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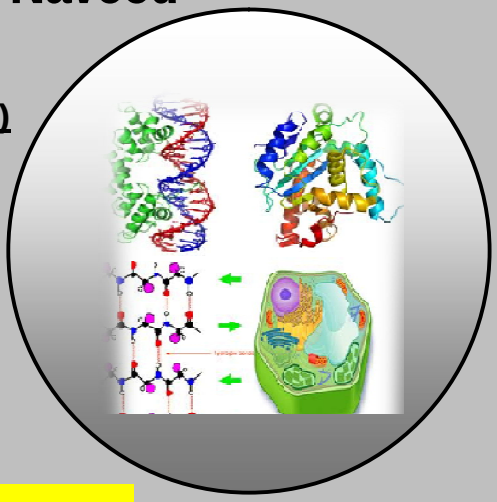

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# Yield Potential and Growth Response of Onion Cultivars Grown Under the Agro-Climatic Conditions of District Karak

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## ABSTRACT

***Three onion cultivars swat-1, super swat -1 and Karak local were evaluated at two different agro-climatic location of District Karak for Bulb yield and other yield contributing characters during 2011-12. The recorded data showed that location affects plant population. Hence 65-70 plants/m2 were counted at both locationsin the cultivar Swat-1. The tallest plants of 60 cm were observed in Local cultivar in Chountra.Heaviest individual bulb of 78 gm was produced by cultivar Swat-1 whereas the Local cultivar gaineda weight of only 28 gm. Moreover the individual bulb weight of cultivars was significantly affected by the interaction of locations. Cultivar Swat-1 produced 92.11 gm heavy bulb at location-1 (Chokara) while 63.89 gm bulb weight was recorded in location-2 (Chountra) by the same cultivar. The highest tonnage of bulbs yield (33.58 and 29.17 ton/ha) was recorded for cultivar Swat-1 at both locations respectively which was associated with the individual bulb weight and diameter gained by the same cultivar.***

**Keywords:*Adaptability, Onion (Allium cepa L.), Cultivar and Bulb.***

## INTRODUCTION

Onion (*Allium cepa* L) is among the most commonly used vegetablesof the world. It belongs to the family *Amarayllidiaceae*, known as Piyaz(Urdu) locally.It is used either fresh as a salad or in preserved form (Slam *et al.* 2007).Now, at least 175 countries growing onion world widely.According to the FAO, 2005 there is an estimated 207 million hectares area under onion cultivation in the world, producing 55 million tons of onion. Leading countries in onion production are China, India, United States, Turkey and Pakistan.

Onion is one of the five main exportable commodities from Pakistan. Pakistan annually produces about 1.5 million tons of onion. Though subjected to annual variations, overall area and production of onions in Pakistan is 107.2 hectares which contributed 1494.5 tons to the world onion production. Sind is the leading onion producing province in Pakistan followed by Punjab, Baluchistan, and KPK (MINFAL, 2004). It is utmost need to employ all the possible ways to boost the production of this very important vegetable crop.

A cultivar performs differently under different agro-climatic conditions and various cultivars of the same species grown even in the same environment give different yields as the performance of a cultivar mainly depends on the interaction of genetic makeupand environment (Jilani & Ghafoor. 2003 and Kimani *et a*l. 1993).These two factors provide an idea to the breeders to choose the right method and test sites foroptimal characters expression.

Literature survey showed that cultivars Glacier and Swift (Vanpary, 1999a) and shallot cultivar Santé were evaluated and recommended for cultivation on high sandy loam soil. Several cultivars have been recommended for their higher yield such as Granex (Bolanos, 1989), upton hybird (Callens *et al*., 1998) and Texas Grano-PRR (Costa *et al.,* 2000). Research has been carried out in Pakistan by Kaiser*et al.,* 2002, 2003a, b, c to evaluate the performance of various cultivars of onion at various districts of Punjab Province.District Karak is the southern district of KPK, its climate issemi-arid and soil is sandy loam at Thaal(Chokara) and Chontra which is suitable for onion production.The aim of this study was to evaluate and comparethe 3 cultivars of onion at 2 different locationsof DistrictKarak for plant growth and onion production.

## MATERIAL AND METHODS

Two field experiments were carried out on farmers' fields at different locations (Chokara and Chountra) of District Karak during 2011-12. Seed of all cultivars were sown in raised nursery bedsin the 1st week of October and transplanted in the first week of February 2011. Nursery was sown during 2nd week of October and transplanted during 1st week of December after dipping in 0.2% solution of Dithane M- 45 for five minutes to keep it clean against fungal diseases.The experiment was laid out in a Randomized Complete Block Design(RCBD) with three replications. The plot size was maintained 7x1.4m.

The plant to plant distance was 8 cm and row to row distance was 25 cm. A basal recommended dose of 120:60:60 kg/ha of NPK was applied. All phosphorus, potassium and half of the nitrogen were applied at the time of soil preparation whereas; the other half nitrogen dose was applied 30 days after transplantation. All the cultural practices like gap filling, weeding, irrigation, plant protection werefulfilled when required. Irrigation was stopped three weeks before harvesting. Mature bulbs were harvested when 75% of the tops had fallen. Either one square meter space or ten plants were randomly selected from each replication in such a way that the marginal effect was avoided and the data were recorded on number of plants/$m^2$, number of leaves/plant, plant height, single bulb weight, diameter of individual bulb and yield ton/ha. Data was statistically analyzed byAnalysis of Variance (ANOVA) (Steel and Torrie 2007). The significant differences among the means were determined by using Duncan's Multiple Range Test (DMRT) (Gomez and Gomez 1984).

## RESULTS AND DISCUSSION

Highly significant differences were observed among cultivars and locations.

**Number of plants $m^{-2}$**

Plant population is a key factor which ultimately leads to good production. The results (obtained data presented in Table-1) showed that the plant population wassignificantly different for different cultivars. The maximum number of plants $m^{-2}$ (68) was counted in Supper Swat-1and the minimum (51 plants $m^{-2}$) in a Local cultivar while the interaction between varieties and locations remained constant as the locations did not affect the plant population.

**Number of leavesplant$^{-1}$**

The number of leaves is an important yield component as leaves through photosynthesis make food and transfer it down to stores it in the bulbs. A perusal of the means table (Table-1) depicted non-significant variability for the number of leaves among onion cultivars evaluated in different locations. However, the maximum number (10 leaves) per plant was recorded in a Local cultivar at Chokara followed by Swat-1 with 9.9 leavesplant$^{-1}$ at Chountra. Super swat-1 11, swat-1 9, local 7.8

**Plant height (cm)**

The means data in Table-1 showed that different cultivars of onion were non-significantly different with respect to height of plants.However thevalues revealed that plant height ranged between 56-60cm. The tallest plants of 60.38 cm were measured in Local cultivar. On the other hand plant height was significantly affected due to locations. The Local cultivar produced the tallest plants 68.57 cm at L2 (Chountra) while quite shorter plants of 52.2 cm were observed in the same cultivar at L1 (Chokara). Thedifference in height of onion is due to the varietal differences among the cultivars under trail and differences in their genetic makeup (Young et al., 2004).

**Weight of individual bulb (gm)**

Bulb weight is very important parameter that contributes towards yield. The means in Table-II regarding single bulb weight indicated that bulb's weight was significantly different among the onion cultivars evaluated in different locations. The weight of a single bulb in Swat-1 was the heaviest (78 gm) and was significantly heavier than the bulb weight of the other cultivars. Similarly interaction between cultivars and locations was also found to be significant. Cultivar Swat-1 produced the heaviest bulb of 92.11 gm at L1 (Chokara) while 63.89 gm bulb was noticed in the same cultivar at the other location L2 (Chountra).

**Table 1. Plant population $m^{-2}$, Number of leaves/plant and plant height (cm) of different cultivars of onion at Chokara and Chountra during 2011-12.**

| S# | Cultivars | Plant population/$m^{-2}$ Chokara Chountra Mean | Number of leaves $plant^{-1}$ Chokara Chountra Mean | Plant height (cm) Chokara Chountra Mean |
|---|---|---|---|---|
| 1 | Supper Swat-1 | 70.000 a 65.333 a 67.667 a | 16.433 a 14.467 a 8.450 | 65.567 a 62.267 a 63.917 |
| 2 | Swat-1 | 58.333 ab 60.667 ab 59.500 b | 13.300 a 12.867 a 9.583 | 73.400 a 70.633 a 72.165 |
| 3 | Swat-1 Local | 51.333 b 51.000 b 51.167 c | 10.100 a 8.433 b9.267 | 52.200 b 56.567 b54.383 |
| Mean | | 59.889 59.000 | 13.27 11.922 | 63.72263.155 |
| LSD (0.05p) for: | | | | |
| **Location** | | 6.300 | N.S | N.S |
| **Varieties** | | 11.90 | 1.363 | 9.959 |
| **L X V interaction** | | | | |

**N.B.** ***Figures followed by the same letters are not significantly different at 5% level of significance (DMR Test).***

**Diameter of bulb (cm)**

The data regarding bulb diameter are given in Table-II. Bulb diameter significantly contributes to the yield of crop component. The means table showed that significant variations in bulb diameter was exhibited by onion cultivars and locations as well. The maximum bulb diameter (5.218 cm) was recorded in cultivar Swat-1 which was at par and statistically equal to Supper Swat-1 by gaining 4.386 cm bulb's diameter.

Similarly the cultivar Swat-1 was on top of the list with 5.280 cm diameter amongst other cultivars in Chokara and 5.155 cm diameter of a single bulb was measured for the same cultivar at Chountra as well.

**Table 2Individual bulb weight (gm), Onion bulbdiameter (cm) and Bulb yield (ton ha$^{1}$)of different cultivars of onion at Chokara and Chountra during 2011-12.**

| S# | Cultivars | Individual bulb weight (gm) | | | Bulb Diameter (cm) | | | Yield (ton/ha.) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Chokara | Chountra | Mean | Chokara | Chountra | Mean | Chokara | Chountra | Mean |
| 1 | Supper | 66.677 b | 71.113 b | | 4.334 ab | 4.438 b | | 32.250 a | 24.750 a | |
| 2 | Swat-1 | 68.945 a | | | 4.386 a | | | 28.500 a | | |
| 3 | Swat-1 | 92.113 a | 63.890 b | | 5.280 a | 5.155 a | | 33.583 a | 29.167 a | |
| | Local | 78.002 a | | | 5.218 a | | | 31.375 a | | |
| | | 26.110 c | 30.553 c | | 2.600 bc | 2.364 c | | 15.000 b | 15.083 b | |
| | | 28.332 b | | | 2.482 b | | | 15.042 b | | |
| Mean | | 61.667 | 55.186 | | 4.071 | 3.986 | | 26.944 | 23.000 | |
| LSD (0.05p) for: | | | | | | | | | | |
| **Location** | | | | | | | | | | |
| **Varieties** | | 12.78 | | | 1.061 | | | 8.135 | | |
| **L X V interaction** | | 16.13 | | | 1.813 | | | 8.853 | | |

**N.B.** ***Figures followed by the same letters are not significantly different at 5% level of significance (DMR Test).***

**Shape of bulb**

The shape of full grown bulb of Super Swat-1 was dark red and ovate spindle while that of Swat-1 was light red and globe flat. The Local cultivar produced bulbs of moderateuniform shape of red, white and pink color. Similar results were reported by Dubey (1994).

**Yield (ton ha$^{-1}$)**

Yield is the ultimate goal of any crop husbandry. Onion bulbs yield (Table-II) showed that different cultivars of onion were significantly different in yield (ton ha$^{-1}$). This might be due to the fact that different onion cultivars significantly vary in their characteristics with respect to the yield because of their genetic makeup (Khan *et al*., 2001).From the average it was obvious that the highest yield of 31.375(ton ha$^{-1}$) was harvested in the cultivar Swat-1 which was at par and statistically equal to Supper Swat-1 by giving 28.500 (ton ha$^{-1}$) bulbs yield while significant differences were found in locations and interaction between locations and varieties. The means data revealed that at Chokara onion yield was 26.944 (ton ha$^{-1}$) while at Chountra 23.000 (ton ha$^{-1}$) yield was obtained.

The means table further depicted that cultivar Swat-1 & Supper Swat-1 produced 33.583 and 32.250 (ton $ha^{-1}$) at Chokara and these cultivars decreased the yield up to 29.167 & 24.750 ton $ha^{-1}$ respectively. These results are in partial agreement with the findings of Singh and Pandy (1974), Vagario(1975) , Shakur and Rashid (1982) andTanveer *et al*., (2012)when they worked with different genotypes.

## CONCLUSION

The conclusion we have drawn from the present study is that:

1. Improved varieties with recommended dose of fertilizer and other cultural practices showed best results in term of yield of onion crop as compared to the local one
2. It may be concluded from the obtained results that specific variety should be planted in a specific area for getting higher bulb yield of onion. In this way, recommendations can be made that are appropriate to the natural and socio-economic environment and consistent with the farmers' objectives and resource availability.

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