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The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(12): 1175-1178

www.thepharmajournal.com
Received: 03-10-2021
Accepted: 10-11-2021

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Tuber crops: Production and utilization in Uttara Kannada district

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Abstract
Tuber crops are the underutilized crops and are the third important food crops after cereals and legumes**.** In Karnataka, Western Ghats region including Sirsi, Joida and Yallapura talukas of Uttara Kannada district and Mysore district are a treasure trove for these tuber crops. More than twenty types of tubers are cultivated in Western Ghats region of Karnataka. The study aims to know the utilization and production of different tuber crops grown in Joida. The study was conducted in Uttara Kannada district of Joida during 2019-20. For this study, thirty farmers who were cultivating tuber crops were randomly selected as samples. Survey was carried out with a help of self-structured interview schedule to elicit the required information from the respondents. The data were collected by personal interview method and tabulated. For analysis of data, frequency, percentage and garret ranking technique was used. The study shows that, majority of the respondents were females and belong to middle age group and having small area for tuber cultivation. Around nineteen different tubers were growing by tuber growers in Joida and using these tubers for medicinal benefits. Major constraint facing by tuber growers was lack of awareness about availability of different tubers among consumers. Hence, it is necessary to create awareness about tuber crops among consumers through exhibitions and tuber mela in every district of Karnataka.

Keywords: Tuber growers, tubers, health, constraint, farming

Introduction
Tuber crops are the underutilized crops and are the third important food crops after cereals and legumes**.** They contribute about six per cent of the world's dietary and are important sources of animal feed and raw materials for the production of industrial products like starch. Tuber is a thickened underground part of stem. Technically a tuber is either a modified stem or modified root, for example sweet potato, potato, cassava and colocasia.

In the year 2013, the major roots and tuber crops occupied about 56.11 million hectares producing 835.55 million metric tons of tubers worldwide, 43 per cent of which was from Asia and 6.43 per cent from India. Globally, the major tubers grown are cassava, sweet potato, potato, yams, taro, aroids and tannia. The major tuber growing states in India are Tamil Nadu, Kerala, Meghalaya, Assam, Andhra Pradesh, Karnataka and Nagaland (Anon, 2015) [3].

In India tuber crops are distributed in five major areas. The areas include (i) South-Western hilly and coastal region, (ii) Southern peninsular region, (iii) Eastern coastal region, (iv) North-eastern region and (v) North-western region. India holds a rich genetic diversity of tropical tuber crops namely potato, sweet potato, cassava, aroids, yams and other tuber crops. The southern part of the Indian sub-continent especially the Western Ghats comprising of forests, mountain ranges, the mid-lands and coastal areas distributed in the states of Kerala, Tamil Nadu, Karnataka and Maharashtra is the abode of a large bounty of genetic wealth of tuber crops (Edison *et al.* 2005) [4].

In Karnataka, Western Ghats region including Sirsi, Joida and Yallapura talukas of Uttara Kannada district and Mysore district are a treasure trove for these tuber crops. More than twenty types of tubers are cultivated in Western Ghats region of Karnataka. The major tuber crops grown in Karnataka are potato, sweet potato cassava, taro, yam, elephant foot yam, arrow root and chinese potato etc. In Karnataka the farmers cultivate verities of tubers and some tubers are naturally available in forest. In Karnataka, tuber cultivation has turned out to be a great success for farmers of Joida taluk of Uttara Kannada district. In Joida, the farmers belonging to Kunabi community have been cultivating verities of tubers. In Karnataka most of the tubers are grown as vegetable crops in homestead or in semi-commercial space. Major of the tubers are available in the month of February and March mainly during the time of Shivaratri festival.

The tuber crops proved to be life sustaining crops in times of natural calamities and famine. When all other starch based crops fail, tuber sustains. Most of these tuber crops are flexible in nature and they adjust with climate change and they have the potential for good return under adverse soil and weather condition (Anon, 2013) [2]. The main aim of this study was to take a broader look at the production of tuber crops and their utilization with following objective.

Objective

To identify the different tubers available in Joida taluk of Uttara Kannada district

Materials and Methods

The present investigation was done in Uttara Kannada district of Joida during 2019-20. For this study, thirty farmers who were cultivating tuber crops were randomly selected as samples. Survey was carried out with a help of self-structured interview schedule to elicit the required information from the respondents. The developed questionnaire included general information of the tuber growers, farming information, types of tubers grown, health benefits, and problems associated with marketing and production of tuber crops. The data were collected by personal interview method and tabulated. For analysis of data, frequency, percentage and garret ranking technique was used.

Result and Discussion

Table 1: Demographic Profile of the tuber growers in selected area

N=30

Particulars		Frequency	Percentage (%)
Gender	Male	09	30.00
	Female	21	70.00
Age	Young (<30)	09	30.00
	Middle (30-60)	19	63.33
	Old (> 60)	02	06.66
Education	Illiterate	11	36.66
	Can read and write	09	30.00
	Primary school (1-4)	05	16.66
	Middle school (5-7)	03	10.00
	High school (8-10)	02	6.66
	PUC	00	0.00
	Degree/Post graduate	00	0.00
Religion	Hindu	29	96.66
	Christian	01	3.33
Family Type	Nuclear	27	90.00
	Joint	03	10.00
Occupation	Agriculture	26	86.66
	Others (Tailor, Forest guard, Business)	04	13.33
Annual Income (Lakh Rs.)	Low (0.50- 1)	09	30.00
	Medium (1-2.5)	15	50.00
	High (>2.5)	06	20.00

Demographic profile of the selected tuber growers was presented in Table 1. It indicates that 70 per cent of the respondents were female and 30 per cent of the respondents were male. These results are in line with Kehinde and Aboaba (2016) [7]. The study stated that majority (91.26%) of the tuber farmers were females. Highest percentage (63.33%) of the tuber growers belongs to middle (30-60 years) age group and only 6.66 per cent belongs to old (more than 60) age group. According to Lawal *et al.* (2013) [8] concluded that, 83 per cent respondents belongs to middle (40-59 years) age group. Regarding education, majority of the tuber growers were illiterate (36.66%) and 6.66 per cent of them completed high school education. The results are similar with Quoi *et al.* (2019) [12], about 59.2 per cent of the tuber growers were not educated. Highest percentage (96.66%) of the selected tuber grower's religion was Hindu and only 3.33 per cent religion was Christian. In study area, majority (90.00%) of the tuber growers belongs to nuclear family and only 10 per cent tuber growers belongs to joint family. The results are similar with Divya and Pushpabharati (2017) [9], 40 per cent of the respondents belongs to nuclear family with family size 3 to 5. Majority of the tuber grower's main occupation was agriculture (86.66%) in study area. The results are in accordance with Jaganathan *et al.* (2019) [6], major source of income in study area was agriculture (83.54%). And also, the results similar with Divya and Pushpabharati (2017) [9], Around 90 per cent of the farmers were involved in agriculture. The present study indicates that, 50 per cent of the tuber growers fall in medium income (Rs. 1-2.5lakh) group and 20 per cent of them belongs to high income (more than 2.5 lakh) group. The results are in accordance with Divya and Pushpabharati (2017) [9], 40 per cent of the respondent's annual income was Rs. 1-3 lakh (medium). And results are also similar with Tor *et al.* (2017) [9], majority (27.60%) of the respondent's annual income was less than Rs. 2 lakhs (medium income group) in Benue state.

Table 2: Farming Information of the tuber growers

N=30

Particulars		Frequency	Percentage (%)
Agricultural Land (Acres)	Small (0-5)	17	56.66
	Medium (5-10)	09	30.00
	Large (> 10)	04	13.33
Source of Irrigation	Bore well	19	63.33
	River water	07	23.33
	Farm ponds	04	13.33
Tuber Cultivation Area (Gunta)	Small (0-2)	13	43.33
	Medium (2-4)	09	30.00
	Large (>4)	08	26.66
Tuber Cultivation Experience (Years)	Less (0-10)	08	26.66
	Moderate (10-20)	18	60.00
	High (>20)	04	13.33
Marketing channels for tuber	Village Merchant	03	10.00
	Agent	09	30.00
	Tuber mela (Consumer)	10	33.33
	Wholesaler	08	26.66

The data in Table 2 shows the farming information of the tuber growers. With respect to possession of agriculture land, highest percentage (56.66%) of the tuber growers were having small land (0-5 acre) and few tuber growers were possessing large (more than 10acres) land. The results are similar with Girawale and Naik (2016) [5], In Gujarat, majority of the tuber growers were small farmers with less than 5-acre land. And also, the results with Divya and Pushpabharati (2017) [9], 73.33 per cent of the respondents having less than 5 acres land. Majority (63.33%) of the tuber growers having bore wel as a source of irrigation and 13.33 per cent having farm ponds as a source of irrigation. Highest percentage (43.33%) of the tuber growers having small (0-2 gunta) tuber cultivation area. According to Aniedu (2016) [1], in Nigeria, 78 per cent of the respondents having less land for tuber cultivation. In study

area, 60 per cent of the tuber growers having 10 to 20 (medium) years of tuber cultivation experience and only 13.33 per cent having more than 20 (high) years of experience. Quoi *et al.* (2019) [12], reveals that 64.30 per cent of the respondents had 4 to 7 years of tuber cultivation experience. In present study, the tuber growers having 10 to 20 years of tuber cultivation experience because, tuber crops are the main source for income as well as food security for them. Marketing channels for selling tubers in study area were village merchant, agent, tuber mela and wholesaler. Among these marketing channels, majority (33.33%) of tuber growers selling tuber in tuber mela. Because, tuber mela creates awareness about different tubers among consumers and in tuber mela, the growers selling tubers directly to the consumers. Hence, farmers get good profit compared to other marketing channels.

Table 3: Different types of tubers grown by the farmers in selected area

N=30

Tubers	Frequency	Percentage (%)
Cassava	09	30.33
Chinese Potato	05	16.66
Sweet potato	21	70.00
Elephant foot yam	16	53.33
Greater Yam		
Dhavi Kon (lion foot type)	08	26.66
Yam (Dukar Kon)	07	23.33
Yam (nagar kon)	06	20.00
Yam (arial bulbs)	04	13.33
Yam (aale kon, hairy type)	04	13.33
Arrowroot	10	33.33
Shatavari	04	13.33
Taro		
Colocasia (banda type)	11	36.66
Colocasia (dwarf type)	18	60.00
Alocasia	03	10.00
Red taro (tambade aalu)	01	3.33
Bili suli gedde	05	16.66
Potato	09	30.00
Lessar yam	08	26.66
Tannia bulbs (kaasar aalu)	01	3.33

Note: Multiple Responses

A close perusal of Table 3 shows the tubers grown by the tuber growers. In study area, around 19 different types of tubers were growing. Among these tubers, sweet potato (70.00%), Colocasia (dwarf type) (60.00%), elephant foot yam (53.33%), cassava (30.33%), arrowroot (33.33%), potato (30.00%), dhavikon greater yam (26.66%), lesser yam (26.66%) and dukar kon yam (23.33%) were growing in higher quantity. The results are in line with the results of Prakash *et al.* (2018) [11], The important tubers grown in Kerala were cassava, sweet potato, yam, Colocasia and elephant foot yam. And Mesta and Pushabharati (2017) [9], reported that, in Western ghats of Karnataka, the farmers growing more than 20 types of tuber crops.

Table 4: Medicinal benefits of tubers as perceived by the tuber growers

N=30

Type of tuber	Medicinal benefit	Frequency	Percentage
Colocasia (Taro)	Diabetes	08	26.66
	Blood Pressure	18	60.00
Chinese potato	Gives better strength	14	46.66
	Improves digestion among pregnant women	19	63.33
Arrowroot	Dysentery	21	70.00
	Fever	11	36.66
	Tiredness	03	10.00
	Keeps body cool	01	3.33
Bili suli gedde	To control white discharge among women	12	40.00
Elephant foot yam	Piles	23	76.66

Note: Multiple Responses

An observation of Table 4 shows that medicinal benefits of tubers as perceived by the tuber growers. Highest percentage (60.00%) of the tuber growers perceived colocasia tuber good for maintaining blood pressure, chinese potato, to improve digestion among pregnant women (46.66%). Arrowroot perceived good for fever and dysentery. Bili suli gedde was perceived to prevent white discharge problem among women (40.00%) and 76.66 per cent perceived elephant foot yam good for piles problem. The information is in accordance with the results of Divya and Pushpabharati (2017) [9]. The study stated that, respondents perceived arrowroot good for repeated fever, tired ness and dysentery. Chinese potato percieved good for strength and reduce the digestion problem among pregnant women.

Table 5: Constraints faced for the production and marketing of tuber crops

N=30

Constraints	Garret score	Per cent	Rank
Production			
Minimum area for tuber cultivation	2502	83.40	II
Difficulty in getting loans from banks	2088	69.60	III
Lack of awareness among consumers about tuber crops	2568	85.60	I
Marketing			
Lack of Regulated market facilities	2181	72.70	II
Lack of minimum support price	2346	78.20	I
Lack of Transportation facility	2147	71.56	III

A glance at Table 5 shows that various constraints faced for production and marketing of tuber crops by tuber growers. Among production constraint, ranked first for lack of awareness about tuber crops among consumer (85.60%) and only 69.60 per cent ranked sixth for difficulty in getting loans from banks. In marketing related constraints, lack of minimum support price ranked third by 78.20 per cent tuber growers, fourth rank for lack of regulated markets (72.70%) and fifth rank for lack of transportation facility by 71.56 per cent of tuber growers. The results are in line with Pandey *et al.* (2017) [9], the study shows that, among marketing related constraints, majority (78.00%) of the respondents reported

lack of support price for tuber crops and 63.00 per cent respondents reported lack of transportation facility were major constraints. According to Girawale *et al.* (2016) [5], high price of fertilizer (51.00%) and 26 per cent farmers reported uneven supply of canal water were the main constraints for the production of tuber crops.

Conclusion

Tubers are the most important crops after cereals. The Uttara Kannada district of Karnataka is a store house for several tubers because in this area around 19 types of tubers were growing and using these tubers for food security and to reap health benefits. Tuber growing farmers in Joida was highly constrained by lack of minimum support price and lack of awareness about variety of tubers among consumers. Therefore, it is suggested to improve the selling cost of the tubers by providing good marketing facility to the tuber growing farmers and creating awareness among consumers about availability of variety of tuber crops by campaign, exhibitions and mainly government should conduct tuber mela every year in all the district of Karnataka. It is necessary to create awareness about health benefits of tuber crops among consumers.

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