

Traditional pickles of Himachal Pradesh

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Received 18 March 2015, revised 17 April 2015

The traditional pickles of indigenous fruits and vegetables, viz., *galgal*, *lingri*, *aaroo*, *plum*, *lasura*, *dehu*, *kachnar* and *beedana* are popular in rural and urban areas of Himachal Pradesh since the very early times. These are used as appetizers and served practically with every meal. The traditional pickles of Himachal Pradesh are unique in the raw material, method of preparation and taste from the pickles in other parts of country. In the present study, the methods of preparation of traditional pickles as practiced by the rural folk have been documented.

Keywords: Himachal Pradesh, Traditional, Pickles, Fermentation

IPC Int. Cl.⁸: A23L 19/20, C12C 11/00, C12Q

Traditional fermentation is a form of food preservation method used since ancient times. In addition to preservation, fermentation improves the nutritive value of foods, enhances flavor and enable the foods more digestible thus making these foods popular all over the world¹⁻³. Fermented foods play a crucial role in providing food security, enhancing livelihoods and social wellbeing of people all around the world⁴. The rural folk have preferred fermented foods over the unfermented ones due to their longer shelf life, pleasant taste, texture and appearance. In India a lot of diversity prevails in the food habits of the people living in different states and many of the states especially the hilly states have their conventional fermented products^{5,6}. In ancient time when hilly state did not have transport systems, people were dependent on food material available seasonally/locally and developed their traditional recipes for food processing and preparation⁷. In Himachal Pradesh traditional fermented pickles, viz. brinjal, *lingri*, *beedana*, peach, pear, plum, tomato, *dheu*, radish, carrot, chilli, garlic, mushroom, etc., have been consumed as a regular food in different recipe over a long period of time. The plant materials used by the people for pickle preparation included its leaves, stem, fruits, buds, vegetables and roots. The fermentation of vegetables and fruits with the addition of salt and spices increases the shelf life

of food generally by 8-10 months⁸. In addition, mutton, chicken and fish pickles are also prepared and consumed in different regions of Himachal Pradesh. Pickles are fermented mainly by lactic acid bacteria which are considered to lower serum cholesterol level and help in preventing tumors by stimulating immune response thus acting as probiotic⁹. So far, the traditional processes for the production of pickles of Himachal Pradesh have not been documented and these folk recipes for pickles preparation are losing sheen in the fast food culture. So, there is a need to conserve our traditional knowledge of pickling for making fruits and vegetables persistable, shelf stable and easily transportable without aid of refrigeration. This paper focuses on documentation of traditional methodology of pickle preparation in Himachal Pradesh and efforts have also been made to elaborate some of the traditional pickling processes.

Methodology

A survey of rural and tribal areas of Himachal Pradesh was done to identify popular indigenous pickles of Himachal Pradesh. Survey was carried out in around 70 households in ten district of Himachal Pradesh representing the diverse ethnic groups and different geographical conditions. Data on the raw materials, spices used in preparation and popular fermentation procedures used in pickle production were collected by active interaction with people of rural and tribal areas of Himachal Pradesh. The local names of raw materials used were included

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and the taxonomic identification of fruits and vegetables used in pickle preparation was done. Microorganisms involved in fermentation of some of the traditional pickles were isolated on MRS agar and were identified by 16s rDNA sequencing method. The sequences were submitted to Gen Bank, NCBI.

Results and discussion

Pickles made from *galgal*, *lingri*, *aaroo*, plum, *elon*, *dheu*, *beedana*, *lasura*, *ghia* and brinjal are indigenous to Himachal Pradesh. Other vegetables used for pickling are carrot, cucumber, cabbage, bittergourd, beans, chillies, jackfruit, garlic, ginger and onions. These pickles besides having nutritional value also act as food adjunct and appetizers and add palatability to the foods. Some of the traditional fermented pickles of Himachal Pradesh along

with raw material, spices used and area of preparation are listed in Table 1. The nutritional value of raw materials used for pickle preparation are given in Table 2^{10,11}. The generalized method of pickle preparation common to most of the pickles of Himachal Pradesh is given as flow chart in Fig. 1. The approximate quantity and the role of various spice /ingredients used in pickle preparation are also summarized in Table 3. The amount and type of various spices used in different pickle depend upon the type of the fruit and vegetable used in the pickle prepared in Himachal Pradesh, black mustard is the unique ingredient which gives characteristics traditional flavor to the pickles. However, black mustard seed (which is supposed to give slightly sour taste to the pickle) is not used in the pickles prepared from ingredients already having acidic taste/sour taste.

Table 1—Some of the traditional pickles of Himachal Pradesh

Local name	Raw material used	Common name/ Botanical name/ Family	Ingredients used	Area
<i>Aaroo</i> pickle	Fruit	Peach/ <i>Prunus persica</i> (L.) Batsch/Rosaceae	Thyme seed, turmeric powder, red chilli powder, fenugreek powder, salt, black mustard and mustard oil.	Kullu
<i>Beedana</i> pickle	Fruit	Quince/ <i>Cydonia oblonga</i> Mill./ Rosaceae	Mustard oil, black mustard, red chilli, fenugreek powder, turmeric powder and salt	Kullu
<i>Chukh</i>	Green and red chillies	Green and red chilli/ <i>Capsicum annum</i> L./ Solanaceae	Chilli, lime juice, salt and mustard oil.	Chamba
<i>Dheu</i> pickle	Unripe fruit	Monkey jack fruit / <i>Artocarpus lakoocha</i> Roxb./Moraceae	Mustard oil, thyme seed, red chilli powder, fenugreek powder, turmeric powder, cumin powder, salt and 3-4 spoon sugar.	Shimla, Mandi, Hamirpur
<i>Elon</i> pickle	<i>Elon</i> seeds	Foetid Cassia/ <i>Cassia tora</i> L./Caesalpiniaceae	Mustard oil, juice of <i>galgal</i> , salt, turmeric powder, fenugreek seed, red chilli, asafoetida, sugar, thyme seed, cumin seed.	Kangra, Chamba
<i>Galgal</i> pickle	Fruit	Hill lemon/ <i>Citrus psedolimon</i> Tanaka/ Rutaceae	Mustard oil, thyme seed, fennel seed, red chilli, fenugreek seed, turmeric powder, sugar and salt	Kullu, Bilaspur, Hamirpur, Mandi, Shimla, Solan.
<i>Kachalu</i> pickle	Tuber	Taro/ <i>Caloca siaesculenta</i> (L.) Schott/ Araceae	Mustard oil, salt, turmeric powder, red chilli, asafoetida, thyme powder and cumin powder, Juice of <i>galgal</i> .	Bilaspur
<i>Kachnar</i> pickle	Flower buds	Orchid tree/ <i>Bauhinia variegata</i> L./ Caesalpiniaceae	Mustard oil, cumin seed, red chilli, vinegar, fenugreek seed, turmeric powder, nigella seed and salt.	Sundernagar, Bilaspur, Solan
<i>Lasura</i> pickle	Fruit	Indian cherry/ <i>Cordia myxa</i> L./ Boraginaceae	Mustard oil, thyme seed, red chilli powder, salt, fenugreek seed and turmeric powder.	Shimla, Bilaspur, Hamirpur, Solan
<i>Lingri</i> pickle	Young fronds	Fern/ <i>Diplazium esculentum</i> (Retz.) Sw/ Athyriaceae	Mustard oil, thyme seed, black mustard powder, red chilli powder, fenugreek powder, salt and turmeric powder.	Kullu, Chamba, Solan
<i>Nashpati</i> pickle	Unripe fruit	Pear/ <i>Pyrus communis</i> L./Rosaceae	Mustard oil, thyme seed, red chilli, black mustard, fenugreek powder, cumin powder, turmeric powder and salt	Kullu
<i>Tamatar</i> pickle	Unripe fruit	Tomato/ <i>Lycopersicon esculentum</i> L./Solanaceae	Thyme powders, fenugreek seed, black mustard, salt, turmeric powder, red chilli powder and mustard oil.	Kullu

Table 2—Nutritional value (per 100 gm fresh material) of the raw materials used for preparation of traditional pickles^{10,11}

Food item	Moisture (%)	Protein (gm)	Fat (gm)	Fiber (gm)	Carbohydrate (gm)	Calcium (mg/100gm)	Phosphorus (mg/100gm)	Iron (mg/100gm)	Energy (Kcal)
<i>Aaroo</i>	86.0	1.2	0.3	1.2	10.5	15	41	2.4	50
<i>Beedana</i>	71.13	0.40	0.33	1.61	23	10.70	22.33	0.76	103.34
<i>Chukh</i>	10.0	15.9	6.2	30.2	31.6	160	370	2.3	246
<i>Dheu</i>	82.1	0.7	1.1	2.0	13.3	50	20	0.5	66
<i>Elon</i>	9.7	20.7	3.9	10.4	43.5	3200	292	-	292
<i>Galgal</i>	84.6	1.5	1.0	1.3	10.0	90	20	0.3	59
<i>Kachalu</i>	73.1	3	0.1	1.0	21.1	40	140	0.42	97
<i>Kachnar</i>	78.3	4.8	1.3	6.8	6.4	56	54	5.3	58
<i>Lasura</i>	90	2	1	3	-	67	25	-	-
<i>Lingri</i>	90.09	1.29	0.16	4.68	2.61	0.08	0.06	8.40	18
<i>Nashpati</i>	86	0.6	0.2	1.0	11.9	8	15	0.5	52
<i>Tamatar</i>	94	0.9	0.2	0.8	3.6	48	20	0.64	20

Table 3—Role of common ingredients used in fermented pickles

Ingredients	Quantity per 10 kg	Possible role in pickle fermentation
Asafoetida	5gm	Antimicrobial action inhibits spoilage causing and Pathogenic microorganisms
Coriander	100gm	Inhibit spoilage causing/ pathogenic microorganisms, impart aroma, flavor and taste
Cumin	100gm	Inhibit spoilage causing and pathogenic microorganisms, enhance starter microorganism,
Fennel	250gm	Flavor enhancing
Fenugreek	200gm	Flavor enhancing and preservative
Lime juice	1L	Improves pickle firmness.
Mustard oil	2 L	Inhibits aerobic spoilage causing bacteria yeasts and molds, Enhance growth of LAB
Mustard seed	350gm	Flavor enhancing, preservative, antibacterial and antifungal properties, growth promotion of LAB
Nigella seed	100gm	Flavor enhancing
Red chilli	100gm	Inhibits spoilage causing and pathogenic microorganisms, improves flavor, taste and appearance.
Salt	250gm	Antimicrobial, extract nutrients from raw material, improves flavor and taste
Thyme	200gm	Flavor enhancing
Turmeric	50gm	Antimicrobial action: inhibits spoilage causing and pathogenic microorganisms.
Vinegar	1.2 L	Gives pickles a tart taste. Acts as a preservative due to the acidity of vinegar.

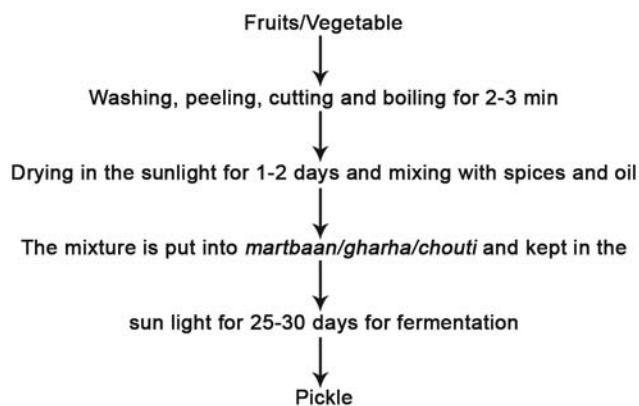


Fig.1—Generalized flow chart for pickle preparation

Some of the traditional pickles of Himachal Pradesh

Lingri pickle

Lingri [*Diplazium esculentum* (Retz.) Sw.] is a fern locally available in high altitude areas of Himachal Pradesh. Its pickle is prepared during summer when there is ample availability of this fern. This is also used in preparation of traditional vegetable curry (*lungru ki sabzi*) in Himachal Pradesh⁷. Rhizome of *lingri* is used in treatment of cough, asthma, fever, dyspepsia, stomachache, diarrhea and its leaves are useful in constipation and used as antibacterial¹². For preparation of *lingri* pickle, scales present on the stem are removed with wet cotton cloth, washed with

water, dipped in boiling water for 2 min and cut into pieces. These are transferred into *shoop/changer/sheeng* (kind of tray made from bamboo stick) (Figs. 2 a, b, c) kept in sunlight for oneday to dry any extra water present on it. Thyme seed, fenugreek seed and black mustard seed were roasted and powdered on *shilbatta* (traditional grinding stone) (Fig. 2d). Salt, red chilli powder, turmeric, roasted spice powder and mustard oil are added to the *lingri*. This mixture is then kept in *chouti/achhari gharha/martbaan* (Figs. 3a,b,c) for 30-35 days for fermentation (Fig. 4). The pickle formed after fermentation is dry in appearance with spicy and slight acidic flavor. Three strains of *Enterococcus faecalis* (KR137532, KR137543, and KR137544) have been isolated from three samples of *lingri* pickle collected from different villages of Himachal Pradesh. The *lingri* pickle can be

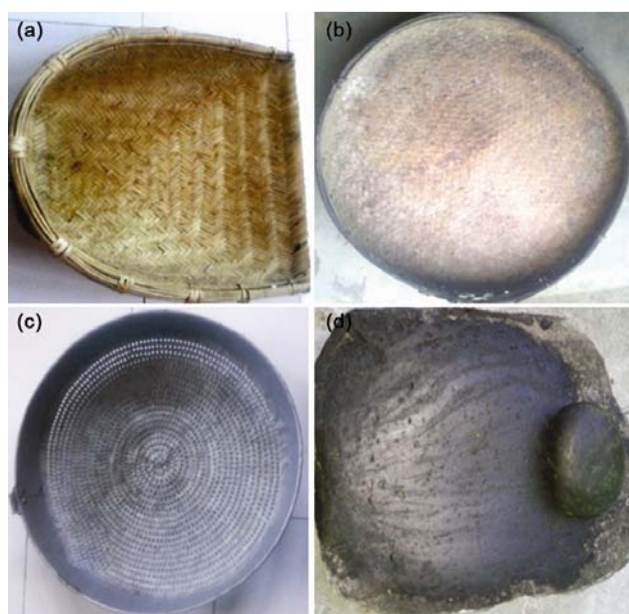


Fig. 2—Utensils used for drying purposes of raw material of pickle (a) *Shoop* (b) *Changer* (c) *Sheeng* (d) *Shilbatta* (Traditional grinder)



Fig. 3—Traditional vessels used for pickling (a) *Chouti* (b) *Gharha* (c) *Martbaan*

consumed for 1-2 yrs without any change in the quality of the product.

***Kachnar* pickle**

Kachnar (*Bauhinia variegata* L.) is a medium sized deciduous tree which has green buds and pink flower. *Kachnar* is a good source of nutrients especially in fiber component and can be beneficial for the patients with constipation and cardiovascular diseases. Bark is used in removal of intestinal worms. Young buds of *kachnar* flowers are used for preparation of *raita*, pickles, flour and curry and also used as flavoring compound¹³. Buds of *Kachnar* are source of dietary antioxidants¹⁴. The method of preparation of *kachnar* pickle (Fig. 5) is similar to that of *lingri* except the types of spices used. In *kachnar* pickle, nigella seed, roasted cumin powder and vinegar are added along with other spices. However, black mustard seeds are not added in its preparation. Due to the tangy flavor of *kachnar* pickle, it is relished with most of the foods. The shelf life of *kachnar* pickle is 10-12 months.

***Beedana* pickle**

Beedana (*Cydonia oblonga* Mill.) is an edible pear shaped fruit mostly grown in Kullu district of Himachal Pradesh. Consumption of *beedana* fruit is considered to help in curing the people suffering from tuberculosis, hepatic insufficiency, diarrhea, dysentery, gastric ulcer, liver and eye diseases. *Beedana* pickle is prepared by first washing of fruits followed by chopping into pieces, boiling for 2-3 min and sun drying. Dried *beedana* pieces are then mixed with red chilli powder, salt, roasted black mustard powder, roasted fenugreek powder, turmeric powder and mustard oil in large pan and this is put into *gharha* for pickle fermentation (Fig. 3b). The inner surface of *gharha* is coated with mustard oil for 5-7 times. In old pot, only one coat is sufficient for quality fermentation. After filling the *gharha* with the mixture, the upper surface of lid is sealed and kept in sunlight for fermentation (Fig. 6). Due to the addition of black mustard powder, this pickle has a unique acidic taste and can be kept for more than 2 yrs without being spoiled.

***Lasura* pickle**

Lasura (*Cordia myxa* L.) is green colored fruit containing gum like sticky material and consumed by the rural people of Mandi, Bilaspur, Kangra, Una and Hamirpur districts in Himachal Pradesh as vegetable curry⁷ and as pickle (Fig. 7). *Lasura* is considered to

be helpful in decreasing the blood pressure and also consumed as antidiabetic. Traditional method used for preparation of *lasura* pickle is shown in (Fig. 8). The prepared product has a characteristic spicy taste and can be kept for consumption for about 1-2 yrs.

Aaroo (peach) pickle

Aaroo pickles made from wild peach [*Prunus persica* (L.) Batsch] which is an indigenous fruit of Kullu district of Himachal Pradesh. This wild peach is put to no use except for preparing the pickle or local *achar* (Fig. 9) by rural women in district Kullu. For the preparation of *aaroo* pickle, *aaroo* fruit is washed



Figs. 4—Lingri pickle: Fig. 5—Kachnar pickle : Fig. 6—Beedana pickle: Fig. 7—Lasura pickle

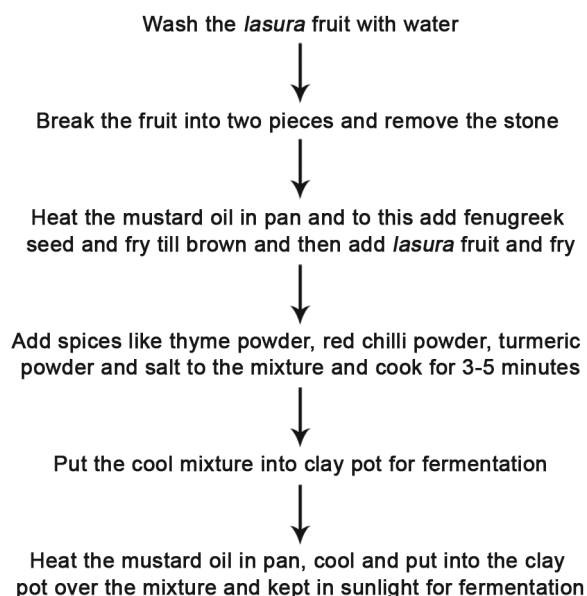


Fig. 8—Flow chart for preparation of *lasura* pickle

with water, boiled and transferred into *sheeng* (traditional sieve) (Fig. 2c) and allowed to drain and kept in the sunlight for drying. Different types of spices like thyme seeds, fenugreek and black mustard were roasted and powdered using *shilbatta*. Turmeric powder, red chilli powder, salt, mustard oil and powder of roasted spices (thyme seeds, fenugreek and black mustard) are mixed thoroughly with *aaroo* and the whole mixture is then put into a large *gharha* (earthen pitcher) for fermentation. Before shifting the mixture into *gharha* smoke of *heeng* (*asafoetida*) is given into empty *gharha* to impart good aroma to the pickle. *Enterococcus faecalis* (KR137535) has been isolated from the samples of *aaroo* pickle. This pickle can be kept for about 2 yrs or more at room temperature for consumption.

Nashpati (pear) pickle

Pear pickle (*Pyrus communis* L.) is prepared in Kullu district of Himachal Pradesh during the month of July and August when there is ample availability of this fruit. Pears are a good source of dietary fiber, antioxidant, minerals and good quantity of vitamin C. The method of preparation of *nashpati* pickle (Fig.10) is similar to that of *aaroo* pickle. However, the shelf life of *nashpati* pickle is less (12-18 months) than that of *aaroo* pickle. The pickle is sweet and sour in taste.

Chukh

Chukh (*Capsicum annuum* L.) is a traditional fermented delicacy of Chamba district of Himachal Pradesh. It is a pickle made of chillies, lime juice, salt and mustard oil (Fig.11). Although it is very hot (spicy), but has pleasant aroma and taste. It can be eaten with *chapati*, *prantha* and breads. Flow chart for *chukh* preparation is given in (Fig.12). The shelf life of *chukh* is about 2 yrs.

Tamatar pickle

Tomatoes (*Solanum lycopersicum* L.) are the source of vitamin A, C and used in salads, sauces, flavoring in soups and as ingredient in other cooked foods. Tomatoes are considered to promote gastric



Figs. 9—Aaroo pickle: Fig. 10—Nashpati pickle : Fig. 11—Chukh

secretions and stimulate liver and also useful in asthma, bronchitis and dyspepsia. The tomatoes are cut into small pieces, dried in sun for one or two days and then mixed with salt, turmeric powder, roasted powder of thyme, fenugreek, black mustard and red chilli, mustard oil. Before putting the mixture for fermentation, *martbaan* is exposed to the smoke of *heeng* and then kept for fermentation (Fig.13). The pickle is acidic in taste and can be kept only for 4-6 months for consumption if properly stored.

Dheu pickle

Dheu (*Artocarpus lakoocha* Roxb.) fruit has a pleasant unusual flavor and distinct taste which is not found in any other fruits. *Dheu* is mostly used for pickles and chutney preparation. The dried slices of fruit are also used in preparation of meat and fish curries as these impart a very special flavor to the curries. The fruits of *dheu* are useful for treatment of dysentery, arthritic swelling and skin diseases. *Dheu* pickle is an indigenous fermented product of Shimla, Mandi and Hamirpur districts of Himachal Pradesh. For its preparation, *dheu* fruit is immersed in boiling hot water for two minutes and dried in sun for one day. Fruit is cut into small pieces and mixed with thyme seeds, salt, red chilli powder, turmeric powder, cumin powder, roasted fenugreek seeds, sugar and

mustard oil. The mixture is then transferred into clay pot called *chouti* (Fig. 3a) for fermentation (Fig.14) and can be consumed in the period of 12-18 months.

Galgal pickle

Galgal (*Citrus psedolimon* Tanaka) is a variety of citrus fruit which is available during winters. The method of preparation of *galgal* pickle is similar to other fermented vegetable pickle. Fully ripened *galgal* fruit is selected for its preparation which is then washed with water, immerses in boiling water for 2 min and sundried. The fruit is cut into small pieces, heat the mustard oil, put fenugreek seed and brown it. Mixed *galgal* fruit with salt, red chilli powder, thyme seeds, mustard oil, sugar, turmeric powder and fennel seeds to the heated pan and cooked for 5-10 min, cooled and left to ferment for 15-25 days (Fig.15). *Galgal* pickle is usually prepared during winter season when temperature is not ambient for fermentation. So to provide the ambient temperature for fermentation, in the upper Himalayan regions, fermentation is carried out near the traditional fireplaces called *tandoor*. *Enterococcus faecalis* (KR137541) and *Leuconostoc mesenteroides* (KR137536) have been isolated from *galgal* pickle samples. This pickle can be kept at room temperature for 2-3 yrs. *Galgal* pickle has unique aroma due to the presence of fennel seeds which also give it a sweet and slight sour taste.

Elon pickle

Elon (*Cassia tora* L.) is generally distributed throughout India and known as *Charota*. In Himachal, this grows as a wild plant in Kangra and Chamba districts. This plant is an annual herbaceous herb, almost an under shrub growing upto 30-90 cm high with pinnate leaves. *Elon* is used in Ayurvedic medicine in the treatment of leprosy, ringworm, and cardiac disorders. The herb also eases the skin itch when it is given mixed with lime juice. The seeds of *elon* are put to no use except for preparing the pickle and chutneys. For the preparation of *elon* pickle, dry seeds of *elon* are roasted in a pan for 2-3 minute and grinded in a *shilbatta*. Mustard oil is heated in a pan and juice of *galgal* is added and boiled to concentrate the juice. To this salt, turmeric powder, roasted fenugreek seed, red chilli, *asafoetida*, sugar, thyme seed, cumin seed and grinded roasted seed of *elon* are added and mixed properly. The mixture is cooled and kept in a clay pot or *chouti* for 15 -20 days (Fig.16). The shelf life of *elon* pickle is 12-18 months.

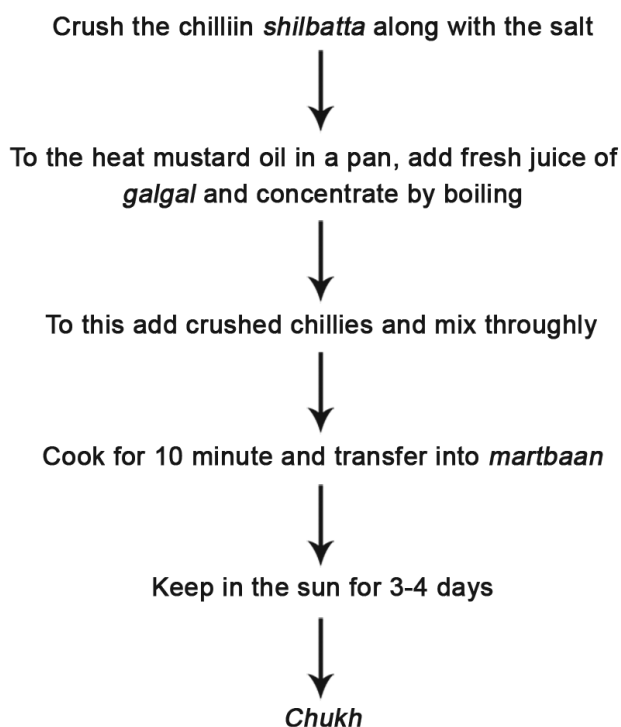
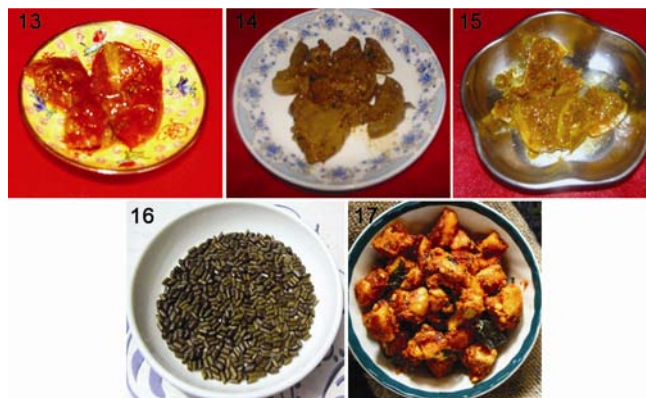


Fig.12—Flow chart for preparation of *chukh*



Figs. 13—*Tamatar* pickle: Fig.14—*Dheu* pickle : Fig. 15—*Galgal* pickle: Fig. 16—*Elon* seeds: Fig.17—*Kachalu* pickle

Kachalu pickle

Kachalu [*Colocasia esculenta* (L.) Schott] is tuberous perennial with a group of underground corms consisting of a central large one and surrounding ones of varying sizes. The juice of the corm is laxative, demulcent, anodyne and is useful in haemorrhoids and congestion of the portal system. For the preparation of *kachalu* pickle, *kachalu* is peeled, cut into round pieces and cooked in mustard oil, half fried, *galgal* juice is added, heated and mixed with different types of spices, i.e., salt, turmeric powder, red chilli, *asafoetida*, thyme seed and cumin powder. As different spices are added during fermentation, the pickle is spicy in taste. After cooling the mixture is transferred into air tight *martbaan* for fermentation (Fig.17) and should be consumed within one year of the preparation.

Conclusion

In Himachal Pradesh, a variety of pickles are prepared from local fruits and vegetables. The preparation of most of the pickles involves fermentation of fruits and vegetables that are available in ample amount during a particular season. In Himachal Pradesh, pickle production is mainly carried out by rural women using their indigenous knowledge. Documentation of methods of pickle preparation offers the opportunity for scale-up to make the household confined fermented products available to a much wider population. This will provide better avenues for rural entrepreneurship development. Moreover, there is a need of microbiological and biochemical evaluations of these traditional pickles in the light of developments in fermentation technology. The pickling of surplus vegetables and fruits enhances the shelf life of the

products, Moreover, in pickle fermentation lactic acid bacteria are involved and pickles are thus probiotic product. Fermentation with known probiotic strains and traditional raw material will further add quality to the pickles of Himachal Pradesh.

Acknowledgement

Authors are thankful to the people of various districts of Himachal Pradesh for sharing the information regarding the preparation of traditional pickles. Financial support from University Grants Commission (UGC), New Delhi as Maulana Azad National Fellowship to Ms. Monika and Post-Doctoral Fellowship to Dr. Savitri is greatly acknowledged.

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