

Storage Study of Custard Apple Seed Powder

A. V. Zambare, D. A. Kulkarni, Pradip Shirtode



Abstract: The present study was conducted to study the changes in physical and chemical properties of custard apple seed powder packed in LDPE, HDPE & LAF packaging under normal and vacuum packaging conditions. Physical properties viz. water absorption capacity, water solubility index, bulk density, pH & Titratable acidity whereas chemical properties viz. moisture, fiber, fat, protein & carbohydrate content of custard apple seed powder packed in different packages under different storage conditions were determined at an interval of 15 days for a period of 60 days. The Physical properties viz. water absorption capacity, water solubility index, bulk density & pH of custard apple seed powder were observed to be decreased with the storage period whereas its Titratable acidity was increased with the storage period. Moisture content of custard apple seed powder was increased with storage time while its other chemical properties viz. fiber, fat, protein & carbohydrate content were decreased with storage time. Vacuum packed custard apple seed powder could be safely stored in laminated aluminum foil up to a period of 60 days.

Keywords: Chemical Properties, Custard Apple Seed Powder, LDPE, HDPE, LAF Packaging, Physical properties

I. INTRODUCTION

Now a day's custard apple has increased its popularity because of increase in research on medicinal potential and bioactive compounds present in its different parts of such as leaves, fruits, bark and its seeds. The fruit of custard apple is 50-80% edible with various nutritional values. The pulp of the fruit is used in the ice cream as the flavoring agents, which contains vitamin B1, dietary fiber, potassium and sodium. Similarly the seeds of custard apple are also rich source of phytochemicals such as Annonaceous acetogenin (neurotoxin), cyclopeptide, carbohydrates, protein, lipids, oleic acid and linoleic acid. Based on various in vivo and in vitro experiments, the custard apple seed extract were found to be helpful in various bioactivities such as antitumor, antimicrobial, antifungal, antidiabetic and hepatoprotective. Based on these available studies, custard apple seeds may be likely to use as in nutraceutical food industry as well as nutrition industry [4].

However, more investigational studies are to be needed for determination of changes in physical and chemical properties of custard apple seed powder during its storage for exploring its medicinal as well as the nutraceutical potential.

II. METHODOLOGY

Materials required for the experimentation was procured from the local market. The seeds of the fruit were separated from the pulp with a scoop & then used for preparation of powder for further study. To store the seed powder for storage study, Low Density Polyethylene (LDPE) (200 gauge), High Density Polyethylene (HDPE) (120 gauge) & Laminated Aluminum Foil (LAF) (100 gauge) were used. Initially the custard apple seed powder was prepared as per the flow chart shown in Fig.1. The custard apple seed powder was packed in different packaging materials as stated above in two different packaging conditions i.e. vacuum and normal packaging and stored for 60 days. The physical properties like bulk density, Water Absorption Capacity, Water Solubility Index, pH, Titratable Acidity of custard apple seed powder were determined as per the methods described by [5]. Also the chemical properties like moisture content, protein, fat, fiber, carbohydrate content of custard apple seed powder were determined as per the method in [2]. Physical & chemical analysis of the custard apple seed powder packed in different packaging materials was conducted at an interval of 15 days during the storage period of 60 days.

III. RESULTS & DISCUSSION

1 kg of powder was obtained after milling of 2.5 kg of dried seeds (Fig.2). Average particle diameter of custard apple seed powder was found to be 0.250 mm (Fig.3).

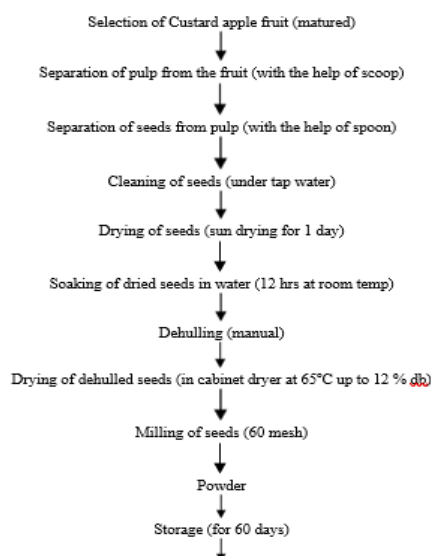


Fig. 1 Flow Chart for Preparation of Custard Apple Seed Powder

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Fig. 2 Dried Custard Apple Seeds



Fig. 3 Custard Apple Seed Powder

A. Physical Properties of Custard Apple Seed Powder

The bulk density & water absorption capacity of custard apple seed powder was decreased with storage time in all the packaging material and in both packaging conditions (Fig.4 & Fig.5). The decrease in bulk density & water absorption capacity was more prominent in LDPE (Normal packing) and less prominent in LAF (vacuum packing). The decrease in bulk density was due to increase in moisture content whereas the decrease in water absorption capacity could be due to the loose association between amylose and amylopectin in the native granules of starch [1].

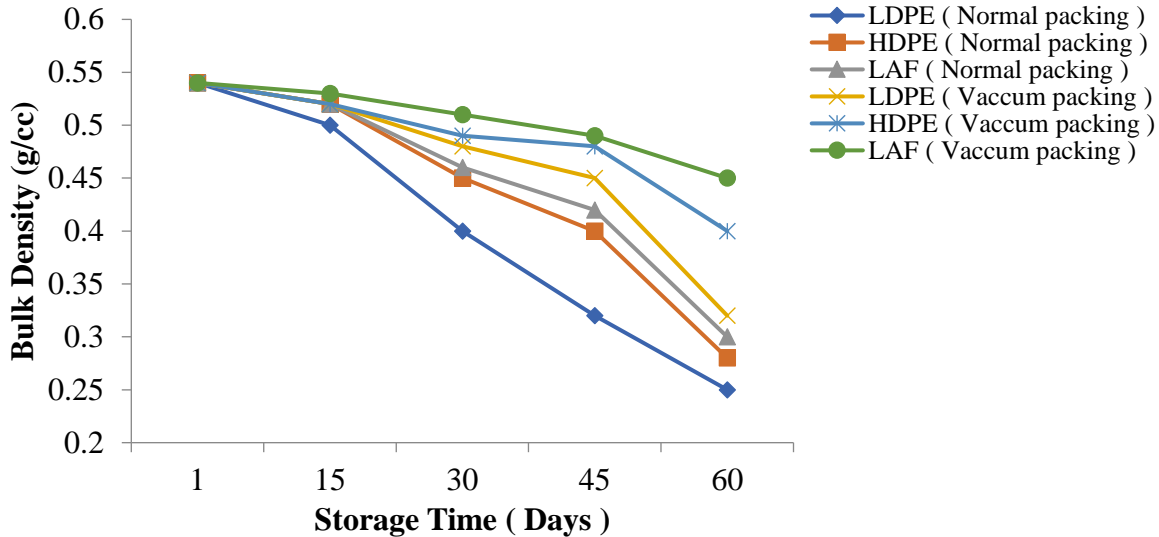


Fig. 4 Effect of Different Packaging Material and Packaging Conditions on Bulk Density of Custard Apple Seed Powder

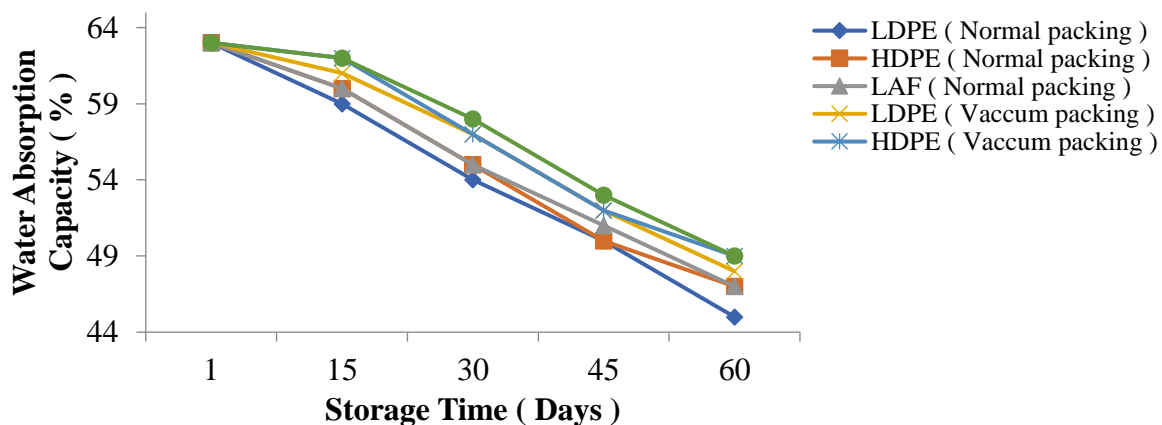


Fig. 5 Effect of Different Packaging Material and Packaging Conditions on Water Absorption Capacity of Custard Apple Seed Powder

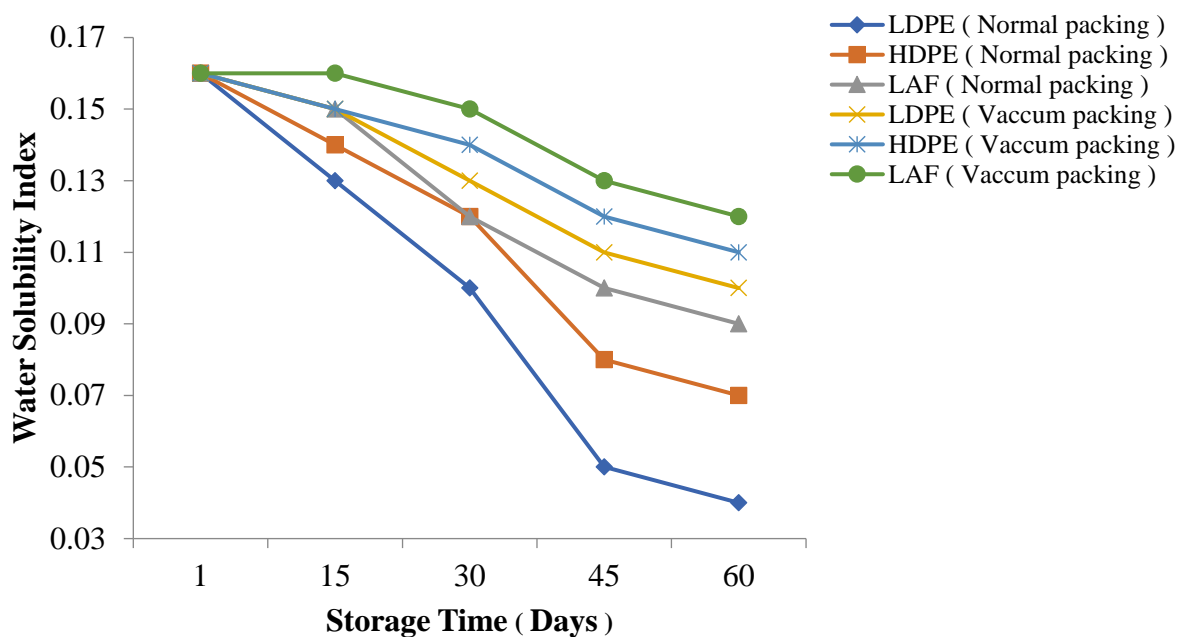


Fig. 6 Effect of Different Packaging Material and Packaging Conditions on Water Solubility Index of Custard Apple Seed Powder

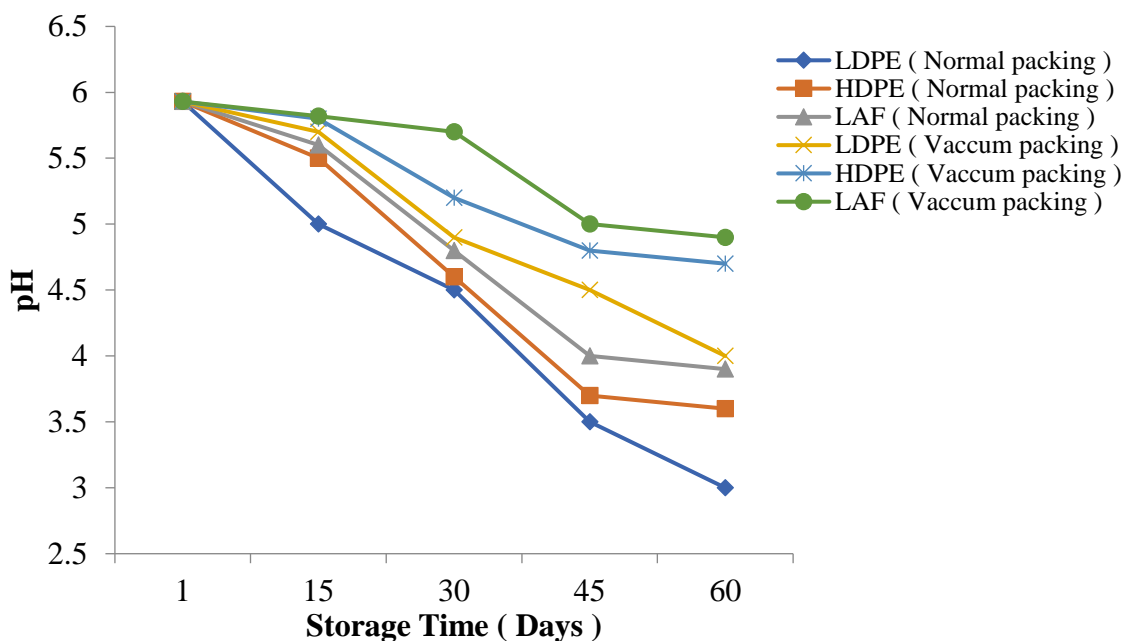


Fig. 7 Effect of Different Packaging Material and Packaging Conditions on pH of Custard Apple Seed Powder

The water solubility index & pH of custard apple seed powder was decreased with storage time in all packaging material in both packaging conditions (Fig.6 & Fig.7). The decrease in WSI was more prominent in LDPE (Normal packing) and less prominent in LAF (vaccum packing). The water solubility index was decreased due to increase in moisture content with storage time whereas the pH was decreased due to the hydrogen ions produced by microorganisms. It was observed from Fig.8 that the Titratable acidity of custard apple seed powder was increased with storage time in all packaging material and in both packaging conditions. The increase in Titratable acidity was more prominent in LDPE (Normal packing) and less prominent in LAF (vaccum packing). The Titratable acidity was increased due to decrease in pH with storage time [3].

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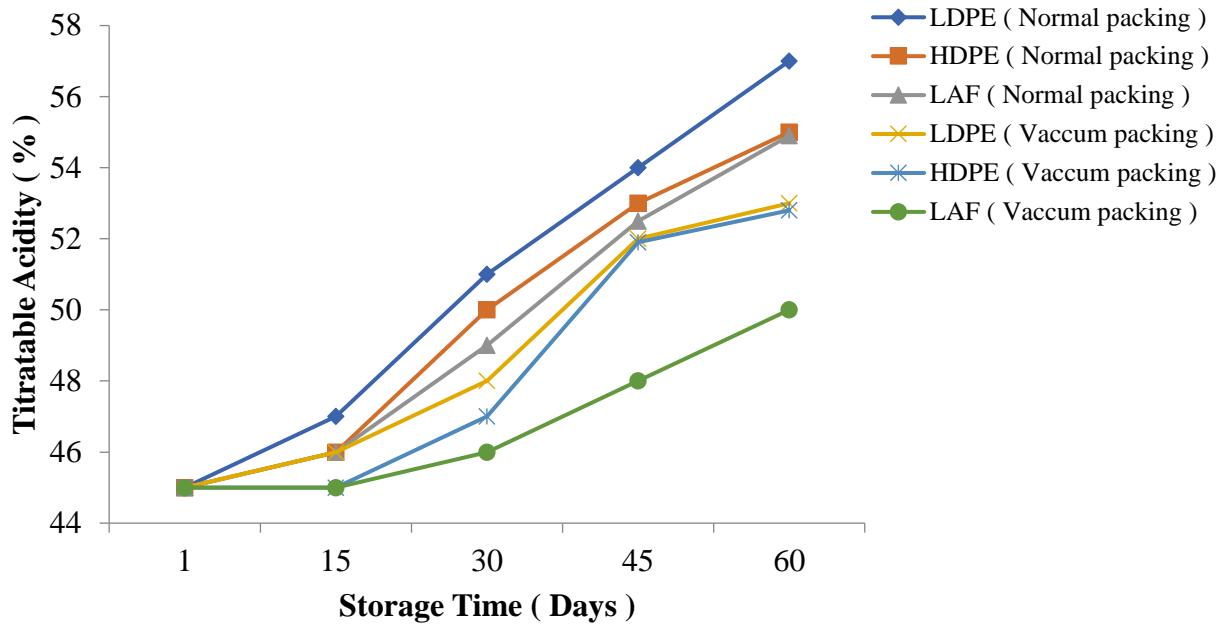


Fig. 8 Effect of Different Packaging Material and Packaging Conditions on Titratable Acidity of Custard Apple Seed Powder

B. Chemical Properties of Custard Apple Seed Powder

The moisture content of custard apple seed powder was increased with storage time in all packaging material and in both packaging conditions (Fig.9). The increase in moisture content was more prominent in LDPE (Normal packing) and less prominent in LAF (vaccum packing). The increase in moisture content was due to moisture permeability of packaging material. The protein, fat, fiber & carbohydrate content of custard apple seed powder was decreased with storage time in all packaging material in both packaging conditions (Fig.10 to Fig.13). The decrease in protein content was more prominent in LDPE (Normal packing) and less prominent in LAF (vaccum packing). This reduction could be due to growth of microorganisms whose metabolic activities lead to breakdown of nutrient in food [1].

From the statistical analysis, it was observed that change in WAC, WSI, protein and carbohydrate content of custard apple seed powder was not significant whereas changes in the values of bulk density, pH, TTA, Moisture content, fiber & fat content of custard apple seed powder was significant during its storage period.

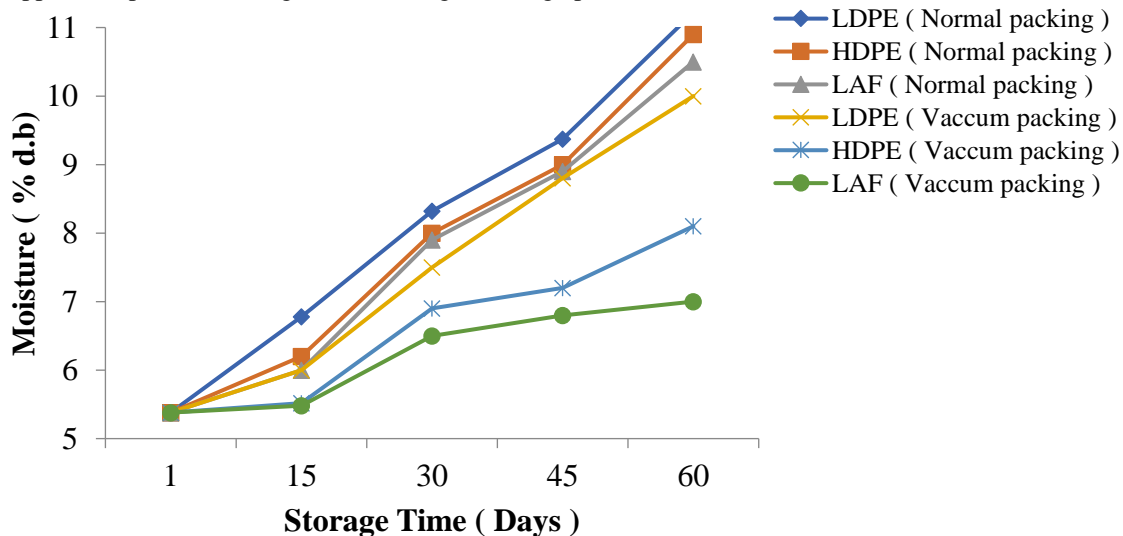


Fig. 9 Effect of Different Packaging Material and Packaging Conditions on Moisture Content of Custard Apple Seed Powder

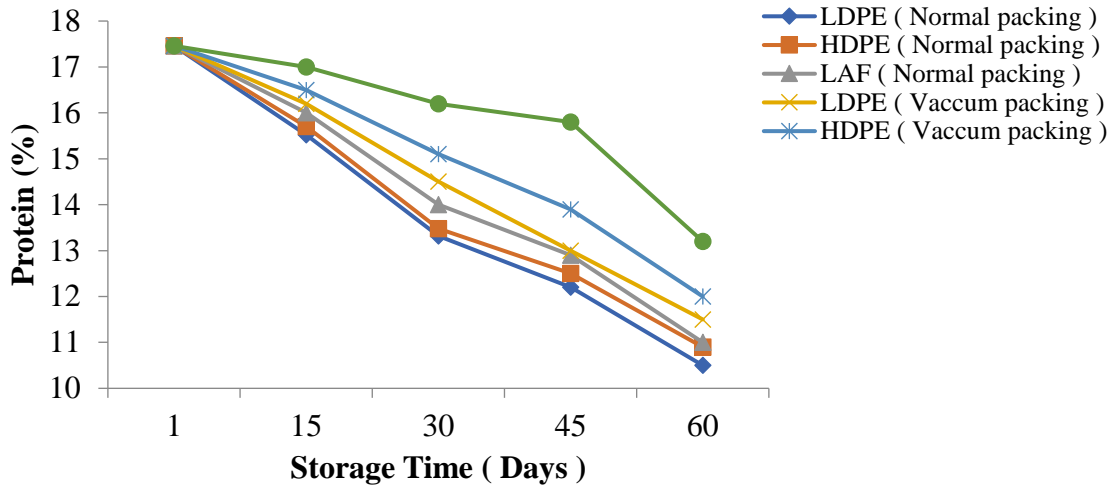


Fig. 10 Effect of Different Packaging Material and Packaging Conditions on Protein Content of Custard Apple Seed Powder

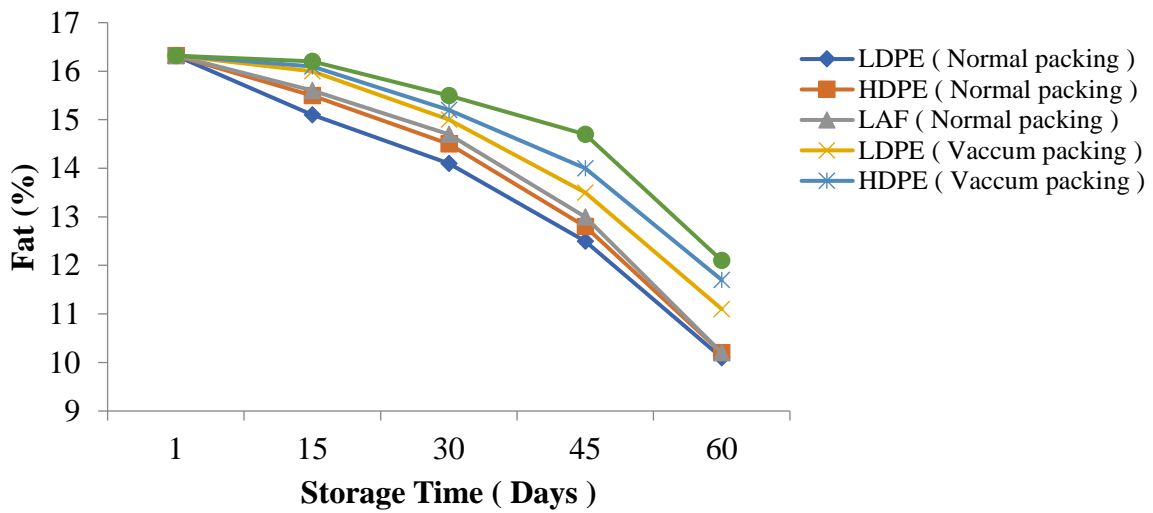


Fig. 11 Effect of Different Packaging Material and Packaging Conditions on Fat Content of Custard Apple Seed Powder

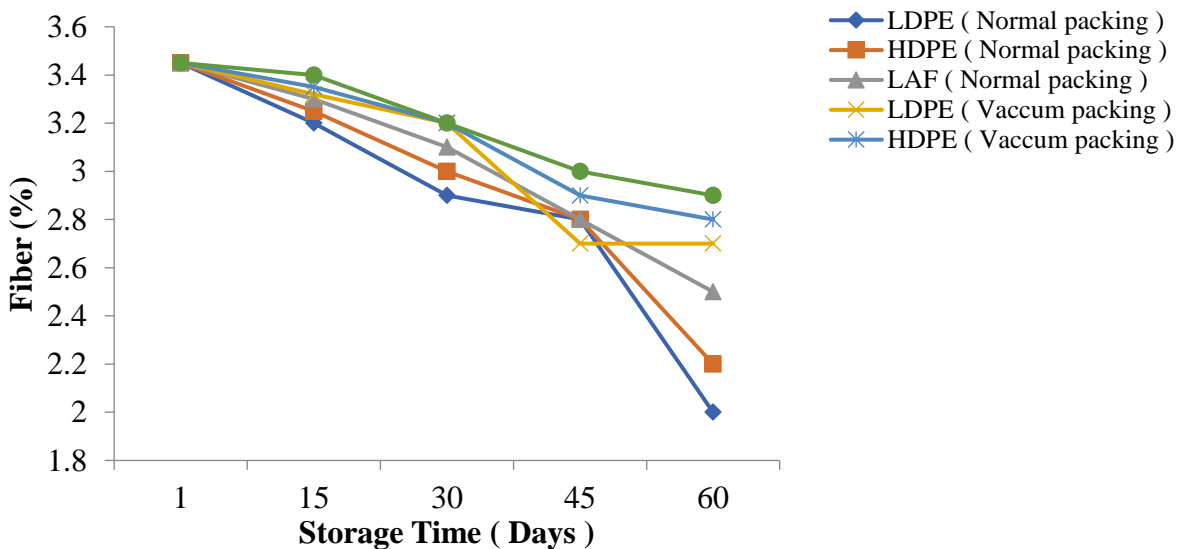


Fig. 12 Effect of Different Packaging Material and Packaging Conditions on Fiber Content of Custard Apple Seed Powder

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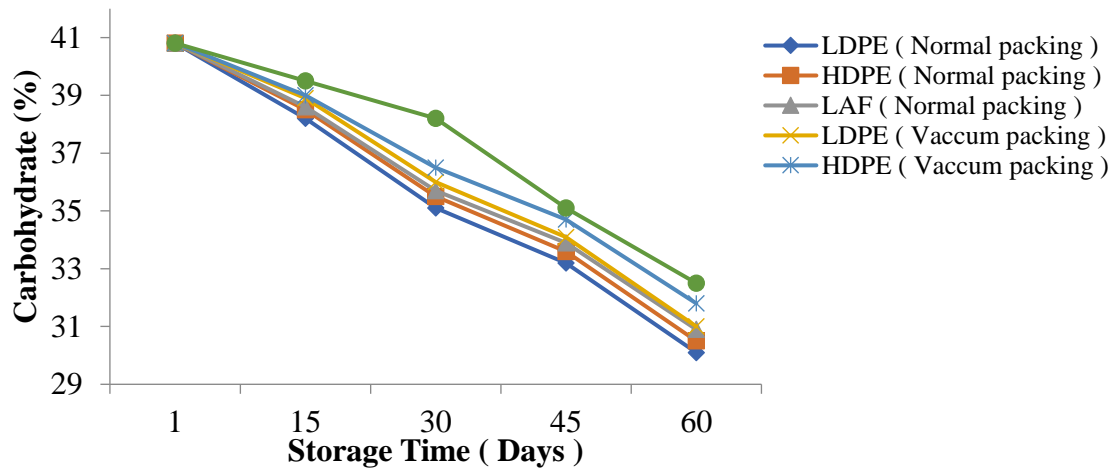


Fig. 13 Effect of Different Packaging Material and Packaging Conditions on Carbohydrate Content of Custard Apple Seed Powder

IV. CONCLUSION

From the experiment it was concluded that,

- 1) The custard apple seed powder stored in the LAF is less prominent to changes in its physical and chemical properties than other packaging materials viz. LDPE and HDPE.
- 2) The custard apple seed powder stored at vacuum packing condition is less prominent to changes in its physical and chemical properties as compared to normal packing condition.
- 3) At room temperature, custard apple seed powder can retain its fiber, fat, protein & carbohydrate content to the maximum up to 60 days if stored in laminated aluminum foil (LAF) with vacuum packing conditions.

DECLARATION STATEMENT

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Ethical Approval and Consent to Participate	No, the article does not require ethical approval and consent to participate with evidence.
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Authors Contributions	All authors have equal participation in this article.

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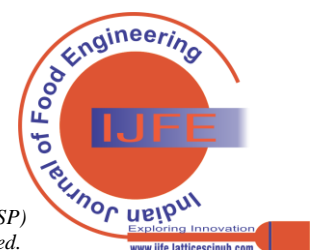
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