

Evaluation of Rabi Onion Genotypes for Storage Characteristics (Six Months Period)

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ABSTRACT

A field experiment entitled, "Evaluation of rabi onion genotypes for storage characteristics (six month period)" was conducted during rabi season, 2017-18 at "Scheme for Research on Onion Storage", Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri. Dist. Ahmednagar (Maharashtra) India. The experiment was carried out in Randomized Block Design with seventeen genotypes and one check variety i.e. N-2-4-1 treatments replicated three times. In storage studies results indicated that, the minimum storage losses (Sprouting losses (%), Rotting losses (%), PLW losses (%) & Total losses) were recorded by the genotypes T₇, T₁₁ and T₁₀. The minimum sprouting losses (after 6 month storage) was recorded in genotype T₁₁ (1.41 %). It was followed by genotype viz. T₇ and T₁₀ (1.51 %). The maximum sprouting losses (after 6 month storage) was recorded in genotype T₁₇ (4.06 %). Rotting losses (after 6 month storage) ranged between T₁₁ (3.19) to T₄ (7.46) per cent. The minimum PLW loss was recorded in genotype T₇ (14.98 %), followed by genotype viz. T₁₁ (15.64 %), T₁₀ (15.85 %) and T₆ (17.16 %). The maximum PLW loss was recorded in genotype T₁₇ (33.26 %). The minimum total losses (after 6-month storage) was recorded by genotype T₁₁ (21.34 %). While the maximum total losses (after 6-month storage) was recorded in T₄ (36.49 %). Considering the above results, it could be concluded that, among the seventeen genotypes T₇ (RHROR-7), T₁₀ (RHROR-10) and T₁₁ (RHROR-11) found promising for further evaluation.

Keywords: Sprouting losses (%), Rotting losses (%), PLW losses (%), Total losses.

INTRODUCTION

Onion (*Allium cepa* L.) is most important bulbous vegetable crop. It belongs to family Alliaceae order Asparagales composed of 795

species in genera. Its chromosome number 2n=16. It is an important vegetable crop grown in India.

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India exports 12 per cent of total world export of onion. It is more than 75 per cent of foreign exchange that comes from export of fresh vegetables. The onion plant has a fan of hollow, bluish-green leaves and its bulb at the base of the plant begins to swell, when a certain day-length is reached. The bulbs are composed of shortened, compressed, underground stems surrounded by fleshy modified scales (leaves) that envelope a central bud at the tip of the stem. It is originated from Central Asia.

The demand for onion is worldwide. Onions are found in most marketable of the world throughout the year and can be grown under wide range of Agro-climatic condition. Irrespective of prices, the demand remains almost constant in the market as it is primarily, used as seasoning for a wide variety of dishes in many homes almost. Among the different states, Maharashtra is leading state in terms of area and production. Other major onion growing states are Gujarat, Karnataka, Odisha, Uttar Pradesh, Andhra Pradesh, Tamil Nadu and Rajasthan.

It is a biennial plant, but is usually grown as an annual and shallow rooted crop. It is basically long day plant for bulb production and grown during *rabi* season. The leaves are yellowish to bluish green and grow alternately in a flattened, fan-shaped swathe. The important contents like allicin, allin and sulphites etc. are present in onion. These compounds are helps to fighting cancer, high blood cholesterol and sugar, liver problems and intestinal problems. It has diuretic and stimulant property. The antifungal property of onion is due to presence of catechol a phenolic compound. It is used in processed form i.e. flakes powder is used for making pickles. (Bhagchandani et al., 1980).

Onion is a cool season crop and it grows well in climate with extremes of high or low temperatures. For good vegetative growth, lower temperatures, (daily mean 13-21⁰C) and short photoperiod are required while for bulb development high temperatures (daily mean 15-25⁰C) and long photoperiod are required. *Rabi* onion varieties require day length of 10-

11 hours while. *Rabi* onion varieties require day length of 12-15 hours. Cole et al. (1996) reported that highest commercial bulb yield was reported at higher planting density, while the highest proportion of large bulb and average bulb weight were examined at lower planting density.

The light red cultivars (e.g. N-2-4-1, Agrifound Light Red, Arka Niketan, Pusa Red, etc.) required comparatively long day conditions for bulb development and have good keeping quality are particularly used for *rabi* season. Nevertheless, cultivation of white onion is also undertaken in *rabi* season with cultivars viz. N-257-9-1, Phule Safed, Pusa White Flat, Pusa White Round, etc. It provides onions from June- November.

Out of total production of onion in the country, it is estimated that about 40 per cent is lost on different accounts during storability. The storability problems of onion, even under temperate conditions, are little understood and very little information is available with respect of their successful storage under tropical conditions. Therefore, the present investigation has been planned to study the variability in growth and development pattern of onion genotypes with respect to morphological, biochemical and storage aspects under prevailing *rabi* season in Rahuri.

Basically, onion is *rabi* season crop. But only few varieties have been useful for *rabi* plantation. Amongst them, N-2-4-1, AFLR and Arka Niketan are the major. But these varieties become older. Hence it is essential to develop a new cultivar for better yield and storability. In this context the germplasm available with Scheme for Research on Onion Storage will be screen for evaluations to fulfill the following objectives.

MATERIALS AND METHODS

The present field investigation was carried out during *rabi* season at, “Scheme for Research on Onion Storage”, Department of Horticulture, MPKV, Rahuri Maharashtra in 2017 – 18. The experiment was laid out in Randomized Block Design with three

replications having seventeen genotypes and one check variety i.e. N-2-4-1.

The Mahatma Phule Krishi Vidyapeeth, Rahuri is situated between 19° 47' and 19° 57' North latitude and 74° 19' and 74°42' East longitudes with elevation of 525 m above the mean sea level. The plots selected for same planting date had a uniform soil

depth and fertility. The soil was medium black, calcareous and well drained.

Treatment details:

Seventeen genotypes and one check variety i.e. N-2-4-1 available at “Scheme for Research on Onion Storage” was utilized for the experimentation.

Table 1: Treatment details:

Treatment No.	Genotype	Treatment No.	Genotype
T ₁	RHROR-1	T ₁₀	RHROR-10
T ₂	RHROR-2	T ₁₁	RHROR-11
T ₃	RHROR-3	T ₁₂	OPS-1
T ₄	RHROR-4	T ₁₃	OPS-2
T ₅	RHROR-5	T ₁₄	OPS-3
T ₆	RHROR-6	T ₁₅	OPS-4
T ₇	RHROR-7	T ₁₆	OPS-5
T ₈	RHROR-8	T ₁₇	OPS-6
T ₉	RHROR-9	Check variety	N-2-4-1

1. Storage characteristics (Six month period)

1.1. Rotting losses monthly interval

At each observation, rotted bulbs were separated out from each lot and weighed

separately and the percentage of rotten bulbs was calculated in relation to the initial weight of bulbs stored.

$$\text{Rotting percentage (RP)} = \frac{\text{Weight of rotted bulbs}}{\text{Initial weight of bulbs}} \times 100$$

1.2. Sprouting losses monthly interval

The sprouted bulbs from each lot were separated out and weighed. The percentage of sprouted bulbs worked out on weight basis.

$$\text{Sprouting percentage (SP)} = \frac{\text{Weight of sprouted bulbs}}{\text{Initial weight of bulbs}} \times 100$$

1.3. PLW losses (monthly interval)

The physiological loss in weight both due to rotting and sprouting was subtracted from total loss in weight and thus loss due to PLW was worked out.

$$\text{PLW} = \text{TLW} - (\text{RL} + \text{SL})$$

Where,

TLW = Per cent total loss in weight

RL = Per cent rotting loss

SL = Per cent sprouting loss

1.4. Total weight loss monthly interval

The percentage of total weight loss was worked out separately for each treatment by adding various kinds of losses i.e. loss due to rotting, sprouting and physiological weight loss.

2. Statistical Analysis

The data recorded in respect of various observations were subjected to the statistical analysis as per procedure given by Panse and Sukhatme (1989).

RESULTS AND DISCUSSION

Storage losses (%):

1. Sprouting losses (%) (after 6 month storage):

It is evident from Table 2. That, significant differences were recorded in sprouting losses (after 6 month storage) by onion genotypes. The minimum sprouting losses (after 6 month storage) was recorded in genotype T₁₁ (1.41 %). It was followed by genotype viz. T₇ and T₁₀ (1.51 %). The maximum sprouting losses (after 6 month storage) was recorded in genotype T₁₇ (4.06 %).

Vinod (2000) evaluated six onion cultivars for rotting, sprouting and total weight loss for every 30-day interval during storage. They reported that, the bulb rotting, sprouting and weight loss increased with increasing storage duration.

2. Rotting losses (%) (after 6 month storage):

The data presented in the Table 2. revealed that the onion genotypes in rotting losses (after 6 month storage) ranged between 3.19 to 7.46 per cent. The minimum rotting losses (after 6 month storage) was recorded by genotype T₁₁ (3.19 %). While the maximum rotting losses (after 6 month storage) was recorded in T₄ (7.46 %).

Sakhale (2001) studied storage losses of seven cultivars of onions in nylon-netted bags at room temperature for 2 months and reported that, the losses due to rotting were found to be highest in 'Decco' cultivar, and lowest in 'Parbhani Local' followed by 'Tadola Local', 'Pusa Selection' and 'Red Creole'.

3. PLW losses (%) (after 6-month storage):

It is evident from Table 2. that significant differences were recorded PLW losses (%) (after 6-month storage) by onion genotypes. The minimum PLW losses (after 6-month storage) was recorded in genotype T₇ (14.98 %). It was followed by genotype viz. T₁₁ (15.64 %), T₁₀ (15.85 %) and T₆ (17.16 %). The maximum PLW losses (after 6-month storage) was recorded in genotype T₁₇ (33.26 %).

Kumar et al. (2000) reported that the application of zinc alone at 10 kg/ha as Zn-EDTA resulted in highest yield of onion bulb (18.40 t/ha) with lower percentage of rotting (13.7 %), sprouting (2.1 %) and physiological weight loss (7.71 %) up to 120 days of storage.

4. Total losses (%) (after 6-month storage):

The data presented in the Table 2. revealed that the onion genotypes for total losses (after 6-month storage) ranged between 21.34 to 36.49%. The minimum total losses (after 6-month storage) was recorded by genotype T₁₁ (21.34 %). While the maximum total losses (after 6-month storage) was recorded in T₄ (36.49 %).

Table 2: Storage losses of onion genotypes (%) (after 6-month storage)

Treatments	Genotype	Sprouting losses (%) (after 6 month storage)	Rotting losses (%) (after 6 month storage)	PLW losses (%) (after 6 month storage)	Total losses (%) (after 6 month storage)
T ₁	RHROR-1	1.66	4.66	23.71	34.65
T ₂	RHROR-2	1.80	6.06	31.18	33.60
T ₃	RHROR-3	2.33	4.77	21.31	35.92
T ₄	RHROR-4	2.24	7.46	31.19	36.49
T ₅	RHROR-5	2.79	4.42	18.13	29.86
T ₆	RHROR-6	2.00	4.59	17.16	35.02
T ₇	RHROR-7	1.51	3.44	14.98	22.56
T ₈	RHROR-8	2.46	5.20	23.95	34.19
T ₉	RHROR-9	2.26	4.90	21.37	35.12
T ₁₀	RHROR-10	1.51	3.71	15.85	28.46
T ₁₁	RHROR-11	1.41	3.19	15.64	21.34
T ₁₂	OPS-1	3.92	4.26	31.04	35.23
T ₁₃	OPS-2	2.47	3.90	27.75	35.47
T ₁₄	OPS-3	2.93	4.46	23.09	35.17
T ₁₅	OPS-4	1.85	5.01	24.56	35.82
T ₁₆	OPS-5	2.37	5.00	24.47	35.62
T ₁₇	OPS-6	4.06	4.16	33.26	33.44
Check variety	N-2-4-1	1.81	3.97	18.44	30.43
SE (±)		0.44	0.77	3.31	2.72
CD @ 5 %		1.27	NS	9.52	NS

Saimbhi and Randhawa (1982) reported that the total losses were highest in big sized bulbs, intermediate in medium bulbs and least in smaller bulbs. It was reported that the cultivar (N-2-4-1) had good keeping quality (Patil, 1960; Singh & Joshi, 1975; & Magdum, 1981). However, Patil (1984) reported that two local cultivars Shiroli and Adsuli recorded less than 30 per cent total storage losses during six months storage period. While the storage losses in respect of released varieties like Pusa Red, N-2-4-1 and Udaipur 101 ranged between 30-40 per cent during the same period, However Shintre (1994) reported least storage losses in N-2-4-1. Patil (1988) in their storage studies in onion reported that, the maximum losses due to decay (43.02 %) followed by weight loss (37.45 %) and sprouting losses (10.62 %). Warade et al. (1996) reported that Baswant-780 had highest total losses (90.65 %) after storage of 8 months followed by MPAU selection and AFDR. The cultivar N-2-4-1 had lowest total losses 49.57 per cent followed by AFLR (51.23). Rotting losses were lowest in AFLR (4.76) followed by N-2-4-1 (5.21 %).

CONCLUSIONS

Majority of the onion crop (50-60 %) is produced in *Rabi* season which has good storage quality. Development of high yielding and better storage quality variety for *rabi* is today's prime need. For this purpose the experiment was conducted on evaluation of light red, red, dark red and pink varieties available at "Scheme for Research on Onion Storage", Department of Horticulture, MPKV, Rahuri.

Seventeen genotypes were evaluated along with check variety N 2-4-1.

Minimum storage losses (SL, RL, PLW and total losses) was recorded by the genotypes T₇ (RHROR-7), T₁₁ (RHROR-11) and T₁₀ (RHROR-10).

Among seventeen genotypes T₇ (RHROR-7), T₁₀ (RHROR-10) and T₁₁ (RHROR-11) found promising for further evaluation.

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