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Prepackaging, Storage Losses and Physiological Changes of Fresh Brinjal as Influenced by Post Harvest Treatments

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Abstract: Different post-harvest treatments manifested specific attribute in maintaining physical appearance, acceptability and economic return for brinjal. It was observed that wet gunny bag treatment also resulted in the best physical appearance, acceptability, reduced weight loss and thereby highest economic return for brinjal at four days after storage. Considering all the attributes, perforated polythene bag treatment was also found to be a suggestive treatment for better storage.

Key words: Prepackaging, storage losses, physiological changes, post harvest, days after storage (DAS), brinjal

Introduction

Vegetables are particularly perishable in nature, it should be brought to the consumer as quickly as possible in order to justify the market requirement. Unfortunately, often poor prepackaging and poor handling methods and marketing systems cause a high post-harvest loss of the commodity. Its quality deteriorates gradually during temporary storage, prepackaging, transport, wholesaling and retailing, particularly when the conditions remain unfavorable and at a stage it becomes unfit for marketing of human consumption. It is estimated that a loss of nearly 25-40% of the vegetables occurs due to rough prepackaging and improper post harvest handling, transportation and storage practices; and the variation often depends on type of vegetables (Singh and Chadha, 1990). Sharma (1987) reported that, post-harvest losses of vegetables in Bangladesh could be as high as 43%. The average post-harvest loss as estimated by Khan (1991) was 26%.

Brinjal (*Solanum melongena* L.) is widely cultivated popular vegetable of Bangladesh which is grown in 29,964 ha of land with a total production of 192.52 thousand metric tonnes (BBS, 1998). The major vegetable growing areas of Bangladesh are Jessore, Borgen, Comilla, Chittagong, Khulna, Kushtia, Dhaka, Tangail, Rangpur, Rajshahi and Dinajpur and a major part of the vegetables produced in these areas are transported to the capital or other cities as soon as possible through different marketing channels (Ahmed, 1992; Hossain, 2000).

The present traditional methods of harvesting, post-harvest handling, prepackaging, transporting and storing of vegetables can be improved with a little additional cost or interference with the existing marketing practices. Expensive machinery is not always required; more efficient and better utilization of the existing facilities are often sufficient. The activities of pre-packaging, transportation and storage are to brigge up the gap between harvesting and consumption and post-harvest losses. Good pre-packaging transport and storage are especially important for brinjal because of their perishability. Prolonging the shelf life of different vegetables is very important under Bangladesh condition. Therefore, present study was undertaken to identify the suitable prepackaging methods in extending the shelf life of brinjal, to determine the post-harvest losses of brinjal and to find out the physiological changes of the vegetables during post-harvest treatments.

Materials and Methods

The experiment was conducted in the Department of Food Technology and Rural Industries, Bangladesh Agricultural University (BAU), Mymensingh, during 2002. The brinjals were collected from a farmer's field of Gaffargaon area at Mymensingh District, Bangladesh. Brinjals were harvested on March 4, 2002 in the morning hours. Immediately after harvest, the brinjals were transferred to the laboratory of the Department of Food Technology and Rural Industries, BAU, Mymensingh for the different post-harvest treatments.

The prepackaging and post-harvest handling treatments were selected as control (T_1), perforated polyethylene bag (T_2), unperforated polyethylene bag (T_3), wet gunny bag (T_4), polyseter bag (T_5) and splashing of water directly on brinjals (T_6). The experiment were carried out in randomized complete block design (RCBD) with three replications. For each replication of a treatment, 3 kg of freshly harvested brinjals were used, and the bamboo baskets containing the vegetables were kept in the floor of a laboratory room. The study was conducted during the winter season from February to April, 2002. The temperature and relative humidity of the atmosphere during the study period ranged from 16.8 to 26.9°C and 79 to 87%, respectively.

Data were collected mainly under laboratory conditions during the post-harvest study. Post-harvest data were collected only up to the stage of edible conditions. Visual observations on shrinkage freshness and colour changes were recorded. The price of the vegetables at the last marketable and edible stage under each treatment was recorded. A panel of local retailers (10) estimated the price of the vegetables at that stage. The estimated value of 3 kg freshly harvested brinjal and the value of the brinjal, after loss in weight and price during storage under different treatments were determined and recorded. Recorded data were subjected to statistical analysis for mean values and test of significance. The variations among the respective data were compared following the Least Significant Difference (LSD) test (Gomez and Gomez, 1984).

Results and Discussion

Effect of post-harvest treatments on physical appearance of brinjal

Vegetables kept with perforated polythene bag and wet gunny bag showed longer shelf life (of 6 days) than other treatments (Table 1). Due to rapid water loss, skin of the brinjal became

shrinkage in control, polyester bag and splashing of water at six DAS, except in wet gunny bag condition (Table 1). In unperforated polythene bag the vegetables became rotten at four DAS but in perforated polythene bag and wet gunny bag they look fresh and edible at six DAS (Table 1). The brinjal were graded for appearance and acceptability by a panel of judges during the storage period. At the harvesting stage (0-day of storage) the score was the highest 10 and at eight DAS the highest score six was for wet gunny bag treatment (Table 2).

Effect of post-harvest treatment on economic aspect of brinjal

Market price of a commodity depends upon its physical appearance as well as consumer's responses to that vegetable. However, in counting profit, the weight and physical appearance are the regulatory factors, which determine the economic returns. At four DAS the brinjal under all treatments were edible, but all did not show the same physical appearance (Table 1). At that

Table 1: Change of colour and physical appearance of brinjal during the storage as influenced by different post-harvest treatments

Post-harvest treatments	Days after storage				
	0[a]	2	4	6	8
Control	Fresh looking	Skin shrinkage soft	Skin fully shrinkage	Stalk dry, skin shrinkage	Fully dried, inedible
Perforated polythene bag	Fresh looking	Fresh looking	Soft, fresh looking	Fresh looking, edible	Skin shrinkage, edible
Unperforated polythene bag	Fresh looking	Stalk rotten	Stalk rotten, not edible	Rotten, not edible	Fully rotten not edible
Wet gunny bag	Fresh looking	Fresh looking	Fresh looking	Fresh looking edible	Fruits fresh, edible
Polyester bag	Fresh looking	Few scattered spots	Skin fully shrinkage	Shrinkage and few rotten not edible	Fully dried stalk rotten, not edible
Splashing of water	Fresh looking	Fresh looking	Skin shrinkage	Stalk dry, skin fully shrinkage	Shrinkage dried, not edible

0[a] days of storage is the day of harvest

Table 2: Scores on general appearance and consumer's acceptance of brinjal as influenced by different post-harvest treatment

Treatments	Scores on general appearance of brinjal days after storage (DAS)				
	0	2	4	6	8
Control	10[a]	7	4	3	2
Perforated polythene bag	10	8	7	6	5
Unperforated polythene bag	10	6	4	3	2
Wet gunny bag	10	9	8	7	6
Polyester bag	10	6	5	4	3
Splashing of water	10	7	6	5	4

[a]Freshly harvested good looking brinjal had the maximum score (10); brinjal with 5 or 4 scores were still edible, but were poor in appearance and consumer's acceptance

Table 3: Economic return from brinjal stored for 4 days under different post-harvest treatment

	Initial			4 days after storage			
Post-harvest treatments	Weight (kg)	Local market price (Tk/kg)[a]	Total amount (Tk)	Weight loss (kg)	Weight retained (kg)	Local market price (Tk/kg)[a]	Total amount (Tk)
Control	3	12	36	0.33	2.67	5	13.35
perforated Ploythene bag	3	12	36	0.10	2.90	8	23.20
Unperforated polythene bag	3	12	36	0.03	2.97	3	8.91
wet gunny bag	3	12	36	0.13	2.87	10	28.70
Polyester bag	3	12	36	0.21	2.79	4	11.16
Splashing of water	3	12	36	0.28	2.72	6	16.32

[a]As indicated by a panel of retailers

stage the brinjal kept in wet gunny bag looked fresh and the weight loss was medium. The market price of those brinjal as indicated by the local retailers was the highest Tk. 10.00 kg^{-1}. Thus the total value of the brinjal kept in wet gunny bag was the highest (Tk. 28.70 per 3 kg) while the vegetable stored in unperforated polythene bag rendered the lowest value (Tk. 8.91 per 3 kg) (Table 3).

It is concluded that brinjal showed the best physical appearance, acceptability, and lower weight loss and thereby rended the highest economic return with wet gunny bag at four days after storage (DAS). In this case perforated polythene bag was also found to be acceptable, considering as physical appearance, acceptability grade and net economic return.

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