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UNVEILING THE POTENTIAL OF UNDERUTILIZED TUBER CROPS: HEALTH BENEFITS AND NUTRITIONAL POTENTIAL

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ABSTRACT

Despite their nutritional benefits, tuber crops remain underutilized worldwide. In tribal areas, these crops are vital for food and nutritional security, offering a diverse range of energy, minerals, and vitamins. Out of 30,000 edible plant species, 30 provide 90% of human calories. Tuber crops, rich in energy, fiber, calcium, iron, and vitamins, are crucial in tribal diets. Processing these crops can enhance food security and health. Additionally, tubers, often associated with poverty, have market potential in the developed world as frozen goods, chips, and flour. Their stress tolerance and efficiency in marginal soils make them increasingly important for regional food security.

KEYWORDS: Cassava, Health benefits, Sweet potato, Tuber crops, Yams

INTRODUCTION

Among all crops, tuber crops exhibit the highest rate of dry matter production per day per unit area and the highest biological efficiency. Roots and tubers are recognised globally as significant food components with immense potential, chief among them being the ability to provide food security to countless millions of people with inadequate resources. Both the food security of tribal groups and the diets of small and marginal farmers depend heavily on tuber crops. In addition to offering dietary diversity, tuber crops possess therapeutic properties that aid in the treatment or avoidance of numerous ailments. India's genetically diversified tropical root and tuber crops include aroids, cassava, sweet potato, yams and other minor tuber crops which are used to make stimulants, tonics, carminatives, and expectorants, a range of tropical tuber crops are used. Tuber crops are rich in dietary fibre and carotenoids including anthocyanin and beta-carotene. In addition to tubers Numerous nutritional and physiological advantages are provided by these crops, such as antimicrobial, hypoglycemic, hypocholesterolemic which that modulate immunity.

TROPICAL TUBER CROPS

1. AROIDS

Taro (Colocasia), gigantic taro (Alocasia), elephant foot yam (Amorphophallus), tannia (Xanthosoma), and swamp taro are tuber-bearing plants in the Araceae family (Cyrtosperma). A staple food in many African nations is colocasia. Aroids can be used to make flour. They have readily digested fine starch in them. Growing taro in the South Pacific is often advised for all newborns, especially allergy-prone ones, as a weaning diet. These rhizomes have various beneficial components that are used in the food sector, such as starch, mucilage, and powders. Their ability to function as a thickening and gelling agent has led to their application in baked goods, culinary pastes, and drinks. (Calle et al. 2021).

Elephant foot yam

Colocasia

2. CASSAVA

The Euphorbiaceae family includes the cassava (Manihot esculenta Crantz), which is thought to have originated in South America, most likely Brazil. Over 500 million people worldwide depend on cassava as a major source of carbohydrates due to its high content Cassava roots contain a variety of compounds, including terpenoids, flavonoids, hydroxycoumarins such scopoletin, non-cyanogenic glucosides, linamarin, and lotaustralin. Before being ground into flour for bread and fufu, the roots are fermented and dried. Grated fermented roots are combined with water, filtered, and then the starch is let to settle to produce starch. Starch can then be used to make tapioca. It's possible to have white or yellowish flesh. In addition to having a high starch content, cassava roots also contain substantial amounts of calcium (50 mg/100 g), phosphorus (40 mg/100 g), and vitamin C (25 mg/100 g). However, they lack some minerals and protein. Conversely, cassava leaves offer a respectable amount of protein; they are low in tryptophan and methionine but high in lysine.

Cassava tuber

3. SWEET POTATO

The Convolvulaceae family includes the domesticated sweet potato (Ipomoea batatas L.) and closely related wild species in the genus Ipomoea and subgenus Eriospermum. Grown in warm temperate, tropical, and subtropical climates, it is the seventh greatest food crop in the world. When the weather conditions are suitable, sweet potatoes can be produced all year round. Because complete crop failure as a result of unfavourable weather is rare; for this reason, it is known as a "insurance crop." The National Aeronautics and Space Administration (NASA) has selected sweet potatoes as a possible crop to be cultivated and used in astronaut meals on space missions due to their special qualities and nutritional value. In India, sweet potatoes are eaten in large quantities after being boiled, baked, or fried; in other countries, sweet potato flour is frequently used in cakes, biscuits, and puddings. Processing sweet potato tubers increases availability and reduces waste after harvest (Kulshrestha et al. 2018). Sweet potato flour, granules, and canned sweet potatoes are among the processed sweet potato goods. In addition to having a high calorie content, it is a good source of dietary protein, vitamins (B complex, vitamin C, and beta carotene), minerals, and trace elements (Kulshrestha et al. 2018).

Sweet potato

4. YAMS

Yams are monocotyledonous plants in the Dioscoreaceae family, which includes them as staple foods in tropical climates of the approximately 600 varieties of yams, six have major social and economic value as resources for food, cash, and healthcare. yams are said to have originated in Africa, Southeast Asia, and South America three tropical regions. Yams are usually served boiling, mashed, or in bits. In soups and stews, yam is usually used in chunks; mashed yam can be used as a thickening or cooked, then fried to make cakes. Yam tubers include vitamins including tocopherols and carotenoids as well as bioactive substances like mucin, dioscin, choline, polyphenols, and diosgenin. Healthy eyes, skin, hair, and bones are facilitated by the high concentrations of protein, fat, carbohydrate, calcium, phosphate, iron, and vitamin A found in yams. According to Ray (2015), pickles, deep-fried chips, cookies, roasted cubes, Payasam, Vada, Chutney, Cutlet, and Pakoda are some of the most popular yam value-added products among processors.

Yam tuber

NUTRITIONAL IMPORTANCE OF TUBER CROPS

People who eat cassava, sweet potatoes, yams, and aroids can readily cure the nutritional deficiencies, which are rich in Vitamin A, Vitamin C, calcium, and minerals. Tubers from cassava plays an important role in health aspects because of their high carbohydrate content, ascorbic acid (Vitamin C), and a few bioactive substances like hydroxycoumarins, non-cyanogenic glucosides, and cyanogenic glucosides, they play an essential function as a staple meal. B-carotene, ascorbic acid (Vitamin C), tocopherol (Vitamin E), dietary fibre, minerals, and bioactive substances including phenolic acids and anthocyanins—which also contribute to the development of the flesh's color—are significantly concentrated in sweet potato tubers, which have orange and purple flesh. The high concentrations of proteins, lipids, minerals, fibre, carbs, and other beneficial ingredients found in yam and aroid tubers make them highly valued. Because these crops are accessible to the impoverished, it is easy to establish the nutritional balance.

Food and Nutritional security

IFPRI's July 1999 IMPACT predictions indicate that there may be a rise in the global market for roots and tuber crops 37 percent from 1995 to 2020. It is anticipated that global demand for sweet potatoes and yams would rise by 30%, and cassava and other minor roots and tubers will rise by 49%. "Food security exists when all 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," the World Food Summit (1996) declared. This emphasises the interdependence of the terms "food security" and "nutritional security." Numerous nutritional conditions caused by insufficient amounts of calcium, vitamin C, and vitamin A could be readily treated by intake of root and tuber crops, such as aroids, sweet potatoes, cassava, and yams. Minerals and vitamins abound in root and tuber crops . While cereal-based meals which does not include vitamin C, ascorbic acid (found in cassava and sweet potatoes) and cooked yams comprise roughly 2% protein on average. Important amino acids are also present in sweet potatoes, although lysine is lacking in rice. Sweet potato roots and green tops with orange and yellow flesh are a strong source of vitamin A, which can help avoid night blindness and malnutrition.

Additionally, sweet potatoes are a great source of antioxidant-rich nutrients such as B-carotene, ascorbic acid (Vitamin C), and tocoferol (Vitamin E), which can help prevent cancer and coronary heart disease. The recommended dietary allowance (RDA) is 500 grams per head per day for root and tuber crops, which may be sufficient to meet this requirement.

CONCLUSION

Roots and tubers are a staple of the human diet and are recognised globally as having enormous potential, chief among them being the promise to provide food security to countless millions of underprivileged individuals with few resources. Even though these crops are typically linked to poverty, the poor are not the only people who can benefit from them. Tubers can be used as functional foods and ingredients in nutraceuticals to preserve wellbeing and lessen the effects of chronic noncommunicable diseases. However, Due to this, study on root crops is lacking in order to fully use their potential benefits, which have been shown to extend beyond the conventional and include use as a source for medicinal cures, among other things.

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