



[Research Article]

Studies on importance of taruls for livelihood security of rural populace in Sikkim

Ashish Yadav*, Ashok Kumar, Wilson Rai, Tirtha Chettri, Avinash, A.D.D. Misra, B.N. Maurya and R.K. Avasthe

ICAR Research Complex for NEH Region, Sikkim Centre, Tadong, Gangtok, Sikkim, India

*Email: 2005ash@gmail.com

ABSTRACT

Sikkim is small state and divided into four districts, viz., North, South, East and West. The populace of Sikkim comprises of 14 hill tribes and many plains-men communities. *Taruls* are minor crops and cultivated mostly on marginal and uncultivable areas. *Taruls* are the underground plant parts (root and tubers) which are generally consumed after steaming and commonly used as traditional staple food by the rural populace of Sikkim. *Taruls* are well adapted to unique hill ecosystems and mostly cultivated, traded and consumed locally. By conducting extensive surveys in villages, local markets, on-spot observations and discussions with elderly and experienced farmer's information regarding the production and local uses of *Taruls* has been documented in this paper.

KEY WORDS: *Tarul*, tuber crops, staple food, Sikkim

Sikkim is small state possess steep gradients, deep gorges, rugged terrains and rough mountains. Sikkim lies in the eastern Himalayas between 27° to 28° latitude and 88° to 89° longitude with altitude ranging from 300 to 8598 m above mean sea level. The state is divided into four districts viz., North, South, East and West. The populace of Sikkim comprises of 14 hill tribes and many plains-men communities. The hill tribes comprises of ethnic communities such as *Bhutias*, *Lepchas*, *Nepalese* and *Kirates* (*Limboos*, *Khumbu-Rais*, *Yakhas*), the communities analogous to *Kirates* (*Sunuwars*, *Magars*, *Gurungs*, *Tamangs*, *Bhujels*, *Thamis*), the *Khasas* (*Bhahuns*, *Chettries*, *Kamis*, *Damais*, *Sarkis*), the communities analogous to *Khasas* (*Thakuris*, *Jogi/Sanyasis*, *Majhis*), and *Newars* (Subba, 2009). Sikkim is one of the global biodiversity hot spots. Sikkim has five different climatic zones within a small geographical area of 7,096 sq. km. The arable land is 1.09 Lakh hectares which is about 16 percent of the geographical area. The average size of holding is 3.9 ha/person, however, the cultivated land is only 0.74 ha/person (Anonymous, 2010). Soils of this region are high in organic carbon, potassium, zinc, copper, iron and manganese. The soils are immature, coarse textured, highly porous, rocky soils, having low water holding capacity, prone to erosion by water and pH varies from 4.3-6.4. The average maximum temperature ranges between 27-

29°C during June-August and minimum temperature between 5-8°C during December-January. Major climatic factors which limits the growth and production are very high average annual rainfall (~3250 mm/annum) mostly occurring during May to October, high relative humidity (63.8-88.7%) and very less bright sunshine hours (1.97-6.3 hours/day) (Rahman and Karuppaiyan, 2011; Rahman *et al.*, 2012).

Taruls are minor crops and cultivated mostly on marginal and uncultivable lands. *Taruls* play a vital role in the nutritional security of local populace. *Taruls* are the underground plant parts which are generally consumed after steaming and commonly used as vegetables by the local people of Sikkim. *Taruls* are generally categorized as underutilized horticultural crops (UUHC). Underutilized horticultural crops are the crops which are neither grown commercially on large scale nor traded widely. These crops are cultivated, traded and consumed locally. Many root and tuber crops are grown as traditional foods that are well adapted to the hill ecosystems. Sikkim state had 24,515 ha area under both vegetable and tuber crops in 2010-11. The total vegetable production was 75,200 tonnes whereas that of other root tuber crops like sweet potato, cassava, yam and colocasia was 49,160 tonnes (Anonymous, 2011). *Taruls* are playing vital role in the nutritional security of rural populace, therefore,

the information regarding the production and local uses of *Taruls* needs to be documented for further improvement by scientific fraternity.

MATERIALS AND METHODS

The present study was conducted in *Dzongu, Sadam, Temi and Tarku* villages of North, South and East Sikkim, respectively and main market, Gangtok which is the most important trading point of all the agricultural produce in Sikkim. Extensive surveys were carried out in the *Dzongu, Sadam, Temi and Tarku* villages where elderly villagers were selected on account of their rich experience in growing *Taruls*. Several surveys were also undertaken at the vegetable shops of main market, Gangtok especially on the day of *Makar Sankranti*. In order to communicate with the villagers in vernacular, rapport building process was established. Detailed discussions with the villagers, shopkeepers and observations on the various agricultural practices and marketing were the key methods that documented data in the study.

RESULTS AND DISCUSSION

Extensive surveys were conducted in villages and markets, on-spot observations and discussions with elderly and experienced farmers led to documentation of substantial information regarding production and uses of *Taruls* in Sikkim. There are several types of roots and tuber crops cultivated and traded in the local markets of Sikkim (Fig. 1). The ethnic communities of Sikkim use their own nomenclature for *Taruls* (Table 1). The status, market availability, rates and traditional uses of *Taruls* has been summarized in Table 2. The detailed information regarding the production and local uses of *Taruls* by the ethnic communities of Sikkim is given below:

Sakharkhanda

Sweet potato (*Ipomea batatas*) is called as *Sakharkhanda* in *Nepali* and *Phungkhe* by the *Limboos* in Sikkim. It has two main local cultivars, *viz.*, purple and yellow skinned. Purple skinned and yellow skinned cultivars are being evaluated at ICAR Sikkim Centre. The yellow skinned sweet potato is a rich source of carotene (Rahman and Karuppaiyan, 2011). This crop is usually available in the market during November to February at a market price of Rs. 50-60/kg. Sweet potato normally a perennial crop, is cultivated as an annual crop in Sikkim up to an elevation of 2500 m. The plant is tolerant to a wide range of soil conditions but is sensitive to water logging. The crop is generally grown on fairly infertile soils with little input of manures/composts. Tubers can be left in the ground after maturity, but once harvested they have a short storage life. It is for these reasons that sweet potatoes are generally grown as a subsistence crop

for immediate consumption in Sikkim. Sweet potato is usually grown as an intercrop or relay crop with maize or is even sometimes mix cropped with millets. The tubers are usually steamed or baked for consumption. The tubers and vines are also used as forage for livestock. A major cause for production loss arises from infestation of the tubers with sweet potato weevil and related pests. The continuous reproduction of the weevil throughout the year makes its control difficult under organic management.

Ghar Tarul

Elephant foot yam (*Amorphophallus campanulatus*) is called as *Ghar Tarul* in *Nepali* and as *Himkhe* by the *Limboos* in Sikkim and grown under rainfed conditions up to an elevation of 2000 m. A robust herbaceous plant with an erect solitary stem usually 1-2.5 m in height and tuber, it is called elephant foot yam because the plant looks like the foot of an elephant. The corms are large globose depressed tubers, usually dull-yellow or brownish-yellow in color, and these produce 5-10 cormels at the end of each growing season. The corms are hand dug with the senescence of leaves and weigh from 3 to 9 kg depending upon the number of growing seasons. This crop is usually available in the market during December to April at a price of Rs 60-70/kg. However, it can go up to Rs 100/kg during January when it has high demand as the local people consume it as a religious food to mark the auspicious day of '*Makar Sankranti*'. Elephant yam has some useful health benefits like the root is carminative, restorative, stomachic and tonic. It is traditionally used in the treatment of piles, dysentery and acute rheumatism. Its root is used in boils, ophthalmia and also as emmenagogue (Rai *et al.*, 2005).

Phul Tarul

Greater yam (*Dioscorea alata*) is called as *Phul Tarul* in *Nepali* in Sikkim and grows well in the mid hills of Sikkim. It is readily available in the market during October to March at a market price of Rs. 25-30/kg. The tubers are mostly used as a vegetable and also for the preparation of traditional alcoholic drink called '*Jaavr*'. It is also used as a fodder for the livestock.

Ban Tarul

Wild yam (*Dioscorea hamiltonii*) is called as *Ban Tarul* in *Nepali* and found mostly in lower to mid hills of Sikkim. This crop is not abundant as it mostly grows wild in forests, hence, the name "*Ban*" meaning forest. However, some rural folk are seen cultivating this crop. This crop is available in the market during January to March at a market price of Rs. 150-200/kg. People mostly eat it steamed or baked and is also used in religious rituals as *tika*.

Simal Tarul

Cassava (*Manihot esculenta*) is called as *Simal Tarul* in *Nepali*. Like other tuber crops it is still a minor crop in this state. It is mainly cultivated in the South district of Sikkim in homesteads and also sometimes inter-cropped with ginger. It has been characterized as a subsistence crop and typically grown by farmers generally on agriculturally marginal lands. It is a perennial shrub of approx. 2 m in height, however, during the crop production process it is grown as an annual crop. Vegetative propagation is done from stem cuttings and planting is done manually on terraces. The most common pests of cassava are weeds and systemic diseases which are carried from one planting to the next in the cuttings. Harvesting begins 8 to 14 months after planting with the entire plant being uprooted usually during October and November and is available at a market price of Rs. 40-60/kg. Yields can range from 7-30 t/ha. Plants can be left unharvested for more than one season with the roots becoming larger during this period. This crop is also used in the preparation of traditional alcoholic drink called '*Jaar*'.

Pindalu

Taro (*Colocasia esculenta*) commonly known as '*Pindalu*' in *Nepali* is a [perennial](#) plant primarily grown as a [root vegetable](#) for its edible starchy [corm](#) and as a [leafy vegetable](#). In Sikkim, Taro is grown in homesteads and sometimes in paddy fields as an intercrop where water is abundant or in upland high rainfall situations. Taro is one of the few crops that can be grown under flooded conditions. This is possible due to air spaces in the petiole which permit gaseous exchange with the atmosphere under water. The crop attains maturity within six to twelve months after planting in dry land condition and twelve to fifteen months for wetland condition. Har-

vesting is usually manually done first the soil around the corm is loosened and then the corm is pulled up by grabbing the base of the petioles. It is usually available during November and December at a market price of Rs. 50-60/kg. This crop is cultivated as a garden plant especially by some ethnic groups of the state and has lots of genetic diversity in Sikkim. It is consumed as a vegetable, soup or in *daal* and also used as a snack after steaming. Steamed corm of taro is commonly served with salt, spices and chillies. Almost all parts are eaten by making different dishes. Large leaves of taro are used as an alternative to umbrella when unexpected rains occur. The tubers and leaves of this plant are also an important fodder of the pigs.

Ishkush

Chayote (*Sechium edule*) is commonly known as '*Ishkush*' in Sikkim. Unlike other tubers it has a status of major crop in the state. Several numbers of local cultivars viz. early, mid and late maturing genotypes, vivipary and non vivipary, spiny and non spiny fruits, green and yellow fruits, glossy and non-glabrous fruits are available in this region. These are being evaluated at ICAR-Sikkim Centre. It is readily available in the market during July to February at a market price of Rs. 50-60/kg. It is a popular vegetable and grown abundantly in Sikkim. Almost all parts of this plant are used by the locals. Fruit, stem and young leaves with tendrils as well as the tuberized portion of the roots are eaten as a vegetable. The stems of these plants are strong and flexible and used in craft manufacturing of baskets, hat *etc.* The local people commonly propagate chayote through seeds or fruits. The seed is removed from the fruit and placed in a flower pot or some other place where the young plants can be carefully tended before being transplanted to the field.

Table 1: Nomenclature of tuber crops by ethnic communities of Sikkim

English name	Scientific name	Traditional name (Ethnic community)
Sweet Potato	<i>Ipomea batatas</i>	<i>Sakkharkhanda</i> (Nepali), <i>Phungkhe</i> (Limboo), <i>Sungur Buk</i> (Lepcha)
Elephant Foot Yam	<i>Amorphophallus campanulatus</i>	<i>Ghar Tarul</i> (Nepali), <i>Himkhe</i> (Limboo), <i>Lee Buk</i> (Lepcha)
Cassava	<i>Manihot esculenta</i>	<i>Simal Tarul</i> (Nepali), <i>Tunglu Buk</i> (Lepcha)
Taro	<i>Colocasia esculenta</i>	<i>Pindalu</i> , <i>Dudhmaney</i> , <i>Lankey</i> , <i>setomaney</i> , <i>Hatipailay</i> (Nepali), <i>Phekhem</i> (Limboo), <i>Sangkri Buk</i> (Lepcha)
Greater Yam	<i>Dioscorea alata</i>	<i>Phul Tarul</i> (Nepali), <i>Kafer Buk</i> (Lepcha)
Wild Yam	<i>Dioscorea hamiltonii</i>	<i>Ban Tarul</i> (Nepali), <i>Tokzok Buk</i> (Lepcha)
Chayote Tuber	<i>Sechium edule</i>	<i>Ishqush Jaara</i> (Nepali), <i>Iskut Buk</i> (Lepcha)
Air Potato	<i>Dioscorea bulbifera</i>	<i>Phakwerek</i> (Limboo), <i>Gitthe</i> (Nepali), <i>Kachung Buk</i> (Lepcha)
Nepal Yam	<i>Dioscorea deltoidea</i>	<i>Sukhey</i> (Limboo), <i>Bhyagur</i> (Nepali), <i>Kosok Buk</i> (Lepcha)
Asiatic Yam, Lesser Yam	<i>Dioscorea esculenta</i>	<i>Yaksu</i> , <i>Pansu Ligo</i> (Limboo), <i>Suthni</i> (Nepali), <i>Seduh Buk</i> (Lepcha)

Table 2: Status, market availability, rates and traditional uses of *Taruls* in Sikkim

Local name	Status	Local cultivars	Market availability	Marker rate	Traditional uses
<i>Sakharkhanda</i>	Minor Crop	02 (Purple Skinned & Yellow Skinned)	November to February	Rs 50-60 / kg	The tubers are usually eaten boiled or baked. The tuber/vines are also used as feed for livestock.
<i>Ghar Tarul</i>	Minor Crop	Not Known	December to April	Rs 60-70/kg (Up to Rs 100/kg in January)	As vegetable and religious food especially during <i>Makar Sankranti</i> .
<i>Simal Tarul</i>	Minor Crop	Not Known	October - November	Rs 40-60 /kg	Tubers are used as vegetable. Also used in preparation of local beverage <i>Jaanr</i> .
<i>Pindalu</i>	Minor Crop	Not Known	November - December	Rs 50-60 /kg	It is used as vegetable or vegetable soup or in <i>daal</i> . It is also used as snack after boiling. Tubers & leaves are important feed of piggery.
<i>Phul Tarul</i>	Minor Crop	Not Known	October to March	Rs 25-30 /kg	Tubers are used as vegetable. Also used in the preparation of <i>Jaanr</i> . Tubers are used for piggery food.
<i>Ban Tarul</i>	Minor Crop	Not Known	January to March	Rs 150-200 / kg	People mostly eat it boiled or baked and is also used in religious rituals as <i>tika</i> .
<i>Ishqush Jaara</i>	Major Crop	09 nos.	July to February	Rs 50-60 /kg	The fruit, stems and young leaves as well as the tuberized portions of the roots are eaten as a vegetable. Because of the flexibility and strength, the stems have been used in the craft manufacture of baskets and hats.



A



B



C



D



E



F



G

Fig. 1: Different types of *Taruls* available in the market of Gangtok, (Sikkim)

A. Ban Tarul; B. Pindalu; C. Simal Tarul; D. Ghar Tarul; E. Sakharkhanda; F. Ishqush Jaara; G. Local women selling *Taruls* on the eve of *Makar Sankranti*

Its calorific value and carbohydrate content is high, chiefly in the case of the young stems, root and seed. The fruit and particularly the seeds are rich in amino acids such as aspartic acid, glutamic acid, alanine, arginine, cysteine, phenylalanine, glycine, histidine, isoleucine, leucine, proline, serine, tyrosine, threonine and valine (Bermejo and León, 1994). The fruit, stems and young leaves as well as the tuberized portions of the roots are eaten as a vegetable, both alone and plain steamed, and as an ingredient of numerous dishes. The fruit has been used for children's food because of its softness. The fruit and roots are not only used as human food but also as fodder. Since it is perennial, the best production is obtained 2-3 years after the plant is established. It is cheap food for pigs than the usual commercial feed. One healthy plant can produce up to 300 fruits per year. *Taruls* are generally grown as a subsistence crop in homesteads for immediate consumption by the rural populace in Sikkim. The yield and quality of these crops are poor which hamper any economic return. There is lack of awareness among the farming community about the nutritional and medicinal values of *Taruls*. Good quality seed and planting material is also not available. Considering the immense potential of *Taruls* in Sikkim for improving the socio-economic status of farmers and inclusion for food security Government support is required in terms of multiplication of good quality planting materials and their distribution besides providing market access through improved marketing network.

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