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Growing seed

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NUTRITION HEALTH BENEFITS AND ECONOMICS OF WATERMELON

Article Id: AL202120

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In recent years an increase in snacking has risen dramatically. Compared in previous years, customers are mindful of their health because of the heavy burden of non-communicable diseases such as obesity, diabetes, cancer and cardiovascular diseases (CVD). As a result, their understanding of food has progressed from being influenced solely by taste and appearance to recognizing the idea of optimum nutrition by avoiding nutritionally deficient foods.

Recent dietary guidelines to increase diet rich in natural antioxidants have created an interest in replacing energy-dense snacks per day with antioxidant fruits. This trend also creates demand in the food industry for the production of nutritious foods, preferably of natural origin, to satisfy the needs of consumers. Consumers are urged to snack on nutritious foods like fruit and vegetables, in this sense. Watermelon (*Citrullus lanatus*) is a quintessential exotic fruit stated to be beneficial to human health, containing nutrients and phytochemicals. It is a good source of vitamins B, C, and E and minerals like phosphorus, magnesium, calcium, and iron. Epidemiological studies have shown that it possesses antioxidants with anti-inflammatory, antihypertensive properties and a protective effect against toxicity caused by carbon tetrachloride

Background

Watermelon *(Citrullus lanatus)* is a member of the family Cucurbitaceae native to tropical Africa near the Kalahari Desert. Botanists refer to it as a "pepo," a fruit with a thick rind and a fleshy centre. It is commonly consumed as a refreshing summer fruit, much appreciated by consumers for its refreshing ability, attractive colour, delicate taste and high water content to quench the summer thirst. Watermelon's sweetness is due primarily to a

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mixture of sucrose, glucose, and fructose. Sucrose and glucose account in a ripe watermelon for 20–40 per cent and fructose for 30–50 per cent of total sugars.

Health benefits

The latest dietary recommendation to increase diet-rich intake of natural antioxidants has created interest in replacing energy-dense snack per day with antioxidant-possessing fruit. Watermelon juice and pulp contain considerable amounts of fibre and carbohydrates. Fibre plays a significant role in blood cholesterol, which helps in the prevention of large bowel diseases, while carbohydrates are the source of energy for the cells. Watermelon is a quintessential exotic fruit containing nutrients and phytochemicals which have been reported to support human health. It is a good source of B, C, and E vitamins, as well as minerals like phosphorus, magnesium, calcium, and iron. Watermelon has been identified as a good source of vitamin C (3.72 mg/100 g). Vitamin C also has the potential to cut off the blood supply to growing cancers and therefore inhibits cancer cell growth. Epidemiological studies have shown that it has antioxidants with anti-inflammatory, antihypertensive properties, and a defensive effect against toxicity caused by carbon tetrachloride. **Bailey *et al.*** found that supplementation with watermelon juice improves aspects of vascular health in an individual with hypertension.

All the biochemical processes that occur in the cells and organelles of our bodies maintain a stable and normal human body. Ijah *et al.* stated that an oxidation reaction in a human body contributes to the formation of free radicals. Free radicals are highly unstable atoms, ions, or molecules that interfere aggressively with other molecules, affecting the normal functioning of deoxyribonucleic acid (DNA) and cell membranes. The cellular redox cycle of free radicals and reactive molecules contributes to the development of reactive oxygen species (ROS), which as toxic as well as beneficial compounds, play a double role. In addition, chemical reactions, free radicals and certain redox reactions are a cause of oxidative stress of macromolecules in living cells. This results in damage to cellular components like lipids, DNA, and proteins. Disorders such as CVD, cancer, and neurodegenerative diseases arise from this degradation. CVD is estimated to be the largest cause of death in European countries; the number of deaths due to cardiovascular diseases is further expected to be around 23.6 million by 2030.

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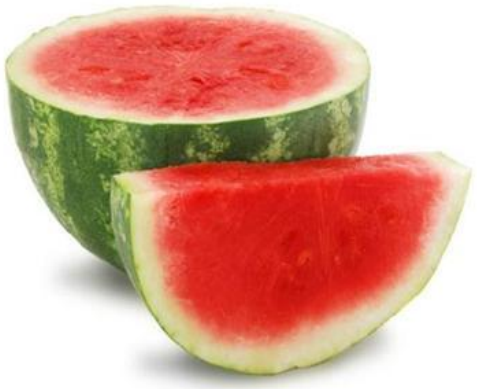
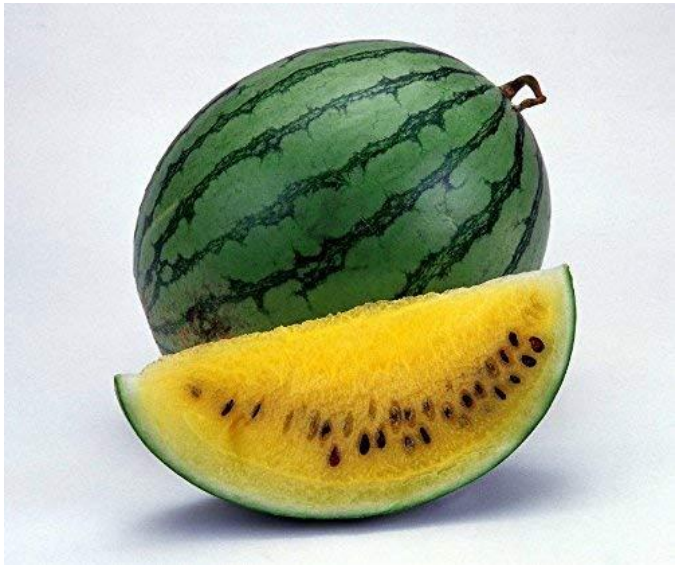
Economic

Marketing efficient distribution of watermelon [*Citrullus lanatus*] is required to optimize economic returns for marketers and consumers. Around January and February 2018, an economic study of watermelon marketing was carried out in Lagos State, Nigeria. Data were collected using a questionnaire to obtain information from 56 study area marketers. Half of the advertisers used urban markets as points of sale and were supplied regularly with watermelon. Marketing for watermelons has been successful. The main restriction marketers have faced their inability to access credit. Regardless of educational level, ample consumer knowledge improved the economic returns of watermelon marketers.

Figure 1. Images of different watermelon cultivars.





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Conclusion

In recent years snacking has become a phenomenon among consumers. Together with unhealthy lifestyles, these snacking trends may promote the formation of ROS and free radicals which lead to non-communicable diseases. Also, the quality parameters have the ability to promote the body's own natural healing process, playing a role in both the prevention and the amelioration of various diseases by suppressing the free radicals, decreasing oxidative stress leading to decrease in the risk of chronic diseases such as cancers, hypertension, diabetes, skin problem, CVD, and asthma. As a result, it is recommended to replace energy-dense foods with fruits. Because of the important nutritional parameters,

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snacking 1 cup/152 g of watermelon juice per day over a lifetime will help to preserve good health and avoid potential ailments.

Reference

Athens F. (2006) Commercial watermelon production. Extension service, University of Georgia, College of Agriculture.

Choudhary, B. R.; Haldhar, S. M.; Maheshwari, S. K.; Bhargava, R.; Sharma, S. K. Phytochemicals and Antioxidants in Watermelon (*Citrullus Lanatus*) Genotypes under Hot Arid Region. *Indian J. Agric. Sci.* 2015, 85, 414–417.

Choudhury B. (2000). Vegetable production, National Book Trust pub. New Delhi, 2000, 150-151.

Elumalai, M.; KArthika, B.; Usha, V. Lycopene- Role in Cancer Prevention. *Int. J. Pharm. Bio. Sci.* 2013, 4, 371–378.

Feher T. (1993) Watermelon: Citrullus lanatus (Thumb) Matsun and Nakai B. O. Pergamum Press, Oxford, UK.

Kyriacou, M. C.; Leskovar, D. I.; Colla, G.; Rouphael, Y. Watermelon and Melon Fruit Quality: The Genotypic and Agro-Environmental Factors Implicated. *Sci. Hortic.* 2018, 30, 8–12.

Lacier, G. and Plummer, R. (2003) Vegetables and melons Outlook Report from the Economic Research Services USDA, VGS-296, April 13.

Naz, A.; Butt, M. S.; Sultan, M. T.; Qayyum, M. M. N.; Niaz, R. S. Watermelon Lycopene and Allied Health Claims. *Excli J.* 2014, 13, 650–666.

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NUTRITIVE VALUES OF WILD EDIBLE SPICES CONSUMED BY THE KHASI TRIBES OF INDIA

Article Id: AL202121

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The clearest way into the universe is through a forest wilderness. The absence of plants is another name of death not only for human but for the whole earth. Humans dependency on plants can be seen from the prehistoric ages. And in a country like ours, you can find hundreds of tomes related to plants. About 300 of the world species are found in die rich for stand, garden & nurseries of Meghalaya. Pari Passuthe highest number of orchid species is located in Mawsmai & Mawmluh. In route to Cherrapunji, the forest at Sohra is a botanist paradise.

Meghalaya is comprised of the South Garo Hills, West Garo Hills, East GaroHills, West Khasi Hills, East Khasi Hills, Ri-bhoi and Jaintia Hills districts lying between 25°47" – 26°10" N latitude and 89°45" – 92°45" E longitude and covers an area of 22,549 km2. The area is bounded on the North, East and West by Assam and on the South by Bangladesh. The Khasis, Jaintias and the Garos are a *Paleo-Mongoloid* people who were said to be one of the earliest waves of the Mongolian invaders.

The State possesses a great plant wealth that is yet to be fully utilized on a commercial scale. Such utilization could accrue abundant benefit to the farmers of the region. In fact, the region has great potential for the plantation of medicinal plants because of ideal agro-climatic conditions and suitable soil. Nature, in its generous abundance, had bestowed on Meghalaya a unique array of vegetation, ranging from tropical and subtropical to temperate or near temperate. The present study was conducted with an aim to enumerate wild edible plants used by the *Khasi* tribes of Meghalaya. This is an effort to provide baseline data that can be helpful in ensuring sustainable utilization

of wild edible fruits of Meghalaya.

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1. **Drumstick- (*Moringaoleifera*)**

Family - Moringaceae

Local name in Khasi-Diengtoh

Parts Use- Flower and Leaves.

It is one of the most useful tropical trees. Its leaves contain prosperous and essential rich disease-preventing nutrients for people of all the ages. Its leaves are edible like spinach and commonly cooked well for making soups and salads. It contains a huge load of the vitamin. A, C, calcium and which is more than the products these are known for a like carrot for Vitamin A orange lemon for vitamin C etc.

It is rich in phytosterols like stigmasterol sitosterol act as for hormones required for reproductive health. Due to known for all properties, it's like the Miracle tree.

Nutritive and Medicinal properties-

I. As it is planted full of important nutrient and anti-nutrient, but its leaves are a rich source of mineral listed Ca, K, Zn, Mg, Fe, Cu, Fiber, Proline.
II. Vitamins Like A, B, C, D and mainly E is found.
III. Phytochemicals like tannin, sterol saponins are also found.
IV. It Contains properties like anti-cancerous anti-diabetic, mainly it also cures used in the treatment of disease like AIDS as gives boosting to the immune system of HIV^{+ve} in dividable.
V. Shortly it can be used to cure more than 300 diseases.

Commercial Application-

i. Seed of Moringa are used to extract oil is known as bem oil is a source of oleic acid to tocopherols, sterols. This oil can be used for cooking, other than that also use a perfume by perfume industries and for lubricate too.

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ii. Its seed also has a prominent coagulant property as the certain cationic protein that can clarify turbid water.

2. **White Jute (*Corchoruscapsularis*)**

Family-Malvaceae,

Part Use- Leaves

It is the one of the sources of jute fibres considered to be finer quality than *Corchorusolitorius*another species of it. The leaves, fruits and roots of this used as traditional medicine beside its leaves are also used as a foodstuff, as a salad, older leaves are cooked as potherb which is rich in proteins amazed to know that even its dried leaves also can be used as a thickness of soups for making tea. It's an incredible ingredient for hair and skin problems.

Nutritive and Medicinal properties

I. The leaves of *C. capsularis* are rich in beta carotene, Ca, and Vitamin C. It is an anti-oxidants active plant with a significant alpha-tocopherol equivalent to Vitamin E.
II. As it leaves used as vegetable which are very helpful in protection from chronic diseases like heart disease, cancer Diabetes, hypertension as well.

Other Benefits and use

I. Leaves are appetizing, as an aid to digestion as laxative, stimulants.
II. Leaves also play a role in reducing fever, liver disorders as well.

Commercial Application

i. A rich, valuable fibre is obtained from stem for remarkable strength.
ii. Use by industries for making gunny bags, ropes and carpets.
iii. The pith leftoure after extraction of fibre is used by the paper industry and in preparation of alcohol.

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iv. Use by skincare and hair care industries as well

3. Curry leaves (*Murrayakoenigii*)

Family- Rutaceae,

Parts use- leaves

It is the very commonly seen use in every Indian kitchen. Known for great flour to the curries leaves are used in aromatic and the fruits of it is a component of dessert in some eastern nation.

It also has medicinal and healthcare purpose product in rural and tribal areas. It is important to tribal communities. Its leaves are commonly known as curry leaves or sweet neem leaves. It is an impotent herb in Ayurveda and Siddha medicine. Here they believe to poses anti-disease properties.

Nutritive and medicinal properties-

I. The leaves contain anti-inflammatory, anti-amnesic memory enhance, fungal, anti-oxidants, skin pigmentation cures, anti-ulcer, anti-diabetic.
II. Use in Tonic, stomachic, internally in vomiting.
III. Role in cure piles, itching etc.
IV. Heal wounds and burns
V. Very rich in source or protein and beta carotene. So use to reduce hair loss by various industries or directly
VI. Good for eye sight.

Commercial application

i. Its oil is found to be used in cure the diabetes
ii. Volatile oil of it use a fixative for soap and perfume.
iii. Add an effective flavor in curries, pickles, soups and chutney.

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4. Culantro (*Eryngiumfoetidum L*)

Family- Apiaceae

Local name in Khasi- Dhonia Khlaw

Parts use- leaves

It is the tropical herb which is commonly known as by different name like long coriander, maxi coriander, false coriander, fitweed etc. sometimes it is used as a substitute for coriander, has a much stronger taste. Leaves can be cooked or steamed and served with rice. It is an important medicinal herb having various medicinal properties which is very effective in chickenpox and measles well a spice plant with huge important cultivated in India, Vietnam and Australia etc.

Nutritive and Medicinal properties

I. Leaves contain 86-88% moisture, protein, fat, carbohydrates and very important leaves are excellence source of vitamin A
II. It has been used in traditional medicine in various tropical region to treat burns, fever, hypertension, constipation, asthma, stomachache, worms, infertility complication, snake bite, diarrhea, malaria.
III. It is also having anti cancerous, anti-diabetic and anti-viralproperties.
IV. Boiled water of it leaves use as herbal bath for chicken pox measles.
V. Oil is also extracted from seed of E. fortidum for various other uses.

Commercial applications-

i. It is use a flavor/ fragrance agent is market.
ii. Use is various restaurants over soups and garnishing.
iii. Use for the various medicinal purpose by pharma industries

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iv. Having important volatile compound is a significant item perfume is cosmetic industries.

5. Chameleon Plant (*Houttuyniacordata*)

Family - Sauruaceae

Local Name in Khasi- Jamyrdoh

Parts use - Fruit & Leaves

Ho*uttuyniacordata*, also known as fish mint, fish leaf, rainbow plant, heartleaf, fish wort, or Chinese lizard tail, it is an edible as well as a medicinal herb with an aromatic smell which has long been used in Asia to treat pneumonia, hypertension. It is a leaf vegetable which is commonly known as fish mint or fishy" *H. cordata* is commonly seen in salad, salsa, cooked with other vegetable and garnish various dishes leaves of *H. cordata* have a delicious orange like smell and make a marvelousflavor to the salad.

Nutritive and Medicinal Properties

I. Externally it is use for the treatment of snake bites and skin disorders. Internally to treat ailments like cancer, cough, dysentery, enteritis and fever.
II. Juice of leaves of it uses to cure blood deficiency and blood purification.
III. Plant has anti-bacterial, anti-inflammatory anti-viral diuretic and women's complaints/ disease properties.
IV. And effective substance obtained from it is used in the treatment of stomach ulcer.

Commercial Application

i. Used as medicine by pharma industrious in various processes.
ii. Use in skincare treatment and in cosmetics
iii. Use in salad, chutney and as garnishing

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iv. Raw material is also used directly for eating and treatment purpose and dishes as well.

Conclusion

The examination demonstrated that this wild-consumable plants gathered from Meghalaya state in India are wealthy in protein, fat, sugar, and fibre and could give fundamental supplements required to keeping up ordinary bodywork. The dietary properties of these plants were additionally all around looking at and furthermore here and there superior to the basic vegetables. These wild species were likewise discovered an altogether valuable wellspring of different minerals. The minerals, especially Na, K, Ca, Fe, Cu, Mg, and Zn, were available in obvious amounts.

References

Seal T, Chaudhuri K and Pillai B. (2018),A rapid high performance liquid chromatography (HPLC) method for the simultaneous estimation of water soluble vitamin in ten wild edible plants consumed by the tribal people of North‐Eastern Region in India. *Pharmacogn Mag*;14:572‐7.

Tapan Seal, Kausik Chaudhuri1, Basundhara Pillai1, ShrabanaChakrabarti, BiswajitAuddy and TanmoyMondal, (2020),Wild- edible plants of Meghalaya State in India: Nutritional, Minerals, Antinutritional, Vitamin Content and Toxicity Studies, *Pharmacogn. Mag.*157.40.183.53.

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IS ACHIEVING ZERO HUNGER BY 2030 APPROACHABLE? *A CRITICAL ROLE OF AGRICULTURE AND ALLIED SECTORS*

Article Id: AL202122

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To have access to safe food is a human right". Although there are enough food, knowledge and resources for all, every ten seconds, a child dies of hunger, and according to WHO (2020) estimates 690 million people went hungry in 2019. The more hunger and malnutrition increases as seen in the post-pandemic scenario, achieving the goal zero hunger by 2030 seems to be unreachable(UN report). So the sensible way to cater to this problem could be to provide nutritious diets/ food in the form of innovative nutrition and health programmes to the billions saving, in turn, trillions of expenditure on health. The number of vulnerable populations suffering from hidden hunger (micronutrient deficiencies) is increasing at an alarming rate every year and has reached more than 2 billion residing mostly in poorer countries. This is caused by a lack of critical micronutrients like vitamin A, zinc, and iron in the daily diet. Hidden hunger impairs the mental and physical development of children and adolescents and can result in lower IQ, stunting, and blindness; women and children are especially vulnerable. Among adults, it has severe effects on productivity, work, mental wellbeing and physiological conditions.

Asia (381 million) and Africa (250 million) remains to be the home for the greatest number of undernourished in the world. The major reasons are the high cost of nutritious foods and low affordability of healthy diets for the vast majority of populations living in these continents. The current scenario of COVID-19 pandemic is further intensifying the vulnerabilities and inadequacies of global food systems affecting all the activities related to the production, distribution and consumption of food globally. It is estimated that at a minimum, another 83 million people, and possibly as many as 132 million, may go hungry in 2020 as a result of the economic recession triggered by the pandemic.

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What options are available in Current Scenario?

Multiple options like food supplements, such as micronutrient-rich capsules or food products fortified during processing exist, but the low purchasing power of the poor, lack of better infrastructure, efficient technology, and a reliable distribution system makes it an unattainable option. Implementation of efficient information, education, and a communication program motivating consumers to change their food habits in favour of nutrient-rich foods may also be an option, but this is costly and time-consuming. Consumption of diversified diets may appear to be another sustainable option to control malnutrition, but this doesn't seem to be possible in the short term as it will require a change in people's food habits and preferences.

Improving Nutrition through Biofortification

The main source for food production is agriculture, that is where from we get nutrients necessary for a healthy life, but agricultural policies and technologies have focused mostly on improving profitability at the farm and agro-industry levels rather than improving nutrition status of the population. With the increasing prevalences of hidden hunger, there is a growing interest in the role agriculture plays in improving nutrition, in particular by paying more attention to the nutritional quality of food. Biofortification seems to be a potential way. It is a scientific method for improving the nutritional value of foods already consumed by those suffering from hidden hunger. Agricultural breeders have a major role in providing the common populations with the availability of improved crops (seed, tuber, or roots, for example) with increased nutritional value. Malnourished communities receive these biofortified crops to grow and eat through several community development programmes. If available and consumed regularly, our body gets higher amounts of essential micronutrients, but it also depends upon the level of absorption of our bodies. With a one-time R&D investment, biofortified seeds could spread through the existing seed distribution systems.

Government initiatives, like the Pradhan Mantri Matru Vandana Yojana maternity benefits program, POSHAN Abhiyan (National Nutritional Mission), and other schemes, namely, the Integrated Child Development Services, Mid-Day Meal Scheme, and the National Food Security Act are well-intentioned and have been able to provide food to people to survive. However, the recent GHI ranking of India shows that providing just-food is not

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enough, rather we need to cater and solve the issue of hidden hunger. Here, biofortification offers a reasonable option to deal in such a situation

Process of Bio Fortification

Plant breeders explore the full spectrum of crop genetic diversity, especially seed banks, to first identify nutrient-rich germplasm, or lines, of food crops that can be used to breed more nutritious varieties. However, the whole process requires the involvement of experts from multiple fields. Nutritionists must determine the additional amount of a nutrient a food crop must provide to measurably improve nutrition when that crop is harvested, processed or cooked, and eaten. To do so, nutritionists must account for

1. Nutrient losses after the crop is harvested (nutrients can degrade substantially during storage, processing, or cooking).
2. The amount of the nutrient that the body actually absorbs from the food (bioavailability).
3. The amount of staple food actually consumed on a daily basis by age and gender.

Advantages of Bio-fortification

Dietary diversity is an ultimate long-term solution to minimizing hidden hunger. Biofortification can be effective in reducing hidden hunger as part of a strategy that includes dietary diversification and other interventions such as supplementation and commercial fortification. Biofortification has four main advantages when applied in the context of the poor in developing countries.

1. First, it targets the poor who eat large amounts of food staples or starchy foods daily.
2. Second, biofortification targets rural areas where the majority of the poor live mostly as subsistence or smallholder farmers, or landless labourers. Despite urbanization and income growth associated with globalization, diets of the rural poor are still heavily based on the staple and starchy foods like cereals and tuber crops in many regions. Expected increases in food prices, exacerbated by climate change, are likely to increase this reliance on staple foods.

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3. Third, bio-fortification is cost-effective. After an initial investment in developing biofortified crops, those crops can be adapted to various regions at a low additional cost and are available in the food system, year after year.
4. Fourth, because this strategy relies on foods people already eat habitually, it is sustainable and later on the developed seeds, roots, and tubers can usually be saved and shared with others in the farming communities. Once the high-nutrition trait is bred into the crops, it is fixed, and the biofortified crops can be grown to deliver better nutrition year after year—without recurring costs.

Biofortification: Limitations and Challenges

It is promising but still possesses certain limitations and challenges as well.

1. First, biofortification requires a paradigm shift. Agricultural scientists need to add nutrition objectives to their breeding programs, in addition to standard goals such as productivity and disease resistance and work closely with Nutritionist. Health care professionals also need to accommodate agriculture-based approaches to clinical interventions and increase their collaboration with agricultural experts.
2. Second, biofortification will be widely adopted only when proponents show these new foods improve nutrition. Most biofortified crops are still in the development pipeline. However, one biofortified staple food crop that has been successfully released is the orange (or orange-fleshed) sweet potato. As more crops will be released, nutritionists will be able to build a body of evidence that biofortification is the viable agriculture-based intervention to improve nutrition.
3. Third, the amounts of nutrients that can be bred into these crops are generally much lower than that can be provided through fortification and supplementation. However, by providing 30–50 per cent of the daily nutrient requirement, biofortified crops can significantly improve public health in countries where hidden hunger is widespread.
4. Fourth, nutritionists now focus on the -9-to-24-month age group, when micronutrients are crucial for healthy development. Infants consume relatively low amounts of staple foods and yet have relatively higher micronutrient requirements, making bio fortification's contribution to micronutrient adequacy in this group limited. There are exceptions; due to particularly high vitamin A

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content of many OSP varieties, regular consumption of these by the mother could contribute substantially to vitamin A intakes of breastfed children (6–23 months of age).

Conclusion

Innovation and investment are the main tools to address the three main challenges (wastage, sustainability and nutrition) of today's food industry in feeding the populations of future and approach towards the goal of zero hunger. Upcycling food waste, application of supply chain technologies (shelf life extension, use of food additives), digital land mapping, biological and microbial-based solutions for sustainability, personalised nutrition, production of healthier food products biofortification and proper food distribution mechanism if worked upon altogether has a potential to mould our agricultural system towards nutrition adequacy which eventually leads to healthier populations.

References

Bouis, H.E & Islam, Y (2020). .Biofortification: Leveraging Agriculture to Reduce Hidden Hunger. CONFERENCE BRIEF. *IFPRI*. http://2020conference.ifpri.info/

Bouis, H.E & Welch, R. M. (2010). Biofortification—a Sustainable Agricultural Strategy for Reducing Micronutrient Malnutrition in the Global South. *Crop Science*, 50(2), S-1–S-13.

Meenakshi, J.V., Johnson, N. L., Manyong, V. M., DeGroote, H., Javelosa,J.,. Yanggen D. R., Naher, F., Gonzalez, C., García, J. & Meng, E. (2010). How Cost-Effective is Biofortification in Combating Micronutrient Malnutrition? An Ex Ante Assessment. *World Development*, 38(1), 64–75.

WHO (2020). The State of Food Security and Nutrition in the World 2019: Safeguarding against Economic Slowdowns and Downturns. *Report*.1, 23-86.

UN News (2020). https://news.un.org/en/story/2020/07/1068261

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ECONOMICS RELATED TO TEA (*Camellia sinensis*) SECTOR- AN OVERVIEW

Article Id: AL202123

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Tea is one of the world's hottest beverages. It is known as the queen of beverages and is an evergreen perennial crop. All over the world Tea is grown in more than 32 countries covering an area of more than 2.5 million hectares. In 2017 India's share in world tea exports was 12.9 percent (203.86 million kg) out of the total export of 1578.56 million kg (Tea Statistics, Tea Board India, 2018). The major tea growing areas in India are concentrated in Assam, West Bengal, Tamil Nadu and Kerala. Other areas where tea is grown to a small extent are Karnataka, Tripura, Himachal Pradesh, Uttaranchal, Arunachal Pradesh, Manipur, Sikkim, Nagaland, Meghalaya, Mizoram and Bihar. Assam is the largest producer of quality tea in India, contributing about 51.90 percent of the country's total tea production. During the year 2017, out of a total area of 480.20 thousand ha and production of 983 million kg, Assam alone accounted for 282.10 thousand ha of area and 657.24 million kg of production, constituting 58.72 per cent and 56.11 per cent of area and production respectively (Tea Statistics, TeaBoard India, 2018). The area, production and productivity of tea in different states of India are given in Table 1

Table 1: Area, production and productivity of tea in different states of India (2016 -17)

Sl. No.	State	Area ('000 ha)	Production (m kg)	Productivity (kg/ha)
1	Assam	282.10 (58.72)	657.24 (56.11)	2330
2	West Bengal	115.08 (19.80)	236.39 (23.98)	2059
3	Tamil Nadu	80.46 (13.90)	160.51 (16.29)	1998
4	Kerala	37.15 (6.45)	55.98 (5.68)	1506
5	Tripura	8.98 (1.55)	7.86 (0.80)	877
6	Bihar	2.01	1.08	548

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		(0.35)	(0.12)	
7	Uttaranchal	1.57 (0.31)	0.25 (0.03)	146
8	Himachal Pradesh	2.35 (0.39)	0.77 (0.11)	329
9	Manipur	1.32 (0.21)	0.12 (0.02)	82
10	Sikkim	0.19 (0.04)	0.08 (0.009)	423
11	Arunachal Pradesh	2.57 (0.45)	5.84 (0.62)	2273
12	Nagaland	1.89 (0.40)	0.19 (0.01)	100
13	Meghalaya	0.56 (0.11)	0.25 (0.03)	459
14	Mizoram	0.65 (0.12)	0.07 (0.007)	115
15	Orissa	0.21 (0.05)	NA	NA
16	Karnataka	2.14 (0.37)	5.18 (0.51)	2423
	Total	**480.20 (100)**	**983.00 (100)**	**995**

Source: Tea Statistics, Tea Board India, 2018

Figures in the parentheses indicate percentages

The tea industry is an important foreign exchange earner and provides a sizeable amount of revenue to the state and central exchequers. India exports around 180 million kg of tea every year. Total net foreign exchange earned by the Indian Tea Industry per annum is around 1847 crore (Tea Statistics, Tea Board India, 2017). For this economic study, the cost of cultivation of tea leaf and value chain aspects have been considered.

Cost of cultivation

An attempt was made to work out establishment cost incurred in setting-up of a tea plantation. The analysis revealed that for lower-small, medium-small and higher-small tea growers, there were Rs. 166968.14, Rs. 213965.24, and Rs. 223473.87 per hectare, respectively. Out of the various cost items, the cost of planting materials or cuttings (Rs. 77741.00 per hectare) occupied the first rank, and it alone contributed for 38.58 per cent of the total establishment cost. Next in importance was charged for hired human labour, which amounted to Rs. 30696.68 per hectare and its share in total establishment cost was 15.23 per cent. Cost of irrigation pump set occupied the third rank, and it constituted 13.38 per cent

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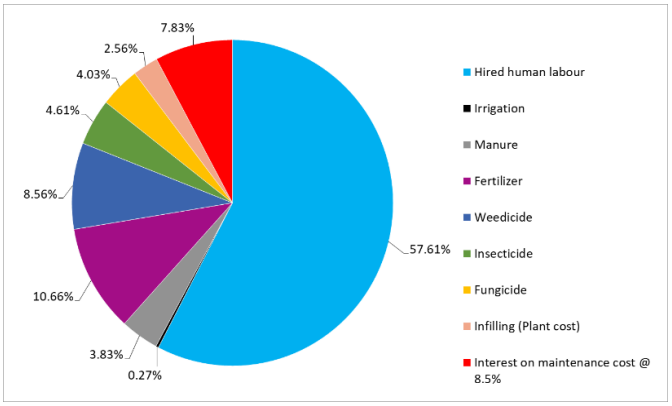
(Rs. 26966.66 per hectare) of total establishment cost. Cost of weedicides was another important item of cost, occupying the fourth rank, and it constituted 13.13 per cent of total establishment cost. The sample tea growers had to spend a substantial amount (Rs. 9035.35 per hectare) on purchase of insecticide which was considered essential for the development of healthy tea plantation and accounted for 4.48 per cent of total establishment cost. Organic mulch in the form of water hyacinth, shade plants, manures, fungicides, et cetera were other less important items of expenditure in total establishment cost (Fig 1).



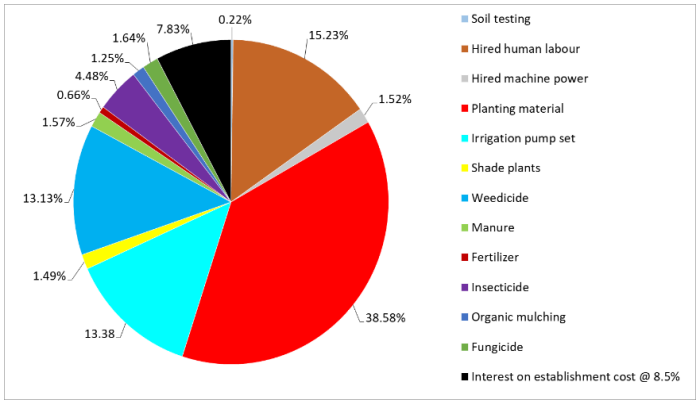


Fig 1: Share of different items to total establishment cost Fig 2: Share of different items to total variable cost

The total variable cost involved in running a small tea plantation amounted to Rs.138551.14 per hectare. Out of this, charges for hired human labour were Rs. 79823.95 per hectare. Hired human labour alone accounted for more than fifty per cent (57.61 per cent) of the total variable cost. It emerged as the most important item of variable cost. The cost of fertilizer was Rs. 14773.13 per hectare and was next to charges for hired human labour. It constituted 10.66 per cent of total variable cost. It was closely followed by an interest in maintenance cost, which was estimated at Rs. 10854.24 per hectare constituting 7.83 per cent of the total variable cost. The cost of weedicide occupied the third position in order of importance. It amounted to Rs. 11861.51 per hectare and its share was 8.56 per cent in the total variable cost. Some not so important items of variable cost were the cost of insecticide, cost of fungicide, cost of manures, et cetera (Fig 2).

The total fixed cost involved in running a tea plantation amounted to Rs. 7054.74 per hectare. Establishment cost alone accounted for more than half of the total fixed cost, i.e., Rs. 4029.38 per hectare (57.12 per cent). It was the most important item of fixed cost.

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Depreciation on implements and machinery was estimated at Rs. 2289.40 per hectare and was next to charges for establishment cost. It constituted 32.45 per cent of total fixed cost. Interest on fixed capital was also a substantial amount with a share of 9.90 per cent among various items of fixed cost. It was followed by land revenue, which was estimated at Rs. 36.84 per hectare constituting 0.52 per cent of total fixed cost.

The examination of efficiency parameters of tea cultivation indicated that yield (tonne per hectare), gross return (Rs. per hectare), net return (Rs. per hectare), benefit-cost ratio and cost of production of green tea leaves (Rs. per tonne) per hectare of tea plantation were 28.59, 483639.68, 338033.80, 3.30 and 16916.39 respectively.

Value chain analysis:

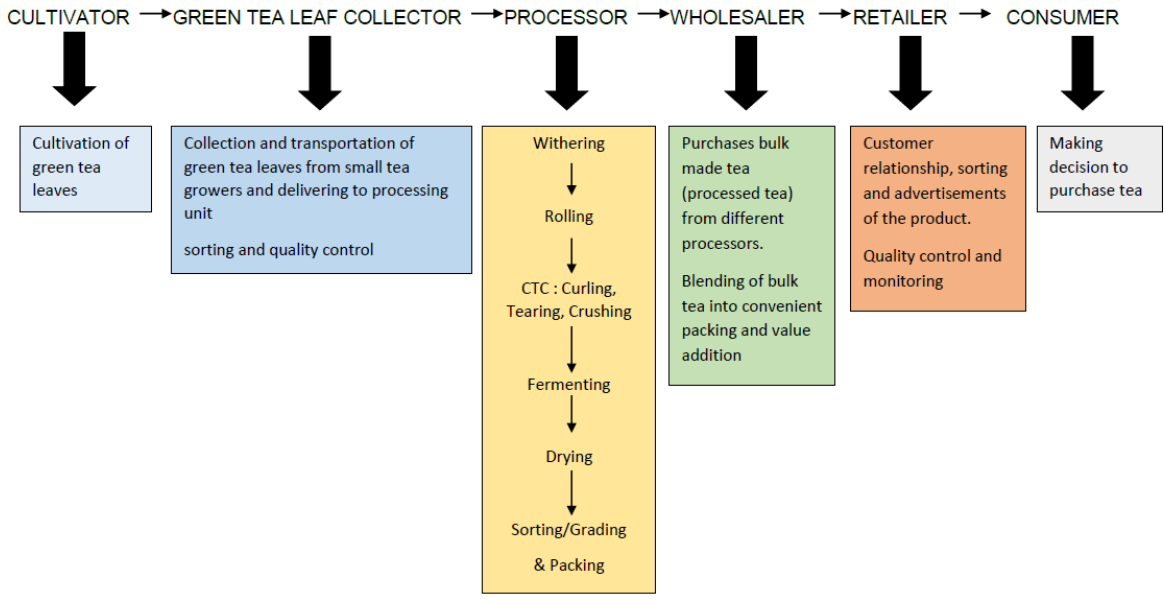

Fig 3: Role of different actors in the tea value chain

The analysis of value chain in tea production revealed that the highest value addition took place at Industry level, where the cost of value addition was Rs. 129.18 per kilogram followed by wholesalers (Rs.35.92 per kilogram), retailers (Rs. 17.80 per kilogram) and green leaf collector (Rs. 3.20 per kilogram). The reason for highest value addition at industry level was that the processors had to bear the cost of electricity, firewood, repair of machines, generator and lorry maintenance, taxes, wages, packing, brokerage, loading and unloading, warehousing and agent's commission. For producing 1.00 kilogram of made tea, processors had to buy 4.00 kg of green tea leaves. In that way, the cost at processing unit became very

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high. The analysis also revealed that the net income of small tea growers and green leaf collectors was Rs. 2.63, Rs. 1.86 per kilogram of green tea leaves respectively and for processors, wholesalers and retailers it was Rs. 20.00, Rs. 2.50 and Rs. 4.00 per kilogram of made tea, respectively.

Conclusion

The study reflects that tea cultivation is labour intensive practice and it contributes more than 50 per cent to the total establishment cost, and when we focus on variable cost; it shows that cost of fertilizer plays an important role. In value chain analysis, it is clear that producers price in consumers rupee is very very less, and the maximum profit gainer is the processor. Therefore, some policies are required for the betterment of tea grower in terms of both cost of cultivation and value chain

- Policies should be formulated to supply plant protection chemicals, fertilizers, machinery and implements to the small tea growers at subsidized rates through the State Agriculture Department.
- The government should also announce the minimum support price for tea like other commercial crops.
- Financial assistance and credit facilities should be provided by the government to the small tea growers to establish tea processing plants on a co-operative basis or under private ownership.
- The small tea growers should come forward collectively to form co-operatives and thus make their smaller lots into a bulk so that they can realize the remunerative prices for their produce.
- The small tea growers should provide higher wage rate to the workers during the peak plucking season to maintain the plucking intensity. Otherwise, the workers could move to the large tea estates.

References

Abdul, H. (2007). Study on cost of production, pricing of green leaf, and the relationship of small tea growers (STG) with bought-leaf factories (BLF) and auction centres. Sustainable Livelihood for Small Tea Growers and Workers in India, Centre for Education and Communication (CEC):1-33

Volume 2 – Issue 12
Online ISSN: 2582-368X
www.agriallis.com

Adhikari, K.B., Regmi, P.P., Gautam, D.M., Thapa, R.B., and Joshi, G.R. (2017). Value chain analysis of orthodox tea: evidence from Ilam district of Nepal. *Journal of Agriculture and Forestry University*, 1:61-68

Arya, N. (2013). Indian tea scenario. *International Journal of Scientific and Research Publications*. 3(7):1-10.

Borah, K and Das, A. K. (2015).Growth of small tea cultivation and economic independence of the indigenous people of Assam. *International Journal of Research in Social Sciences and Humanities*. 1(5).82-93

Directory of small tea growers of Assam. Department of Industries & Commerce. Government of Assam. 1:1-552

Government of Assam. Sonitpur district. www.sonitpur.gov.in/

Indian Tea Association. An institute of Trust and Assurance. www.indiatea.org

IndiaAgronet.com. Tea plantation guide | Tea cultivation. www.indiaagronet.com>tea

IndiKosh. Sonitpur. www.indikosh.com/dist/300966/sonitpur

Tea Board India (2001) Under Ministry of Commerce & Industry. Government of India. www.teaboard.gov.in

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ROLE OF PHYTOBIOTICS IN AQUACULTURE

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Phytobiotics can be regarded as plant-derived products added to feed in order to enhance performance in aquatic species. Mostly leaves, roots, tubers or fruits of herbs, spices and other plants can be used as pytobiotics. They are generally used to enhance better growth performance in shrimp and fish culture.

Aquaculture is the major contributor towards fish supply as production from marine capture fisheries is almost stagnant over recent years. Now a day's intensification of aquaculture in terms of increasing stocking density, excess feed utilization caused to lead stress in aquatic organisms, which ultimately lead to suppressing the immunity and growth of the organisms. Till now, chemotherapy is the major option for the prevention and treatment of aquatic diseases. However, a chemical drug has several showed negative impacts on the environment as well as a human in several pieces of literature. Antibiotics and their residues have a negative role in the aquatic system because most of the bacterial strains are developing drug resistance in the environment. Hence, in recent years, attention is given towards eco-friendly and sustainable methods of aquaculture disease management practices.

So to overcome the above problem, stimulation of the non-specific immune system is a superior choice available for enhancing the immunity as well as growth performance of cultured organisms. Bioactive compounds are rich in phytobiotics, which can act as immune stimulants. Moreover, they are a new frontier area of aquaculture, and there is an underlying need to obtain a clear and direct dose-dependent stimulatory effect on the immune system, physiology of the organism and growth.

Functions

1) Increase the activity of phagocytic cells and increase their bactericidal activities.

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2) It triggers natural killer cells, complement activity, proliferate lymphocytes, lysozyme and antibody responses of fish and shrimp.
3) Mainly it shows a positive effect on aquatic organisms

Phytobiotics as therapeutics in aquaculture

1) Alternative to chemical drugs it shows better disease management and eco friendly to nature.
2) Majorly plant origin is mostly using in aquaculture to activate appetite, antiviral, antibacterial and anti-parasitic agent in aquaculture.
3) Bioactive compounds such as phenols, sulphur, terpenoids, alkaloids, flavonoids, and saponins are present in plant origin, which are commonly used as phytobiotics.
4) Several kinds of literature have been reported to assess the effect of dietary algal derivatives; herb and plant extract on fish health.
5) However, there is still a lacuna between the method of herbal extract preparation in a different method, administration route and their long-term effects on fish physiology. Recently increased consumer preferences on organic food products over recent years underlined the possibilities of phytobiotics in aquaculture.

Table 1: List of herbs can be used as therapeutics in aquaculture

SL. No.	Herbs (Scientific Name)	Common Name	Properties
1	Allium sativum	Garlic	Antibacterial, Antiparasitic.
2	Zingiber officinalis	Ginger	Antistress, Growth promoter, Antibacterial
3	Ocimum sanctum	Tulsi	Appetite stimulation, Growth promoter, Antibacterial,
4	Aloevera	Aloe	Antibacterial
5	Azadirachta indica	Neem	Antibacterial, Antifungal, Antiparasitic
6	Piper longum	Long pepper	Growth promoter, Antiparasitic

Potential of phytobiotics in aquaculture

Plants extracts have been used to have a variety of properties such as like anti-stress, growth promotion, appetite stimulation, immune system enhancement, bloodstock

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maturation, aphrodisiac and antipathogenic due to the presence of various bioactive substances such as alkaloids, terpenoids, tannins, saponins, glycosides, flavonoids, phenolics, steroids and essential oils.

Moreover, phytotherapies are cost-effectiveness, environment friendly and more eco-friendly than synthetic molecules and are less likely to elicit drug resistance, because of more diversified compounds presences in plant extracts then chemicals drugs.

Conclusion

Various parts of herbs, the extraction method and the concentration of the extracts can show possible influence on the health, growth and reproductive ability of the cultured organisms. There is less risk in preparation of the plant extract, concentration and administration of herbal extracts, previous studies have noted the multiple activities and potential application of herbal extracts in aquaculture. In another study, the intraperitoneal injection has been showing to be the most efficient way of administration. Furthermore, it is much expensive and can also activate stress responses in fish. Finally, administration through oral route seems to be the most suitable way in aquaculture practices. Furthermore, It is evident that the application of herbal extract is favourable in different aspects of aquaculture, including disease prevention, treatment and stimulating the growth performance in fish and shrimp species. However, it is important to conduct various research in vitro and in vivo experiments to have clear knowledge. Furthermore, the dose-dependent action against different pathogens, physiological functions and different bioactive compounds and their mode of action and possible residual action is also needed to be understood.

References

Ahilan B, Nithiyapriyatharshini A, Ravaneshwaran K. (2010) Influence of certain herbal additives on the growth, survival and disease resistance of goldfish, Carassius auratus (Linnaeus). *Tamilnadu Journal of Veterinary and Animal Sciences*.; 6(1):5-11.

Chakraborty SB, Hancz C. (2011) Application of phytochemicals as an immunostimulant, antipathogenic and antistress agents in finfish culture. *Reviews in Aquaculture*.; 3(3):103-119.

Citarasu T. Herbal (2010) biomedicines: a new opportunity for aquaculture industry. *Aquaculture International*.; 18(3):403-414.

Volume 2 – Issue 12
Online ISSN: 2582-368X
www.agriallis.com

DADF. Annual Report (2016). Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, Government of India. Krishi Bhavan, New Delhi, 2016.

FAO. The State of World Fisheries and Aquaculture (SOFIA) (2014). Food and Agriculture Organization, Rome, Italy.

Musa N, Wei LS, Seng CT, Wee W, Leong LK. (2008) Potential of edible plants as remedies of systemic bacterial disease infection in cultured fish. *Global Journal of Journal of Entomology and Zoology Studies* ~ 1427 ~ Pharmacology.; 2(2):31-36.

Reverter M, Bontemps N, Lecchini D, Banaigs B, Sasal P. (2014) Use of plant extracts in fish aquaculture as an alternative to chemotherapy: current status and future perspectives. Aquaculture.; 433:50-61.

Reverter M, Tapissier-Bontemps N, Sasal P, Saulnier D. (2017) Use of medicinal plants in aquaculture. Diagnosis and Control of Diseases of Fish and Shellfish.; 223-261.

Vallejos-Vidal E, Reyes-Lopez F, Teles M, MacKenzie S. (2016) The response of fish to immunostimulant diets. Fish & Shellfish Immunology.; 56:34-69.

Venkatalakshmi S, Michael RD. (2001) Immunostimulation by leaf extract of Ocimum sanctum Linn. in Oreochromis mossambicus (Peters). Journal of Aquaculture in the Tropics.; 16:1-10.