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Adoption of Traditional and Indigenous Storage and Drying Method of Vegetables in Cold Arid Region of Changthang

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Abstract

The process of drying or dehydrating food involves removing moisture to preserve and store it, in changthang , this has been a long-standing tradition, especially in the winter months due to harsh climate not availability of fresh vegetables. Solar drying was modification of traditional sun drying technique which is tried for all agricultural commodities. The methods used by different changthangi farmers and were studied that this method is cheap and giving an acceptable, palatable and safe product for human consumption.

Keywords: *Storage, Dryer, Vegetables, Changthang, Harvest*

1. Introduction

Changthang is a unique part of Ladakh, characterized by harsh climatic conditions with dryness and very low rainfall. The temperature varies from hot to extreme cold. This area is known as a Cold Himalayan Desert and has very low thermal and hydric indexes. July and August are the hottest months, while January is the coldest. In Changthang, average precipitation, mostly in the form of snow, is less than 10 mm, which can be fatal to livestock during the winter (Tashi Dolkar and Phuntsog Tundup, 2024) experiences extremely cold temperatures during winter, often dropping well below freezing. The harsh climate makes it difficult to grow crops during this season. The growing season in Ladakh is limited to a few months in summer. Farmers must harvest and store enough food to last through the long winter months when no fresh produce is available. People in cold desert of Ladakh practiced a number of indigenous techniques for the management, storage and use of bioresources. the technique of sun-drying vegetables and herbs has been around since ancient times. The indigenous knowledge of vegetable storage for off-season consumption is unique, and still being practiced in some part of the region. The region remains isolated from rest parts of the country from November to May every year due to heavy snowfall. Getting fresh vegetables from outside the region is beyond the reach of the people due to high air cargo charges of ₹130/kg. Therefore, the only means of getting vegetables during winter months is by storing the locally produced surplus vegetables for off-season consumption. Traditionally, few vegetables are being grown in the region and the indigenous knowledge of selected vegetable storage has been matured and refined over time as new situations are confronted. Vegetables stored for the winter months form a major source of income for vegetable growers. Women in changthang region sell stored vegetables to army, griffin winter (Figure 1). Drying is commonly described as the operation of thermally removing water content to yield a solid product. Moisture held in

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loose chemical combination, present in the product matrix or even trapped in the microstructure of the solid, which exerts a vapour pressure less than that of pure liquid is called bound moisture. Moisture in excess of bound moisture is called unbound moisture (Anupam Tiwari, 2016).

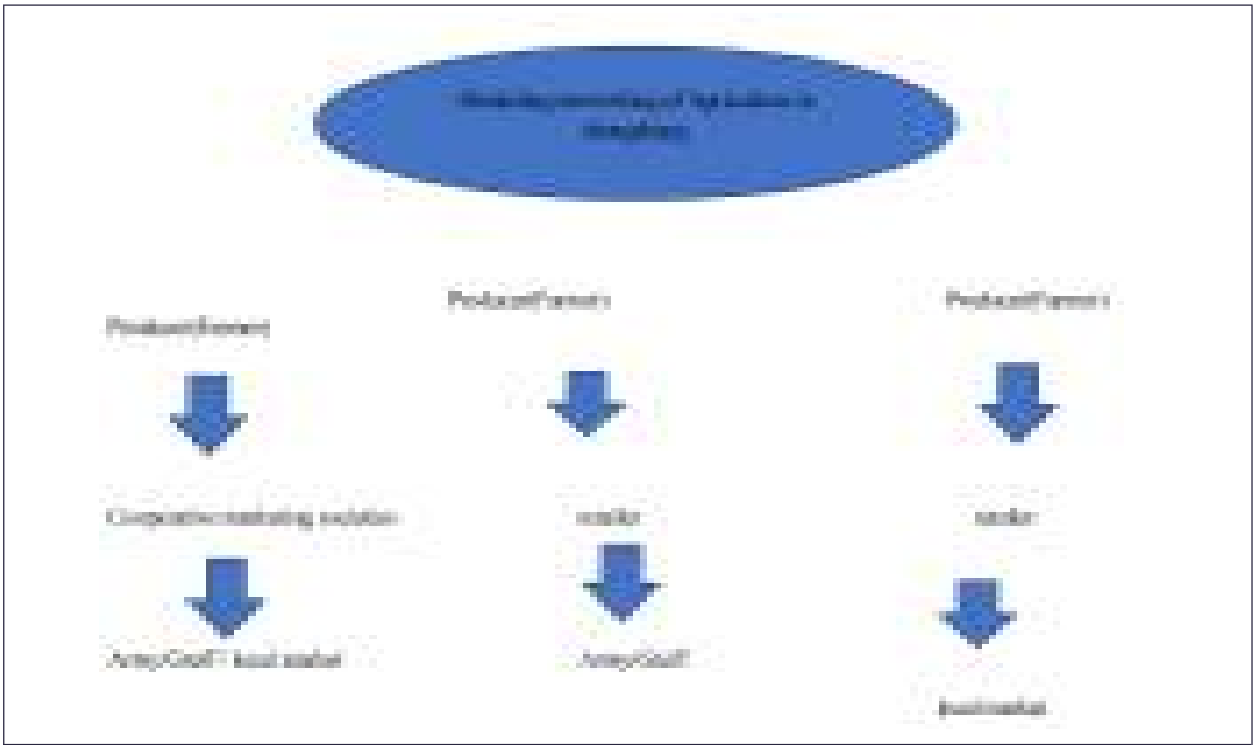

Figure 1: Marketing Networking of Agriculture

2. Literature Review

Drying is a mass transfer process of removing moisture from food products to reduce the bulkiness of agricultural produce (Gatea, 2011; Radhika *et al.*, 2011). Drying involves heat transfer, therefore, reducing energy consumption, improving the drying process efficiency and obtaining high quality products with minimal costs will be the goal of modern drying (Doymaz, 2011; Darvishi *et al*., 2014).

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Convective hot air drying of agricultural produce is the most common method used to remove moisture from food products. However, the shortcomings of this method include low and long drying period, high energy consumption and contamination of food products as a result of poor handling, low energy efficiency (Sarimeseli, 2011). However, in order to reduce the problems and to achieve a more effective and faster thermal drying process, the use of microwave and dielectric heating methods for drying agricultural produce is encouraged (Sarimeseli, 2011).

3. Materials and Methods

Survey was done in changthang nyoma block. Data pertaining to the study were collected by focused group discussion, method demonstration, observation with villagers of nyoma block farmers were took participated. Participatory Learning Appraisal (PLA) method was also used .The practice of storing food has been a part of the local culture for generations. Traditional methods of preservation, like drying and fermenting, help ensure food security throughout the winter.

4. Results and Discussion

4.1. Storage Method in Changthang Region

Changthang is a unique part of Ladakh, characterized by harsh climatic conditions with dryness and very low rainfall and there is severe scarcity of fruits and vegetables.From September month Drying being one of the most cost effective

means of preservation of agricultural crops and foods of all varieties after harvesting crops green leafy, vegetables and cauliflower, cabbage, tomato, and turnip,red chillies through dehydration and drying and solar dryer and storage for winter season. Drying is the process of water removal, usually driven by heat, from solid and liquid products resulting in solid-dried products. Within a fresh foodstuff exist two types of moisture, firstly the bound moisture characterized by the liquid retained in the microstructure of the solid part and secondly the unbounded moisture represented by the excess of the bounded water. Sun-dried vegetables, fruits and meats sustain the winter diet People in cold desert of Ladakh practiced a number of indigenous techniques for the management, storage and use of bioresources. The isolation of the region plays an important role in the sustenance of such knowledge base. In the event of modernization, the people are gradually moving away from tradition. The indigenous knowledge of vegetable storage for off-season consumption is unique, and still being practiced in some part of the region. Therefore, documentation of the indigenous knowledge from cultural view point and possible future use is compiled here based on personal knowledge, observations and discussions. Vegetable find important place in the changthang region .

Area measuring 310 ha is under vegetable cultivation producing 7,544 tons of fresh vegetables annually in Leh district. Due to sub-zero temperature during winter months, vegetable cultivation is possible only from April to October, and harvesting is done from July to October. Storage of vegetables produced during the summer season is must for its consumption during winter months (Ali Zulfikar *et al*., 2012).

Table 1: Traditional Approach of Drying Vegetable Storage by the Changthang Farmers

• Glass room where vegetables drying
• Terrace during sun-shine in day time
• Hanging method
• Solar polyhouse dryers

Dried vegetables have been an important part of the food culture in Changthang. The process of drying or dehydrating food involves removing moisture to preserve it, and in Changthang, this has been a long-standing tradition, especially in the winter months. By drying and preserving the vegetables, people were able to store food for the winter and ensure a steady supply of food (Table 1). Over time, the consumption of these vegetables have become a cultural norm, from generation to generation. People of changthang believe that the dried vegetables should be free of preservatives, chemicals, and other harmful substances. Experts believe that there is no harm in consuming sun-dried vegetables as long as preservatives are not added to it. Usually the pickling of vegetables and the use of chemicals for preservation can lead to harmful health effects, but there is no evidence that sun-drying alone is harmful.

4.2. Present Situation in Changthang

Traditional sun-drying methods are still in use. The little improvement made include the practice of the scientific pre-drying operations i.e. sorting, cleaning and blanching, steaming and the use of rugs, mats, solar drier, box solar drier and trays raised above ground level. This allows for air flow through the product bed and eliminates many sources of contamination. The methods used by different changthangi farmers and were studied that this method is cheap and giving an acceptable, palatable and safe product for human consumption (Figure 2).

Figure 2: Farmer Drying Vegetables

Table 2: Sun Drying Method of Vegetables

Type of Food	Traditional Preservation Methods	Mistake	Corrections
Vegetables	Boiling the green leaves and sun-drying them on a mat, ground Dried vegetable is stored in polythene begs.	After postharvest there is neither proper sorting of leaves, washing nor boiling to inactivating destructive elements. Drying is not carried out effectively. The ultimate colour of the dried vegetable is unattractive and the dried vegetable is often contaminated with duet and sand.	Firstly pick young tender leaves and sort them properly wash it properly and blanch them for 2-3 minutes in a weak solution of table salt or Soda. This ensures the retainment of colour. Dry the vegetable a clean mat,rugs or and trays raised, until the product becomes triable. the vegetable often to ensure proper solar drier, box solar drier.

4.3. The Traditional Methods of Preserving Foods with Recommendations Designed at Producing Better Products

4.3.1. Box Dryer

The box-type solar dryer has been widely used for small scale food drying. It consists of a wooden box with an attached wooden lid. The inside surface is painted black and the product is supported on a mesh tray above the dryer floor. The box solar dryer is a large wooden and the product is located in trays or shelves inside a drying cabinet. The combined action of solar radiation incident directly on the product to be dried and hot air provides the necessary heat required for the drying process. In most cases, the air is warmed during its flow through a low pressure drop solar collector and passes through air ducts into the drying chamber and over drying trays containing the crops. The moist air is then discharged through air vents or at the top of the chamber.

The advantages of this System for Farmers are:

- Simple in construction.
- Low labour costs.
- Simply load and then unload.

4.3.2. Greenhouse Dryer

The thought of a greenhouse dryer is to combine the function of the solar collector with a greenhouse system. The roof and wall of this solar dryer can be made of transparent materials such as fibre glass, UV stabilized plastic or polycarbonate sheets. The transparent materials are fixed on a steel frame support or pillars with bolts and nuts and sealing to prevent humid air or rain water leaking into the chamber other than those introduced from the inlet opening. To increase solar radiation absorption, black surfaces should be provided within the structure. If designed properly, greenhouse dryers can allow a greater degree of control over the drying process than the box dryers and they will be more appropriate for large scale drying in changthang region.

Figure 3: Greenhouse Dryer

The advantages of this System for Farmers are:

- Faster Drying Time. At Least 50% Faster Than Conventional Drying Method.
- Higher Temperature. Up To 35-40 Degree Celsius.
- Weather Resistant. Wind And Storm Are No Longer an Obstacle.
- Heat Retention. Retains Heat Up To 24 Hours.
- Retains Nutrient.
- Hygienic.
- Contamination Resistant.
- Less Labour Intensive.

4.3.3. Schedule for Drying of Vegetables

Table 3: Schedule for Drying of Vegetables

Vegetables	Preparation and Pre-treatment	Time of Sulphuring (min)	Drying Temp. (°C) and Time
Cabbage	Wash, remove outer leaves and core, cut into fine shreds	Blanch 5-6min, immerse for 10 min in 0.5% salt solution and drain	35-45 °C 3 days
Chillies	String mature dark red pods and hang in sun	No treatment	35-40°C
Carrot	Wash, scrape stalks and tips, cut into 10mm thick slices	Blanch for 2-4 min in boiling 1.5% common salt solution	35-40°C 3-4 days
Cauliflower	Wash, remove stalks covering leaves and stems break flowers apart into pieces of suitable size.	Blanch 4-5 min, in 1% KMS solution and drain	40-45°C 3-4 days
Palak, methi, other GLV	Sort, wash, trim off rough stems and stalks, shred.	Blanch for 2 min in boiling water or steam	35-40°C 2-3 days
Spinach	Sort, wash thoroughly and cut into 10-12 mm. portions using a stainless steel knife	Blanch as above for 2 minutes	40-45°C 3 days
Tomato	Wash and cut into slice	Blanch for 30-60 seconds, peel and slice 10 mm thick	35-45°C 3-4 days
Turnip	Wash, remove stalks, peel and cut in to 5mm thick slices.	Blanch for 2-4 min in boiling water	30-45°C 3-4 days

5. Conclusion

Sun-drying is of great economic importance, better preservation of crops is imperative, and the method is accepted, requiring low capital investment and no energy resources is a great need to improve the current methods of drying fruits, vegetables. Drying Vegetables Fruits and Herbs Is Easy and at No Cost and Zero Energy Solar Dryer working At Mountains of Ladakh.

References

Ali Zulfikar, Yadav Ashish, Stobdan Tsering and Singh Shashi. (2012). Traditional Methods for Storage of Vegetables in Cold arid Region of Ladakh, India NISCAIR-CSIR, *India. Indian Journal of Traditional Knowledge*, 11(2), 351-353.

Anupam Tiwari. (2016). A Review on Solar Drying of Agricultural Produce. *J Food Process Technol.*, 7, 9. doi: 10.4172/2157-7110.1000623

Doymaz, I. (2011). Experimental Study on Drying Characteristics of Pomegranate Peels. *Food Science and Biotechnology*, 20, 965-970. http://dx.doi.org/10.1007/s10068-011-0133-3.

Gatea, A.A. (2011). Design and Construction of a Solar Drying System, a Cylindrical Section and an Analysis of the Performance of the Thermal Drying System. *African Journal of Agricultural Research*, 6, 343-351.

Sarimeseli, A. (2011). Microwave Drying Characteristics of Coriander (*Coriandrum sativum*. L.) Leaves. *Energy Conversion and Management*, 52, 1449-1453.

Tashi Dolkar and Phuntsog Tundup (2024). A Study on Tribal Food Habits, Food Culture and Lifestyle of Changthang Region. *International Journal of Environmental & Agriculture Research*, 10(10), 2024.

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