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Effect of storage and prepackaging on keeping quality of vegetables

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ABSTRACT

Prepackaging help to protect the vegetables from heat and to retain the keeping quality, perforation of the polythene packages is advised from the point of a creation to retain the keeping quality. This Point into consideration 100 gauge polythene bags with (without perforation of size 30 x 25 cm) were selected for packaging vegetables. Leafy vegetables and other vegetables were stored in three different conditions. Minimum weight losses and remained in good conditions up to 7 to 8 days of storage when stored in perforated polythene bags. Ladies finger in perforated bags showed slightly more weight loss, better quality and had no off flavor imperforated polythene bags remained maximum of vitamin C content folled by perforated and open condition. Statistically highly significant differences was observed for texture, color, aroma, overall freshness, and weight losses, Vitamin C loss when stored at room temperature, open condition perforated and non perforated condition of polythene bag in all models.

Key words : Polythene bag, Cooling devices, Physiological weight losses.

Polythene bags are very important in storage of perishable food. Many times prepackaging is done for storing vegetables. Prepackaging helps to protect the vegetables from heat and to retain the keeping quality. Polythene packages are common in use, perforation of alteration to retain the keeping quality. It increases the shelf life of vegetables and prevents the spoilage.

100 gauge polythene films for packaging of fresh leafy vegetables and 200 gauge films for packaging the fresh fruits increased shelf life of commodities at room temperature shelf life of commodities like brinjal, carrots, green chillies, ladies fingers stap bean beetle leaves and curry leaves would be doubled by use of polythene packaging.

Prepackaging studies on okra cultivar pusa sawni by using 400,300,100 gauge polythene film bags under room temperature conditions 32 to 2°C and H 70 to 75%) had a shelf life of a days as against 2-3 days of unpackaged produce. (Shah *et al*., 1980). Self life of two okra varieties namely pusa sawni and padmini prepacked inperforated and unperforated polythene bags of 400 and 200 gauge thickness at ambient condition (42°C and 77.5% R.H.). Fruits packed n polythene bags had minimum weight loss and remained in good conditions up to 10 days of storage. Ladies finger in perforated bags showed slightly more weight loss, better quality and had no off flavor (Saimbi and Randhawa, 1983). Polymeric films to extend the post harvest life and improve marketability of fruits and vegetables (Kawada). Vegetables loosing their freshness soon after their harvest because of their highly perishable nature. Shriveling of fresh vegetables owing to high temperature and low humidity is a feature commonly observed particularly in the northern parts of the country during summer (Roy Khurdiya, 1982).

Keeping this in view an experiment was conducted to study for 100 gauge (30 x 40cm) for leafy vegetable storage and 200 (20 x 26 cm) for other vegetables storage under the room temperature and low cost cooling devices in perforated and un perforated polythene.

METHODOLOGY

Selection of polythene bags:

Polythene bags of hundred gauge and two hundred gauge sizes of 30 x 40 cm and 20 x 27 cm were selected to store vegetables as conditions of experiments.

The conditions were as referred and indicated below:

- Storage of vegetables in open condition – O
- Storage of vegetables in polythene bags without perforation – WP
- Storage of vegetables in polythene bags with 0.5% perforation for providing ventilation.

The vegetables selected for experiment and the conditions used to store these vegetables in cooling devices.

Development of cooling devices A simple technique of regarding the temperature and building up the humidity to control the transpiration losses was used to develop the cooling devices.

Based on principle of evaporative cooling, five different models were made using locally available materials. The basic frame of square prism shape having 40 x 70 sq cm area was made from bamboo sticks. Water holding trays of 18 gauge aluminum sheet were made of size 41 x 41 cm with a depth of 5 cm, at the bottom of the

tray 4 mm diameter holes were drilled adjacent to exterior material of the frame. These trays were placed on top of basic frame. Exterior material of sides each of 40 x 66 cm size were prepared from gunny cloth (A) gunny bag with charcoal (B), Khus curtain (C), Gunny bag with Spagnutnoss (D), Desert bag cloth (E).

Selection of vegetables:

Vegetables which were commonly consumed and locally available, particularly in summer were selected. These included two common vegetables, such as ladies finger (Abelomschus Escutentusmocnch), Cluster beans (Cyamposis tetragonaboloba and two leafy vegetables such as spinach (spinacia oleracea) and coriander leaves (coriandrum satisum).

Recording of observation:

-Temperature and humidity inside the room and the cooling devices.

The temperature was noted for room and each model using (wet bulb and dry bulb) thermometers at every two hours from 7.30 a.m to 7 p.m. besides room temperatures. Similarly relative humidity was also measured after every two hours inside the models and room, using hygrometers (Range 0-10 100%).

Physical characteristics of the vegetables:
Developing the score card:

A score card was developed using five point scale as recommended by Swami Nathan (1974). The parameter for the evaluation included color, texture, aroma and overall freshness.

Recording weight loss in selected vegetables:

The initial weights of the vegetables were noted rechecked and cleaned by discarding the spoiled ones and reweighed daily to know the weight loss by top pan balance.

Vitamin 'C' content in selected vegetables:

A ascorbic acid content of vegetables was estimated by 2.6 dichloro-indophenol method (NIN, 1983)

Statistical procedure

The statistical analysis of the data was carried out by applying factorial randomized block design (three way classification as per Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Average physiological weights of spinach, coriander, ladies finger and cluster beans when kept in room temperature selected models are present in Table 1. As seen from the Table 1 the initial weight of 350 gms each and 50 gms for corianderleaves were decreasing from 2 days.

Under room temperature (36°C and Humidity 30%) had a self life of 7 days against 3 days of unpackaged produce. In all the models average physiological weight losses were more in spinach stored in open condition.

Initial 50 gram weight was lowering from 2nd day of the experiment while the reduction was drastic after 3rd day in all models. Maximum physiological losses were observed in 80% in room's sample (36°C and 30%).

After 5 days storage 100 per cent spoilage was observed in model A and E, while in model B, it was 40q 80% spoilage in open treatment 35 q (70%) and on perforated 37 (74%) in perforated polythene bags.

In conditions openly stored coriander leaves were decayed earlier than the perforated and non perforated polythene bags in all the models.

Statistical analysis proved highly significant differences among models and in the conditions in stored spinach and coriander leaves.

Average physiological weight losses of ladies finger stored in room and selected models derived experiment period.

Average physiological weight of ladies finger and cluster beans during the 7 days storage in room and selected models is depicted in Table 1 as noted from the table the initial 350gms weight of cluster bean and ladies finger was reducing from 2nd day onwards. In room sample (36°C temp and 30%RH) ladies finger and cluster bean packed in polythene bags had minimum weight losses and remained in good condition up to 7 days of storage. Ladies finger in perforated bags showed slightly more weight loss.

Minimum physiological weight losses were denoted in ladies finger and cluster beans stored in B model followed by C and D as viewed maximum weight losses occurred in open storage compared to that in perforated and un perforated polythene bags and more in open in model A and E. Statistical analysis confirmed high significance in average physiological weight among room, models and conditions.

Vitamin 'C' content:

Average percentage vitamin C losses in spinach coriander, ladies finger and cluster beans of selected models and conditions.

The average loss of vitamin 'C' content of spinach and coriander leaves is delineated in Table 1. As evident in control sample, models and conditions, the initial quantity

Table 1 : Mean score of physical characteristics, average weight losses, vitamin C content of leafy and other vegetables stored in room, selected models and conditions during experiment

Room/ models conditions		Temperature (C^o)	Humidity (%)	Spinach		Coriander		Ladies finger		Cluster bean	
				%Wt. Loss after 3 days	% Vit. C loss after 5 days	% Wt. Loss after 3 days	%Vit. C loss after 5 days	%Wt. Loss after 5 days	%Vit. C loss after 5 days	%Wt. Loss after 5 days	%Vit. C loss after 5 days
Room	O	36	30	80.00	56.44	100	66.76	80	45	56	18.00
	WP			68.30	42.60	82	21.40	70	32.51	18	20.00
	WPP			70.20	41.00	80	20.50	72	33.50	17	21.00
A	O	24.26	79	71.42	25.92	80	40.33	42.85	33.38	37.14	22.2
	WP			44.28	18.51	66	10.8	22.85	25.00	8.5	15.5
	WPP			52.85	14.81	62	10.21	28.5	25.00	14.28	16.6
B	O	23.98	81	72.85	22.22	56	20	21.42	20.	14.28	15.5
	WP			42.14	7.40	46	6	8.57	4.1	8.5	11.1
	WPP			41.71	11.11	50	8	11.42	6.6	10	8.8
C	O	24.50	80	71.14	14.81	70	30.0	37.14	25.00	27.14	20.0
	WP			64.28	7.40	56	10	8.5	12.5	7.14	14.4
	WPP			65.71	11.11	60	20	11.42	16.66	11.42	15.5
D	O	24.71	80	81.25	14.81	50	30	25.71	29.16	34.28	17.7
	WP			68.35	11.11	70	8	11.42	16.66	10	13.3
	WPP			64.25	11.11	56	10	11.42	12.5	14.28	11.1
E	O	25.50	77	88.15	29.62	60	4	57.14	41.6	42.85	33.3
	WP			65.21	25.92	70	30	14.28	33.3	14.11	20.0
	WPP			61.30	22.22	58	20	21.42	25.00	14.28	22.2
F value		94.29	69.86**	11.81**	10.2**	11.96**8	4.5**	6.09**	10.22**	11.79**	4.5**
S.E.±		1.99	9.00	6.45	5.7	1.01	1.90	4.75	5.77	1.68	1.90
C.D. (P=0.05)		3.20		18.21	2.0	2.91	6.61	13.45	2.00	10.41	6.61

of vitamin 'C' had been lowered down on 5th days of experiment. Comparatively maximum losses were observed in room in open condition 32 per cent followed by a lower percentage were noted in perforated and unperforated. In all models average vitamin 'C' losses were in spinach stored in open condition. The statistical analysis confirmed the variations of vitamin C among room models and conditions highly significant in spinach and coriander stored in different models room.

In case of ladies finger and cluster beans the average vitamin C losses were minimum in perforated polythene sheet which was 4.16 and 11.11 per cent at end of 5 days in the models. The average losses in vitamin C in different models were statistically significant. It is concluded that minimum vitamin C losses occurred in the ladies finger stored in wrapped polythene with perforation cluster bean in all the models and room as it is lowest in model B. Mean score for color, texture, aroma and overall freshness of spinach and coriander leaves stored in room, selected models and conditions during experiment.

Table 2 reflects the mean score for color, texture, aroma and overall freshness of spinach in room and selected models. As expressed in the table initially reported maximum score was observed in room stored sample than perforated and unperforated sample. Minimum scored was observed in B model (perforated polythene bags spinach). Highest score was observed for colour, texture, aroma and overall freshness of coriander leaves stored in perforated polythene than unperforated polythene bags. Minimum score was observed for open condition. Statistically highly significant difference of spinach coriander leaves were noted among room, models and condition.

Mean score for colour, texture, aroma, overall freshness of ladies finger and cluster beans stored in room, selected models and conditions during experiment. Colour, texture, aroma and overall freshness of ladies finger scored higher in unperforated and perforated condition than open condition for respective of room and all models and conditions. Statistically highly significant differences was observed for colour, texture and overall freshness of ladies finger and cluster bean stored in room temperature in open perforated and unperforated polythene bags in room and all models.

Table 2 : Mean score of models and conditions for various characteristics of cluster beans, lady's finger, spinach and coriander leaves during experiment period

Models / conditions		Cluster Beans				Lady's Finger				Spinach				Coriander Leaves			
		Colour	Aroma	Texture	Overall Freshness	Colour	Aroma	Texture	Overall Freshness	Colour	Aroma	Texture	Overall Freshness	Colour	Aroma	Texture	Overall Freshness
A	O	4.00	4.81	4.64	4.62	4.60	4.78	4.62	4.71	3.96	4.11	3.81	3.66	4.71	4.56	3.94	4.42
	WP	4.85	4.87	4.71	4.80	4.78	4.87	4.80	4.82	4.08	3.96	3.98	3.67	4.77	4.66	4.13	4.70
	WPP	4.88	4.92	4.87	4.88	4.90	4.95	4.88	4.81	4.15	4.04	4.11	4.65	4.83	4.76	4.19	4.78
B	O	4.88	4.94	4.84	4.85	4.88	4.92	4.78	4.90	4.83	4.46	4.75	4.29	4.85	4.78	4.37	4.31
	WP	4.94	4.95	4.90	4.90	4.92	4.92	4.10	9.94	4.86	4.58	4.67	4.54	4.88	4.85	4.62	4.85
	WPP	4.97	4.98	4.97	4.97	4.94	4.97	4.97	4.80	4.90	4.64	4.74	4.66	4.92	4.9	4.68	4.90
C	O	4.85	4.90	4.72	4.72	4.77	4.84	4.71	4.84	4.79	4.37	4.41	4.13	4.82	4.63	4.26	4.70
	WP	4.88	4.92	4.82	4.82	4.84	4.91	4.84	4.90	4.80	4.48	4.50	4.44	4.86	4.71	4.37	4.76
	WPP	4.88	4.92	4.88	4.88	4.90	4.94	4.90	4.70	4.87	4.51	4.60	4.55	4.90	4.80	4.55	4.83
D	O	4.77	4.82	4.74	4.74	4.84	4.85	4.68	4.80	4.71	4.36	4.40	4.08	4.75	4.60	4.23	4.66
	WP	4.85	4.88	4.82	4.82	4.91	4.91	4.78	4.80	4.10	4.47	4.51	4.49	4.78	4.70	4.34	4.76
	WPP	4.92	4.92	4.81	4.81	4.91	4.94	4.88	4.70	4.25	4.53	4.60	4.53	4.86	4.78	4.49	4.83
E	O	4.71	4.72	4.61	4.61	4.64	4.72	4.57	4.72	3.81	3.67	3.38	3.30	4.41	4.46	3.83	4.41
	WP	4.78	4.80	4.70	4.70	4.80	4.81	4.71	4.82	4.01	3.87	3.70	3.89	4.63	4.60	4.20	4.68
	WPP	4.80	4.87	4.76	4.76	4.87	4.85	4.84	4.07	4.08	3.97	3.82	4.12	4.75	4.66	4.36	4.78
F values		9.66**	9.76*	5.75*	1.36	5.64	8.58	3.41	3.66	3.83	1.23	6.82	2.21	1.21	2.34	2.05	1.
S.E.±		0.76	0.64	0.68	0.78	0.83	0.60	0.38	0.37	0.37	0.89	0.69	0.76	0.52	1.20	1.18	
C.D. (P=0.05)		2.69	1.81	1.32	N.S	2.34	1.71	0.10	2.50	1.18	2.20	NS	2.16	1.94	NS	3.00	NS

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