrogen was applied as a basal dose while remaining 2/3 nitrogen was applied in two equal splits half at first irrigation and half at development stage. The crop was irrigated three times during the entire period of growth. First irrigation was applied 30 days after sowing, second at flowering and third at the start of seed development. Thinning was done twice up to the age of one month to maintain a distance of 10 cm between the plants. Two hoeing were given to keep the field free from weeds. Insecticides were sprayed for the control of aphids. All the agronomic practices were kept normal and uniform for all the treatments. Ten plants were selected at random from each plot to measure plant height, number of pods plant\(^{-1}\), number of seeds pod\(^{-1}\), 1000 seed weight (g), Yield kg ha\(^{-1}\), Biological Yield kg ha\(^{-1}\) and Harvest Index%.

The yield data were recorded by harvesting randomly selected 3m x 3m from each treatment, whereas number of pods was recorded on the average of ten plants from each treatment. Data was subjected to statistical analysis.
as mean values of three replications. Data were analyzed statistically for analysis of variance (ANOVA) following the method described by Gomez & Gomez (1984). The significance of differences among the means was compared by using Least Significant Difference (LSD) Test (Steel & Torrie, 1984).

OBSERVATION RECORDED
1). Plant height (cm): By measuring 10 randomly selected plants from each replication from the base to tip of plant with the help of measuring tape.
2). Number of pods plant$^{-1}$: By counting 10 randomly selected plants from each replication and then average number of pods plant$^{-1}$ were calculated.
3). Number of seed pod$^{-1}$: By counting 10 randomly selected pods from each replication and then average number of seeds pod$^{-1}$ were calculated.
4). 1000 seed weight (g): By weighting 1000 seeds from each replication and then average weight in gram were calculated.
5). Biological yield kg ha$^{-1}$: Each plot was weighted after harvesting at its maturity and calculated on Biological yield kg ha$^{-1}$.
6). Seed yield kg ha$^{-1}$: Each plot was harvested at its maturity stage for seed yield weighted and seed yield were computed on per ha basis.
7). Harvest Index %: H.I % was calculated by using 
\[
H.I \% = \frac{\text{Economical yield}}{\text{Biological yield}} \times 100
\]

RESULTS AND DISCUSSION

Plant height (cm).
Plant height of a crop is a function of both the genetic and environmental factors. The data (Table I) revealed that plant height was significantly affected by different Brassica varieties. The maximum plant height (98cm) was attained by CON II, which was statistically at par with canola Raya and Dunkeld producing (97.66cm) and (95.66cm), respectively. Whereas, the minimum plant height (83cm) was observed in Chakwal Raya variety. The maximum plant height in CON II might be due to genetic character. Similar findings were reported by Cheema et al. (2001), Islam et al (2004) and Inayt et al (2009) who found differences in plant height of different Brassica spp.

Table 1. Growth and yield performance of various brassica genotypes under the agro-ecological condition of Quetta

<table>
<thead>
<tr>
<th>Varieties Name</th>
<th>Plant height(cm)</th>
<th>Number of pods plant$^{-1}$</th>
<th>Number of seed pod$^{-1}$</th>
<th>1000 seed weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sultan Raya</td>
<td>92.000</td>
<td>72.333</td>
<td>16.000</td>
<td>17.000</td>
</tr>
<tr>
<td>BARD – 1,</td>
<td>95.000</td>
<td>82.333</td>
<td>17.000</td>
<td>18.333</td>
</tr>
<tr>
<td>DUNKELD,</td>
<td>95.667</td>
<td>82.667</td>
<td>21.000</td>
<td>15.000</td>
</tr>
<tr>
<td>CON II</td>
<td>98.000</td>
<td>96.667</td>
<td>24.000</td>
<td>16.333</td>
</tr>
<tr>
<td>Chakwal Raya</td>
<td>83.000</td>
<td>90.000</td>
<td>37.333</td>
<td>14.000</td>
</tr>
<tr>
<td>Canola Raya</td>
<td>97.667</td>
<td>84.000</td>
<td>17.667</td>
<td>12.667</td>
</tr>
<tr>
<td>Grand Mean</td>
<td>93.048</td>
<td>83.381</td>
<td>21.667</td>
<td>15.476</td>
</tr>
</tbody>
</table>

Table 2. Growth and yield performance of various Brassica genotypes under the agro-ecological condition of Quetta.

<table>
<thead>
<tr>
<th>Varieties Name</th>
<th>Biological yield kg ha$^{-1}$</th>
<th>Seed yield kg ha$^{-1}$</th>
<th>Harvest Index %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sultan Raya</td>
<td>19958AB</td>
<td>1185.7D</td>
<td>5.900CD</td>
</tr>
<tr>
<td>BARD – 1,</td>
<td>21380A</td>
<td>1652.3A</td>
<td>7.700A</td>
</tr>
<tr>
<td>DUNKELD,</td>
<td>17493C</td>
<td>1294.3C</td>
<td>7.4333AB</td>
</tr>
<tr>
<td>CON II</td>
<td>20270AB</td>
<td>1504.7B</td>
<td>7.4000AB</td>
</tr>
<tr>
<td>Chakwal Raya</td>
<td>18326BC</td>
<td>994.0E</td>
<td>5.4133D</td>
</tr>
<tr>
<td>Canola Raya</td>
<td>19293BC</td>
<td>994.0E</td>
<td>5.1333D</td>
</tr>
<tr>
<td>Grand Mean</td>
<td>14439D</td>
<td>960.7E</td>
<td>6.6233BC</td>
</tr>
<tr>
<td>CV</td>
<td>18737AB</td>
<td>1226.5</td>
<td>6.5148</td>
</tr>
<tr>
<td>LSD 5%</td>
<td>941.21</td>
<td>46.269</td>
<td>0.3999</td>
</tr>
</tbody>
</table>
Numbers of pods plant is a major yield determining component of Brassica varieties and contribute substantially towards seed yield. The parameter under study was significantly influenced by different Brassica varieties. Maximum number of pods plant\(^{-1}\) (96.67) was attained in CON II variety (Table 1). The significant difference regarding number of pods plant\(^{-1}\) in different Brassica varieties may be due to their genetic potential. Sultan Raya produced minimum numbers of pods plant\(^{-1}\). These results corroborate the findings of Cheema et al. (2001), Islam et al (2004) and Inayt et al (2009) who reported significant differences in number of pods plant\(^{-1}\) among different cultivars of Brassica species.

**Number of seeds pod\(^{-1}\).**

Data presented in Table 1 show significant effect of different Brassica varieties on number of seeds pod\(^{-1}\). These results corroborate the findings of Cheema et al. (2001), Islam et al (2004) and Inayt et al (2009) who found significantly different number of seeds pod\(^{-1}\) in different Brassica species.

**1000-seed weight (g).**

The 1000-seed weight is also an important yield determining component which contributes towards the final seed yield of a crop. The 1000-seed weight was significantly affected by various cultivars. The maximum 1000-seed weight (18.33 g) was attained by BARD-1 variety. Whereas, the minimum tested weight (12.66 g) was observed in Canola Raya. Maximum 1000-seed weight in BARD-1 variety may be attributed due to better source sink relationship than the other varieties. These results are in line with those of Cheema et al. (2001), Islam et al (2004) and Inayt et al (2009) who found significant differences for 1000-seed weight.

**Biological yield (kg ha\(^{-1}\)).**

Data presented in Table 2 show significant effect of biological yield on different varieties. The results are quite in line with the findings of Cheema et al. (2001), Islam et al (2004) and Inayt et al (2009) who reported non-significant differences in biological yield of different Brassica species.

**Seed yield (kg ha\(^{-1}\)).**

Final seed yield of a crop is the combined expression of various yield components like number of pods plant\(^{-1}\), seeds pod\(^{-1}\) and 1000-seed weight. Seed yield was significantly influenced by different varieties. The maximum seed yield (1652.3 kg ha\(^{-1}\)) was produced by BARD-1 variety. While, minimum seed yield (994 kg ha\(^{-1}\)) was attained by Chakwal Raya and 19-H respectively. The significant difference in seed yield in BARD-1 variety was attributed to improved yield components over the other varieties. These results confirmed the findings of Cheema et al. (2001), Islam et al. (2004) and Inayt et al (2009) working on Brassica species found higher seed yield over *Brassica compestris*.

**Harvest index.**

The data (Table 2) revealed that harvest index was significantly affected by any of the varieties. These results confirmed the findings of Cheema et al. (2001), Islam et al. (2004) and Pashan Eslam (2013) working on Brassica species found higher seed yield over *Brassica compestris*.

**REFERENCES**


Islam M, Ahmad H, Rashid A (2009). Evaluation of promising lines of *Brassica napus*. Published by VDM Verlog Dr. Muller


