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NUTRITIONAL ANALYSIS OF FIVE WILD EDIBLE TUBERS USED BY THE TRIBAL COMMUNITIES OF KANYAKUMARI DISTRICT, TAMILNADU, INDIA

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ABSTRACT

Wild edible plants play a vital role in the food habits of rural and tribal communities across the world and important source of nutrients in the daily life. In the present investigation the nutritional analysis of five wild edible tubers of the plant species like *Colocasia esculenta* L., *Dioscorea esculenta, Dioscorea offositifolia* L., *Dioscorea pentaphylla, Dioscorea wallichii* Hook.f. were evaluated by determining proximate nutrient analysis. This study indicated that the highest carbohydrate (88.08%) and protein (89.07%) was recorded in *colocasia esculenta* L.respectively. However highest fat (5.61%) and fibre (9.61%) were recorded *Dioscorea wallichii* Hook.f. Fat and fibre was recorded lowest (1.77%) and (3.21%) in *Dioscorea esculenta*. Mineral composition in all tubers varied greatly presence of nutrient elements such as Calcium, Phosphorus, Nitrogen is formed maximum in *Colocasia esculenta* L. (0.8%, 94.8% and 130.5%). Magnesium in *Dioscorea offositifolia* L. (401.6%) and Potassium in *Dioscorea esculenta* (151.7%) .Wild edible tuber plants sustain numerous organic phytochemicals and significantly contribute to the nutritional security of mankind that has been linked to the promotion of good health. The study revealed that these wild tubers exhibited high nutritional composition therefore, could be used as supplementary diet in mountain region and should be promoted to conserved and enhance their genetic diversity.

***Keywords*:** Organic phytochemical; nutritional potential; energy value, supplementary diets

INTRODUCTION

Kanyakumari district tribal communities are characterized by a rich heritage of wild edible plants and is the precious gift from nature to the ethnic communities. It is better income source to the tribal people, as they collect wild edible tubers for selling as well as for their own use. Carbohydrate, fats and proteins constituted the major portion of the diet. Millions of people in many developing countries do not have enough food to meet their daily requirements and are deficient in one or more nutrients (FAO, 2004). In developing countries, wild plants are exploited as sources of food and other life supporting commodities and thus provide an adequate level of nutrition to the human beings (Aberoumand and Deokule, 2010). These plants serve as an indispensable constituent of human diet supplying the body with minerals, vitamins and certain hormone precursors, in addition to protein energy (Akubugwo *et al*., 2007).

The wild edible plants diversity is widely distributed in mountain forest and is valuable source of food and medicines for domestic and commercial purposes. Additionally, these plants also provide some useful products like fiber, fodder, tannin, resin and dyes etc. (Kayang, 2007). The dietary habits of tribal communities usually based on their traditional knowledge, culture and seasonal availability of resources. Many wild edible plants used by tribal communities are a great source of proteins and minerals (Oommachan & Masih, 1988).There has been a growing interest to evaluate various wild edible plants for their nutritional value (Ogle *et al*., 2001; Agrahar-Marugakar & Pal, 2004; Pradeepkumar *et al*., 2015).

Nutritional value of wild edible plants are comparatively less explored but considered as a potential contribution to dietetic diversity and food security of rural communities all over the world (Grivetti & Ogle, 2000; Ogle *et al*., 2003).The consumption of wild plants as major food and food supplement is very common in food insecure areas as well as among the ethnic communities all over the world, which also contribute to the economy of millions of

households (Ghani *et al*., 2012). In India, most of the ethnic communities in the rural areas depend on wild resources to meet their food requirements. Nutrients derived from plants are important for human health and complement other food resources (Sasi *et al*., 2011). Leaves of many plants are aromatic, sour, sweet, bitter or tasteless but are among the readily available sources of proteins, vitamins, minerals and essential aminoacids (Fasuyi, 2006). The quality of food depends upon the presence or absence of relative concentration of various nutrients such as carbohydrates, proteins, enzymes, fats, amino acids, vitamins, minerals and anti-nutritional parameters (Acipa *et al*., 2013).

Kanyakumari forest provides a large number of wild edible plants. Its fruits, tubers, leaves, seeds, roots, young shoots, toddy etc. make an important contribution to the food of tribal people contain nutritional and medicinal values. Tribal communities have been largely depends on nature either directly or indirectly of food, clothes, shelter and medicine. Due to the improvement of traditional knowledge and technology people obtain our agricultural practices the traditional knowledge is useful to develop new food sources now a days. Wild edible plants are most commonly used method of preparation for medicines, paste, raw, juice, boiling and oil are used by tribal people of Kanyakumari wild life sanctuary.

Tribal people consume the wild edible plants with which the source of their food, income and considered a healthy diet. Diets consumed by tribal population have been subject of interest since antiquity with more recent investigation focused on their evident health benefits (Gupta, 1989). The objectives of this work is to indigenous knowledge of the plants and evaluated its nutritional benefits.

MATERIALS AND METHODS

Study Area

Kanyakumari district is circumscribed by Tirunelveli district in the North and North East by Kerala state in the North West and the confluence of the Arabian Sea and Indian Ocean in the west and south, Kanyakumari district is the Southern part of Western Ghats region which is located between 77º 15' and 77º36' of east of longitude and 8º 03' and 8º 35' north of latitude. The present study was conducted at Kothayar and its vicinity located in the Sothern Western Ghats of Kanyakumari district (77º 15' E, 8º 29'N) at an elevation of 250-700. It is a part of Agasthyamalai hill range and falls in the veerapuli forest reserve in Tamil Nadu (Sundarapandian *et al*., 1997; Chandrasekaran *et al*., 1997; Swamy *et al*., 2000; Sundarapandian *et al*., 2000). Kanyakumari District is one of the smallest Districts in the Tamil Nadu state having an area of 1684 sq.kms of which 1541.3 sq.kms is rural.

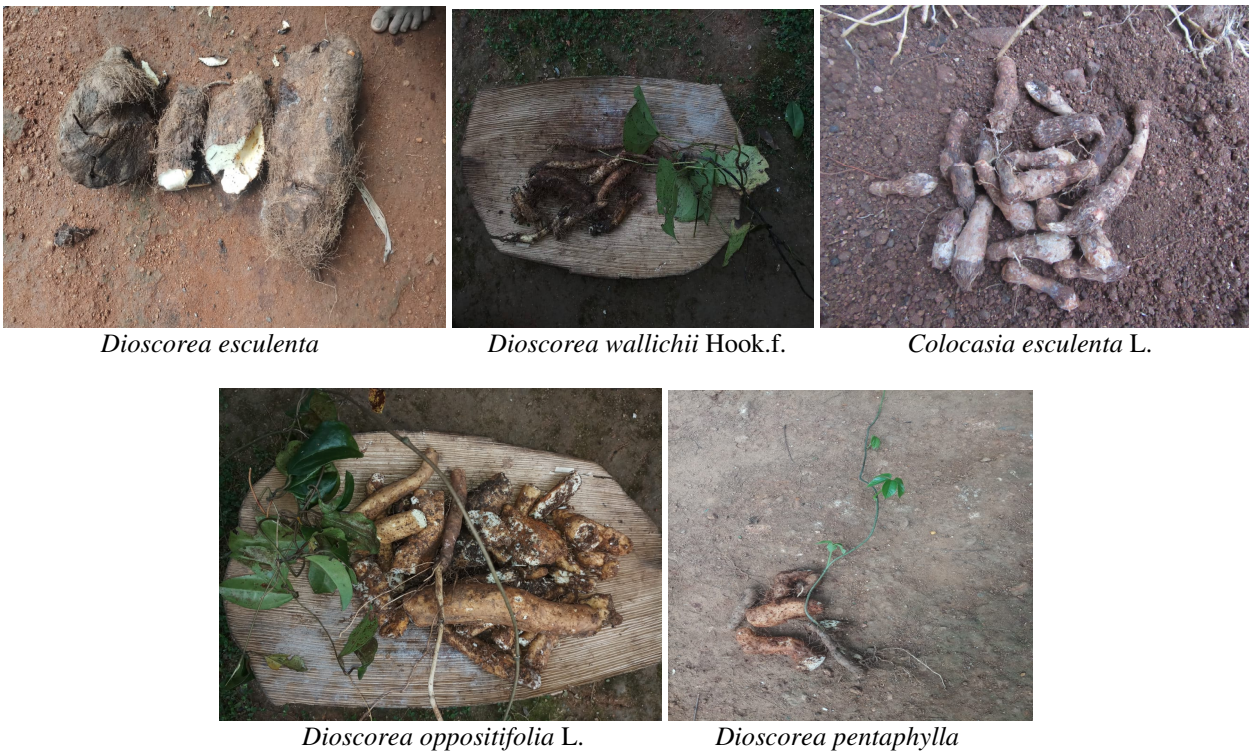
Most part of the Kanyakumari district enjoy a temperate climate, the south west monsoons period starts from the month of June and September, while the North East monsoon period start from October and end in the middle of December. During the months of January and February, the atmosphere is mostly dry with high humidity. The total geographic area of the district is about 1,65,810 hectares are used for agriculture 60%. The economy of the Kanyakumari district is predominantly 60% of the population is depends on agriculture and it allied activities such as goats for earning their livelihood.

Fig. 1: Kothaiyar study area

Nutritional Analysis

Randomly sampled fresh edible parts of the five edible tubers were collected from their natural habitats in Kanyakumari District tribal communities in Tamil Nadu. The samples were thoroughly washed with water and dried using room temperature. The dried samples were ground into fine powder using an electric grinder and stored in room temperature in airtight container for detail chemical analysis. Crude protein in the tubers samples were determined following Hartee- Lowry method (Hartee1972; Lowry *et al*., 1951). Total carbohydrate was determined by Anthrone method using spectrophotometer (Hedge & Hofreiter, 1962). Total fat were determined by Bligh and Dyers method (Bligh and Dyer, 1959). Total fibre was determined by Food Analysis Method (Maynard,1970). Minerals were analyzed

through digestion using tri-acid (Sulphuric acid, Perchloric acid, and Nitric acid) in KEL PLUS block digester following (Allen *et al*.,1974). Phosphorus content was determined using UV-VIS Spectrophotometer following molybdenum blue method; potassium, calcium and nitrogen were determined using flame photometer, whereas magnesium content was determined through EDTA titration method (Allen *et al*., 1974). All the analyses were carried out in triplicates and the data were obtained by statistically analysed.



Dioscorea esculenta *Dioscorea wallichii* Hook.f. *Colocasia esculenta* L.

Dioscorea oppositifolia L. *Dioscorea pentaphylla*

Fig.2: Nutritional analysis of wild edible tubers

RESULT AND DISCUSSION

During the present study, a sum of five wild edible tuber species belonging to families, tribal name and medicinal uses from the study area (Table 1). The edible parts of fresh plant material e.g *Colocasia esculenta* L., *Dioscorea offositifolia* L., *Dioscorea esculenta, Dioscorea pentaphylla, Dioscorea wallichii* Hook.f. collected from different places of Kanyakumari tribal peoples have a relatively compared to crude protein, fat, fibre and carbohydrate content (Fig. 2; Table 2).

Table 1: Medicinal uses of selected wild edible tubers

S. No	Botanical name	Tribalname	Family	Partsused	Medicinal uses
1.	*Colocasia esculenta* L.	Neellapali	Araceae	Tubers	Totreatblood purification.
2.	*Dioscorea esculenta*	Mukkezhangu	Dioscoreaceae	Tubers	To treat body swelling.
3.	*Dioscorea oppositifolia* L.	Kavala	Dioscoreaceae	Tubers	To treat body swelling and rheumatism.
4.	*Dioscorea pentaphylla*	Noora	Dioscoreaceae	Tubers	To treat blood purification.
5.	*Dioscorea wallichii* Hook.f.	Neduvan	Dioscoreaceae	Tubers	To treat blood purification.

Table 2 : Important nutritional content in some wild edible tubers

S. No.	Name of the plants	Carbohydrate%	Protein %	Crude fat %	Crudefibre %	Energy/content Kcal/100g
1.	*Colocasia esculenta* L.	88.08±0.12	89±0.13	4.61±0.03	4.49±0.02	409.90±0.66
2.	*Dioscorea esculenta*	80.88±0.12	85.05±0.13	1.77±0.03	3.21±0.02	380.85±0.53
3.	*Dioscorea oppositifolia* L.	70.57±0.12	62.47±0.06	1.99±0.02	7.41±0.03	334.95±0.53
4.	*Dioscorea pentaphylla*	77.47±0.13	84.05±0.12	2.01±0.02	6.31±0.02	342.56±0.29
5.	*Dioscorea wallichii* Hook.f.	65.06±0.06	77.08±0.12	5.61±0.03	9.61±0.03	330.94±0.53

Protein content of the five wild edible tubers were highest protein content were recorded in *Colocasia esculenta* L. with 89.07% and lowest in *Dioscorea oppositifolia* L. with 62.47%. Fat and fibre content in the edible parts among the five tubers was significantly highest in *Dioscorea wallichii* Hook.f. with 5.61% and 9.61% and lowest in *Dioscorea esculenta* with 1.77% and 3.21% (Table2).Total carbohydrate content ranged between 88.08% and was highest in *Colocasia esculenta* L. were it was lowest in *Dioscorea wallichii* Hook.f. and 65.06% (Table2).

Minerals are inorganic chemical elements required as essential nutrients for any organism to perform body functions necessary for life. Among the essential minerals, the most important and common are Magnesium, Calcium, Phosphorus and Potassium. In the study Calcium, Phosphorus, Nitrogen, Magnesium and Potassium analyzed from the tubers of five selected wild edible tubers (Table 3). Nitrogen, Phosphorus and Calcium present was highest for *Colocasia esculenta* L. (0.8±0.1, 130.5±2.8, 94.8± 2.3). Magnesium present was highest for *Dioscorea oppositifolia* L. (401.6±7.2). Potassium present was highest for *Dioscorea esculenta* (151.7±11.2). Mineral elements play an important role in regulating many vital physiological processes in the human body such as enzyme regulation, skeletal structure, neuromuscular irritability and clotting of blood (Kalita *et al*., 2006).

Table 3 : Minerals analysis of edible tubers

S.No	Name of the plant species	N (mg)	Mg(mg)	Cal(mg)	P(mg)	K (mg)
1.	*Colocasia esculenta*L.	0.8±0.1	320.7±7.6	94.8±2.3	130.5±2.8	35.1±2.3
2.	*Dioscorea esculenta*	0.6±0.1	401.6±7.2	61.7±1.1	75.5±3.2	128.3±3.1
3.	*Dioscorea oppositifolia*L.	0.7±0.1	22.7±3.5	35.5±4	48.8±1.8	151.7±11.2
4.	*Dioscorea pentaphylla*	0.3±0.05	25.2±3.8	41.8±3.9	69.8±1.8	44.3±2.4
5.	*Dioscorea wallichii* Hook.f.	0.3±0.04	19.2±1.2	20.2±4.4	72.1±3.6	54.3±3.4

Vishwakarma and Dubey (2011) reported that the Fibre content in the three wild edible plants considered for this study was close the range of *Amaranthus, Achyranthes, Chenopodium* etc. This study was confirmed that all the three wild plants were rich in carbohydrate and was higher than that of Amaranthus sp. that contained 9.7-21.2% from eastern Chattisgarh. (Binita and Lal Bihari, 2016) suggested that three wild edible plants are analysed for this study range of crude protein content was highest in Polygonum runcinatum with 24.72% and lowest in Pilea bracteosa with 16.96% from Papum Pare district of Arunachal Pradesh.

Rana *et al.* (2018) analysed for this study area of Western Himalaya were collected five edible fruits contained relatively high moisture ,protein, fibre and fat content. The present study revealed that all the five wild edible tubers namely *Colocasia esculenta*L., *Dioscorea offositifolia*L., *Dioscorea esculenta, Dioscorea pentaphylla, Dioscorea wallichii* Hook.f. which were widely consumed by the ethnic tribes of Kanyakumari district of Tamil Nadu, India were rich in total carbohydrate, protein. Fat and fibre can serve as an easily accessible nutritional source. Further, studies are required to determine the nutritional potential including medicinal properties of the remaining wild edible tubers are commonly consumed in the Kanyakumari district.

CONCLUSION

The study shows that the wild edible tubers collected from Kanyakumari district tribal communities were rich protein available carbohydrate, total dietary fibre and fat, and it is believed that plants could be used for the nutritional purpose of human being due to their good nutritional qualities and adequate protection may be obtained against diseases arising malnutrition.

The experimental findings also revealed that these wild edible tubers were the good source of nutrient for tribal population, and in addition well comparable with various commercial edible plants. So the cultivation of the wild edible species needs to be adopted in large scale, with will produce economic benefits for poor farmers.

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