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Short communication

RO-1 an improved onion variety for the warmer areas of Rajasthan

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Onion (*Allium cepa* L.) is an important vegetable grown as cash crop throughout the world. India occupies first position in respect of area (16.04 %) in the world and ranks 2nd in bulb production (9.65 %), next to China. It is an export-oriented crop earning valuable foreign exchange for the country. Rajasthan contributes about 5.75 per cent of total area and 3.59 per cent of total production in the country. The present production level of onion is about 15-20 per cent less than the existing demand of population in Rajasthan. To redress the existing constraints, an appropriate breeding approach was initiated to develop a promising onion variety RO-1, which could provide higher yields and better returns to the farmers. To develop a suitable onion variety for semi-arid agroclimatic condition of Rajasthan, the selfing and massing method [1] was adopted for improvement of local landraces of Muhana at Agricultural Research Station, Durgapura, Jaipur, Rajasthan. Through selection cycle of selfing and massing a new line RO-1 was selected. Initially this line was tested in augmented design for yield levels as well as for other desirable parameters along with popular varieties. This promising line, Rajasthan Onion 1 (RO-1) was included in various evaluation trials since 1991-92 to 2000-01. The trials were conducted in randomized block design with three replications along with two check varieties *viz.*, N-53 and Nasik Red. The agronomic trials were also planted for three years (1998-99 to 2000-01) to confirm the bulb yield superiority of this variety over check variety N-53. Transplanting was done in first week of January at a spacing of 15 cm × 10 cm in plots of 3.0 m × 1.80 m. Recommended agronomical practices were adopted to raise the crop. The bulb yield per plot (kg) was recorded and data were subjected to standard statistical analysis [2]. Besides this, sixteen other characters were also recorded to access the performance of RO-1 over check varieties. Disease intensity of major onion diseases *viz.*, purple blotch and *stemphylium* blight was also recorded (1998-99 to 2000-01) to assess the resistance of RO-1 along with two check varieties (N-53 and Nasik Red). Further, to confirm the yield potentiality of RO-1 over popular varieties (N-53 and Nasik Red) grown in the state, a trial was conducted at Adaptive Trial Centre, Tabiji, Ajmer (1999-2000).

The analysis of yield data of breeding trials for six years revealed that this newly developed onion variety RO-1 significantly out yielded both the check varieties (N-53 and Nasik Red) (Table 1). During 1992-93, this variety gave significantly superior bulb yield over widely cultivated variety N-53, whereas it also gave higher bulb yield (16.5%) over check variety Nasik Red. In the year 1999-2000, although it was not significantly superior in bulb yield, however, it gave bulb yield as good as check varieties. Overall results of breeding trials revealed that RO-1 gave 29.2% and 48.8% higher bulb yield over Nasik Red and N-53 varieties, respectively. These results indicated that newly developed onion variety has good adaptability and stability for higher bulb yield under semi-arid agroclimatic condition of the state. Results of three years agronomic trials showed that this variety gave significantly higher bulb yield over N-53 in two years trials. It is noteworthy that RO-1 has showed better productivity over these years and gave 22.5% higher bulb yield (Table 2). These results indicated that RO-1 variety has good bulb yield potential and it is envisaged that this variety will open up new vistas of boosting onion production and alleviate the socio-economic status of the subsistent farmers of Rajasthan. A close perusal of the disease intensity of the major disease in Table 3, revealed that RO-1 variety showed resistance to purple blotch over three years. However, it showed moderately resistant reaction to the *stemphylium* blight consistently over three years. These results clearly indicated that RO-1 has fairly good resistance against both the major diseases as compared to the check varieties. Consistency in disease resistance also proved that the RO-1 is an excellent variety for bulb yield as well as disease resistance and thereby the cultivation of this promising onion variety could offer an exciting opportunity for overcoming the stagnating yield plateau of onion in warmer areas of Rajasthan.

Table 1. Bulb yield performance of onion variety RO-1 in breeding trials for eight years

Variety	Onion bulb yield (q/ha)								Mean (q/ha)
	1991-92	1992-93	1993-94	1994-95	1995-96	1998-99	1999-2000	2000-01	
RO-1	263.9*	392.3	446.5*	345.8*	419.4*	342.1*	212.3	469.4*	361.5
Nasik Red (C)	188.7	336.7	349.3	241.7	-	270.4	208.5	363.4	279.8 (29.2 %)
N-53 (C)	218.7	290.6	345.1	-	261.1	255.1	190.7	356.9	242.8 (48.9 %)
C.D. at 5%	37.6	60.1	73.1	48.7	55.1	51.0	35.9	42.3	
C.V. %	12.6	12.2	12.8	10.3	13.9	14.0	10.3	8.8	

*Significantly superior; In parenthesis per cent increase of RO-1

Table 2. Bulb yield performance of onion variety RO-1 in agronomy trials for three years

Variety	Bulb yield q/ha			Mean (q/ha)
	1998-99	1999-2000	2000-01	
RO-1	265.09*	221.61	415.20*	300.63
N-53 (C)	186.19	229.10	320.78	245.35 (22.5%)
S. Em ±	5.08	1.66	5.09	
C.D. at 5%	14.59	4.79	14.65	

*Significantly superior; In parenthesis- per cent increase of RO-1

in improved storage structure as compared to other local / improved varieties under cultivation in the state.

Inbuilt mechanism of this RO-1 variety for higher bulb yield along with better quality parameters and shelf life and resistance to major diseases, it was naturally expected to meet the challenges of

Table 3. Response of onion variety RO-1 to Purple blotch and *Stemphylium* blight in pathological trials

Variety	Purple blotch			*Stemphylium* blight			Mean	
	1998-99	1999-2000	2000-01	1998-99	1999-2000	2000-01	Purple blotch	*Stemphylium* blight
RO-1	6.50 (R)	8.16 (R)	3.00 (R)	11.80 (MR)	14.70 (MR)	17.18 (MR)	5.88 (R)	14.56(MR)
Nasik Red (C)	6.90 (R)	8.26 (R)	7.06 (R)	37.58 (MS)	44.58 (MS)	40.00 (MS)	7.41 (R)	40.72(MS)
N-53 (C)	12.10 (MR)	16.72 (MR)	15.66 (MR)	34.78 (MS)	41.38 (MS)	41.75 (MS)	14.82 (MR)	39.30(MS)

Disease scoring scale: 0-10% Resistant (R); 10-20% Moderately resistant (MR); 20-50% Moderately susceptible (MS); Above 50% Susceptible (S).

Results of Adaptive trial exhibited that RO-1 variety significantly out yielded over both the check varieties during 1999-2000. The results further indicated that bulb yield of RO-1 was recorded 49% and 24.6% higher than Nasik Red and N-53 check varieties, respectively. These results supported that this variety has inherent mechanism for higher production of bulb yield. Results of thirty on farm demonstrations (1000 sq m each) of RO-1 at farmer's field gave 18.8% higher average bulb yield over local onion variety. The results of on farm demonstrations clearly indicated that RO-1 enables a higher level of productivity both under optimum and sub-optimum environments and permits stability and sustainability of production under semi-arid agroclimatic condition of Rajasthan. Results of various quantitative and quality traits revealed that average plant height, bulb weight, bulb diameter and maturity of RO-1 was 62.5 cm, 65.9 g, 4.68 cm and 130.7 days, respectively. It also possesses superior bulb quality parameters *viz.*, TSS (10.5%), dry matter contents (6.55 %), low bolting (0.42 %), splits (0.92 %), unmarketable yield (0.57 %) and good keeping quality. The bulbs of this variety are copper red in colour, slightly flattened globe and moderately pungent. Due to its mild pungency, it is preferred for salad purpose in domestic market. RO-1 variety has all the desired quality parameters to meet out the demand of local consumers of the state of Rajasthan. It was observed that during storage, RO-1 has shown better shelf life and can be kept 3-4 months with minimum storage losses under ambient conditions environmental constraints of Rajasthan. Therefore, this onion variety RO-1 was identified by State Horticulture Seed Sub-Committee on 12th February, 2002 for cultivation in Rajasthan. RO-1 has potential to open up new vistas of boosting onion production under mega environment of Rajasthan, where new cropping sequences are emerging to produce more food / vegetables and earn more profitability from per unit area. Results of various cropping sequences conducted recently have shown that onion is a more profitable crop than any other crop in cropping sequences in *rabi* season. Excellent performance of RO-1 having higher bulb yield, uniform shape, size, colour, mild pungency, better shelf life along with other more desirable attributes, it is hoped that this variety will fetch higher premium of produce in the domestic market. Hence, recently it has attracted the attention of a large number of the onion growers of the state to plant RO-1 on more areas in *rabi* season. Besides this, RO-1 has good potential to be entered as a permanent player in the international market to fetch better price, particularly in European and Japanese markets, where big size, mild pungent onion bulbs are preferred by the consumers.

References

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