

Effects of different packaging materials on chlorophyll and ascorbic content of the stored okra

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Abstract

Fresh and young, tender but firm pods of okra (*Abelmoschus esculentus*) were sorted, hydro cooled and air cooled for one hour. Packaging of pods were done in LDPE (low density polyethylene) and HDPE (high density polyethylene) films with thickness 50 μ m and 200 μ m in each packet and were kept for 21 days at ambient temperature. It was observed that different packaging material shown different properties for ascorbic acid and chlorophyll content. All these tests were done after every 3 days for 21 days. HDPE (high density poly ethylene) was found more effective in retaining total chlorophyll content and ascorbic acid content in it.

Key Words: High density poly ethylene, Low density polyethylene, Optical density.

Vegetables besides generating cash income for the growers are a rich source of Vitamins and other nutrients for the ultimate consumer. However, they suffer losses in their quality and quantity between harvest and consumption. Magnitude of such losses in India has been estimated to be varying between (25-30) percent of total production annually. Okra (*Abelmoschus esculentus*) is rich source of proteins, vitamins and minerals. They are low in calories, salt, fat and are devoid of sugar, starch and cholesterol. Okra requires a particular environment to grow which can also be created artificially to have around the year supply of them.

In U.P., okra is available either as package or non packaged okra in the local market. Improper packaging and storage conditions result in their deterioration and reduction in shelf life as fruits and vegetables are respiring products, there is a need to transmit gases from the package. Films designed with these properties are called permeable films. The importance of fruits and vegetables can not be overemphasized. The vitamins content in fruits and vegetable are known to be nutritionally superior when compared to many cereals and leguminous crops (FAO,1992). They are highly perishable due to high moisture content and there-by susceptible to rapid deterioration. So they have to be properly packaged and stored if not consumed immediately. If okra left for more than 2 days tend to become fibrous and unsuitable for direct use, thus proper packaging and

storage allows for a better quality and extends shelf life for some day.

Packages made from different plastic films such as low density polyethylene (LDPE), normal and micro perforated polypropylene (PP) act as a barrier for such a gaseous exchange (Ishikawa *et al.*, 1992; Rai *et al.*, 1999). During the gaseous exchange a stage comes when the influx of O₂ through the film packaging is just equal to the O₂ consumption rate of the produce. At the same time, the CO₂ efflux through the package become equal to the evolution rate of the produce. The atmosphere at that stage is under steady state. However, the generated atmosphere is not always appropriate, due to various produce, film and storage parameter. When selecting packaging films for the packaging of fruits and vegetables the main characteristics to consider are gas permeability, water vapor transmission rate, mechanical properties, transparency, type of package and sealing reliability.

Materials and methods

Fresh and young, tender but firm pods of okra (*Abelmoschus esculentus*) were sorted, hydro cooled and air cooled for one hour. Packaging of pods were done in LDPE (low density polyethylene) and HDPE (high density polyethylene) films with thickness 50 μ m and 200 μ m in each packet and were kept for 21 days at ambient temperature.

The chlorophyll content was determined by homogenizing 1 g of okra (green portion) with 10 ml of acetone and n-hexane (4:6), using a mortar and pestle. The homogenized solution was allowed to stand for 30 seconds. 1 ml of the supernatant was taken and was diluted with 9ml of the extract solution of acetone and n-hexane (4:6). The resulting solution was analyzed spectrophotometrically with the help of an UV-vis spectrophotometer. The optical density of the samples was measured at 663, 645 nm versus acetone and n-hexane (4:6) solution as reference. The total chlorophyll concentration was quantified as per the method proposed by Nagata and Yamashita (1992).

$$\text{Total chlorophyll (mg/100 gm.)} = 0.0202(\text{O.D. at 645 nm}) + 0.00802(\text{O.D. at 663nm})$$

Ascorbic acid: 30 gm (W_1) of okra seeds was weighed and was blend with equal weight (W_2) of 6% metaphosphoric acid for 3 to 4 min. 15 gm (W_3) of this slurry was transferred into a 100ml (V_1) volumetric flask and volume was made up by adding 3% metaphosphoric acid and was filtered by passing through a filter paper. Burette was filled with standardized 2,6-dichlorophenol indophenol dye. 10ml (V_2) of filtered solution was taken in a conical flask and was titrated immediately against the standard dye solution (V) till faint pink colour appeared and persisted for 15 seconds.

The ascorbic acid content was estimated quantitatively as per the method proposed by **Klein and Perry (1982)**. The following formula was employed for calculating the ascorbic acid content.

$$\text{Ascorbic acid (mg/100 gm)} = [(W_1 + W_2) / (W_1 * W_3)] * (V_1 / V_2) * [100(V/T)]$$

Results and discussion

There is a gradual increase in the value of total chlorophyll in HDPE as sample were observed till 10th day after which there was a gradual decrease due to blanking. HDPE showed the total chlorophyll content of 7.00 mg/100 gm and the sample of LDPE was showed a gradually decrease in value of total chlorophyll in content. There was a considerable loss in the values of total chlorophyll in LDPE sample. LDPE showed total chlorophyll content of 3.00 mg

/100 gm and control sample showed 0.00 mg/100gm chlorophyll content.

Ascorbic acid content decreased gradually with increase in storage period. HDPE sample showed 8.10mg/100 gm ascorbic acid content at 21st day. And LDPE sample showed 7.90 mg/100 gm. Control sample showed 5.60 mg/100gm ascorbic content.

Conclusion

According above result, HDPE packed sample were more effective to retain ascorbic acid and chlorophyll content as compared to LDPE and control sample and LDPE sample was more effective than control sample.

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Table 1: Effects of different packaging material on chlorophyll content of the stored okra

Days → Sample ↓	1 st day	4 th day	7 th day	10 th day	13 th day	15 th day	17 th day	19 th day	21 st day
LDPE	9.80	9.84	8.50	6.80	4.45	4.00	3.49	3.30	3.00
HDPE	9.80	9.95	10.20	11.50	11.00	9.90	8.80	7.80	7.00
control	9.80	6.00	4.10	3.50	1.90	1.20	00.00	00.00	00.00

Table 2: Effects of different packaging material on ascorbic acid content of the stored okra

Days → sample ↓	1 st day	4 th day	7 th day	10 th day	13 th day	15 th day	17 th day	19 th day	21 st day
LDPE	20.00	18.18	15.38	14.70	12.82	11.36	9.88	8.06	7.90
HDPE	20.00	16.70	14.70	14.05	12.05	11.20	9.69	8.20	8.10
control	20.00	16.00	15.00	13.00	10.00	9.20	8.00	7.00	5.60