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Influence of Different Onion Cultivars on Storage Life under Hill Zone of Karnataka

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A B S T R A C T

An experiment was conducted to study the storage behavior among thirty onion genotypes under ambient condition for four months. The experiment results revealed that after four months of storage, the minimum per cent of sprouting was noticed in Bhima Shakti (7.68 %), while, the maximum per cent of sprouting was noticed in N-53 (15.10 %). The minimum per cent of rotting was observed in Bhima Shakti (7.34 %) and the maximum per cent of rotting was recorded in N-53 (14.78 %).With respect to total loss in weight, the cultivar Bhima Shakti (16.05 %) recorded minimum loss in weight after 4 months of storage, while, Poona Nasangi (28.63 %) recorded maximum loss in weight.

Introduction

Onion is one of the most important vegetable crops commercially grown in the world.It is a diploid (2n=2x=16), herbaceous biennial in the Amaryllidaceae family and is one of the monocotyledonous crops. It belongs to the genus *Allium* which consists of about 750 species, among which, Japanese bunching onion, leeks, and garlic are the most important edible Allium crops (Rabinowitch and Currah, 2002). It is probably originated from Central Asia between Turkmenistan and Afghanistan where some of its relatives are still growing in the wild forms.

The Mediterranean regions are considered to be the secondary centre of origin (CSIR, 2003). Onion is a short duration horticultural crop (Brewster, 1990) grown at low latitudes. It is semi-perishable in nature and gets deteriorated during storage, transportation and marketing. Bulbs stored under ambient conditions are more prone to storage losses. These losses are comprised of physiological loss in weight *i.e.*, moisture losses and shrinkage (30-40 %), rotting (10-12 %) and sprouting (8-10 %). Factors such as high respiration rate, biochemical changes, physiological injuries, water loss and physiological disorders are mainly responsible for post-harvest losses of onion

bulbs (Kedar *et al.*, 1989). Increase in temperature increases the sprouting per cent of onion bulbs, while, increase in humidity increases the rotting per cent of bulbs. Despite the achievements in production technology, post-harvest losses during storage still pose a great problem. Hence, it becomes necessary to study the performance of onion genotypes for storage characteristics.

Materials and Methods

The experiment was conducted at the experimental block of Department of Vegetable Science, College of Horticulture, Mudigere, which is situated in the hill zone of Karnataka during *Rabi* season. The study was conducted using Randomized Complete Block Design (RCBD) with two replications involving thirty genotypes which were procured from various research centres (Table 1). The bulbs were harvested and field cured for a week. Four kg of bulbs were selected randomly from each replication and the initial number of bulbs of all the cultivars per 4 kg was recorded replication wise. The bulbs were stored for 4 months under ambient conditions. Observations on storage characters *viz*., per cent loss due to sprouting, per cent loss due to rotting and total loss in weight were recorded.

The per cent loss due to sprouting was calculated by weighing the bulbs that were sprouted in different treatments and the per cent loss due to rotting was calculated by weighing the bulbs that were rotten in different treatments. The weight of bulbs prior to storage and weight after storage were recorded at 15 days interval for 4 months and the difference was worked out to estimate the total loss in weight.

Results and Discussion

Results pertaining to per cent loss due to sprouting, per cent loss due to rotting and total loss in weight among thirty onion genotypes is depicted in Table 2 and 3.

In the present investigation, the per cent loss due to sprouting was not noticed in any of the genotypes during first and second months after storage. However, during third month of storage, per cent loss due to sprouting was maximum in PusaRed (4.37 %), whereas, minimum in Bhima Shubra (1.21 %). During fourth month of storage, it was maximum in N-53 (15.10 %) and minimum in Bhima Shakti (7.68 %). Similar findings were reported by Shanmugasundaram (1999), Trivedi and Dhumal (2010) and Utagi *et al.*, (2015). Brewster (1994) reported that factors such as stage of bulb development during harvest, premature defoliation, skin integrity, harvesting, conditions during ripening and curing are responsible for sprouting.

The results regarding per cent loss due to rotten bulbs revealed that, during first month after storage, none of the genotypes exhibited rotting. However, during second, third and fourth month after storage, significant difference was observed for per cent loss due to rotten bulbs. Cultivar N-53 recorded highest per cent of rotten bulbs during second and fourth month after storage (4.87 % and 14.78 % respectively), while, W-125 (4.38 %) during third month after storage. The minimum per cent of rotten bulbs was observed in Arka Niketan (1.27 %), W-405 (1.06 %) and Bhima Shakti (7.34 %) during second, third and fourth month after storage respectively. Shanmugasundaram (1999), Shanmugasundaram (2000), Trivedi and Dhumal (2010), Dhotre (2009), also observed significant difference with respect to per cent loss due to rotting among different genotypes of onion. Kukanoor (2005) reported that due to high moisture content on outer scales, the onion bulbs are more prone to rotting loss after harvest.

The genotypes exhibited significant difference in respect of total loss in weight. The total loss in weight was maximum in N-53 (5.38 %), Bhima Red (12.27 %), Bhima Super (21.37 %) and Poona Nasangi (28.63 %) after first, second, third and fourth month after storage respectively, while it was minimum in Bhima Kiran (1.07 %) and Bhima Super (7.45 %) after first and second month after storage respectively. During third and fourth month after storage, it was minimum in Bhima Shakti (10.33 % and 16.05 % respectively). The results are in collaboration with findings of Shanmugasundaram (2000), Shanmugasundaram (2003), Trivedi and Dhumal (2010), Jamali *et al.*, (2012).

Table.1 List of onion genotypes used in the study and their sources of collection

Sl.No	Genotypes	Source of collection
1.	Arka Kalyan	IIHR, Bengaluru
2.	Arka Niketan	IIHR, Bengaluru
3.	Bhima Dark Red	DOGR, Pune
4.	Bhima Kiran	DOGR, Pune
5.	Bhima Light Red	DOGR, Pune
6.	Bhima Raj	DOGR, Pune
7.	Bhima Red	DOGR, Pune
8.	Bhima Safed	DOGR, Pune
9.	Bhima Shakti	DOGR, Pune
10.	Bhima Shubhra	DOGR, Pune
11.	Bhima Super	DOGR, Pune
12.	Bhima Swetha	DOGR, Pune
13.	N-53	DOGR, Pune
14.	Poona Nasangi	Local collection
15.	Pusa Red	IARI, New Delhi
16.	W - 045	DOGR, Pune
17.	W - 125	DOGR, Pune
18.	W - 143	DOGR, Pune
19.	W - 177	DOGR, Pune
20.	W - 182	DOGR, Pune
21.	W - 203	DOGR, Pune
22.	W - 210	DOGR, Pune
23.	W - 226	DOGR, Pune
24.	W - 253	DOGR, Pune
25.	W - 364	DOGR, Pune
26.	W - 405	DOGR, Pune
27.	W - 444	DOGR, Pune
28.	W - 464	DOGR, Pune
29.	W - 498	DOGR, Pune
30.	W - 500	DOGR, Pune

Table.2 Storage behavior of onion bulbs among thirty genotypes of onion (After 1 and 2 months of storage)

Sl. No	Genotypes	Initial weight of bulbs (kg)	Total number of bulbs	Per cent loss one month after storage			Per cent loss two month after storage		
				Per cent of sprouting bulbs	Per cent of rotten bulbs	Total loss in weight (%)	Per cent of sprouting bulbs	Per cent of rotten bulbs	Total loss in weight (%)
1.	Arka Kalyan	4.00	44	0	0	4.33	0	2.83	10.08
2.	Arka Niketan	4.00	42	0	0	3.25	0	1.27	9.23
3.	Bhima Dark Red	4.00	40	0	0	1.89	0	2.45	10.33
4.	Bhima Kiran	4.00	45	0	0	1.07	0	2.57	8.57
5.	Bhima Light Red	4.00	51	0	0	3.02	0	3.02	11.25
6.	Bhima Raj	4.00	48	0	0	2.68	0	2.35	7.55
7.	Bhima Red	4.00	43	0	0	1.08	0	1.75	12.27
8.	Bhima Safed	4.00	56	0	0	4.13	0	2.71	7.78
9.	Bhima Shakti	4.00	42	0	0	2.74	0	1.41	11.56
10.	Bhima Shubhra	4.00	49	0	0	2.33	0	1.52	10.16
11.	Bhima Super	4.00	45	0	0	3.63	0	3.09	7.45
12.	Bhima Swetha	4.00	46	0	0	2.13	0	2.18	8.41
13.	N-53	4.00	44	0	0	5.38	0	4.87	10.25
14.	Poona Nasangi	4.00	50	0	0	2.98	0	1.34	11.34
15.	Pusa Red	4.00	52	0	0	2.29	0	1.32	8.12
16.	W - 045	4.00	47	0	0	2.31	0	3.08	8.62
17.	W - 125	4.00	45	0	0	2.56	0	1.68	12.13
18.	W - 143	4.00	46	0	0	2.34	0	3.34	7.81
19.	W - 177	4.00	54	0	0	3.35	0	2.11	10.62
20.	W - 182	4.00	50	0	0	3.89	0	1.79	10.06
21.	W - 203	4.00	49	0	0	2.66	0	2.08	7.67
22.	W - 210	4.00	54	0	0	2.31	0	3.14	11.73
23.	W - 226	4.00	51	0	0	1.71	0	1.47	11.14
24.	W - 253	4.00	48	0	0	1.41	0	3.98	8.64
25.	W - 364	4.00	52	0	0	2.63	0	2.26	7.76
26.	W - 405	4.00	45	0	0	2.61	0	2.87	10.98
27.	W - 444	4.00	49	0	0	3.21	0	2.23	12.07
28.	W - 464	4.00	51	0	0	2.50	0	2.72	8.83
29.	W - 498	4.00	51	0	0	3.11	0	3.18	8.43
30.	W - 500	4.00	50	0	0	2.93	0	1.58	10.34
	Mean	-	-	**0**	**0**	**2.75**	**0**	**2.41**	**9.71**
	S.Em±	-	-	-	-	0.05	-	0.03	0.02
	C.D @ 5%	-	-	-	-	0.15	-	0.09	0.06

Table.3 Storage behavior of onion bulbs among thirty genotypes of onion (After 3 and 4 months of storage)

Sl. No	Genotypes	Initial weight of bulbs (kg)	Total number of bulbs	Per cent loss three month after storage			Per cent loss four month after storage		
				Per cent of sprouting bulbs	Per cent of rotten bulbs	Total loss in weight (%)	Per cent of sprouting bulbs	Per cent of rotten bulbs	Total loss in weight (%)
1.	Arka Kalyan	4.00	44	1.41	2.62	10.70	12.70	13.05	20.37
2.	Arka Niketan	4.00	42	2.23	2.47	17.43	10.00	9.33	24.22
3.	Bhima Dark Red	4.00	40	2.24	3.08	15.44	10.44	8.87	18.40
4.	Bhima Kiran	4.00	45	3.13	4.37	12.73	7.70	9.35	17.50
5.	Bhima Light Red	4.00	51	4.05	2.10	18.45	9.65	11.19	21.09
6.	Bhima Raj	4.00	48	1.60	1.23	16.11	12.35	10.39	18.57
7.	Bhima Red	4.00	52	4.37	2.32	17.77	12.21	10.48	22.61
8.	Bhima Safed	4.00	56	1.33	4.21	16.09	11.31	12.54	20.57
9.	Bhima Shakti	4.00	42	2.95	1.23	10.33	7.68	7.34	16.05
10.	Bhima Shubhra	4.00	49	1.21	3.04	18.62	11.52	12.40	22.63
11.	Bhima Super	4.00	45	1.79	3.58	21.37	11.06	9.31	21.46
12.	Bhima Swetha	4.00	46	3.11	3.75	17.01	10.78	11.24	24.01
13.	N-53	4.00	44	2.48	2.33	12.84	15.10	14.78	23.35
14.	Poona Nasangi	4.00	50	1.36	4.03	18.31	9.44	11.66	28.63
15.	Pusa Red	4.00	52	4.37	2.32	17.77	12.21	10.48	22.61
16.	W - 045	4.00	47	2.96	2.66	15.07	12.33	10.65	26.66
17.	W - 125	4.00	45	1.70	4.38	12.63	9.65	10.77	19.50
18.	W - 143	4.00	46	3.91	2.69	19.35	9.87	7.42	18.43
19.	W - 177	4.00	54	2.53	1.57	18.44	13.68	12.41	17.34
20.	W - 182	4.00	50	2.78	3.41	17.32	10.76	8.75	24.81
21.	W - 203	4.00	49	3.09	3.30	15.39	11.54	13.15	21.49
22.	W - 210	4.00	54	2.61	2.36	16.21	10.25	9.60	25.64
23.	W - 226	4.00	51	1.57	3.57	10.48	14.10	12.64	24.46
24.	W - 253	4.00	48	4.35	3.22	14.73	14.03	12.26	20.86
25.	W - 364	4.00	52	2.51	2.97	18.69	12.51	10.24	23.39
26.	W - 405	4.00	45	3.12	1.06	20.05	10.98	12.37	21.09
27.	W - 444	4.00	49	2.68	1.77	11.46	12.24	10.86	17.23
28.	W - 464	4.00	51	1.74	3.65	15.32	11.63	9.23	22.69
29.	W - 498	4.00	51	1.58	2.86	15.21	10.86	13.63	19.86
30.	W - 500	4.00	50	3.07	2.75	20.27	13.34	8.81	20.21
	Mean	**-**	**-**	**2.54**	**2.85**	**15.82**	**11.43**	**10.90**	**21.62**
	S.Em±	-	-	0.03	0.05	0.13	0.08	0.09	1.92
	C.D @ 5%	-	-	0.09	0.15	0.37	0.24	0.26	5.56

Abbey *et al.*, (2000) and Leilah *et al.*, (2003) reported that the difference in storability of genotypes may be due to the genetic variation. The respiration heat might be responsible for higher weight loss of onion bulbs in the storage (Moazam, 1983). From the study, the variety Bhima Shakthi was found to be more suitable for long term storage. The minimum storage losses in Bhima Shakthi was also due high TSS and high dry matter content of the bulbs as reported by Trivedi and Dhumal (2010).

References

Abbey, L., Danquah, O. A., Kanton, R. A. L. and Olympio, N. S., 2000. Characteristics and storage performance of eight onion cultivars. Ghana Journal of Science. 40: 9-13.

Brewster, J. L., 1990. Physiology of crop growth and bulbing. Onions and Allied Crops, pp.53–81.

Brewster, J. L., 1994. Onions and other vegetable *Alliums.* CAB Intl., Cambridge, England, pp.121-125.

CSIR., 2003. The Wealth of India: A dictionary of Indian raw materials and industrial products. Council of Science and Information Research: New Delhi. 1(1): 167–181.

Dhotre, M., 2009. Studies on genetic diversity and influence of nitrogen sources on performance of *kharif* onion (*Allium cepa var. cepa* L.). M. Sc. Thesis, University of Agricultural Sciences, Dharwad, India.

Jamali, L. A., Ibupoto, K. A., Chattha, S. H. and Laghari, R. B., 2012. Study on physiological weight loss in onion variety during storage. Pakistan Journal of Agricultural Sciences. 28(1): 1-7.

Kedar, A.A., Zagory, D. and Kerbal, E.L., 1989. Modified atmosphere packaging of fruits and vegetables. Critical Reviews in Food Science and Nutrition. 50: 761-766.

Kukanoor, L., 2005. Post-harvest studies in onion Cv. N-53. Ph. D. (Hort.) Thesis, University of Agricultural Sciences, Dharwad, India.

Leilah, A. A., El-Kalla, S.A., Mostafa, A.K. and Afifi, H.M.A., 2003. Performance of some local Egyptian onion strains under different planting dates. Scientific Journal of King Faisal University. 4 (1): 119-136.

Moazam, H., 1983. Influence of nitrogen fertilizer, irrigation and pre-harvest foliar application of maleic hydrazide on post-harvest behaviour of onion (*Allium cepa L.*) bulbs under several storage conditions. Ph. D. Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri.

Rabinowitch, H. D. andCurrah, L., 2002. Evolution, domestication and taxonomy. In:(eds) *Allium* crop science: recent advances. CAB Int. Wallingford, UK, pp. 372-395.

Shanmugasundaram, S., 1999. Effect of bulb size and storage conditions on storability of onions. AVRDC report, p. 25.

Shanmugasundaram, S., 2000. Storage loss and disease incidence of 12 onion cultivars in ambient storage room 1 (SR1) and storage room 2 (SR2) after 15 weeks of storage, AVRDC report, p. 26-27.

Shanmugasundaram, S., 2003. Development of onions with good storability. AVRDC report, p. 3-5.

Trivedi, A. P. and Dhumal, K. N., 2010. Variability and correlation studies on bulb yield, morphological and storage characters in onion (*Allium cepa* L.). Journal of Pure and Applied Sciences. 18: 1- 4.

Utagi, S., Anjanappa, M., Kale, S.M. and Badiger, M., 2015. Influence of different onioncultivars on storage life under central dry zone of Karnataka. International Journal of Processing and Post-harvest Technology. 6 (1): 36-40.

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