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**EFFECT OF CURING TIME AND NECK LENGTH ON THE STORABILITY OF
SUMMER (*Allium cepa* L.) ONION**

M.B. SARKER, M.A.I. SARKER, S. HASAN, M.M. HOSSAIN AND M.N. SARKAR



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M.B. SARKER*, M.A.I. SARKER, S. HASAN, M.M. HOSSAIN AND M.N. SARKAR

Regional Agricultural Research Station, Bangladesh Agricultural Research Institute (BARI), Burirhat, Rangpur.

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ABSTRACT

Sarker MB, Sarker MAI, Hasan S, Hossain MM, Sarkar MN (2023) Effect of curing time and neck length on the storability of summer (*Allium cepa* L.) onion. *Int. J. Expt. Agric.* 13(2), 13-18.

The experiment was conducted at the Spices Research Centre of Bangladesh Agricultural Research Institute (BARI), Sibgonj, Bogra from July–October 2013 to find out the optimum curing time and neck length of onion bulbs for better storage life. Three curing times of onion bulbs viz., 7, 14, and 21 days and three neck lengths of onion viz., 2, 4 and 6 cm were evaluated in two factors randomized complete block design. The seed bulbs were stored from July to October 2013. The variety BARI onion 5 was used as a test crop. The combined effect of curing time and neck length had a significant effect on physiological weight loss, rotten bulbs (%) and sprouted bulbs (%) of onion. The lowest weight loss (35.22%), rotten bulbs (9.86%) and sprouted bulbs (6.17%) were found in 14 days of curing with a 4 cm neck length after 120 days of storage. This treatment combination was found better compared to other treatments.

Key words: curing, storability, neck length, onion, seed bulbs

INTRODUCTION

Onion is one of the most important commercial spice crops grown in Bangladesh. It consumes as raw or a component of meals in many different cultures around the world. Also, unlike many other vegetable species, the consumption of onion is not limited to a particular season (Hanci 2018). There is a steady demand for onion bulbs throughout the year which is increasing every year. A severe scarcity of onion bulbs is seen from August to March in the vegetable markets. Then, onions need to be imported from outside the country. Customs data from the National Board of Revenue (NBR) showed that in FY18 some 0.90 million tons of onion were imported by Bangladesh, which increased to 1.10 million in FY19.

It ranks first in production among the spice crop cultivated in the country. It is used in seasoning a wide variety of dishes. Onion can be eaten raw or as cooked. Mild and colorful bulb onions are used for salads. It is also used in processed form e.g. flakes, powder, paste, crush and making pickles. It has medicinal value. It is used for the prevention and treatment of atherosclerosis, diabetes and coronary diseases. The onion is being cultivated in Bangladesh for thousands of years. In Bangladesh it ranks 1st in terms of production and consumption among the spice crops having produced 17.04 lakh MT of onion from 4.19 lakh acres of land (BBS 2015). Bangladesh is ranked 9th among the onion-producing countries having an average yield far below 11 t/ha as compared to the world average of 19.32 t/ha. The demand for onions in Bangladesh is growing steadily in conjunction with population growth and rising per capita income. But its availability for consumption is only about 9-10 lac metric tons due to 30-40% storage losses. It is also very difficult to store kharif onion for longer period due to its higher moisture content. Rotting, sprouting, physiological loss in weight and moisture evaporation result in serious losses up to 50-90 per cent depending upon genotype and storage condition (Sharma and Chauhan, 2022). Whereas, the requirement is about 20.44 lac metric tons annually (AIS 2014) so, a huge amount of onion needs to import each year to meet the demand at the expense of foreign currency. In Bangladesh, onion production is low because of the unavailability of quality seeds and proper cultural practices. The cultivation of onion in the summer season is constrained due to adverse weather and proper cultural practices (Islam *et al.* 2008). Storage temperature and humidity cause a loss in weight, sprouting and rotting, thereby deteriorating the quality of bulbs in storage. Onion is an important and major spice crop of Bangladesh. The farmers of our country practice different curing times without giving proper attention to the neck length of summer onion for storage. It is due to a lack of definite recommendations regarding curing time & neck length. As a result, a lot of summer onion is lost due to rotting, sprouting in the storage etc. Therefore, seed production of summer onion faces problems due to seed bulb scarcity. There is no such study in this regard in Bangladesh. The study aims to know the effect of curing time and neck length on the storage life of summer onion seed production was undertaken.

MATERIALS AND METHODS

Location: The experiment was conducted at the Spices Research Centre of Bangladesh Agricultural Research Institute (BARI), Sibgonj, Bogra from July to October 2013. In the research field of Spices Research Center, Shibgonj, Bogra the bulbs of summer onion BARI onion-5 were produced during the kharif-1 season. The seed bulb was stored from July to October 2013.

Plant Materials: The variety BARI Onion-5 was used in the experiment.

*Corresponding author & address: Md. Bikash Sarker, E-mail: bikash09_src@yahoo.com
Md. Bikash Sarker, Md. Armanul Islam Sarker, Selina Hasan, Md. Mostahed Hossain and Manobendra Nath Sarkar

Treatment: Curing is done by the bulb windrow method (Figure 1). Nivedida *et al.* (2019) reported that the field curing was done for 50 kg of onion by subjecting it to windrow method for 1 day and the heap method for 4 days may vary based on the environmental conditions.) A collected at three types of curing time *viz.*, 7, 14 and 21 days and three neck lengths *viz.*, 2, 4 and 6 cm were evaluated.



Fig. 1. Bulb curing windrow method

Design: The experiment was two factors randomized complete block design replicated three times. After harvest onion bulbs were cured according to the treatment. The neck of the onion bulbs was cut down according to the treatment.

Data Collection: After curing onion bulbs were stored from 1st July to 30 October at room temperature at storage. The stored bulbs were checked and data were collected at 30 days intervals. Data were recorded on physiological weight loss%, rotting%, and sprouting%.

Statistical analysis: Data were analyzed statistically. The analysis of variance (ANOVA) used Statistic10 software. The mean separation test was done through DMRT.

RESULTS AND DISCUSSION

Effect of different curing days on weight loss (%) of onion bulbs

From the results, it was found that after 30 days of storage, the cumulative percentage of weight loss occurred slowly but after 60 days weight loss was comparatively higher. The highest cumulative percentage of weight loss (42.74%) was recorded at 120 days of storage from 7 days of curing (Fig. 2). Also, it was observed that comparatively lower weight loss occurred (37.48%) at 14 days of curing at 120 days of storage.

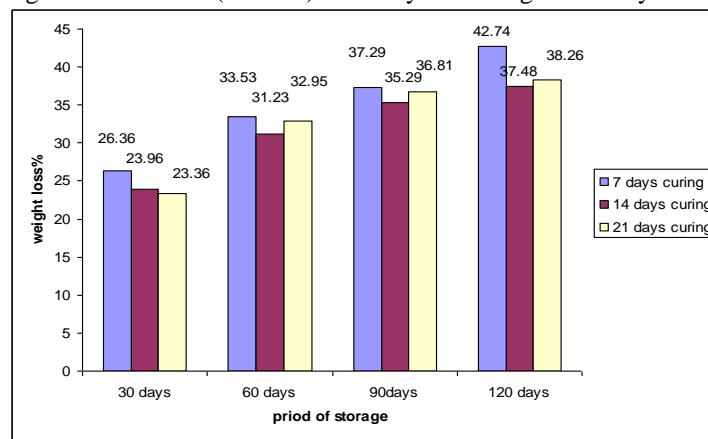


Fig. 2. Weight loss (%) of stored onion bulbs as influenced by different curing days

Effect of Different Neck Lengths

It was found that after 30 days of storage, the cumulative percentage of weight loss occurred slowly but after 60 days, weight loss was comparatively higher. The highest cumulative percentage of weight loss (44.93%) was recorded at 120 days of storage from 2 cm neck Length. It was observed that comparatively lower weight loss occurred (36.63%) at 4 cm neck length (Fig. 3). Bhonde *et al.* (1983) reported that the window method of field curing the bulbs leaving >2 cm neck which reduces weight loss of onion. 2.5 cm neck length had shown minimum storage losses in onion, more number of scales and colour retention for longer period as reported by Singhal (2000).

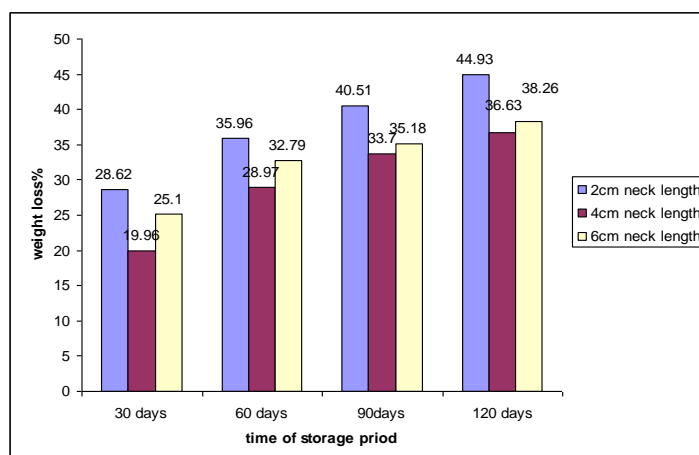


Fig. 3. Weight loss (%) of stored onion bulbs as influenced by different neck length

The combined effect of different curing days and neck length

The weight loss (%) of summer onion bulbs as affected by different curing days and neck lengths are presented in Table 1. The weight loss (%) of bulbs varied significantly on different days of storage. The highest percentage of weight loss (49.67) was recorded from 7 days of curing with a 2 cm neck length at 120 days of storage. The lowest weight loss percentage (35.22) was recorded from 14 days of curing with a 6 cm neck length at 120 days of storage.

Table 1. Combine the effect of different curing days and neck lengths regarding physiological weight loss

Treatments	Weight loss (%)			
	30 Days	60 Days	90 Days	120 Days
7 days curing with 2 cm Neck length	30.00a	37.33a	41.44a	49.67a
7 days curing with 4 cm Neck length	29.22ab	36.22ab	40.44ab	42.00bc
7 days curing with 6 cm Neck length	26.66abc	34.33abc	39.77ab	43.12b
14 days curing with 2 cm Neck length	22.22cde	30.22bcd	34.99bc	38.00cde
14 days curing with 4 cm Neck length	17.77e	26.94d	32.33c	35.22e
14 days curing with 6 cm Neck length	19.88de	29.77cd	33.77c	36.66de
21 days curing with 2 cm Neck length	19.88abc	33.05abc	35.44bc	40.55bcd
21 days curing with 4 cm Neck length	26.88abcd	30.55bcd	33.22c	35.22e
21 days curing with 6 cm Neck length	24.88bcde	34.77abc	36.88abc	38.99bcde
Level of significant	**	**	**	**
CV%	12.77	9.64	7.83	6.48

Effect of different curing days on rotting (%) of onion bulbs at storage

The percentage of rotten bulbs at different periods of storage was significantly influenced by the curing time of the onion. Rotting of onion bulbs started after 30 days of storage and continued during the whole storage period. At the end of storage, significantly the maximum number of rotten bulbs (16.35% by number) was recorded from 7 days of curing while the minimum number of rotten bulbs (14.48% by number) was recorded from 14 days of curing (Fig. 4).

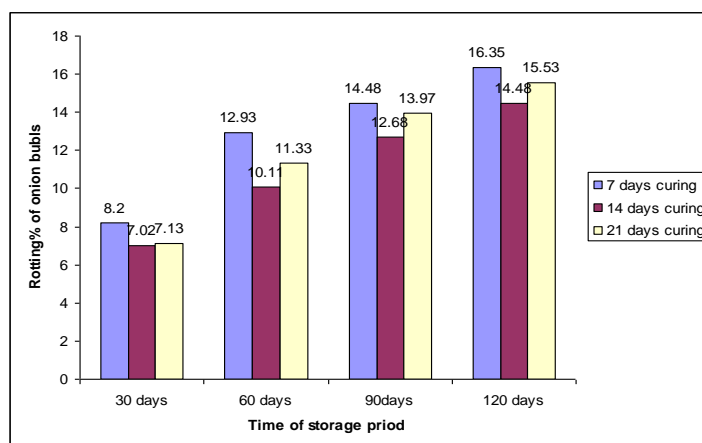


Fig. 4. Rotting % of onion bulbs as influenced by different curing days

Effect of neck length on onion rotting (%) of onion bulbs

The percentage of rotten bulbs at different periods of storage was significantly influenced by the neck length of the onion. Rotting of onion bulbs started after 30 days of storage and continued during the whole storage period. At the end of storage, significantly the maximum rotten bulbs (17.91% by number) were recorded from 2 cm neck length whereas the minimum rotten bulbs (12.11% by number) were recorded from 4 m neck length (Fig. 5). The leaves are cut leaving about 2-2.5 cm tops above the bulb after complete drying this practice helps to increase the dry matter content if tops are cut too close the neck does not close well and provides for decay organisms (Drs. Depa sharma *et al.* 2020). Leave 2-3 inches of neck on the bulb dried and neck tight bacterial disease and botrytis neck rot cannot move in dry tissue (John Howell *et al.* 2013).

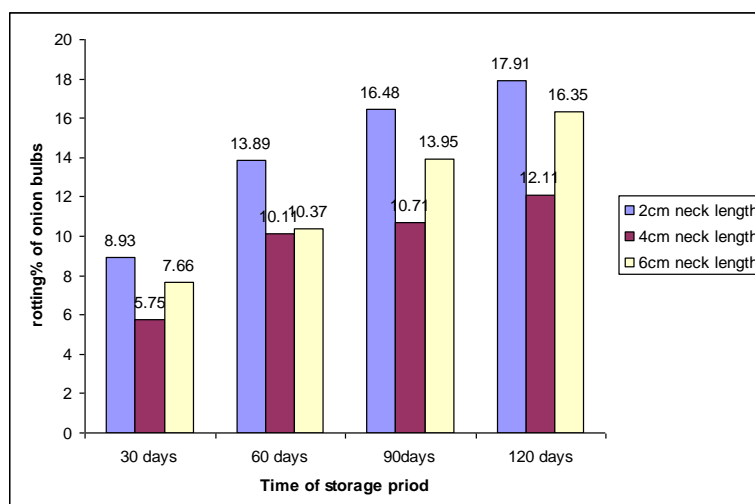


Fig. 5. Rotting % of onion bulbs as influenced by different neck length

Combine the effect of different curing days and neck lengths on rotten (%) onion bulbs

The percentage of rotten bulbs at different periods of storage was significantly influenced by the curing time and neck length of the onion. Rotting of onion bulbs started after 30 days of storage and continued during the whole storage period. At the end of storage, significantly the maximum rotten bulbs (18.40% by number) were recorded from 7 days of curing with 2 cm neck length whereas the minimum rotten bulbs (9.86% by number) were recorded from 14 days of curing 4m neck length (Table 2).

Table 2. Combine the effect of different curing days and neck lengths on the rotting % of onion bulbs at storage

Treatments	(% Rotten bulbs on different storage days)			
	30 Days	60 Days	90 Days	120 Days
7 days curing with 2 cm Neck length	9.86a	14.74a	17.60a	18.40a
7 days curing with 4 cm Neck length	8.53ab	13.86ab	16.13ab	17.86a
7 days curing with 6 cm Neck length	8.4ab	13.06abc	15.73ab	17.46a
14 days curing with 2 cm Neck length	6.53bcd	12.13abcd	11.33de	14.13bc
14 days curing with 4 cm Neck length	4.80d	7.93f	8.733c	9.86d
14 days curing with 6 cm Neck length	5.9cd	10.26def	12.06cd	12.33cd
21 days curing with 2 cm Neck length	8.20ab	11.93bcd	14.53bc	16.53ab
21 days curing with 4 cm Neck length	7.73bc	8.53ef	13.20bcd	15.73ab
21 days curing with 6 cm Neck length	7.06bc	10.66cde	14.13bcd	16.80ab
Level of significant	**	**	**	**
CV%	14.01	12.23	11.23	10.73

Effect of different curing days on sprouted (%) of onion bulbs at storage

The percentage of sprouted bulbs at different periods of storage was significantly influenced by the curing time of the onion. Sprouting of onion bulbs started after 30 of storage and continued during the whole storage period. At the end of storage, significantly the maximum sprouted bulbs (10.61% by number) were recorded from 7 days of curing whereas the minimum sprouted bulbs (8.05% by number) were recorded from 14 days of curing (Fig. 6).

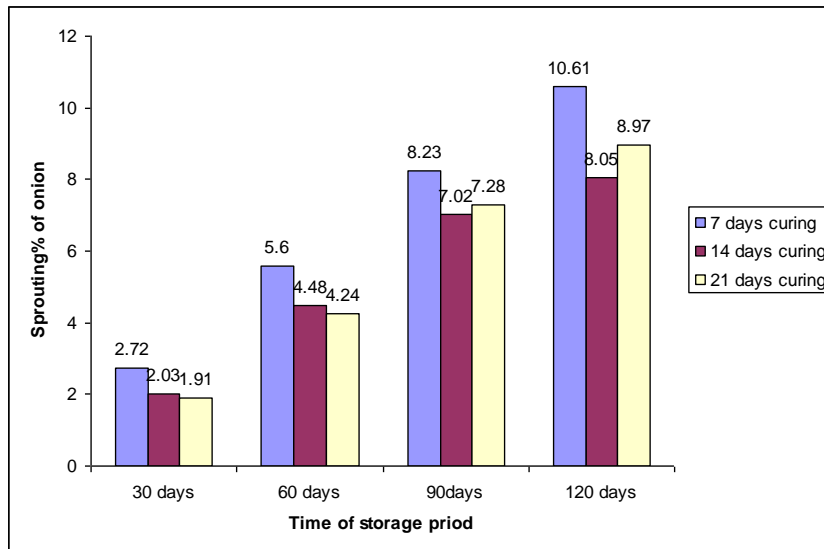


Fig. 6. Sprouting (%) onion bulbs as influenced by different curing days

Effect of neck length on sprouting (%) of onion bulbs

The percentage of sprouted bulbs at different periods of storage was significantly influenced by the neck length of the onion. Sprouting of onion bulbs started after 30 of storage and continued during the whole storage period. At the end of storage, significantly the maximum sprouted bulbs (11.51% by number) were recorded from 2 cm neck length during 120 days of storage whereas the minimum sprouted bulbs (7.42% by number) were recorded from 4cm neck length. Bose *et al.* (1993) reported that kharif onion stored with leaves stays a long time and in a good marketable condition in storage than the defoliated bulbs after harvest in India (Fig. 7).

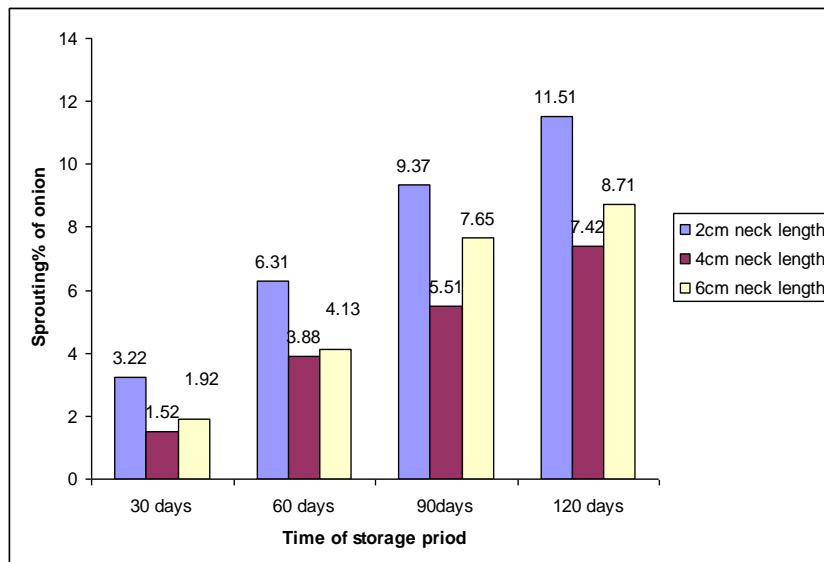


Fig. 7. Sprouting (%) of onion bulbs as influenced by neck length

Combine the effect of different curing days and neck lengths on the sprouting (%) of onion bulbs

The percentage of sprouted bulbs at different periods of storage was significantly influenced by curing time and neck length of onion. Sprouting of onion bulbs started after 30 of storage and continued during the whole storage period. At the end of storage, significantly the maximum sprouted bulbs (13.06% by number) were recorded from 7 days of curing with a 2 cm neck length while the minimum sprouted bulbs (6.17% by number) were recorded from 14 days of curing with 4cm neck length (Table 3).

Table 3. Combine the effect of different curing days and neck lengths on Sprouted (%) onion bulbs

Treatments	Sprouting (%)			
	30 Days	60 Days	90 Days	120 Days
7 days curing with 2 cm Neck length	3.73a	6.80a	9.86a	13.06a
7 days curing with 4 cm Neck length	3.5a	6.40ab	9.46a	11.33ab
7 days curing with 6 cm Neck length	2.43b	5.73bc	8.80ab	10.13bc
14 days curing with 2 cm Neck length	2.23b	5.33cd	6.13cd	8.76cde
14 days curing with 4 cm Neck length	0.90b	2.86g	4.53d	6.17f
14 days curing with 6 cm Neck length	1.43cd	3.46fg	5.86cd	7.33def
21 days curing with 2 cm Neck length	2.20bc	4.66de	8.70ab	10.00bc
21 days curing with 4 cm Neck length	1.70bc	3.60fg	7.06bc	6.66ef
21days curing with 4 cm Neck length	1.86bc	4.13ef	7.20bc	9.46bcd
Level of significant	**	**	**	**
CV%	18.68	11.01	14.79	13.52

CONCLUSION

The findings of this study indicated that onion storability was better when weight losses (%), sprouting (%) and rotting (%) were lowest. It was also found that 14 days of curing of onion bulbs with a 4cm neck length method performed better.

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