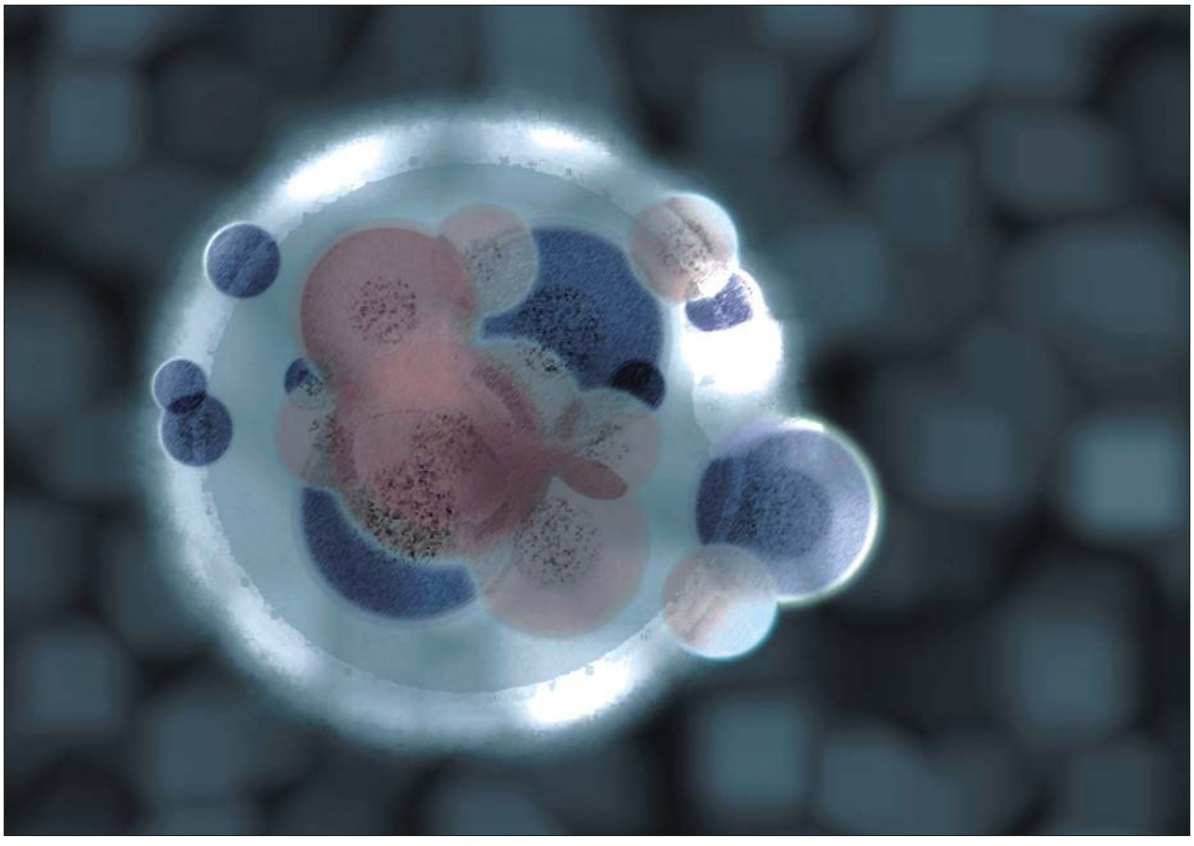

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Prepackaging, Storage Losses and Physiological Changes of Fresh Bitter Gourd as Influenced by Post Harvest Treatments

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Abstract: Different post-harvest treatments manifested specific attribute in maintaining physical appearance, acceptability and economic return for bitter gourd. The physical appearance of bitter gourd at 6 days after storage was better in the perforated polythene bag and wet gunny bag. At the harvesting stage (0 day of storage) the score was the highest 10 and at 6 DAS the highest score 6 and 7 were recorded in perforated polythene bag and wet gunny bag, respectively. The gross return after 4 days after storage was higher in these treatments.

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

INTRODUCTION

Farmers produce a vegetable crop, which is 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 unfavourable and at a stage it becomes unfit for marketing or 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[1]. Sharma[2] reported that, post-harvest losses of vegetables in Bangladesh could be as high as 43%. The average post-harvest loss as estimated by Khan[3] is 26%.

Bitter gourd (*Monordica charantia*) is most widely grown vegetables in Bangladesh. Bitter gourd is grown in 13625 ha of land with a total production of 21240 thousand metric tonnes[4]. The major vegetable growing areas of Bangladesh are Jessore, Bogra, 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[5,6].

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 is often sufficient. The activities of pre-packaging, transportation and storage are to bridge up the gap between harvesting and consumption and post-harvest losses. Good pre-packaging transport and storage are especially important for tomato because of their perishability. Prolonging the shelf life of different vegetables is very important under Bangladesh condition. So, the present study was undertaken I) to identify the suitable prepackaging methods in extending the shelf life of Bitter gourd, ii) to determine the post-harvest losses of Bitter gourd and iii) 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.

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The bitter gourd seeds were collected from a farmer's field of Valuka, Mymensingh, Bangladesh. Bitter gourds were collected immediately after harvest in the morning hours. Then bitter gourds 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_5), polyester bag (T_5) and splashing of water directly on tomato (T_6). The experiments were carried out in Randomized Complete Block Design (RCBD) with three replications. For each replication of a treatment, 3 kg of freshly harvested Bitter gourd were used and the bamboo baskets containing the vegetables were kept in the floor of a laboratory room. 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 Bitter gourd and the value of the tomato, 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[7].

RESULTS AND DISCUSSION

Effects of post-harvest treatments on physical appearance of bitter gourd: Bitter gourd stored in perforated polythene bag remained edible up to 6 DAS and under this treatment bitter gourd looks fresh and few became blackish. Wet gunny bag treatment also showed fresh but somewhat yellowish. The physical appearance of the bitter gourd in the control, polyester bag and splashing of water treatment, skin became shrinkage and yellowish. The bitter gourds were graded for appearance and

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

	Days after storage			
Treatments	0[a]	2	4	6
Control	Greenish	Skin shrinkage soft	Skin shrinkage mostly rejected	Fully dried non edible
Perforated polythene bag	Greenish	Greenish, fresh looks	Partially shrinkage, edible	Blackish spot on fruits, edible
Unperforated polythene bag	Greenish	Pale green, shrinkage	Rotten, non marketable	Orange colour, rotten, non edible
Wet gunny bag	Greenish	Fresh looking	Fresh look yellowish	Mostly fresh looks, edible
Polyester bag	Greenish	Shrinkage, black spot on fruits	Skin shrinkage, ripen soft	Orange colour, spotted, non edible
Splashing of water	Greenish	Fresh looking	Skin shrinkage, few yellowish	Orange colour, partially dried, non edible

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

Table 2: Scores on general appearance and consumer's acceptability of bitter gourd tomato as influenced by different post-harvest treatments

	Days after storage (DAS)			
Treatments	0	2	4	6
Control	10[a]	8	5	3
Perforated polythene bag	10	8	7	6
Unperforated polythene bag	10	7	5	3
Wet gunny bag	10	8	7	7
Polyester bag	10	7	4	3
Splashing of water	10	8	6	4

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

Table 3: Economic return from bitter gourd stored for 6 days under different post-harvest treatments

	Initial			4 days after storage			
Treatments	Weight (kg)	Local market price (Tk kg^{-1})[a]	Total amount (Tk)	Weight loss (kg)	Weight retained (kg)	Local market price (Tk kg^{-1})[a]	Total amount (Tk)
Control	3	15	45	0.79	2.21	6	13.26
Perforated polythene bag	3	15	45	0.22	2.78	12	33.36
Unperforated polythene bag	3	15	45	0.05	2.95	4	11.80
Wet gunny bag	3	15	45	0.12	2.88	11	31.68
Polyester bag	3	15	45	0.34	2.66	5	13.30
Splashing of water	3	15	45	0.57	2.43	6	14.58

[a]As indicated by a panel of retailers.

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 6 DAS, the highest score 7 was for the wet gunny bag treatment (Table 2). At 6 DAS most bitter gourds were fresh and marketable in perforated polythene bag and wet gunny bag treatment (Table 1). Bitter gourd kept in unperforated polythene bag and polyester bag showed orange colour, rotten and not edible at 6 DAS (Table 1).

Effect of post-harvest treatments on economic aspect of bitter gourd: Like all other vegetables market price of a vegetable depends upon the physical appearance i.e., acceptability of the vegetables to the consumers. However, in counting the economic return the weight is the dominating factor, which determines the final out turn of the vegetables. Economic analysis of bitter gourd indicated that final cost of the vegetables were arbitrated by the retailer was Tk 12.00 kg^{-1} perforated polythene bag when the vegetables stored in perforated polythene bag. The total return was 33.36 Tk 3 kg^{-1} and in the wet gunny bag treatment the total value was 31.68 Tk 3 kg^{-1} (Table 3) at 4 DAS. The lowest price was determined by the panel of relatives was 4.00 Tk kg^{-1} for unperforated polythene bag and total return was 11.80 Tk 3 kg^{-1}. The next lowest return found in the treatment of polyester bag immediate after harvest (13.30 Tk 3 kg^{-1}) at 4 DAS (Table 3).

In the present study, the physical appearance of bitter gourd at 6 days after storage was better in the perforated polythene bag and wet gunny bag. At the harvesting stage (0 day of storage) the score was the highest 10 and at 6 DAS the highest score 6 and 7 were recorded in perforated polythene bag and wet gunny bag, respectively. The gross return after 4 days after storage was higher in these treatments. So, perforated polythene bag and/or wet gunny bag may be used for storing bitter gourd.

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