

EFFECT OF PLANTING METHODS ON PERFORMANCE OF ONION VARIETIES UNDER COLD DESERT CONDITIONS

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KEYWORDS

Cold desert
Onion
Planting method
Varieties

Received on :
08.12.2012

Accepted on :
11.04.2013

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ABSTRACT

A study was conducted at Research Farm of High Mountain Arid Agriculture Research Institute (SKUAST-K), Stakna, Leh to investigate the impact of three planting methods (Flat bed, Middle of Ridge, Both sides of Ridge) on the performance of four onion varieties in Split plot design with three replications. Flat bed system produced statistically highest net bulb weight (66.00g), bulb diameter (51.33mm) and yield per ha (440.2 qt). Net bulb weight, diameter and yield per ha of onion hybrid Rosy was highest but at par with Local Red and Nasik Red. It can be concluded that planting on flat land is best method for onion production in cold desert conditions.

INTRODUCTION

Ladakh region is a high altitude cold desert of India with distinct geography and climatic conditions; altogether offering a tough life managed with meagre resources. Agriculture particularly horticulture sector being the sustainable to the rural living has directly and indirectly contributed towards the development of the region. The new era of change and development demands the advancement in the farming on an economic scale. Onion (*Allium cepa* L.) is the major vegetable crop for the region owing to its use in green form or as mature bulb or both used as salad and in preparations of immeasurable number of dishes besides its long shelf life for off season market.

Owing to its importance in the region it becomes imperative to work out the best management practices (BMP) for exploiting its best potential; though there are number of improved varieties available. Literature pertaining to suitable planting method for onion cultivation in cold deserts is scanty. There is no report on the different methods of onion planting accompanied by varietal evaluation. There are numerous varieties of onion, each having different characteristics and yield (Bolanos, 1989; Shimeles, 1998; Shimeles & Dessalegne, 1999; Costa *et al.*, 2000). It is expected that the individual variety may perform different on various planting methods. This necessitated the evaluation of various method of planting in combination of genotypes.

Keeping in view the choice of grower and consumers, a study was contemplated in the Research Farm of High Mountain Arid Agriculture Research Institute, Leh to work out the impact of different planting methods on onion with the objective of enhancing yield per unit area and bulb size.

MATERIALS AND METHOD

Experiment was conducted in open field conditions at Research Farm of High Mountain Arid Agriculture Research Institute (SKUAST-K), Stakna, Leh. Experimental location is situated at 3319 m amsl with latitude 33°58.551' NS and longitude 77°41.995' EW. Climate of the area is typically dry temperate with extreme fluctuations in the temperature and negligible rain fall.

Performance of four onion varieties viz. Nasik Red, Hybrid Rosy, Local White and Local Red was studied in summer season of the year 2009 under three planting methods namely flat land, middle of ridge and both sides of ridge at in Split plot design with three replications. Spacing was kept 15x10 cm, 20x10 and 15x10cm for flat bed, middle of ridge and both sides of ridge, respectively. Transplanting was done on 15 May, 2009. Standard package of practices followed to raise healthy crop. At harvest, data were recorded on 5 randomly taken plants per replication with respect to yield and horticultural characters and subjected to statistical analysis as per Snedcor and Cochran (1967). Main effects of planting method as well genotypes along with their interaction were studied to find out mainly suitable method and genotype for cold arid regions.

RESULTS AND DISCUSSION

Analysis of variance indicated that planting method had significant effect on net bulb weight, bulb diameter, neck diameter and yield per ha. Significant differences were observed in varieties for all the characters under study.

Interaction effects of planting method x variety were significant only for leaf length and bulb diameter only. Arian *et al.* (2004) also reported significant differences bulb diameter, bulb yield and total marketable under different planting methods.

Effect of planting methods is presented in Table 1. Planting of onion in flat land produced statistically highest net bulb weight, bulb diameter, neck diameter and yield per ha over the other two methods of planting. Performance of onion on flat land is much higher and it can be recommended for cold arid region un-doubtedly. Best size and highest yield potential of onion on flat land might be due to predominantly sandy to sandy loam soils of cold deserts that allowed proper growth of onion bulbs as onion bulbs do not need much depth of soil. On the other hand, making ridges is time consuming, increase cost of cultivation and require more water and time for irrigation. Ahmed and Hassan (2007) also reported that planting on flat gave significantly higher yield than planting on ridges in Sudan. The highest garlic yields were also recorded when garlic was planted in holes in flat plots (Nourai, 2007). Contrary results were reported by Haque *et al.* (2002) in garlic in Brahmaputra alluvial tract. This may be due to the differences in soil texture. The significant reduction in marketable yield was observed in ridge and furrow system of planting due to lower plant density. The highest marketable yield was obtained from flat bed system of planting (Lawande and Sankar, 2001).

Table 2 present performances of varieties. Perusal of data in the Table indicated that leaf length was maximum in hybrid

Rosy and at par with var. Nasik Red. Hybrid Rosy also produced highest net bulb weight and yield per ha with the Local Red (check) and Nasik Red. Bulb diameter is also recorded by hybrid Rosy which is statistically superior to other onion varieties under study. Neck diameter was observed at par in Nasik Red, hybrid Rosy and Local Red (check). Pakyurek *et al.* (1994) tested various varieties for yield and quality and concluded that not all the varieties gave the similar response. It can be summarized that varieties did not matter much for onion cultivation provided that seed has been purchased from authentic source and it should not be more than one year old. However, big bulbs can be achieved by using hybrids in cold deserts but big sized bulb are observed having poor storage life during freezing winters of the region as these are stored for off-season for winter consumption.

Perusal of data in Table 3 revealed that none of the treatment combination of planting method x variety differ statistically with respect to net bulb weight, yield per ha and neck diameter. Flat x Local Red recorded highest bulb weight and yield per ha followed by Flat x hybrid Rosy. Flat x Hybrid Rosy recorded statistically longest leaf followed by Middle of ridge x Hybrid Rosy. Similar trends were observed for neck diameter. This implies that neck diameter is directly related to the length of leaf in onion.

At flat sowing system, leaf length of Hybrid Rosy and Nasik Red was found at par with each other. Similar trends were observed for leaf length when onion transplanted in middle of

Table 1: Effect of planting methods on yield and horticultural characters of onion

Planting method	Characters				
	Leaf length (cm)	Net bulb weight (g)	Bulb diameter (mm)	Neck diameter (mm)	Yield/ha (Q)
Flat	34.83	66.00	51.33	11.00	440.2
Middle of ridge	31.42	31.83	39.98	9.26	195.7
Both sides of ridge	32.75	29.33	38.38	8.60	159.2
CD 0.05	NS	5.41	2.81	0.37	40.05

Table 2: Effect of varieties on yield and horticultural characters of onion

Varieties	Characters				
	Leaf length (cm)	Net bulb weight (g)	Bulb diameter (mm)	Neck diameter (mm)	Yield/ha (Q)
Nasik Red	35.00	43.67	44.19	10.58	274.1
Hybrid Rosy	37.00	50.61	48.05	10.55	308.7
Local White	27.78	29.00	36.44	7.01	185.8
Local Red	32.22	46.28	44.25	10.35	291.4
CD 0.05	3.11	7.96	3.56	1.51	51.87

Table 3: Interaction effect of planting methods x varieties on yield and horticultural characters of onion

Varieties	Characters				
	Leaf length (cm)	Net bulb weight (g)	Bulb diameter (mm)	Neck diameter (mm)	Yield/ha (Q)
Flat x Nasik Red	34.67	65.50	50.84	11.70	439.9
Flat x Hybrid Rosy	39.67	68.00	52.59	11.89	453.6
Flat x Local white	31.33	57.33	49.10	9.22	382.4
Flat x Local Red	33.67	73.17	52.77	11.19	488.0
Middle of ridge x Nasik Red	32.33	30.83	39.68	9.50	154.2
Middle of ridge x Hybrid Rosy	38.33	51.83	50.19	11.77	259.2
Middle of ridge x Local white	27.67	13.63	28.52	6.41	68.3
Middle of ridge x Local Red	27.33	31.00	41.55	9.35	155.0
Both sides of ridge x Nasik Red	38.00	34.67	42.03	10.53	231.2
Both sides of ridge x Hybrid Rosy	33.00	32.00	41.38	7.99	213.4
Both sides of ridge x Local white	24.33	16.00	31.69	5.38	106.7
Both sides of ridge x Local Red	35.67	34.67	38.43	10.51	231.2
CD 0.05	5.38/7.09	NS	6.15/6.86	NS	NS

ridges. However, Nasik Red showed longest leaves and was at par with Hybrid Rosy and Local Red when transplanted on both sides of ridges. Similar results were recorded for bulb diameter when onion transplanted on both sides of ridges. Hybrid Rosy recorded statistically superior bulb diameter in middle of ridges. All the varieties produced bulb diameter at par with each other in flat method.

All the three methods recorded leaf length at par in Hybrid Rosy, Nasik Red and Local White. While transplanting on both sides of ridges produced maximum leaf length but was at par with flat system. However, bulb diameter was observed maximum in flat method and at par with middle of ridge in case of Hybrid Rosy. However, it was maximum and statistically highest in flat method in case of Nasik Red, Local White and Local Red.

Higher yields in onion transplanted on flat land might be due to the more availability of moisture and nutrients in flat land compared to the ridges which are more prone to moisture loss under arid conditions. Besides, availability of nutrients and organic matter is also high on flat beds than on ridges.

Therefore, it can be concluded that planting on flat land is best method for onion production in cold deserts for better bulb size and yield per unit area. Onion hybrids may be adopted for good yield potential and quality over open-pollinated varieties.

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