

Livelihood Improvement and Nutritional Security Through Tuber Crop in Odisha

*Antaryami Lenka, Dr. M. Nedunchezhiyan,
Sushanta Kumar Jata, Biswanath Sahoo*

Tropical root and tuber crops are considered as the third important crops after cereal and grain legume. They contribute 6% of the average daily calorific intake of human beings. Tropical tuber crop produce that are used for human food and animal feed. The popular tuber crops include sweet potato (*Ipomoea batatas*), cassava (*Manihot esculenta*), taro (*Colocasia esculenta*), yam (*Dioscorea sp.*), elephant foot yam (*Amorphophallus paeoniifolius*), yam bean (*Pachyrrhizus erosus*), arrowroot (*Maranta arundinaceae*), etc constitute cheap source of food and energy particularly suitable for the poor section of human population and capable enough to withstand biotic and abiotic stresses. Tuber crops have a higher biological efficiency as food producers and show the highest rate of dry matter production per day per unit area among all the crops. They are also recognized as the most efficient converters of solar energy. Root and tuber crops have traditional place in the daily diet of the tribals of Odisha. Cassava is cultivated in Ganjam, Kandhamal, Gajapati, and Koraput; yam in Ganjam, Kandhamal, Khurda, Keonjhar, Mayurbhanj, Dhenkanal; elephant foot yam in Baleswar, Mayurbhanj and Bhadrak; sweet potato in Gangam, Koraput, Bolangir, Dhenkanal, Sundargarh and Mayurbhanj. Odisha tribals are fond of tuber crops and the forest is rich in wild tubers used both for food and medicinal purposes.



Food Security:

The IMPACT projections made by IFPRI in July, 1999 suggest that global demand for roots and tuber crops will increase by 37% in between 1995 and 2020. The worldwide demand for cassava and other minor roots and tubers is projected to increase by 49% and for sweet potato and yams by 30%. The World Food Summit (1996) stated that 'Food security exists when all the people, at all times have physical, social and economic access to sufficient safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life, which emphasizes that food security and



nutritional security are two intermingled terms. It is in this new paradigm of growth in food supply that root and tuber crops become increasingly significant as energy and nutritional store houses.

They produce large quantities of energy (carbohydrate) in relatively less time than other crops. They are most efficient in converting solar energy, for example cassava producing 250×10^3 kcal/ha and sweet potato 240×10^3 kcal/ha as compared to 176×10^3 for rice, 110×10^3 for wheat and 200×10^3 for maize. In order to meet this unfortunate scenario, tuber crops constitute

the important link to fill the food security gap and they can accept the challenge.

Nutritional security:

Several nutritional disorders due to deficiency of Vitamin A, Vitamin C and Calcium could be easily alleviated by consumption of root and tuber crops like cassava, sweet potato, yam and aroids. Root and tuber crops are rich in Vitamins and Minerals (Table 1). On an average cooked yam have about 2% protein, cassava and sweet potato provide ascorbic acid (Vitamin C) where as cereal based foods have none. Sweet potato also contains important amino acids while rice is deficient in lysine. The orange and yellow fleshed sweet potato roots and green tops are good source of Vitamin A, which can prevent night blindness and malnutrition prevalent. Besides, sweet potato is rich in anti-oxidant, nutrients like B- carotene, ascorbic acid (Vitamin C), tocoferol (Vitamin E), which can prevent coronary disorder and cancer. There are specified RDA (recommended dietary allowance) which is possibly met by the root and tuber crops @ 500 gram per head per day. Since, these crops are affordable to the poor people, the nutritional balance can be easily achieved.

Table 1. Proximate composition of tuber crops (Grams per 100 g on dry weight basis)

	Protein	Fat	Minerals	Fibre	Carbohydrates
Sweet potato	3.6	0.8	3.0	2.3	88.0
Cassava	1.7	4.9	2.5	1.5	84.9
Yam	4.7	0.3	5.3	3.3	86.6
Colocasia	11.6	0.4	6.3	3.7	78.5
Elephant foot yam	5.6	0.5	3.8	3.8	86.3
Colocasia leaves (black types)	31.9	9.4	11.8	8.5	38.0
Colocasia leaves (green types)	22.6	8.7	12.8	16.8	39.4

In Odisha root and sweet potato crops are important particularly in the tribal belts where they have traditional place in the daily diet. The important tuber crops grown in Odisha include sweet potato, yam, aroids, elephant foot yam, cassava, yam bean and arrowroot. They occupy only 0.33% of gross cropped area and provide only 1% of the calorie intake but contribute 0.7 % of value of agricultural out put. Odisha has the major area and production of sweet potato. Odisha ranked first with 39% area and 33% of production. They play vital role in food security and nutrition of not only tribals and lower income group people of Odisha but sweet potato, yam

crops are common ingredients in vegetable uses in Odisha and the main vegetable in the “Prasad” of Lord Jagannath.

Root and tuber crops were introduced in tribal dominated districts of Kandhamal, Kalahandi and Dhenkanal of Odisha under National Agricultural Innovation Project (NAIP) during the year 2011-12. In total 398 no. of demonstration of elephant foot yam, sweet potato, yam, cassava and yam bean were demonstrated (Table 2). Disease free quality planting materials of tuber crops were given along with standard package of practices.

Table 2. Demonstration of tuber crops interventions:

Activity	Number of demonstrations	Average demonstration area (m ²)	Average tuber yield (kg)	Gross return (Rs)	Net return (Rs)	Benefit cost ratio
FLD on Gajendra (elephant foot yam)	102	100	330	6660	4600	3.23
FLD on Odisha elite (greater yam)	92	200	471	9416	6921	3.77
FLD on yam bean (RM-1)	70	300	550	2748	1781	2.84
FLD on colocasia (Muktakeshi)	5	200	427	4270	2972	3.28
FLD on high yielding varieties of sweet potato	65	400	415	2076	1392	3.04
FLD on orange flesh sweet potato varieties	11	400	407	2034	1400	3.21
FLD on sweet potato + redgram intercropping	10	400	363 kg tuber + 34.4 kg seeds	2849	1948	3.16
FLD on cassava	39	50	83	332	232	3.32
FLD on arrowroot	4	50	78	930	623	3.03



In Kandhamal, Kalahandi and Dhenkanal districts 92 demonstrations of greater yam (var. Orissa Elite) were conducted. The total area covered 1.84 ha, average yield 471 kg/200 m², net return Rs. 6921 and benefit cost ratio obtained was 3.77. Similarly 102 demonstrations of elephant foot yam (var. Gajendra) were conducted. The total area covered 1.02 ha, average yield 330 kg/100 m², net return Rs. 4600 and benefit cost ratio of 3.23. In sweet potato, 65 no. of high yielding variety of sweet potato (var. Kishan), the total area covered 2.6 ha, average yield 415 kg/400 m², net return Rs.1392, benefit cost ratio of 3.04 and 11 no. of orange flesh demonstrations were conducted, the total area covered 0.44 ha, average yield 407 kg/400 m², net return Rs.1400, benefit cost ratio of 3.21. In cassava 39 (var. Vellayani Hraswa) demonstrations were conducted. The total area covered 0.195 ha, average yield 83 kg/50 m², net return Rs. 232 and benefit cost ratio of 3.32. In Colocasia, 5 no. demonstrations (var. Muktakeshi) were conducted in these districts. The total area covered 0.1 ha, average yield 427kg/200 m², net return Rs.2972 and benefit cost ratio of 3.28. In arrowroot 4 no. demonstrations were conducted in these districts. The total area covered 0.02 ha, average yield

78kg/50 m², net return Rs.623 and benefit cost ratio of 3.03. In yam bean 70 no. demonstrations (var. RM-1) were conducted. The total area covered 2.1 ha, average yield 550kg/300 m², net return Rs.1781 and benefit cost ratio of 2.84.

Scope of root and tuber crops in Odisha

- Drought prone area could be best utilized with drought tolerant tuber crops like cassava and yam.
- Tuber crops can be grown under rainfed as well as irrigated areas.
- Tuber crops can be grown as intercrop in perennial orchards/plantation crops.
- Ten agro climatic zones of Odisha are suitable for growing different root and tuber crops.

Sustainable yield

Hence, an orchestrated approach is the need of the hour, beginning with production and distribution of large scale high quality planting material, balanced nutrient application, timely intercultural operations, harvest and proper method of storage.

Antaryami Lenka (Senior Research Fellow), Dr. M. Nedunchezhiyan (Senior Scientist, Agronomy) and Sushanta Kumar Jata (Junior Farm Superintendent), RCCTCRI, Bhubaneswar-751019.

Biswanath Sahoo (Subject Matter Specialist), KVK, Bhadrak.