



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; 9(6): 1359-1360

Received: 21-08-2020

Accepted: 27-09-2020

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Storage studies in onion (*Allium cepa* L.) varieties and genotypes

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Abstract

The present investigation entitled was carried out at Instructional farm, Department of Vegetable Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS.) during *rabi* season of year 2018-2019. The study was under taken by using twenty genotypes of onion including three checks i.e. Arka Kalyan, Arka Kirtiman and Akola safed. The experiment was laid out in randomized block design in three replications. All the genotypes were grown under similar condition and stored at ambient condition. The results revealed that, the PLW, rotting, sprouting and black mould losses of stored bulbs increased steadily as the period of storage extended. Among all the genotypes AKON-3 consistently recorded the minimum PLW, rotting, sprouting and black mould at 60 and 90 days after storage.

Keywords: Onion, storage, sprouting, rotting, black mould

Introduction

Onion (*Allium cepa* L.) is one of the most important bulb vegetable crops cultivated all over the world on commercial scale. It belongs to family 'Alliaceae' and it has chromosome number $2n=2x=16$. Onion is one of the important spice commodities consumed in India almost every day. It is an indispensable item in every kitchen as vegetable, spice and condiment used to enhance flavour of different recipes. Unless stored for some time, daily supply, irrespective of season is not possible. Therefore, importance of storage onion becomes inevitable for regular supply to consumers or sometimes bulbs are to be stored for longer period due to seasonal glut in the market. The annual storage losses of onion have been estimated to be more than 40 percent on different accounts during storage and handling (Maini *et al.*, 1984) [2]. Whole onions are best stored in a cool, dry, dark and well-ventilated room. Ideal places include the pantry, cellar, basement or garage. In India onion is grown over 10.26 million hectares area with the production of 184.40 MT. Maharashtra, Karnataka and Madhya Pradesh are the leading states in India contributing more than 45% of both area and production (Anon. 2018) [1].

Material and Methods

The present investigation was carried out at Instructional farm Department of Vegetable Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS.) during *rabi* season of the year 2018-2019. The study was under taken by using twenty genotypes of onion with three checks using randomized block design. The genotypes used during present investigation and their sources are listed in table 1.

The observations on Physiological loss in weight (%), sprouting (%), rotting (%) and incidence of black mould (%) were recorded after 60 and 90 days after storage. The observations statistically analysed and result was interpreted by using methods suggested by Panse and Sukhatme (1967) [3]. Physiological loss in weight (%), sprouting (%), rotting (%) and incidence black mould (%) was calculated using the formulae given below.

1 Physiological loss in weight (%)

$$PLW (\%) = \frac{P_0 - P_1, P_2}{P_0} \times 100$$

Where

P0 = initial weight. P1 = weight after 60 days P2 = weight after 90 days.

2 Sprouting (%)

$$\text{Sprouting (\%)} = \frac{\text{Number of the sprouting bulbs}}{\text{Initial number of bulbs}} \times 100$$

$$\text{Rotting (\%)} = \frac{\text{Number of the rotted bulbs}}{\text{Initial number of bulbs}} \times 100$$

$$\text{Black mould (\%)} = \frac{\text{Number of the black mould bulbs}}{\text{Initial number of bulbs}} \times 100$$

Table 1: Genotypes under study

Sr. No.	Name of the genotypes	Source
1	AKON-1	Department of vegetable science, Dr. PDKV, Akola
2	AKON-2	
3	AKON-3	
4	AKON-4	
5	AKON-5	
6	AKON-6	
7	AKON-7	
8	AKON-8	
9	AKON-9	
10	AKON-10	
11	AKON-11	
12	AKON-14	
13	MLO-1	
14	MLO-1-1	
15	MLO-2	
16	MLO-4	
17	MLO-4-1	
18	Arka Kalyan	IIHR, Bangalore
19	Arka Kirtiman	
20	Akola safed	Dr. PDKV, Akola

Results and Discussion

The data regarding physiological loss in weight as influenced by different genotypes is presented in table 2. The onion bulbs in storage are generally undergo loss in weight, physiological changes like sprouting, rotting and black mould. Genotypes and storage time had significant effect on PLW, rotting, sprouting and black mould. During the present investigation minimum PLW at 60 DAS and 90 DAS was observed in the genotypes AKON-3 and MLO-1-1 i.e. 10.1% and 17.89% respectively. However maximum PLW was recorded at 60 DAS and 90 DAS in the genotype AKON-14 i.e. 19.1% and 26.1% respectively with the mean value 14.26% and 21.31% i.e. at 60 DAS and 90 DAS respectively. The rotting of the onion bulbs is normally observed during storage due to the pathogen and development of excess humidity in the storage environment. An inhibition of growth activity of pathogen responsible for rotting of bulb leads to low rotting during storage. Minimum rotting bulb at 60 DAS and 90 DAS was observed in the genotype AKON-3 i.e. 2.05% and 3.55% respectively. However maximum rotting recorded at 60 DAS and 90 DAS in the genotype AKON-14 and AKON-11 i.e. 10.55% and 18.24% respectively with the mean value 6.47% and 12.59% i.e. at 60 DAS and 90 DAS respectively. Sprouting is one of the major causes of qualitative as well as quantitative deterioration of stored bulbs. Sprouting of bulbs increased with the increase in storage period. Minimum sprouting at 60 DAS and 90 DAS was observed in the genotype AKON-3 i.e. 2.6% and 5.99% respectively. However maximum sprouting recorded at 60 DAS and 90 DAS in the genotype AKON-14 i.e. 9.9% and 13.1% respectively with the mean value 6.43% and 9.99% i.e. at 60

DAS and 90 DAS respectively. Minimum black mould at 60 DAS and 90 DAS was observed in the genotype AKON-3 i.e. 2.61% and 6.16% respectively. However maximum black mould recorded at 60 DAS and 90 DAS in the genotype AKON-14 i.e. 7.9% and 11.88% respectively with the mean value 5.28% and 9% i.e. at 60 DAS and 90 DAS respectively. Hence, similar results for storage losses in onion were recorded by Gorrepatik *et al.*, (2018) [4].

Table 2: Storage losses in different onion genotypes

Genotypes	PLW (%)		Rotting (%)		Sprouting (%)		Black mould (%)	
	60 DAS	90 DAS	60 DAS	90 DAS	60 DAS	90 DAS	60 DAS	90 DAS
AKON-1	18.30	25.43	10.39	18.00	9.18	12.40	7.37	10.94
AKON-2	18.40	25.05	10.12	18.02	9.31	12.65	7.47	11.11
AKON-3	10.10	17.90	2.05	3.55	2.60	5.99	2.61	6.16
AKON-4	10.91	18.30	2.05	4.13	3.00	6.35	2.90	6.91
AKON-5	15.12	22.40	7.25	16.51	7.60	10.70	6.20	9.54
AKON-6	15.45	22.90	8.05	17.20	8.25	11.25	6.34	9.82
AKON-7	14.40	21.99	7.10	16.08	7.14	10.40	5.87	9.33
AKON-8	11.96	18.91	5.27	12.05	4.55	8.44	3.66	7.57
AKON-9	13.50	20.40	6.12	13.46	6.41	10.12	5.33	9.12
AKON-10	11.98	18.70	5.59	12.25	4.70	8.83	3.91	7.77
AKON-11	18.50	24.96	10.18	18.24	9.36	12.68	7.51	11.22
AKON-14	19.10	26.10	10.55	17.96	9.90	13.10	7.9	11.88
MLO-1	12.20	18.69	4.52	8.33	5.10	9.17	4.00	8.05
MLO-1-1	11.06	17.89	4.14	7.79	3.40	7.15	3.00	7.04
MLO-2	12.90	20.30	4.75	9.10	5.45	9.70	4.85	8.57
MLO-4	13.10	20.13	4.95	9.25	6.07	9.90	5.10	8.91
MLO-4-1	12.70	19.54	4.52	8.30	5.18	9.49	4.29	8.27
Arka Kalyan	15.74	22.63	8.50	16.65	8.45	11.37	6.89	10.18
Arka Kirtiman	17.97	25.00	8.80	16.99	8.75	11.91	7.24	10.37
Akola safed	11.90	19.00	4.45	7.99	4.27	8.25	3.24	7.25
SE (m)	1.48	1.86	0.74	1.40	0.60	0.91	0.48	0.80
CD@5%	4.22	5.32	2.11	4.00	1.74	2.61	1.39	2.30

Whereas

PLW- Physiological loss in weight

DAS- Days after storage

Conclusion

It was observed from the present investigation that, increasing the period of storage ultimately increased storage losses in onion genotypes. All the genotypes showed significant variation in storage losses observed during the present investigation i.e. Physiological loss in weight, rotting, sprouting and incidence of black mould. From the present investigation, it can be concluded that the genotype AKON-3 recorded minimum losses in Physiological loss in weight, rotting, sprouting and black mould at 60 and 90 days after storage than rest of the genotypes under study.

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