COMPARATIVE STUDY OF ONION CULTIVARS AT MARDAN, KHYBER PAKHTUNKHWA-PAKISTAN

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ABSTRACT

An experiment was conducted at Pakistan Agricultural Research Council (PARC) Mardan, during winter 2010 to overview "Comparative study of onion cultivars at Mardan". The experiment was laid out with one factor Randomized Complete Block Design having three replications. Cultivars (Swat-1, NARC and Parachinar local) were subjected to plots having a size of 6m². The optimum level of phosphorus (90 kg ha⁻¹), potassium (60 kg ha⁻¹) and half dose of nitrogen (60 kg ha⁻¹) were applied before transplanting while half dose of nitrogen (60 kg ha⁻¹) were applied after 30 days of transplanting as basal dose. A significant difference was seen among the cultivars. Among different cultivars, Parachinar Local showed a significant increase in number of leaves (15.4), leaf length (47.7 cm), neck height (6.5 cm), plant height (77.9 cm) and total yield ha⁻¹ (33.1 tons). A non significant response was seen in parameter i.e. survival percentage. It is concluded that onion cultivar Parachinar local resulted in higher yield and recommended for cultivation in the region.

Key Words: Onion cultivars, Vegetative components and yield.

INTRODUCTION

Onion (Allium cepa L.) belongs to the family Amaryllidaceae which is one of the most important mono-cotyledonous crop. It is cross pollinated and cool season vegetable crop. Onion is the oldest known vegetable, as it is mentioned in the Holy Quran and also in Bible. Onion is an indispensable and important vegetable item which is used in every kitchen therefore its constant demand always remains throughout the year. Besides of its high food value and also it is also a good source of income for vegetable growers. It can be eaten as green leaves, bulbs that are mature and immature which can be eaten as fresh and also can be used in preparation of different dishes. The pungency of the onion bulbs is due to the presence of a volatile oil that is allylpropyl disulfide (Baloch, 1994). These have diuretic properties and are beneficial to the digestive tract. Onions are good for eyes, act as a heart stimulants and useful as anti rheumatic remedies (Shanmugavelu, 1990).

In Pakistan, the total production of onion is 1704100 tons and is cultivated on an area 129600 ha. Average yield per hectare in Khyber Pakhtunkhwa is 11.3 tons per hectare and total area under onion cultivation is 12100 ha with a production of 136400 tons (MINFA, 2008-09). Baloch et al. (1994) found that application @ 125 kg N with 75 kg K₂O gave the highest yield. Rashid and Rashid (1978) found that onion bulb size and weight increases with increasing row spacing but reduced total bulb yield. They obtained the high bulb size and weight when seedlings were planted at ridges 60 cm apart with plant to plant distance of 10-15 cm. A cultivar performs differently under different agro climatic conditions and various cultivars of the same species grown even in the same environment often yield differently. The performance of a cultivar mainly depends on the interaction of genetic makeup and environment. These two factors provide an idea for the selection of specific cultivar for specific locality. The present study envisages the evaluation and selection of 10 locally available onion various for good quality bulb formation

MATERIALS AND METHODS

An experiment to study “Comparative study of onion cultivars at Mardan” was conducted during 2010 at Pakistan Agricultural Research Council (PARC) Mardan Station with a view to find out the growth and yield components of onion cultivars. The land was thoroughly prepared. A plot size of 6 m² was used for the experiment. Nursery of the onion cultivars was taken from vegetable section, Agricultural Research Station (North) Mingora Swat. The seedlings were transplanted to well prepare field during the month of December. The experiment was laid out in one factorial Randomized Complete Block design (RCBD). There were three
treatment combinations and each was replicated three times. The row to row distance was 20 cm while plant to plant distance was 10 cm. All the cultural practices such as weeding, hoeing, irrigation and fertilizer application were done uniformly.

Table 1a. Monthly mean temperature and rainfall of Mardan during the growing season of onion crop (2010-11)

<table>
<thead>
<tr>
<th>Month</th>
<th>Daily Minimum</th>
<th>Daily Maximum</th>
<th>Mean Total Rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2010</td>
<td>9.6</td>
<td>25.6</td>
<td>12.3</td>
</tr>
<tr>
<td>December 2010</td>
<td>4.9</td>
<td>20.1</td>
<td>23.3</td>
</tr>
<tr>
<td>January 2011</td>
<td>4.0</td>
<td>18.3</td>
<td>26.0</td>
</tr>
<tr>
<td>February 2011</td>
<td>6.3</td>
<td>19.5</td>
<td>42.7</td>
</tr>
<tr>
<td>March 2011</td>
<td>11.2</td>
<td>23.7</td>
<td>78.4</td>
</tr>
<tr>
<td>April 2011</td>
<td>16.4</td>
<td>30.0</td>
<td>48.9</td>
</tr>
<tr>
<td>May 2011</td>
<td>21.3</td>
<td>35.9</td>
<td>27.0</td>
</tr>
</tbody>
</table>

The following parameters regarding growth and yield components of onion bulbs were recorded accordingly.

**Number of leaves plant**

The number of leaves plant was counted and means were recorded by selecting 5 representative plants from each plot in each replication.

**Leaf length (cm)**

The data regarding the leaf length were measured in centimeters by placing the lower end of the measuring tape touching the joint of the leaf through the tip of the leaf by taking 5 randomly selected plants from each plot.

**Neck height (cm)**

The neck height of 5 randomly selected plants was measured with the help of measuring tape from the bulb top surface to the point where leaves start to separate and the average was calculated.

**Plant height (cm)**

The data pertaining plant height were recorded in centimeters at the end of the growing season i.e. at harvest by measuring the plant from soil surface to the tip of the main stem. Five randomly selected plants from each plot and after that means were estimated.

**Total yield (tons ha**

All the harvested onion bulbs were weighed after harvesting. The total yield data were recorded in tons and yield per hectare was calculated using the following formula.

\[
\text{Total yield (tons ha}^{-1} \text{)} = \frac{\text{Bulb yield plot}^{-1}}{\text{Area of plot (m}^2\text{)}} \times 10,000 \text{ m}^2
\]

**Statistical Procedure**

The data recorded on different parameters were subjected to Analysis of Variance (ANOVA) technique to find out the difference between the different treatments and their interactions. In cases where differences were found significant, the means were compared for differences using Least Significant Difference (LSD) test. Statistical computer software, MSTATC (Michigan State University, USA), was applied for computing both the ANOVA and LSD (Steel and Torrie, 1980).

**RESULTS AND DISCUSSION**

**Number of leaves plant**

The data regarding number of leaves plant was given in Table I. The mean values for number of leaves plant revealed that the cultivars had a significant response on the number of leaves. Among different cultivars of onion the highest number of leaves (15.40) was recorded in cultivar Parachinar local, followed by Swat-1 (11.10) and the lowest number of leaves (9.00) noted in NARC. The reason might be due to marked varietal differences exist among different onion cultivars as well as their genetical constitute. There might be a strong relationship between sink and source in some cultivars and maximum translocation of photo assimilates.
in the presence of optimum temperature and relative humidity during the vegetative growth resulted in production of more leaves in some cultivars (Wilson, 1972).

**Leaf length (cm)**

The data concerning leaf length is presented in Table I. The results from analysis of variance showed that leaf length is significantly affected by cultivars. Mean values of leaf length for different cultivars showed that highest leaf length (47.1 cm) obtained from Parachinar local followed by Swat-1 (32.6 cm) while lowest leaf length was recorded in NARC (32.6 cm). The increase in leaf length might be due to the genetical variation or potentiality of different onion cultivars. Greater availability of nutrients in adequate quantity especially during leaf formation and developmental stages might have directed the plants to translocate most of its reserved food materials towards building the leaf length as compared to those which could not produce longer leaves (Flore and Layne, 1999). These results are in line with Kumar et al., (1998) who reported that application of N at 150 kg ha\(^{-1}\) gave the best results with regard to leaf length. Singh and Chaure (1999) mentioned that leaf length increased up to 150 kg N ha\(^{-1}\).

**Table I  Number of leaves and leaf length of onion cultivars as affected by humic acid levels.**

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Number of leaves</th>
<th>Leaf length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swat-1</td>
<td>11.1 b</td>
<td>35.7 b</td>
</tr>
<tr>
<td>NARC</td>
<td>9.0 c</td>
<td>32.6 c</td>
</tr>
<tr>
<td>Parachinar local</td>
<td>15.4 a</td>
<td>47.7 a</td>
</tr>
<tr>
<td>LSD Value</td>
<td>0.74</td>
<td>4.84</td>
</tr>
</tbody>
</table>

**Neck Height (cm)**

The data attributing neck height is given in Table II. From the analysis of variance, it is cleared that the cultivars significantly influenced the neck height of onion bulbs. Mean value of neck height for different onion cultivars indicated that more neck height (6.5 cm) was recorded for the cultivar Parachinar local. A non significant difference was recorded in the neck height of NARC (5.0 cm) and swat-1 (5.1 cm) but significantly different from Parachinar local (6.5 cm). The increase in neck height of onion is due to the varietal differences among the cultivars under trail and differences in their genetic make up (Young et al., 2004). Similarly our results for certain extent, agreed with the results of Pandy et al., (1992), who reported that greatest neck thickness with 1\(^{st}\) June sowing instead of 30\(^{th}\) June, 15\(^{th}\) July or 30\(^{th}\) July.

**Table II  Neck height (cm), Plant height (cm) and Total yield (tones ha\(^{-1}\)) of Onion cultivars as affected by Humic acid levels.**

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Neck height (cm)</th>
<th>Plant height (cm)</th>
<th>Total Yield (tones ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swat-1</td>
<td>5.1 b</td>
<td>62.4 b</td>
<td>33.86 b</td>
</tr>
<tr>
<td>NARC</td>
<td>5.0 b</td>
<td>60.7 b</td>
<td>31.72 b</td>
</tr>
<tr>
<td>Parachinar local</td>
<td>6.5 a</td>
<td>77.9 a</td>
<td>37.08 a</td>
</tr>
<tr>
<td>LSD Value</td>
<td>0.44</td>
<td>4.98</td>
<td>2.25</td>
</tr>
</tbody>
</table>

Means followed by the same letter (s) do not differ significantly from one another at 5% probability level, using LSD test.

**Plant Height (cm)**

The data pertaining plant height is presented in Table II. The statistical analysis of data revealed significant differences in different cultivars. Mean table for plant height of different cultivars indicated that greater plant height (77.9 cm) was recorded for cultivar Parachinar local followed by Swat-1 (62.4 cm) whereas lower plant height (60.7 cm) was expressed by cultivar NARC. The variation in plant height among different cultivars may be due to the differences in genetic makeup of the various cultivars under trail and adaptation ability of these cultivars to particular environment (Khan et al., 2001). Similarly the findings of Majeed (1986) are of great importance in this connection, who evaluated six onion cultivars and reported that cultivars Swat-local and Faisalabad were the tallest cultivars with a plant height of 55.00 and 53.40 cm respectively. Among the varieties maximum yield (15.79 t ha\(^{-1}\)) was recorded in Shah Alam followed by Faisalabad Early. Similarly the minimum yield (13.45 t ha\(^{-1}\)) was recorded in Phulkara.

**Total Yield (tons ha\(^{-1}\))**

The data relating to bulb weight is indicated in Table II. From the statistical analysis of data representing total yield expressed that different cultivars had significant affect of total yield on onion cultivars. Mean value of yield ha\(^{-1}\) for different onion cultivars indicated that the highest yield ha\(^{-1}\) (37.08 tons) was recorded in cultivar Parachinar local, followed by cultivar Swat-1 (33.86 tons) where as lowest yield ha\(^{-1}\) was
noted in cultivar NARC (31.72 tons). This might be due to the fact that different onion cultivars significantly vary in the characteristics with respect to the yield because of their genetic makeup (Khan et al., 2001). The results of Blandon (1969) are of primary importance in this regard; who compared ten onion cultivars and reported that cultivar Granex gave the highest yield (48 ton ha\(^{-1}\)). These results also agree with those of Betancourt and Rivas (1973), Singh and Pandy (1974) and Vigario (1975) who compared different cultivars of onion under different agro climatic conditions and reported that highest yield of onion bulbs were obtained from White Granex, Poona Red and Dessex respectively.

**CONCLUSION**

On the basis of the results obtained it is concluded from our research that; the different onion cultivars significantly influenced most of the growth and yield components of onion bulb production. All the onion crops stood healthy and neither affected by any kind of pest or disease during the experimental trial and the weather condition was a typical one. Whereas, the cultivar "Parachinar local" resulted in highest bulb yield followed by Swat-1 while the lowest bulb yield was recorded in cultivar "NARC".

**REFERENCES**


