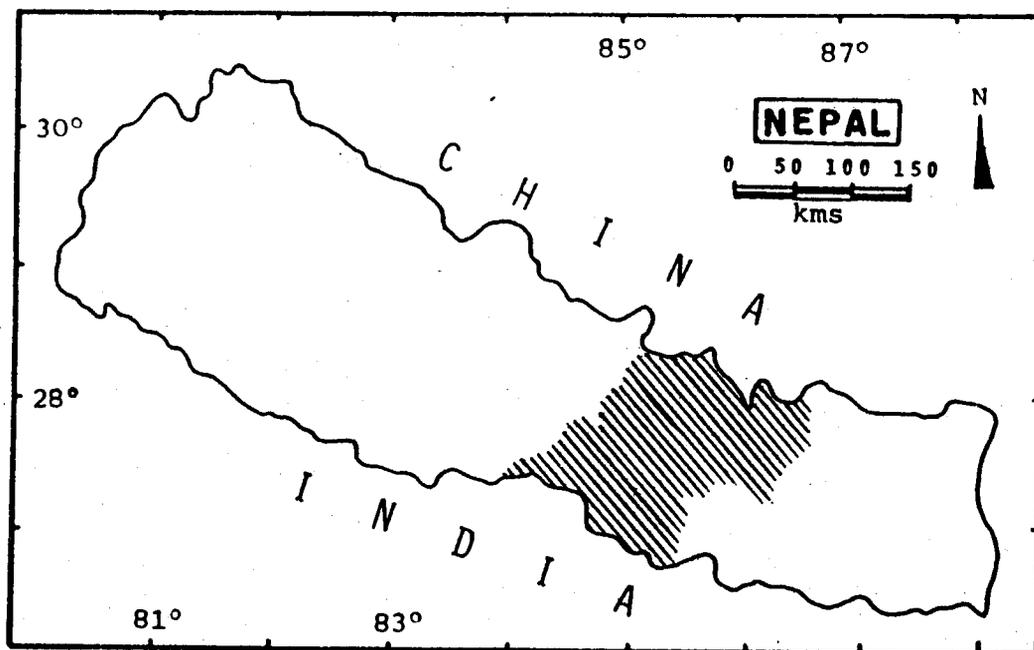


ETHNOBOTANICAL STUDIES IN CENTRAL NEPAL: THE PRESERVATION OF PLANT-FOODS

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Introduction

Plants have always been an inevitable part of the life and culture of the Nepalese people. Like many other uses of plants, the preservation of plant foods is an age-old tradition in the Nepalese society. A study on the ceremonial plant foods of central Nepal is already in the record (Bhattarai, 1989). The present paper is an attempt to document the various plant - food preservation techniques currently practiced in central Nepal.



Map 1. Location of study area in the country

Methods of Study

The study area, which included 15 districts (Kathmandu, Lalitpur, Bhaktapur, Kabhrepalanchok, Sindhupalchok, Rasuwa, Nuwakot, Dhading, Bara, Parsa, Rautahat, Makawanpur, Chitwan, Ramechhap and Dolakha) of central Nepal (Map 1), was surveyed repeatedly between 1984-1988, in different seasons along various transects. Interviews were conducted with the villagers and urban inhabitants of different ethnic backgrounds. Information regarding the plant parts and methods of their preservation were recorded in detail. Frequently, the procedures were observed, the preserved plant-foods were tasted, and occasionally they were even used in the field by the investigator. The voucher specimens were collected with the help of informants. Their botanical identity was confirmed at the National Herbarium (KATH), where herbarium specimens of wild plants and samples of some preserved plant-foods are deposited.

Findings

In the following enumeration, methods of plant-food preservation and the plant-parts utilized have been described. For each plant, its Latin name, family and Nepali names have been given successively in parentheses.

A. Drying

Drying by dehydrating the plant parts under the sun is the most commonly used method of preservation. For accelerated and complete dehydration, the succulent parts are bruised or cut into small pieces. After drying, they are mostly stored in air-tight containers. The product is frequently re-dried for prolonged preservation.

Commonly, the leaves with petioles of the following species are dried for preservation: various species of arum (*Arisaema concinnum* Schott; Araceae; 'Banko', *Arisaema costatum* [Wall.] Martius; Araceae; 'Banko', *Arisaema flavum* [Forsk.] Schott; 'Banko' and *Arisaema speciosum* [Wall.] Martius; Araceae; 'Sarpa ko makai'), cauliflower (*Brassica oleracea* L. var. *botrytis* L.; Cruciferae; 'Kauli'), cabbage (*Brassica oleracea* L. var. *capitata* L.; Cruciferae; 'Bandakobi'), taro (*Colocasia esculenta* [L.] Schott; Araceae; 'Karkalo'), rat-tail radish (*Raphanus caudatus* L.; cruciferae; 'Newari mula'), turnip (*Brassica rapa* L.; Cruciferae; 'Shalgam'), radish (*Raphanus sativus* L.; Cruciferae; 'Mula'), taro (*Remusatia vivipara* [Roxb.] Schott; Araceae; 'Kalo pindalu', 'Jangali pindalu') and fenugreek (*Trigonella foenum-graecum* L.; Papilionaceae; 'Methi').

The leaves that are dried together with their petioles and tender twigs belong to: onion (*Allium cepa* L.; Alliaceae; 'Pyaj'), garlic (*Allium sativum* L.; Alliaceae; 'Lasun'), wild garlic (*Allium wallichii* Kunth; Alliaceae; 'Ban

lasun'), fragrant onion (*Allium tuberosum* Rottl.; Alliaceae; 'Dundu'), prickly amaranth (*Amaranthus spinosus* L.; Amaranthaceae; 'Lunde'), amaranth (*Amaranthus viridis* L. Amaranthaceae; 'Latte'), 'Indian rape' (*Brassica napus* L. var. *napus* L.; Cruciferae; 'Tori'), black mustard (*Brassica nigra* [L.] Koch; Cruciferae; 'Kaltori'), leaf mustard (*Brassica juncea* [L.] Czern. and Coss. subsp. *integrifolia* [West] Thell; Cruciferae; 'Rayo'), kohlrabi (*Brassica oleracea* L. var. *gongylodes* L.; Cruciferae; 'Gyathkobi'), garlic pear (*Crataeva unilocularis* Buch.-Ham.; Capparidaceae; 'Barun', 'Sipligan'), pigweed (*Chenopodium album* L.; Chenopodiaceae; 'Bethe'), caper-bush (*Capparis spinosa* L.; Capparidaceae; 'Baghmukhe'), shepherd's purse (*Capsella bursa-pastoris* [L.] Medic.; Cruciferae; 'Tori jhar', 'Tori ghans'), fennel (*Foeniculum vulgare* Mill.; Umbelliferae; 'Sunf'), lizard's tail (*Houttuynia cordata* Thunb.; Saururaceae; 'Gane', 'Gande'), garden cress (*Lepidium sativum* L.; Cruciferae; 'Chamsur'), Indian poke (*Phytolacca acinosa* Roxb.; Phytolaccaceae; 'Jaringo'), Solomon's seal (*Polygonatum cirrhifolium* [Wall.] Royle and *Polygonatum verticillatum* [L.] Allioni; Liliaceae; 'Khirro'), vegetable mallow (*Malva verticillata* L.; Malvaceae; 'Laphe sag'), smilacina (*Smilacina purpurea* Wall.; Liliaceae; 'Sikari sag'), wild cucumber (*Solena heterophylla* Lour.; Cucurbitaceae; 'Golkankri') and buckwheat (*Fagopyrum esculentum* Moench; Polygonaceae; 'Fafar'). These are washed with hot water and cooked like vegetables.

Likewise, the petioles of Indian rhubarb (*Rheum australe* D. Don; Polygonaceae; 'Padamchal') and tender shoots of vegetable smart weed (*Aconogonum molle* [D. Don] Hara; Polygonaceae; 'Thotne') are cut longitudinally, and dried. Young shoots and vegetative buds of the fig tree (*Ficus lacor* Buch.-Ham.; Moraceae; 'Kabhro') and the succulent petioles of the begonia plant (*Begonia picta* J. E. Smith and *Begonia rubella* Buch.-Ham. ex D. Don; Begoniaceae; 'Magarkanche') are gently crushed and dried. These being sour in taste, are mostly used in pickles and curries.

The leaves, petioles and inflorescence of Nepal aromatic garlic (*Allium hypsistum* Stearn; Alliaceae; 'Jimbu') are dried. It is used as a flavouring agent in curries and lentil soup.

The leaves and stem-bark of Indian Cassia ligna (*Cinnamomum tamala* [Buch.-Ham.] Nees & Eberm.; Lauraceae; 'Tejpat') are dried and preserved. These are used as a spice to flavour curries, lentil soup, vegetable and meat.

The corm of arums (*Arisaema concinnum* Schott, *Arisaema flavum* [Forsk.] Schott and *Arisaema speciosum* [Wall.] Martius), taro (*Colocasia esculenta* [L.] Schott) and tubers of yam (*Dioscorea deltoidea* Wall. ex Griseb. and *Dioscorea pentaphylla* L.; Dioscoreaceae; 'Bhyakur'), white yam (*Dioscorea alata* L.; Dioscoreaceae; 'Tarul') and potato yam (*Dioscorea bulbifera* L.; Dioscoreaceae; 'Githa') are peeled, cut into small

pieces and dried. These may be cooked like potatoes after prolonged boiling or ground into flour to prepare breads.

The rhizomes of East Indian arrowroot (*Curcuma angustifolia* Roxb.; Zingiberaceae; 'Barkhe saro'), costus (*Costus speciosus* [Koenig] Smith; Zingiberaceae; 'Kust'), polygonum (*Bistorta macrophylla* [D. Don] Sojak; Polygonaceae; 'Dalle ghans', 'Dalle jhar'), Solomon's seal (*Polygonatum verticillatum* [L.] Allioni), wild cucumber (*Solena heterophylla* Lour.), christophine (*Sechium edule* [Jacq.] Sw.; Cucurbitaceae; 'Iskus'), nut grass (*Cyperus rotundus* L.; Cyperaceae; 'Siru', 'Mothe'), old-world arrow head (*Sagittaria trifolia* L.; Alismataceae; 'Lapta', 'Dantema') and lizard's tail (*Houttuynia cordata* Thunb), are washed, sliced, dried and preserved to use as vegetable or to ground into flour. The rhizomes of the ground orchid (*Satyrium nepalense* D. Don; Orchidaceae; 'Dalle ghans', 'Thamni') and orchis (*Dactylorhiza hatagirea* [D. Don] Soo; Orchidaceae; 'Panchaunle', 'Hastajadi') are also dried and preserved to use as food or medicine.

The swollen root of elephant-foot yam (*Amorphophallus campanulatus*) [Roxb.] Blume ex Dcne.; Araceae; 'Ole') is peeled and cut into pieces to dry. These are boiled to cook like vegetables or made into pickles.

The fleshy root of turnip (*Brassica rapa* L.) and rat-tail radish (*Raphanus caudatus* L.) are made into thin slices and dried. In the case of radish (*Raphanus sativus* L.), when the slices are made, it is called 'Chana' and when these are cut vertically to half or more of the thickness, but the slices are not made separate retaining the original shape, it is called 'Sanjana'. These are used as vegetable during off-season.

The flowers and floral buds of mountain ebony (*Bauhinia variegata* L.; Caesalpiniaceae; 'Koiralo'), camel's foot tree (*Bauhinia purpurea* L.; Caesalpiniaceae; 'Tanki'), silk-cotton tree (*Bombax ceiba* [L.] Sw.; Bombacaceae; 'Simal'), Nepalese elephant apple (*Dillenia pentagyna* Roxb.; Dilleniaceae; 'Tantari') and agati sesbania (*Sesbania grandiflora* [L.] Poir.; Pailionaceae; 'Agasti') are dried and preserved to use as a vegetable or to prepare pickles. Likewise, the flowers of tree rhododendron (*Rhododendron arboreum* Smith; Ericaceae; 'Gurans') are dried and preserved to use as an ingredient in pickles, and also powdered and mixed with flour to prepare sweets and breads.

Fruits of pumpkin (*Cucurbita pepo* L.; Cucurbitaceae; 'Farsi'), white gourd (*Benincasa hispida* [Thunb.] Cong.; Cucurbitaceae; 'Kubhindo'), tomato (*Lycopersicon lycopersicum* [L.] Karst.; Solanaceae; 'Golvenda'), bitter gourd (*Momordica charantia* L.; Cucurbitaceae; 'Tite karela'), balsam apple (*Momordica balsamina* L.; Cucurbitaceae; 'Barela'), christophine (*Sechium edule* [Jacq.] Sw.), lady's finger (*Abelmoschus esculentus* [L.] Moench; Malvaceae; 'Ramtoriyan') and wild cucumber (*Solena heterophylla*

Lour.) are sliced and dried as preserved vegetables. Unripe fruits of banana (*Musa paradisiaca* L.; Musaceae; 'Kera') are also preserved likewise to cook like potatoes.

Crushed fruits of Indian gooseberry (*Phyllanthus emblica* L.; Euphorbiaceae; 'Amala') and hog-plum (*Spondias pinnata* [L.f.] Kurz; Anacardiaceae; 'amaro') are dried to use in pickles. In the case of Nepalese hog-plum (*Choerospondias axillaris* [Roxb.] Burt & Hill.; Anacardiaceae; 'Lapsi'), the fruits are boiled and peeled. The pulp is separated from the seed. Both the fruit-coat and the pulp are dried separately and preserved to use in pickles and curries. The unripe fruits of mango (*Mangifera indica* L.; Anacardiaceae; 'Aanp') and plum (*Prunus domestica* L. subsp. *insititia* [L.] Schneid.; Rosaceae; 'Alubokhara') are cut into small pieces and dried for the same use. Mature fruits of pear (*Pyrus communis* L.; Rosaceae; 'Naspati'), apple (*Malus pumila* Mill.; Rosaceae; 'Syau'), wild pear (*Pyrus pashia* Buch.-Ham. ex D. Don; Rosaceae; 'Mayal'), Eve's apron (*Ficus auriculata* Lour.; Moraceae; 'Nimaro', 'Timila') and peach (*Prunus Persica* [L.] Batsch; Rosaceae; 'Aru') are cut into thin slices, dried and preserved as dry fruits. Likewise, the ripe fruits of Indian berberry (*Berberis aristata* DC. and *Berberis asiatica* Roxb. ex DC.; Berberidaceae; 'Chutro'), sea buckthorn (*Hippophae salicifolia* D. Don; Elaeagnaceae; 'Ashuk'), Nepalese berberry (*Mahonia napaulensis* DC.; Berberidaceae; 'Jamanemandro'), bastard oleaster (*Elaeagnus infundibularis* Moniyama; Elaeagnaceae; 'Madilo'), Indian wax tree (*Rhus parviflora* Roxb.; Anacardiaceae; 'Sati bayar', 'Bhakki amilo') and Java plum (*Syzygium cumini* [L.] Skeels; Myrtaceae; 'Jamun') are dried and preserved for future uses. The fruits of Chinese date (*Zizyphus mauritiana* Lam.; Rhamnaceae; 'Bayar') are dried and preserved to use as such or to prepare pickles. The dried fruits of caraway (*Carum carvi* L.; Umbelliferae; 'Jangali jira') and cow parsnip (*Heracleum nepalense* D. Don; Umbelliferae; 'Budo okhati') are preserved to use as a spice to flavour food-stuffs.

B. Boiling

This method is employed to prepare 'Chuk' which is the evaporated juice of sour fruits or other plant-parts. The juice is gently boiled to obtain a concentrated liquid with increased strength. It is preserved in air-tight containers and used in pickles and curries. The preservation period mainly depends upon the extent of concentration, and 'Chuk' that has been preserved for 20 years or even more is not uncommon. Fruits like lime (*Citrus aurantifolia* [Christm.] Swingle; Rutaceae; 'Kagati'), lemon (*Citrus limmon* [L.] Burm.f.; Rutaceae; 'Jyamir'), rough lemon (*Citrus jambhiri* Lush.; Rutaceae; 'Jyamir'), pummelo (*Cirtus decumana* L.; Rutaceae; 'Bhogate'), citron (*Citrus medica* L.; Rutaceae; 'Bimiro') and pomegranate (*Punica*

granatum L.; Punicaceae; 'Darim') are extensively used to prepare 'Chuk'. Occasionally, the juice squeezed from the sour petioles of Indian rhubarb (*Rheum australe* D. Don) is also employed to prepare 'Chuk', and preserved.

C. Smoking

This method, although uncommon has been observed. Usually, the tender shoots of vegetable smart weed (*Aconogonum molle* [D. Don] Hara), Indian rhubarb (*Rheum australe* D. Don), taro (*Colocasia esculenta* [L.] Schott) and arums (*Arisaema utile* Hook. f. ex Schott; Araceae; 'Dhokyo'), *Arisaema concinnum* Schott and *Arisaema flavum* [Forsk.] Schott) are placed or hanged above the fire-place in the kitchen to dry. The smoke is said to ensure preservation for a longer period. The typical flavour of the smoke is yet another characteristic identity of the preserved food. This method is usually employed in the high-altitude localities, and particularly during the rainy season.

D. Fermentation

In this method, the plant parts are subjected to natural fermentation through dumping until they attain the characteristic aroma with sour taste. It is employed to prepare the following types of food-stuffs for preservation.

a. Gundruk

The fresh leaves are gently pounded, the juice is squeezed out of them, and they are allowed to wilt under the sun for a few hours. This is then dumped tightly into an earthen vessel, the mouth of which is covered by sal leaf (*Shorea robusta* Gaertn.; Dipterocarpaceae; 'Sal'), or any other hard, broad leaf, and pressed by a stone. After a week or so, when the process of fermentation is completed, the fermented leaves are taken out of the vessel and spread in the sun to dry. The product is called 'Gundruk,' which has a characteristic aroma and a typical sour taste. This dried 'Gundruk' is used by frying in oil or butter with spices and made into a curry by adding water, preferably that obtained from rice-wash ('Chaulani'). The gundruk may be washed in hot water and made into pickles for immediate consumption.

Every leafy vegetable could be made into 'Gundruk,' but those commonly in practice are Indian rape (*Brassica napus* L. var. *napus* L.), black mustard (*Brassica nigra* [L.] Koch), leaf mustard (*Brassica juncea* [L.] Czern. & Coss. subsp. *integrifolia* [West] Thell), cauliflower (*Brassica oleracea* L. var. *botrytis* L.), kohlrabi (*Brassica oleracea* L. var. *gongylodes* L.), turnip (*Brassica rapa* L.), radish (*Raphanus sativus* L.), rat-tail radish (*Raphanus caudatus* L.), cabbage (*Brassica oleracea*

L. var. *capitata* L.), butter cup (*Ranunculus diffusus* DC.; Ranunculaceae; 'Sarro'), blister butter cup (*Ranunculus scleratus* L.; Ranunculaceae; 'Sarro'), Indian poke (*Phytolacca acinosa* Roxb.), shepherd's purse (*Capsella bursa-pastoris* [L.] Medic.), water cress (*Rorippa nasturtium-aquaticum* L.; Cruciferae; 'Lahure sag') and arums (*Arisaema utile* Hook. f. ex Schott and *Arisaema flavum* [Forsk.] Schott.).

b. Sinki

'Sinki' is the fermented product of radish (*Raphanus sativus* L.) root. It bears a typical flavour and a sour taste. Although widely used, for a person unaccustomed to this dish, 'Sinki' may give an unpleasant flavour and taste.

To prepare 'Alo sinki', which literally means moist 'Sinki', the radish roots are dumped in a pit lined with sal leaves. Leaves like those of banana (*Musa paradisiaca* L.) and mountain ebony (*Bauhinia variegata* L.) or any other of hard-texture may also be used. Leaves are also used to cover the top after placing it in the pit, and the whole package is covered with soil for 10-12 days necessary to undergo fermentation. After repeated washes the product is used in pickles and curries. This type of 'Sinki' is meant for immediate consumption, as it can be preserved for only about a month.

To prepare 'Sukeko sinki', which literally means dry 'Sinki', radish roots along with the lower portion of the petioles and even the immature leaves are cut longitudinally into 4 pieces. These are again cut transversely into 5-8 cm sizes and packed tightly in an earthen vessel. The pot is closed by affixing sal-leaves or any other hard-textured leaves and placed in a sunny place for about 3 weeks. The contents are then removed, dried under the sun, and preserved for future use in pickles and curries. Such a dry 'Sinki' can be preserved for a longer period, although it is less acidic and also bears low flavour as compared to the previous type.

c. 'Tama'

'Tama' is the fermented product of the tender shoots of bamboo (*Dendrocalamus hamiltonii* Nees & Arnl. ex Munro.; Poaceae; 'Tama bans'). Tender shoots are sliced into thin chips and subjected to underground dumping, the pit being covered from all sides by sal leaf or any other hard-textured leaves as in the case of 'Sinki'. In about 2 weeks, the sliced bamboo-chips attain the characteristic fermented aroma with desirable sour taste. Such a method is generally employed for the large-

scale production of 'Tama' for commercial purposes. Therefore, the bamboo-chips are usually adulterated with those of the non-edible solid bamboo (*Dendrocalamus strictus* [Roxb.] Nees; Poaceae; 'Jangali bans') or the flowering stalks of the century plant (*Agave cantala* Roxb.; Agavaceae; 'Ketuki').

For domestic consumption, the sliced bamboo-chips are washed, drained and dressed with turmeric powder (*Curcuma domestica* Val.; Zingiberaceae; 'Besar'), Indian rape oil (*Brassica napus* L. var. *napus* L.) and ground seeds of leaf-mustard (*Brassica juncea* [L.] Czern. & Coss. subsp. *integrifolia* [West] Thell) and subjected to fermentation in an earthen vessel. A wooden vessel or wide-mouthed glass bottle may also be used. After about 3 weeks, when the fermentation finishes, these can be used in pickles and curries. 'Tama' too, like 'Sinki', can be dried for longer preservation and is called 'Sukeko tama', literally meaning dry 'Tama'. However, in general, when 'Tama' is prepared for drying and preservation, the bamboo shoot chips are subjected to fermentation without oil or spices.

d. Pickles

Various types of pickles are prepared for use in the near future involving the fermentation principle. The plant-parts most commonly used for the process are fruits of cucumber (*Cucumis sativus* L.; Cucurbitaceae; 'Kankro'), ash gourd (*Benincasa hispida* [Thunb.] Cogn.), chocho (*Sechium edule* [Jacq.] Sw.), petioles of taro (*Colocasia esculenta* (L.) Schott), roots of radish (*Raphanus sativus* L.) and curd of cauliflower (*Brassica oleracea* L. var. *botrytis* L.). The plant part is cut into pieces and wilted in the sun for few hours. It is then dressed with ground seeds of leaf-mustard (*Brassica juncea* [L.] Czern. & Coss. subsp. *integrifolia* [West] Thell), turmeric powder (*Curcuma domestica* Val.), rape oil (*Brassica napus* L. var. *napus* L.) and common salt in varying proportions, depending upon tradition and taste. It is kept in an air-tight container, preferably in a wooden or earthen vessel, for about a week to undergo fermentation. As this fermented product cannot be preserved for a long period, it has to be consumed within a few weeks.

E. Acidic preservation

a. 'Purano achar'

'Purano achar' literally means a long-preserved pickle; a period of 15 or even 20 years is not uncommon. Various spices such as the fruits of cumin (*Cuminum cyminum* L.; Umbelliferae; 'Jira'), fennel (*Foeniculum vulgare* Mill.), ammi (*Trachyspermum ammi* [L.] Sprague ex Turill.;

Umbelliferae; 'Jwanu'), wingleaf prickly ash (*Zanthoxylum armatum* DC.; Rutaceae; 'Timur'), and the seeds of leaf-mustard (*Brassica juncea* [L.] Czern. & Coss. subsp. *integrifloia* [West] Thell), fenugreek (*Trigonella foenum-graecum* L.) and radish (*Raphanus sativus* L.) are fried in rape oil (*Brassica napus* L. var. *napus* L.) and then boiled in enough quantity of citrus juice, notably lime (*Citrus aurantifolia* [Christm.] Swingle), lemon (*Citrus limon* [L.] Burm. f.), rough lemon (*Citrus jambhiri* Lush.), pummelo (*Citrus decumana* L.) or citron (*Citrus medica* L.) until the juice becomes viscous. It is then poured into an air-tight container, some rape oil is added, and it is preserved.

b. 'Nimki'

Lime fruits (*Citrus aurantifolia* [Christm.] Swingle) are washed and rubbed against a rough stone from all sides so as to remove a thin layer of the bark. These are kept in a glass bottle, some salt is added from the top, and it is placed in a sunny place. Sometimes, fresh lime-juice is also added before sun-fermentation. The additional lime juice is intended to submerge the fruits to avoid fungal infections. If the lime-juice is insufficient to submerge the fruits, these are occasionally displaced with a dry stick or spoon, to keep them saturated. After about 2 weeks, these are ready to be served, and they remain edible for the next 20 years or even more. Sometimes, these are also dried for preservation or to carry along during outings.

F. Sugary preservation

This method of food preservation, involving the fruits, is actually the domestically prepared jam, locally called 'Goram'. Mature fruits of pear (*Pyrus communis* L.), guava (*Psidium guajava* L.; Myrtaceae; 'Amba'), peach (*Prunus persica* [L.] Batsch), wild pear (*Pyrus pashia* Buch.-Ham. ex D. Don; Rosaceae; 'Mayal'), plum (*Prunus domestica* L. subsp. *institia* [L.] Schneid.), apricot (*Prunus armenica* L.; Rosaceae; 'Khurpani'), and unripe fruits of mango (*Mangifera indica* L.) or walnut (*Juglans regia* L.; Juglandaceae; 'Okhar') are peeled, sliced and boiled with sugar until the mixture is thick. Fruits like Nepalese hog plum (*Choerospondias axillaris* [Roxb.] Burt & Hill.), gooseberry (*Phyllanthus emblica* L.), box myrtle (*Myrica esculenta* Buch.-Ham. ex D. Don; Myricaceae; 'Kaphal'), yellow strawberry (*Duchesnea indica* (Andr.) Focke; Rosaceae; 'Bhuin ainselu') and Himalayan yellow raspberry (*Rubus ellipticus* Smith; Rosaceae; 'Ainsela') are directly boiled in sugar solution with powdered spices like black pepper (*Piper nigrum* L.; Piperaceae; 'Marich') ginger (*Zingiber officinale* Rosc.; Zingiberaceae; 'Aduwa'), greater cardamom (*Amomum subulatum* Roxb.;

Zingiberaceae; 'Alainchi'), cardamom (*Elettaria cardamomum* Maton; Zingiberaceae; 'Sukumel'), Indian cassia ligna (*Cinnamomum tamala* (Buch.-Ham.) Nees & Eberm.), cinnamon (*Cinnamomum zeylanicum* Blume; Lauraceae; 'Dalchini') and clove (*Syzygium aromaticum* [L.] Merr. & Perry; Myrtaceae; 'Lwang'). Instead of sugar, molasses may also be used. The amount of sugar used, the extent of evaporation, and the thickness of the sugar solution determine to the preservation-time period.

G. Oily preservation

This method involves the preservation of spices with unripe mangoes (*Mangifera indica* L.) in the form of pickle. Unripe mangoes are cut into longitudinal halves along with the seeds. The endosperm is removed, which results in the formation of a concave groove. These are dressed with turmeric powder (*Curcuma domestica* Val.) and welted in the sun for 1-2 hours. Various spices such as fenugreek (*Trigonella foenum-graecum* L.), ammi (*Trachyspermum ammi* [L.] Spague ex Turill), cumin (*Cuminum cyminum* L.), black pepper (*Piper nigrum* L.), fennel (*Foeniculum vulgare* Mill.), black cumin (*Nigella sativa* L.; Ranunculaceae; 'Mungrelo'), coriander (*Coriandrum sativum* L.; Umbelliferae; 'Dhaniya'), wingleaf prickly ash (*Zanthoxylum armatum* DC.), chillies (*Capsicum annum* L.; Solanaceae; 'Khursani'), as well as the seeds of radish (*Raphanus sativus* L.), Indian rape (*Brassica napus* L. var. *napus* L.) and leaf-mustard (*Brassica juncea* [L.] Czern. & Coss. subsp. *integrifolia* [West] Thell), are mixed in varying proportions, according to tradition and taste, and fried. These are then crushed with desired quantities of asafetida (*Ferula assafoetida* L.; Umbelliferae; 'Hing'), rape oil and salt. This mixture is then placed in the concave grooves of the mango halves and kept in a wide-mouthed glass bottle with a sufficient amount of rape oil. It can be consumed after about a month, and it remains good for 20 years or even more.

Discussion

Food is the most important of the basic human needs and, undoubtedly, plants supply the major portion of the human foods. The present investigation provided information on a number of our long existing indigenous styles of plant-food preservation. The tradition of plant-food preservation appears to be a wise step towards the rational use of available resources in the best way possible when abundant, for the days of food scarcity. Among the 123 species, sub-species and varieties of plants that are preserved or at least used as preservatives, 71 entities, including the common spices, are the cultivated or exotic ones.

In remote areas, the preserved plant-foods were mostly of wild origin, while those in urban areas were dominated by the cultivated group. Likewise, in remote areas plant-foods were mostly preserved for use in times of food scarcity, while the same in the urban localities were intended to provide variety to the diet.

Most preserved foods are hardly distinguishable from the adulterated ones. Hence the adverseness of the possible adulterants, mostly in the commercial productions, must be questioned. As various techniques are employed to preserve plant-foods, some of which are also credited with curative properties, and as some of them preserve foods for 15 or even 20 years, their merit must be scientifically evaluated in relation to their nutritional and hygienic virtues, whereas harmful practices, if any, must be discouraged.

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