

Traditional Processed Fruits and Vegetables Products of Uttarakhand

PC Tripathi

Directorate of Research for Women in Agriculture, Bhubaneswar 751003, Odisha, India
(email: prakaashtripathii2000@yahoo.co.in)

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Uttarakhand is a hill state with 70% of geographical area under hills. The topography, elevation, geographical features, diversity of flora and fauna, ethnic diversity, land-use pattern, and socio-economic conditions are diverse. The traditional cropping pattern includes cultivation of different crops such as cereals, millets, pulses, oil seeds, vegetables etc. The total geographical area of Uttarakhand is 53,483 sq km. Around 62% of total geographical area is covered with forest and area under cultivation is only 14%. Around 57% of the agricultural land is in the hilly tract while 43% in the plains of *Tarai* and *Bhabhar*. Irrigated land is only 9.43%, which is mainly in the flat land of *Tarai* and *Bhabhar* regions. Due to low productivity of cereals oilseeds, pulses, fruits, and vegetables cultivation is gaining popularity in the region. In 2012-13, the area under fruits was 200851ha with production of 805668 tonnes and area under vegetables was 62993ha with production of 625127 tonnes (Anonymous, 2013). The productivity of most of the crops is very low in upland and it is slightly higher in valleys. Today food insecurity is looming over hill regions of the state. Because of

low productivity of the crops and poor returns, the farmers are forced to leave farming. In order to ensure the food and nutritional security local farming communities have begun utilization of cultivated as well as wild edible plant species, available in the surrounding environment. The processing and utilization of these crops are largely confined to the home scales that render many of these valuable nutrients unavailable to human beings (Khamgaonkar *et al.*, 2013). Several indigenous fruits and vegetables were grown in northern India during the reign of Akbar (Randhawa, 1982). In ancient times the sun and wind were used to dry foods naturally. Several vegetables were cultivated in the *Kumaun* region during the period of *Chand* dynasty and British Empire (Atkinson, 1882; Pandey, 1937). Evidence shows that Middle East and oriental cultures actively dried foods in hot sun as early as 12,000 BC. Vegetables and fruits were also sun dried in ancient times (Mack, 2001).

Most of these processed products of the region are consumed locally in the form of traditional foods (Rai *et al.*, 2009). There are several fruits and vegetables produced

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in the region. Most of them are cultivated in summer and rainy seasons, and the crops mature by the end of September before the start of winter. To increase their availability in the winter and to increase their storage life, a lot of traditional products are prepared. These products provide the nutritional and food security, and sustainable livelihood to the people of the region before implementation of the public distribution system (Mehta *et al.*, 2010). Further the seasonal migration of people from hills to *Bhabhar* regions in the olden days was the motive to convert their agricultural products into different processed foods.

With the large scale implementation of public distribution system, increased marketing and transport, the practice of preparation of these products has been vanishing. Although there are few women self-groups that are preparing these products and making them available in some outlets in some cities but the traditional ways of preparation of these products is at the verge of extinction. It is possible that the future generations shall be deprived of these traditional knowledge and skills. The present study was designed to document the traditional fruits and vegetables processed products.

Methodology

A field survey was undertaken during 2008-09 in Almora district of Uttarakhand to record the various traditional processed products. The information was collected directly from the farmwomen for the traditional processed products of fruits and vegetables, their preparation process, culinary uses and socioeconomics of these products. Sample households from Timila, Kafulti, Dabar, Ugalia, Bhargoan, Siroli, Pali, and Badhan villages were randomly selected representing different socioeconomic groups. During the survey, non-participant observation method was also applied while recording the information. Information obtained was authenticated from knowledgeable elderly people of the villages in the study area. After collection of information it was classified as described below.

Results and Discussion

On the basis of the survey of traditional fruits and vegetables products and their preparation methods were documented. The plant species and their parts used by the local inhabitants, which are used for processing are presented in table 1. Dehydration technique of vegetables was most popular practice in the region. There

Table 1. The fruits and vegetables used for processing

Name of Crop	Vernacular name	Botanical name	Family	Plant parts used	Products
Cucumber	<i>Kakad</i>	<i>Cucumis stauvus</i>	Cucurbitaceae	Fruits	Noodles, Flakes, Nuggets
Pumpkin	<i>Gadu</i>	<i>Curcubita maxima</i>	Cucurbitaceae	Fruits	Flakes
Ashgourd	<i>Bhuj</i>	<i>Banincasa hispida</i>	Cucurbitaceae	Fruits	Noodles, Flakes, Nuggets
Radish	<i>Moo</i>	<i>Raphanus sativus</i>	Cruciferae	Roots, leaves	Noodles, Flakes
Spinach	<i>Pauon</i>	<i>Spinacea oleracea</i>	Amaranthaceae	Leaves	Flakes, Powder
Coriander	<i>Dhania</i>	<i>Coriandrum sativum</i>	Apiaceae	Leaves	Flakes, Powder
Colocasia	<i>Pinau</i>	<i>Colocasia esculenta</i>	Araceae	Leaves	Flakes, Nuggets, Powder
Yam	<i>Gethi</i>	<i>Dioscovera alata</i>	Diocoseceae	Tuber	Nuggets
Bottle gourd	<i>Lauki</i>	<i>Lagenaria siceraria</i>	Dioscoreceae	Fruits	Noodles
Mint	<i>Poting</i>	<i>Metha arevensis</i>		Leaves	Flakes, powder
Potato	<i>Alu</i>	<i>Solanum tuberosum</i>	Solanaceae	Tuber	Flakes, Nuggets
Black Mustard	<i>Rai</i>	<i>Brassica juncea</i>	Cruciferae	leaves	Flakes
Turmeric	<i>Hald</i>	<i>Curcurma domestica</i>	Zingiberaceae	Rhizome	Powder
Ginger	<i>Aad</i>	<i>Zingiber officinale</i>	Zingiberaceae	Rhizome	Dried rhizome, Powder
Bitter gourd	<i>Karela</i>	<i>Momordica charantia</i>	Cucurbitaceae	Fruits	Flakes
Amaranthus	<i>Chua</i>	<i>Amaranthus cruentus</i>	Amaranthaceae	leaves	Flakes
Chilli	<i>Mirch</i>	<i>Capsicum annum</i>	Solanaceae	Fruits	Whole fruit, Powder
Sweet gourd	<i>Ramkerala</i>	<i>Cyclanthera pedata</i>	Cucurbitaceae	Fruits	Flakes,
Potato yam	<i>Gethi</i>	<i>Dioscorea bulbifera</i>	Dioscoraceae	Tuber	Flakes,
Fenugreek	<i>Methi</i>	<i>Trigonella foenum-graecum</i>	Fabaceae	Leaves	Powder
Aonla	<i>Aow</i>	<i>Embllica officinalis</i>	Phyllanthaceae	Fruits	Pickle
Mango	<i>Aam</i>	<i>Mangifera indica</i>	Anacardiaceae	Fruits	Pickle
Lemon	<i>Nibu</i>	<i>Citrus lemon</i>	Rutaceae	Fruits	Pickle
Lime	<i>Kagzi nibu</i>	<i>Citrus aurantifolia</i>	Rutaceae	Fruits	Pickle

were many vegetables stored by the farmers after sun drying. These sun-dried vegetables were consumed during scarcity in winter season. The common products were *badies* (nuggets), *khware* (flakes/chips), *dhoosa* (noodles), powder, whole dried vegetables etc. These were not only helpful in supporting the livelihood, but also addressed the economic needs by selling them in the local market. These are described as follows:

Badies (nuggets). The nuggets are the most popular products. These are

The medicinal plants form an important source of income for the rural community in several Asian countries mainly in the Himalayan region. In North-east India, medicinal plants were the second dominant species in relation to use category in traditional home gardens. In Assam, after vegetable and fruit constituents, the medicinal plants were the most dominant species in home garden .

prepared with several vegetables when they are available in abundance. Farmers prepare nuggets for utilizing surplus produce and use them in crisis. Nuggets are prepared with black gram paste mixed with grated vegetables. *Mangodies* (nuggets) are smaller version of *badi* and is made of green gram, both *badies* and *mangodies* are made during hotter months and stored for winter months when fresh vegetables are not available in the market and provide the substitute for vegetables. Vegetables like cucumber, potato, ash gourd, etc. are used to make the nuggets. The nuggets are preserved for personal use as well as they are sold for livelihood. Most common is cucumber nuggets. These are prepared with mature hill cucumber and black gram. The mature cucumbers are cut in to four to six equal size pieces. The inner core with seeds is discarded. These pieces are grated in thin long flakes with the help of traditional grater (*bhujkor*). The outer yellow or brown rind is discarded. Thereafter the excess water of these grated cucumbers is squeezed thoroughly. The black gram paste is prepared by soaking it for overnight then macerating them to fine paste. The grated cucumbers are



Figure 1. Sun drying of *badies* (nuggets).

thoroughly mixed with finely macerated black gram paste. The mixture is kept overnight for fermentation. Next day, small size half oval shape balls are made of this mixture and kept on wooden planks or on the slates of house roof for sun drying. These are allowed to dry under sun for 10 or more days till they became crispy. These are then removed carefully from plank or slates. The removal work is done in the morning to minimize the breakage due to presence of dew (Figs. 1, 2). These partially dried nuggets are again sun dried for 2-3 days to further reduce the moisture before packing them in cotton cloth bags and stored in cool dry place. To prepare one kg nuggets, 20 kg mature cucumber and half kg black gram are required. Generally salt and turmeric are added in these nuggets but in some areas asafetida is also added to add flavor and colour. The procedure of ashgourd nuggets preparation is similar to that of the cucumber nuggets. Generally 15kg ash gourd is required to prepare 1 kg nuggets. The potato nuggets are prepared by boiling of potatoes. The boiled potatoes are mashed after peeling. These nuggets are also dried in the same way as described above. Generally black gram paste is not

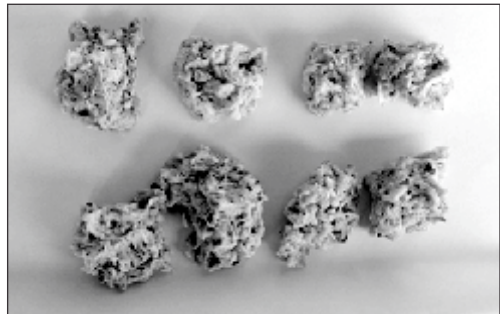


Figure 2. Sun-dried cucumber *badies* (nuggets).

added in potato *badies*. *Mangodies*, a type of nuggets, are prepared from green gram paste, salt, asafetida, and coriander powder. They do not contain any vegetables or fruits. The procedure of making nuggets slightly varies region to region.

These nuggets are traditionally stored in cotton cloth bags and kept in wooden boxes. These are stored for 7-8 months. The cucumber nuggets are used for making curries which is eaten with rice while potatoes and ash gourd nuggets are used for preparation of vegetable curries.

Khware (Chips)

The chips (*khware*) are another popular product used extensively in the region. Several vegetables are used for preparation of chips.

Potato chips. These are more common in the potato-growing areas and mostly the potato produced during all seasons are used for making chips so that these can be used in the lean months. The thin flakes are made from raw potato after peeling and washing. These slices are boiled in hot water for few minutes and then sun dried for 6-7 days. The dried chips are stored in cotton cloth bags and stored at cool and dry place. These are used as snacks after frying.

Radish chips. The round type of the radish varieties are used for this purpose. These are cleaned and washed and thin flakes are made with a sharp knife or sickle. These chips are sundried for 6-7 days and stored in cotton cloth bags in cool and dry condition. These are used as

vegetable in winter months after soaking in hot water for 1-2 hours.

Pumpkin chips. The yellow ripped pumpkins are used for making chip. The flat and thin chips of pumpkin are prepared after removal of seeds and soft inner core. Thin flakes of radish are made with a sharp knife or sickle. These are sun dried for 6-7 days. The dried chips are stored in cotton cloth bags and stored at cool dry place. These are used after soaking in hot water for 30-40 minutes.

Leafy vegetables chips. The flakes of colocasia leaves, radish leaves and spinach are also prepared whenever they are in abundance. The tender leaves and stem of colocasia are cut into small flakes. These are sun dried for 6-7 days and prepared during September- October. The young and soft leaves of radish are also dried after cutting in medium size pieces. The spinach and black mustard leaves are dried in February -March and used in the summer months. Generally the young and tender leaves are used for processing. These vegetables are neither boiled nor treatment given to these before and after cutting except washing. The dried vegetable chips are stored in dry place in cotton cloth bags. These are used after soaking in hot water for 20-30 minutes.

Dhoosa (noodles). Some vegetables are grated to make thin and long noodles. These are sun-dried and stored. Radish, cucumber and bottle gourd are commonly used for this purpose. The round type radishes are washed and cleaned. These are grated and excess water is removed by

squeezing. These are thinly spread on bamboo mat/grass mat (*feena*) for sun drying. These noodles dried in 3- 5 days and then stored in cotton cloth bags in dry place. These are used after rehydration by soaking in hot water for 30-45 minutes. The radish noodles are used preparation of vegetable curries. The cucumber and bottle gourd noodles are prepared in similar ways. Mature cucumber and semi-mature bottle gourd used for making noodles. The outer rind and inner core and seeds are discarded and flesh is grated using *Bhujkor* (grater). These noodles are squeezed for removal of excess water. Thereafter these are sun dried for 3-5 days, and stored at cool dry place after packing. These are used for making *rayata* (curd mixed with small pieces of raw vegetables) after soaking in hot water for 30-40 minutes.

Powder. Some vegetables are dried and powdered for storage. Among them coriander, fenugreek, and mint are most common. The leaves are washed and dried without cutting during winter and summer. The dried leaves are crushed to make powder and leaf petioles and stem pieces are removed. These are stored in wooden boxes or glass bottles. These are used for flavouring curd, chutney etc in off season.

Dried whole vegetables. Chilly, turmeric, and ginger are sundried without cutting. The yellow and red chilly are allowed drying on the plants. Once Dried chillies are stored in cotton or jute bags in cool dry condition. Turmeric is dried after boiling for 30-45 minutes. Sometimes these are cut into pieces for rapid drying.

The cut pieces are sundried for 15-20 days and stored in dry place. The drying of ginger is not common. Some times whole rhizomes are dried without any treatment.

Pickles. Pickles are most popular products. The pickles are prepared from mango, aonla (Indian goose berry), and lemons and limes. Generally oil-based pickles are prepared. The vegetables pickles are not common.

Most of these dried products are prepared without adding any preservatives and additives. Thus, the colour and appearance of the products is not so appealing. These products had been

The rural women were the sole producers of these products in the past. The knowledge and use of these products has decreased sharply in the present generation of rural women compared to the previous two generations. The results of this study raised some questions such as why people are more attracted towards the modern preservation techniques in spite of many harmful side-effects of the artificial preservatives used in modern preservation techniques. Why the use of traditional techniques is decreasing, despite their useful features like easy to use, cheaper, eco-friendly, no side-effects if used judiciously?

source of the food and livelihood security of the farming community and other inhabitants of the region in past. Implementation of public distribution system of food grains, increased availability of vegetables in off season due to better transportation, and availability of numerous processed products have decreased the production and utilization of these traditional processed products. The use of these products except few has rapidly decreased and the related traditional knowledge is disappearing. There is possibility that future generations will not be aware about these products. The rural women were the sole producers of these products in the past. The knowledge and use of these products has decreased sharply in the present generation of rural women compared to the previous two generations. The results of this study raised some questions such as why people are more attracted towards the modern preservation techniques in spite of many harmful side-effects of the artificial preservatives used in modern preservation techniques. Why the use of traditional techniques is decreasing, despite their useful features like easy to use, cheaper, eco-friendly, no side-effects if used judiciously?

There is need to conserve the diversity of these traditional products by documentation and popularization. Some efforts have been made to document and conserve the meat products of the region

Fortunately, Some of self-help groups and Non-Government Organizations (NGOs) are preparing some of the these products such as *badies* and marketing them at different outlets. But the other products which are not so popular are slowly vanishing. There is need to conserve the diversity of these traditional products by documentation and popularization. Some efforts have been made to document and conserve the meat products of the region (Khamgaonkar *et al.*, 2013). The similar efforts are required for the traditional products of cereals, pulses, fruits, vegetables, and dairy products. Use of traditional processed food among common people should be motivated by awareness campaigns, seminars, newspaper articles, and new industries should be set up to promote traditional methods. The traditional techniques can be modified, by introducing technological interventions wherever possible, which will be beneficial not only for the common people and government but also for our future generations.

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