

RESEARCH PAPER

Utilisation of minor tuber crops grown in Western Ghats of Karnataka

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Abstract: Tuber crops are the most important food crops after cereals. These crops find an important place in the dietary habits of the farmers; especially in attaining food security of the tribal population. A number of tubers are gathered by tribal population and consumed as a substitute to cereals or along with cereals. Utilization of these helps to attain food and nutrition security. In the present study information was gathered by personally interviewing the farmers (n=30) of Western Ghats areas (Sirsi, Joida, Yallapur) of Karnataka using a questionnaire. Results indicated that more than 20 types of minor tubers were grown in these areas. They were consumed in the form of boiled, powdered, steamed, fried, and processed with sweets and spices. A variety of recipes were prepared using these tubers viz., - *sambar, barfi, bhaji, payasa, gojju, hasi, tambli, sukkha, etc.* These tubers are not only used for culinary purpose but also for the medicinal purpose viz., diabetes, hypertension, weakness, dysentery, tiredness, paralysis, fever, stomach ache, piles, cough, etc. The tubers of '*Shatavari*' are used to improve milk production and '*Bili suli gadde*' is used for controlling white discharge problem among women. From this study, it can be concluded that large number of minor tubers are cultivated or gathered in Western Ghats region and used in daily life for attaining nutrition and health security. Plethora of knowledge is available with farmers of this region regarding health benefits of the minor tubers.

Key words: Arrowroot, Cassava, Minor tubers, Taro, Yams

Introduction

The terms roots and tubers refer to any growing plant that stores edible material in subterranean root, corm and tuber (Ugwu, 2009). Roots and tubers were critical components in the diet during the early evolution of mankind and the most important food crops of very ancient origin in the tropics and sub-tropics, associate with human existence, survival and socio economic history (Ogunlakin, *et. al.*, 2012). Minor tuber crops are the underutilized crops and are the third important food crops after cereals and legumes and are either a staple or subsidiary food for about one-fifth of the world population. They contribute about six per cent of the world's dietary calories and are important sources of animal feed and raw materials for industrial products.

Tamil Nadu, Kerala, Meghalaya, Assam, Andhra Pradesh, Karnataka, and Nagaland are the major roots and tubers growing states in India (Anon, 2015). These crops are associated with several rituals and beliefs. Planting of tuber crops in Kerala coincides with *Sivarathri* festival in February/March. Tribes eat yams for maintaining their physical health and for medicinal purpose (Viswanathan, 2004). Minor tubers were used in treating many ailments viz., piles, diarrhea, vomiting, rheumatism, headache, epilepsy, leprosy, ulcers, jaundice and dysentery. Also used as laxative, galactagogue, stimulants, tonics, carminatives, and expectorants. *Ipomoea carnea* root decoction reduces blood pressure (Anon, 2006).

The Western Ghats region is also a store house of several under-utilized edible tuberous species of which *Tacca bipinnatifida*, *Asparagus spp.*, *Aponogeton sp.* and *Ceropegia sp.* are also used as vegetables (Anon, 2006). The taro germplasm includes cultivated and stoloniferous wild taro present in Western Ghats. *Moghania tuberosa*, a wild type bearing succulent roots, has been located in coastal Konkan

region of Maharashtra. Western Ghats region including Sirsi, Joida and Yallapura of Uttara Kannada, is a treasure trove of these crops. In spite of all these advantages, no systematic study to document these minor tuber crops grown and its utilization has been undertaken in Karnataka, except few scanty studies reported from Central Tuber Crops Research Institute (CTCRI), Kerala. This study was undertaken to document minor tuber crops grown and consumed in Western Ghats.

Material and methods

Documentation of minor tuber crops was carried out in Sirsi, Joida and Yallapur taluk of Uttara Kannada District during 2016. Thirty farmers who were cultivating minor tubers of different types and consuming in daily life were randomly selected to form a study subjects. A questionnaire was developed to elicit information on minor tubers in consultation with nutritionist, statisticians and literature. The questionnaire included general information, crops grown, tubers grown or collected, form of consumption, products prepared, health and medicinal benefits, problems faced during cultivation-marketing-processing and preservation. The data were collected by personal interview method and tabulated. Frequency and percentages calculated.

Results and discussion

Joida taluk of Uttara Kannada is a home for the tribal people known as '*Kunubi*', the tuber crops being the livelihood for these people. Sirsi and Yallapura taluk of Uttara Kannada possess suitable climatic condition for the production of the tuber crops. Hence, farmers of these three taluks were surveyed for the documentation. Table 1 reveals the information on the demographic profile of the respondents of study area. Among the respondents, 60 per cent were males and 40 per cent were females. About 50 per cent of the respondents were between

Table 1. Demographic profile of respondents N=30

Particulars	n	%	
Gender	Male	18	60.00
	Female	12	40.00
Age (yrs)	21-40	7	23.33
	41-50	15	50.00
	51-60	5	16.67
	>60	3	10.00
Occupation	Agriculture	27	90.00
	Others (postman, 3 tailoring, forest guard, etc.)	3	10.00
Family size	3 to 5	12	40.00
	5 to 10	14	46.67
	>10	4	13.33
Land holding (Acre)	0-5	22	73.33
	5-10	7	23.33
	>10	1	3.33
Annual income (Lakh Rs)	< 0.60	7	23.33
	0.60 - 1	9	30.00
	1 -3	12	40.00
	>3	2	6.67
Source of irrigation (other than rainy season)	River water, well (Summer)	12	40
	Well (Summer)	18	60

the age group of 41-50 years. Around 90 per cent of the respondents were involved in agriculture with only 10 per cent people involved in other occupations like- teaching, postman, tailoring, forest guard, etc.

Joint family system was commonly seen in the study population, comprising of 5-10 people per family (46.67 %) or about 3-5 members (40 %) per family. Majority of respondents (73.33 %) were having less than five acres of land, followed by 5-10 acres (23.33 %). But only few families possessed more than 10 acres (3.33 %) of land. The annual income varied between the families. Majority of the respondents (40 %) were having annual family income of 1-3 lakh rupees. All families surveyed depended on rain water, however 60 percent of them possessed open wells as a source of irrigation during summer.

Both tuber and non tuber crops were grown and consumed by the respondents. Around 24 different types of minor tubers were reported to be cultivated by the respondents (Table 2).

Table 2. Tuber crops grown by the respondents N=30

Tuber	n	%
Elephant foot yam	20	66.67
Cassava	18	60.00
Taro (<i>kaale aalu</i>)	17	56.67
White taro (<i>dahe aalu</i>)	13	43.33
Arrow root	11	36.67
Lesser yam (<i>kaate kanaga</i>)	10	33.33
Potato yam	8	26.67
Chinese potato	7	23.33
Shatavari (<i>Asperagus</i>)	6	20.00
Sweet potato (<i>ratali</i>)	6	20.00
White yam (<i>dhahi kon</i>)	6	20.00
Yam (<i>aale kon</i>)	6	20.00
Pirashi	5	16.67
Red yam (<i>tambade kon</i>)	5	16.67
Taro	5	16.67
Yam (<i>dukar kon</i>)	5	16.67
Yam (<i>nagarkon</i>)	4	13.33
Taro (<i>kaasar aalu</i>)	3	10.00
Kaarle	1	8.33
Bili suli gedde	2	6.67
Yam (<i>African yam</i>)	2	6.67
Red taro (<i>tambade aalu</i>)	1	3.33
Yam (<i>chani kando</i>)	1	3.33
Yam (<i>taroti kon</i>)	1	3.33

Note: Multiple responses

Among them- cassava (60.00 %), elephant foot yam (66.67 %), taro (56.67 %), white taro (43.33 %), arrow root (36.67 %), lesser yam (33.37 %) were grown in higher quantity. Along with these, different yams and taro were grown and consumed by the respondents.

The tubers were reported to be consumed in different forms, viz. boiled, steamed, fried, savoury and sweet products (Fig. 1) by the respondents. However, boiling was the common processing method followed (41%), which was further used for preparing other products. Boiling the tubers was reported to reduce the acidity and anti-nutrients present in the tuber (Savage *et al.*, 2000). Around 10 per cent of the respondents prepared sweets, while nine per cent of them fried tubers before consumption.

Distribution of respondents based on method of processing tubers is presented in Table 3. Around 93 per cent of respondents boiled yams and subsequently prepared savoury

Table 3. Distribution of respondents based on method of processing the tubers N=30

Tubers	Method of processing									
	Boiling		Steaming		Frying		Boiling and sautéing with spices		Boiling with milk and sweeteners	
	n	%	n	%	n	%	n	%	n	%
Yams	28	93.33	4	13.33	4	13.33	28	93.33	14	46.66
Cassava	22	73.33	8	26.67	-	0.00	12	40.00	-	0.00
Arrowroot	4	13.33	-	0.00	-	0.00	4	13.33	-	0.00
Pirashi	5	16.66	-	0.00	-	0.00	-	0.00	-	0.00
Shatavari (<i>Asparagus</i>)	6	20.00	-	0.00	-	0.00	-	0.00	-	0.00
Bili suligadde	2	6.67	-	0.00	-	0.00	-	0.00	-	0.00
Sweet potato	12	40.00	8	26.67	-	0.00	-	0.00	5	16.67
Taro	-	0.00	-	0.00	10	33.33	29	96.67	3	10.00

Utilisation of minor tuber crops grown in

Table 4. Products prepared by respondents using the tubers

Name of the product	Tuber used	Types of products prepared	Per cent*	Method of processing
<i>Bhaji</i>	Taro, Yam, Cassava	47	25.13	Boiling
<i>Sambar</i>	Taro, Yam, Cassava, Arrow root	39	20.86	Boiling
<i>Ambat</i>	Taro, Yam, Cassava, Elephant Foot Yam	21	11.23	Boiling
<i>Hasi</i>	Taro, Yam, Cassava	18	9.63	Boiling
<i>Et/Sukkha</i>	Taro, Yam, Cassava, Elephant Foot Yam	13	6.95	Boiling
Fry (<i>podi/kapa</i>)	Taro, Cassava	13	6.95	Shallow fat frying
<i>Goggi</i>	Taro, Yam	13	6.95	Boiling
<i>Sweets</i>	Taro, Yam, Cassava	10	5.35	Boiling
<i>Chips</i>	Taro, Yam, Cassava	5	2.67	Drying, deep frying
Flour	Arrow root	4	2.14	Grinding, drying
<i>Barfi</i>	Elephant Foot Yam	2	1.07	Boiling
Roasted tuber	Cassava	2	1.07	Roasting
Total	187	100		

Note: Multiple responses obtained

* per cent calculated for column total

Table 5. Health benefits of minor tubers as perceived by the respondents

Tuber	Ailment	Form of consumption	Reasons for use
<i>Pirshi</i>	Cures weakness Improves health condition	Boiled	Easily available at low cost or no cost
<i>Kaarle, khaarot</i>	Heals fracture BP, Diabetes	Smashing (it will give gel like substance) Boiled	Good for health
<i>Chinese potato</i>	Gives strength Better digestion among pregnant women	Boiled,x bhaji	Grown in backyards
<i>Shatavari</i>	Galactagogue	Beverage form: grind with jeera, filter. Add milk and consumed. For cattles- same was given with peel Milk form: grind with jeera, filter it. Add milk and can be consumed	Organically grown and safe for health
Arrow root	Nerve weakness Dysentery Repeated fever Tiredness Keeps body cool	Powdered form: add 1 tsp of powder to glass of water and drink. If need, heat it little and drink.	Good in taste and add variety to diet
<i>Aarati kundige</i>	Galactagogue	Consumed as jam with milk	Medicinal benefits
<i>*Kove gida</i>	Paralysis	Smash the tuber and boil in oil. Apply all over the body	and traditional believes
Taro stalk juice (<i>dantina rasa</i>)	Removes thorn	Extracted juice is applied on the injured part	
Haalu makkala gedde	Galactagogue	Grinding with milk and drink	
Suli gida (suruli)	white discharge in females	Grind with milk and filter it; then drink	
Haalu balli	Fever	Kashaya : tuber juice+ milk+sugar+ water	
Haalu kesu	Removes hair in stomach	Juice is extracted from the stalk and consumed	
Makkala kesu			
Elephant foot yam	Piles	Can be consumed in any form	
Ambe kombu	Removes blood clot	Crush the tuber and make paste; apply it on the injured part	
Baje	Cough	Crush the tuber and make paste; give it to eat	
	Improves speech in children	Rub the tuber on the tongue after peeling and apply paste on tongue	

Note: All crops were grown in *Kharif* and consumed when it is available (Seasonal)

products with the addition of spices. Sweet dishes were prepared only with yams (46.66 %), sweet potato (11.67 %) and taro (10.00 %) after boiling the tubers with milk and sweeteners. Higher percentage of respondents (73.33 %) boiled cassava and 40.00 per cent prepared savoury products. *Pirshi*, *shatavari* and *bili suligadde* were only boiled and consumed by the

respondents. Cassava and sweet potato were steamed before consumption by 26.67 per cent of respondents.

Table 4 reveals the products prepared using the tubers. *Bhaji* was the common product (25.13 %), followed by *sambar* (20.86 %) and *ambat* (11.23 %). Less than five percent respondents prepared chips (2.67 %), powder (2.14 %) and *barfi*

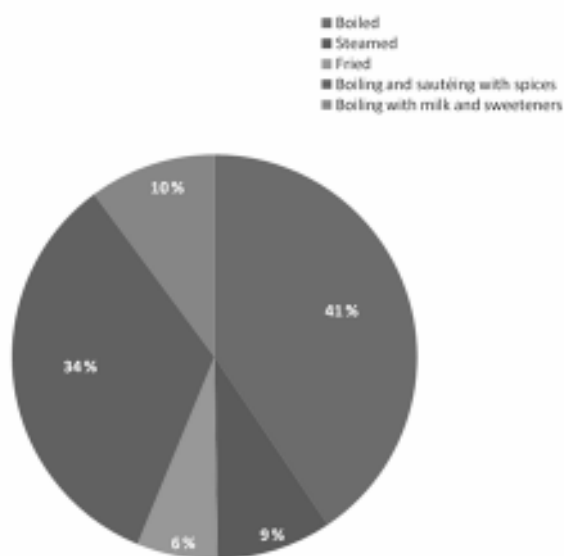


Fig. 1. Processing methods followed for minor tubers

(1.07 %). Only one per cent of the respondents consumed tubers after roasting on charcoal. Taro, yam, cassava and elephant foot yam were used for the preparation of *ambat*, a traditional recipe that resembles gravy. *Bhaji*, *chips*, *hasi* and sweets were prepared with yams, taro and cassava. *Et/sukkha* a dry *bhaji* is prepared with taro, yams, elephant foot yam and cassava. Similarly, taro, yams, cassava and arrow root were used for the preparation of *sambar*, while taro and cassava were used for frying. *Gojju* was prepared with yams and taro. Arrowroots

were converted into powder and stored for long time. Cassava was consumed after roasting on charcoal.

The minor tubers are not only used for culinary purpose, but also for curing many ailment like- hypertension, diabetes, paralysis, fever, piles, cough, *etc.* The data on health benefits of minor tubers is explained in Table 5. The tubers *Pirashi*, Chinese potato, Arrow root were perceived to relieve weakness and give strength, probably due to high carbohydrate content and hence source of energy. *Shatavari*, *Aarati kundige* and *Haalu makkala gedde* were used as galactagogue in the form of liquid or semi liquid. Baje was thought to cure cough and improves speech in children. Many of these tubers were boiled and consumed to get relief from the ailment. Or alternatively, they were crushed and paste is used for external application. Nevertheless, this perception of the farmers needs to be researched on and proven scientifically. However, a few studies carried out across the globe have also indicated similar findings (Chopra *et al.*, 1958; Angayarkanni *et al.*, 2007; Khan *et al.*, 2008; Nataraj *et al.*, 2009; Yadu and Ajoy 2010; Dey *et al.*, 2010; Angayarkanni *et al.*, 2010; Surendhra *et al.*, 2011).

Conclusion

A large number of minor tubers are cultivated or gathered in Western Ghats region and used in daily life for attaining food security and to reap health benefits. They were processed into variety of traditional products and consumed during growing seasons. Apart from culinary purpose, minor tubers are used for medicinal purpose also to cure many common ailments. Plethora of knowledge is available with farmers of this region regarding health benefits of the minor tubers that needs to be documented.

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