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Effect of different packaging material on dehydrated fenugreek (*Trigonella foenum graecum* L.) leaves

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Abstract

The present investigation entitled “Effect of different packaging material on dehydrated fenugreek (*Trigonella foenum graecum* L.) leaves” was aimed to utilize proper packaging material for storage of dried fenugreek with higher nutritional and sensory quality. Experiment was conducted for packaging of dehydrated fenugreek leaves with using different packaging material viz. P₁- Low Density Polyethylene Pouch (LDPE), P₂- High Density Polyethylene Pouch (HDPE), P₃- Aluminum Laminated Pouch, P₄- Glass Bottle and P₅- Plastic Bottle. The results of the present investigations indicate that dried fenugreek leaves packaged in glass bottle was rated as the best packaging material for storage of dried fenugreek leaves on the basis of higher sensory score as well as nutritional composition and also exhibited minimum changes in nutritional as well as sensory quality during forty five day of storage. Thus, prepared dried leaves of fenugreek or other produce can commercially be packed in glass bottle for better returns to growers and processors as well as to ensure retain consumer quality and acceptance.

Keywords: fenugreek leaves, drying, packaging material, physico-chemical and sensory quality

Introduction

Fenugreek (*Trigonella foenum graecum* L.) is an important spice, occupying third and fourth place in area and production among all the minor spices grown in India. Fresh green leaves are extensively used for medicinal purposes like chronic dysentery, diarrhoea, chronic cough, dropsy, spleen, diabetes, colic troubles, ulcers and rickets. Furthermore, it stabilizes the insulin, blood sugar and hemoglobin levels. Fenugreek also to be used as antidiabetic remedy for both type I and II diabetes. Saponins and diosgenin present in fenugreek are responsible for hypolipidemic and antidiabetic action. Fenugreek is described as an antihyperglycemic herb in humans and laboratory animal. (Bhutia, *et al.*, 2017) [3]. Dehydration is a best method for preservation of leafy vegetable because it reduce cost of storage and transportation due to the reduction in weight and volume of the final product. Dehydrated leafy vegetables have the potential to become an important product because of relatively inexpensive, quickly cookable and rich in several nutrients which are essential for human health. Besides dehydrated leafy vegetables have a great potential to use throughout the year there is a great demand in oversea countries for the dried fenugreek. Drying of leafy vegetables and making use for future opens up new vistas in the field of food technology, since they are rich in antioxidants to develop new commercial products (Shobha, and Ranganna, 2010) [6]. Packaging of various food materials commenced for various basic purposes like careful handling, protection from microbial activities, humidity and oxygen. Advantages of packaging forms trails of list, but major of them are to carry food till consumer end without leakage and breakage; protect food against range of hazards; to provide convenient handling throughout production, storage and distribution systems; to reduce post-harvest losses and giving access to larger markets. Apart from the traditional materials viz., leaves, vegetables, fibres and textiles; industrial materials are also used as packaging materials. Consumers tend to prefer certain materials with products, partially because they are perceived to be appropriate for the distinct product. In addition to materials, the packaging containers often vary in regard to size, shape and appearance. Glass material is impervious to micro-organisms, pests, moisture, oxygen and odour. These basically do not react with foods or have chemical that migrate into foods. The major point of note is glass can be reused and recycled. Apart from being brittle and heavy in weight, they do not

have any disadvantage. Plastic bottles are more prevalent in use, for they have good property of toughness, unbreakable and easy to seal. Barrier to gases and moisture is important aspect when working with processed/dried food products, which is quite good in plastic bottles. PET (polyethylene terephthalate) type of plastic material is strong, transparent glassy film. LDPE (Low density polyethylene), HDPE (High density polyethylene) and other metal coated plastic films are also used in packaging industry. LDPE are found to be heat sealable, inert and odour free. Though these are poor odour barriers. LDPE being less expensive are used for shrink wrapping. On the other hand, HDPE are quite thicker, stronger but less flexible and more brittle material. These are better barrier to gas and moisture. Aluminum coated films work on concept of coating thin layer of aluminum, which produces a very good barriers to oil, gases, moisture, odour and light.

Material and Methods

Leaves of fenugreek were procured from ASPEE College of Horticulture and Forestry, Navsari Agricultural University and brought to Department of Post Harvest Technology, ASPEE College of Horticulture and Forestry, NAU, Navsari. The freshly collected leaves were sorted, washed and then dry in tray dryer for 7 hours at 60°C. Then dried leaves of fenugreek were packed in five different packaging materials (Table 1) and storage at room temperature for six months for periodical analysis.

Table 1: Different packaging material

Treatment	Packaging material
T ₁	Low Density Polyethylene Pouch (LDPE)
T ₂	High Density Polyethylene Pouch (HDPE)
T ₃	Aluminum Laminated Pouch
T ₄	Glass Bottle
T ₅	Plastic Bottle

Table 2: Effect of different packaging materials on the moisture content (%) (dry weight bases) of dried fenugreek leaves during storage.

Storage Period (S)	Different packaging materials (P)					
	T ₁ - LDPE Pouch	T ₂ - HDPE Pouch	T ₃ - Aluminum Laminated Pouch	T ₄ - Glass Bottle	T ₅ - Plastic Bottle	Mean (S)
Initial	4.11	4.11	4.11	4.11	4.11	4.11
15 days	7.64	6.09	7.07	4.45	6.69	6.39
30 days	9.71	9.37	7.98	4.96	8.75	8.15
45 days	11.16	10.59	9.62	5.32	9.29	9.20
Mean (P)	8.16	7.54	7.20	4.71	7.21	

Ash content

Perusal of data pertaining to effect of packaging materials on ash content of dried fenugreek leaves during 45 days storage has been presented in Table 3. Data shows that among different packaging material, the mean ash content of dried leaves (P) varied between 10.23 % and 10.78 %, with maximum ash content in dried leaves which were packed in glass bottle and minimum in dried leaves packed in

Ash contents of samples was determined gravimetrically then calculated and expressed as per cent on fresh weight basis (AOAC, 1984). The moisture was estimated by drying the weighted samples in hot air oven at 70±2°C to a constant weight (Ranganna, 1997) [4]. The dried fenugreek leaves were evaluated for sensory qualities on the basis of colour by a panel of 7-10 judges on a 9-point Hedonic scale (Amerine *et al.*, 1965) [1].

Results and Discussion

Physio-chemical characteristics

Effect of packaging materials on physico-chemical characteristics of dried fenugreek leaves during 45 days storage has been explained under following heads:

Moisture

Perusal of data pertaining to effect of packaging materials on moisture content of dried fenugreek leaves during 45 days storage has been presented in Table 2. Data shows that among different packaging material, the mean moisture content of dried leaves (P) varied between 4.71% and 8.16 %, with minimum moisture content in dried leaves which were packed in glass bottle and maximum in dried leaves packed in LDPE pouch. Here, it did not show any appreciable change in moisture content when packed in glass bottle due to low water vapor transmission rate (WVTR) compared LDPE pouch. Swain *et al.* (2013) [7] reported that moisture content of dried capsicum slices packaged in laminated aluminium foil slightly increased during four month of storage due to the low rate of migration of water vapor from the storage environment into the packaging material. During 45 days storage, the mean moisture content of dried leaves (S) increased from 4.11% to 9.20 % (S₁ to S₃). Forty five days storage of dried leaves packed in different packaging material resulted minimum increase (4.11 % to 5.32 %) in moisture content of dried leaves which were packed in glass bottle and maximum increase (4.11% to 11.16 %) in Aluminum laminated pouch.

Aluminum laminated pouch. During 45 days storage, the mean ash content of dried leaves (S) decreased from 11.00 % to 10.05 % (S₁ to S₃). Forty five days storage of dried leaves packed in different packaging material resulted minimum decreased (11.00 % to 10.58 %) in ash content of dried leaves which were packed in glass bottle and maximum decreased (11.00 % to 9.84 %) in Aluminum laminated pouch.

Table 3: Effect of different packaging materials on the ash content (%) of dried fenugreek leaves during storage.

Storage Period (S)	Different packaging materials (P)					
	T ₁ - LDPE Pouch	T ₂ - HDPE Pouch	T ₃ - Aluminum Laminated Pouch	T ₄ - Glass Bottle	T ₅ - Plastic Bottle	Mean (S)
Initial	11.00	11.00	11.00	11.00	11.00	11.00
15 days	10.15	10.4	10.29	10.86	10.23	10.39
30 days	9.94	9.97	10.03	10.69	10.11	10.15
45 days	9.84	9.88	9.98	10.58	9.95	10.05
Mean (P)	10.23	10.31	10.33	10.78	10.32	

Sensory characteristics

Effect of packaging materials on sensory characteristics of dried fenugreek leaves during 45 days storage has been explained under following heads:

Color

Perusal of data pertaining to effect of packaging materials on colour score (9-point hedonic scale) of dried fenugreek leaves during 45 days storage has been presented in Table 4. Data shows that among different packaging material, the mean colour score of dried leaves (P) varied between 6.35 and 7.45, with maximum colour score in dried leaves which were packed in glass bottle and minimum in LDPE pouch. Retention of food color after thermal processing may be used to predict the extent of quality deterioration of food resulting from exposure to heat (Shin and Bhowmik, 1995) [5]. Swain *et al.* (2013) [7] observed that total colour difference was least

affected by aluminium (Al) laminates followed by high density polyethylene (HDPE) and polypropylene (PP). This indicated that for the entire storage period of four month, the ambient temperature were sufficient for the loss in 'L', and 'b' values of the capsicum slices. The reason for decrease in colour score may be due to change in water-vapor transmittivity of packaging materials with the increase in relative humidity of air by which the color pigments were subjected to losses in their brightness (L-Value), yellowness (b-Value) and redness (a-Value). During 45 days storage, the mean colour score of dried leaves (S) decreased from 8.00 to 6.08 (S1 to S3). Forty five days storage of dried leaves packed in different packaging material resulted minimum decreased (8.00 to 7.00) in colour score of dried leaves which were packed in glass bottle and maximum decreased (8.00 to 5.00) in aluminum laminated pouch.

Table 4: Effect of different packaging materials on colour (9-point hedonic scale) of dried fenugreek leaves during storage.

Storage Period (S)	Different packaging materials (P)					
	T ₁ - LDPE Pouch	T ₂ - HDPE Pouch	T ₃ - Aluminum Laminated Pouch	T ₄ - Glass Bottle	T ₅ - Plastic Bottle	Mean (S)
Initial	8.00	8.00	8.00	8.00	8.00	8.00
15 days	6.4	6.6	7.2	7.60	7	6.92
30 days	6	6.2	6.8	7.20	6.6	6.52
45 days	5	6	6.2	7.00	6.2	6.08
Mean (P)	6.35	6.7	7.05	7.45	6.95	

Conclusion

Overall, it is concluded that dried fenugreek leaves packed in glass bottle was found superior based on nutritional as well as sensory quality and prepared dried fenugreek leaves can also be stored satisfactorily for period of forty five days in glass bottle having higher sensory quality and better stability of nutritional quality.

References

1. Amerine MA, Pangborn RM, Roessler EB. Principles of sensory evaluation of food. Acad. Press, London, 1965.
2. AOAC. Official methods of analysis, Association of Official Analytical Chemists. 14th edn., Arlington, Virginia, USA, 1984.
3. Bhutia HP, Chattopadhyay N, Hore JK, Yonzon R, Lepcha R. Weed and water management in fenugreek (*Trigonella foenum graecum* L.)- A review. Journal of Crop and Weed. 2017; 13(3): 204-208.
4. Ranganna S. Handbook of analysis and quality control for fruit and vegetable products. Tata McGraw Hill Publishing Co. Ltd., New Delhi (India), 1997.
5. Shin S, Bhowmik SR. Thermal kinetics of color changes in pea puree. Journal of food engineering. 1995; 24:77-86.
6. Shobha H, Ranganna B. Study on different drying methods on the quality of dehydrated methi leaves. Mysore journal of agriculture science. 2010; 44(3):529-535.
7. Swain S, Samuel DVK, Kar A. Effect of Packaging Materials on Quality Characteristics of Osmotically Pretreated Microwave Assisted Dried Sweet Pepper (*Capsicum annum* L.). Journal of Food Process Technology. 2013; 4:264.