The G.B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD) celebrated the International Day for Biological Diversity (IDB) under the theme, "Our Biodiversity, Our Food, Our Health" at various localities across the Indian Himalayan region through its HQs at Kosi-Katarmal, Almora and the four regional Centers (Garhwal Regional Center, Srinagar; Himalach Regional Center, Kullu; Sikkim Regional Center, Pangthang, and Northeast Regional Center, Itanagar Arunachal Pradesh). In addition the Institute also participated and showcased the R&D accomplishments in biodiversity conservation through posters and videos based on the R&D work highlighting the importance of mountain biodiversity in the national level event organized by National Biodiversity Authority (NBA) and Ministry of Environment, Forest and Climate Change (MoEFCC) at Kalaivanar Arangam, Chepauk, Chennai. This event was inaugurated by Shri. M. Venkaiah Naidu, Hon’ble Vice President of India inaugurated the function. In his address Hon’ble Vice President said that Biodiversity is fundamental to the survival of the human race and human being must re-establish the link with nature like our ancestors. Shri. Anil Kumar Jain, Additional Secretary - MoEFCC & Chairman, NBA welcomed the audience and provided the importance of biodiversity in India. The Additional Chief Secretary, Govt. of Tamil Nadu, Shri H. R. Verma, the Principal Secretary, Govt. of Tamil Nadu, Shri S. Kallolikar, the Secretary, National Biodiversity Authority, Dr. P. Ramachandran and other dignitaries were present on the occasion. The GBPNIHESD stall organized during this event was visited by over 400 visitors.

At the Institute HQs one day programme at Nature Interpretation and Learning Centre (NILC) was organized by Centre for Biodiversity Conservation and Management (CBCM) of the institute wherein 32 students (12 boys and 20 girls) and 6 teachers from six different schools of Almora district, Uttarakhand participated. The programme began with an address by Dr. R.S. Rawal, Director GBPNIHESD and the Chief Guest of the function Dr. B.S. Kalakoti explaining why the engagement of young students is important for biodiversity conservation and management. Field based demonstrations and presentations of modules related to biodiversity value i.e. importance of traditional food, nutritional composition of traditional and modern (fast) food, wild edibles and livelihood, herbal spices, role of traditional agro-diversity, importance of medicinal plants, organic farming etc, were made. An exhibition by students was also made on this occasion. At the Institute of Biotechnology, G.B. Pant University of Agriculture & Technology, Patwadangar (Distt. Nainital) two day (22-23 May 2019) event was organized for 25 officials of Research Wing of the State Forest Deptt., Uttarakhand and researchers of the regional Universities with a focus on Long-Term Ecological Monitoring (LTEM) of forest diversity vis-a-vis climate change. Inaugurating the Workshop, Chief Guest Shri Sanjiv Chaturvedi (Conservator of Forest, Research, Govt. of Uttarakhand) emphasized on The importance of LTEM of forests for biodiversity conservation.
Lectures and hands-on practical exercises on related topics were delivered by subject experts and Institute faculty. Dr. Narendra Singh, Aryabhata Research Institute of Observational Science, Nainital, Prof. Jeet Ram, Head, Dept. of Forestry & Environmental Sciences, Kumaun University, Prof. Uma Melkania, G. B. Pant University of Agriculture and Technology, Pantnagar, and Dr. G.C. Joshi, former Incharge Scientist of C.C.R.A.S., Tarikhett (Distt. Almora) were the main resource persons. IBD was celebrated at another R&D field sites of the Institute at Sri Narayan Ashram, Chaudas (Pithoragarh) and at the Institute of Biotechnology, G.B. Pant University of Agriculture & Technology, Patwadangar (Distt. Nainital). At the Sri Narayan Ashram 60 local farmers, 41 students and 2 teachers of Chaudas valley participated in the event. The main focus was given on the wild edibles and medicinal and aromatic herbs diversity of the area and their cultivation practices. At the Himachal Regional Center, Kullu, IBD was jointly celebrated with Himachal Pradesh State Biodiversity Board (HPSSB), Shimla. The Chief Guest of the function Shri Akshay Sood, Additional District Magistrate, Kullu while addressing the participants requested representatives of various panchayats to play active role in biodiversity conservation by formation of People’s Biodiversity Registers (PBR). In addition, various lead lectures on the different aspects of biodiversity were given by eminent persons including Prof. P.L. Gautam, Former Chairman, National Biodiversity Authority; Dr. J.R. Thakur, Former Associate Director, YSPUHF; Dr. K.C. Sharma, KVK, CSKHPKV, Bajaura; Dr. M.L. Thakur, HPSSB, Shimla, etc. At this occasion a brain storming session was organized to discuss on the mountain biodiversity and its role in livelihood and health in which 135 participants representing various stakeholder groups participated. At the Sikkim Regional Center, Pangthang the IBD was celebrated in the form of an exposure visit and biodiversity knowledge interpretation competition for students and plantation drive. The day was linked with the three days nature camp (May 22-24, 2019) where students were introduced to diverse aspects of biodiversity. At the Garhwal Regional Center, Srinagar an awareness program and brain storming session for the 30 students and 15 teachers of local schools was organized in which biodiversity conservation and food security was focused to sensitize the students. At the Northeast Regional Center, Itanagar events were organized for the students of Donyi Polo Vidya Bhawan School, Itanagar at the Rural Technology Centre (RTC) of the Institute. In this event Institute scientists shared valuable information with the participants on forest biodiversity, agricultural diversity; its importance and conservation practices. After technical discussions, a drawing competition was organized among the school students on the theme Biodiversity of Arunachal Pradesh.
Himalaya is the youngest mountain chain and globally important biodiversity hotspot. Among the Himalayan mountain chains, the Indian Himalayan Region (IHR) is designated as one of the biodiversity hotspots and has been recognized as a rich repository of unique biodiversity, which supports 18,440 plant species, including 1,748 medicinal plants, of which 25.3% are endemic to Himalaya. The different topography, micro and macroclimatic conditions, and habitats show variation among the life forms. The flora and fauna of the Himalaya vary with climate, rainfall, altitude and soils. The climate ranges from tropical at the base of the mountains to permanent ice and snow at the highest elevations. The amount of yearly rainfall increases from west to east along the southern front of the range. This diversity of altitude, rainfall and soil conditions combined with the very high snow line supports a variety of distinct plant and animal communities.

The Himalaya represents a vast mountain system and globally valued for its significant role in regulation of global as well as regional climate that has direct impact on biodiversity and ecosystem services crucial for sustenance of millions people in Himalaya and adjoining areas. The Chaudas valley is inhabited by an ethnic community known as Bhotia or Shauka located in habitits Dharchula area of Kumaon Himalayas in Pithoragarth district, Uttarakhand in North India. This biodiversity rich area is culturally connected to Nepal and Tibet and supports plant species used in India, Chinese and Tibetan systems of medicines. These communities utilize their agriculture land in cultivating specialized crops such as buckwheat (Fagopyrum esculentum), sweet buckwheat (Fagopyrum tataricum), and barley, potato and other vegetables to meet the nutritional and food security of these communities. In 2019, Centre for Biodiversity Conservation and Management of GBPNIHESD Kosi-Katarmal, Almora celebrated International Biodiversity Day (IDB) under theme “Our Biodiversity, Our Food, Our Health” at Sri Narayan Ashram, Chaudas area, Pithoragarh district to create awareness and sensitize local inhabitants of the region towards conservation of the forest resources, promotion of their cultivation and conservation. The stakeholder of region know about rich biodiversity of forest used as fodder species (i.e., Quercus glauca, Quercus leucotrichophora), wild edible fruit species (i.e., Myrica esculenta), Rhododendron arboreum, Prunus cerasoides, Pyracantha crenulata, Berberis asiatica), and a number of medicinal and aromatic plants. The wild edible fruit species were major sources of vitamins, minerals, amino acids, carbohydrates, proteins, natural antioxidants and other health promoting substances and their regular consumption in diets (fresh or raw products) useful for reducing several degenerative and neurodegenerative diseases. Their sustainable utilization and formulation of products such as juice, jam, sauce, jelly, etc also plays a significant role in upliftment of economic condition of local inhabitants. This event provides an opportunity to local farmers, students to discuss on conservation and cultivation of high value medicinal plants, establishment of seed banks and linking these practices with their livelihood opportunity. The various techniques of propagation (i.e., seed germination, vegetative propagation), land preparation, agro-techniques, demand of herbal products, organic farming, and conservation of genetic diversity, gene bank, improvement of quality material, cultivation technique/approaches were also discussed. For promotion and conservation of threatened plant species at high altitude institute developed ex-situ conservation demonstration model and polyhouse at Sri Narayan Ashram, Dharchula. The several high value medicinal plant species such as Hedychium spicatum (Van haldi), Valeriana jatamansi (Samyo), Allium stracheyi (Faran), Picrohriza kurrooa (Kutki), Sausurea costus (Kuth), Angelica gualia (Gandrayan) etc were grown. The stakeholders knew that how these plant species can be conserved through various cultivation approaches, which will reduce pressure on its wild population and domestication of these will be provide ex-situ conservation of these species and also make an alternative source of income generation to the local farmers. Total 11 farmers of the region started cultivation of Hedychium spicatum (Van haldi), Valeriana jatamansi (Samyo), Allium stracheyi (Faran) on their fields and institute also provided technical support on their cultivation, post harvesting techniques and marketing. This module was to create awareness and sensitize local inhabitants of the region for the mass cultivation and conservation of medicinal plants and develop linkages between human and nature. This kind of participatory approaches will be helpful for conservation of the species, fulfill market demand, cultivate quality of plant material and also helpful for reducing migration of local inhabitants from high altitude region.
Revitalizing and Therapeutics Potentials of Home Garden Medicinal and Aromatic Plants

The medicinal and aromatic plants (MAPs) are one of the major ecosystem services having direct implication in human well-being. The World Health Organization (WHO) estimates approx. about 80% of the human population’s dependence on plant based medicines despite the heavy flow and demand of synthetic drugs in the market. In view of this, the medicinal plants have always been in limelight of local medical practitioners, pharmaceutical industry and plant explorers since time immemorial. The growing recognition comes in view of its products with least side effects and single raw material source for modern therapeutics. Dwindling ecological status, over exploitation, illegal trade, habitat fragmentation etc., are some of the reasons highlighting the importance of conserving genetic resources has received increasing attention among conservationists, and ecologists. In view of these home gardens play a key role not only in cultivation but also aids in conservation efforts and step up of field germplasm banks. Land use pattern of home gardens are one of the oldest, representing reservoirs of cultivated food crops and potentially useful MAPs, thus providing an array of direct or indirect ecosystem services from it. Ruling out the importance of home gardens and the ecosystem services provided, the theme of this year of “International Biodiversity Day” was “Our Biodiversity Our Food and Our Health” under which the school children’s were sensitized towards the necessities of home gardens medicinal plants. Along with the commonly grown and used medicinal plants, knowledge disseminations on their available market products and their therapeutics values were highlighted (Table 1).

<table>
<thead>
<tr>
<th>Species</th>
<th>Common names</th>
<th>Ethnobotanical uses</th>
<th>Therapeutic uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocimum tenuiflorum</td>
<td>Basil (tulsi)</td>
<td>Common colds, Headaches</td>
<td>Diabetes, Emetic syndrome</td>
</tr>
<tr>
<td>Aloe barbadensis</td>
<td>Aloe vera</td>
<td>Headaches, dizziness, cold and flu, antifungal</td>
<td>Arthritis, rheumatism</td>
</tr>
<tr>
<td>Terminalia chebula</td>
<td>Harad (haritaki)</td>
<td>Ulcer, skin allergies and constipation</td>
<td>Weight loss, anti-dandruff, diabetes</td>
</tr>
<tr>
<td>Thymus vulgaris</td>
<td>Thyme</td>
<td>Respiratory disorders, acne treatment, antibacterial</td>
<td>Promotes hair growth, muscle cramps</td>
</tr>
<tr>
<td>Salvia rosmarinus</td>
<td>Rosemary</td>
<td>Facilitates digestion, improves memory, helps with migraine, improves menstural cramps</td>
<td>Anti-aging, cancer prevention, anti-depressant</td>
</tr>
<tr>
<td>Trigonella foenum-graecum</td>
<td>Fenugreek (methi)</td>
<td>Helps in digestion, good for lactating mothers and menstrual discomfort</td>
<td>Good for diabetics, improves kidney health</td>
</tr>
<tr>
<td>Mentha piperita</td>
<td>Peppermint (pudina)</td>
<td>Heartburn, indigestion and headaches</td>
<td>Bad breath, mosquito repellent</td>
</tr>
<tr>
<td>Citrus limon</td>
<td>Lemon</td>
<td>Antioxidant, digestive issues, detoxifier</td>
<td>Disinfectant, muscle aches</td>
</tr>
<tr>
<td>Curcuma longa</td>
<td>Turmeric (haldi)</td>
<td>Pain reliever, reduces inflammation, treats indigestion, skin problems, wound healing</td>
<td>Boost immunity, cancer prevention, arthritis and diabetes</td>
</tr>
<tr>
<td>Phyllanthus emblica</td>
<td>Indian gooseberry (amla)</td>
<td>Hair growth, lice and dandruff prevention, improves eyesight</td>
<td>Anti-aging, skin nourishment, diabetes, heart disease, migraine,</td>
</tr>
<tr>
<td>Zingiber officinale</td>
<td>Ginger</td>
<td>Inflammation, cold and flu, analgesic, menstrual cramps</td>
<td>Prevents Alzheimer's disease, control high cholesterol</td>
</tr>
<tr>
<td>Allium sativum</td>
<td>Garlic</td>
<td>Antioxidant, toothache, diabetes, acne treatment, cold and sore throats</td>
<td>Lowers cholesterol, inhibits leukemia, increases insulin production and blood sugar level regulation</td>
</tr>
<tr>
<td>Cymbopogon citratus</td>
<td>Lemongrass</td>
<td>Natural bug repellent, detoxifier, improves blood circulation, good for itchy scalp and dandruff, headache relief</td>
<td>Antibacterial and antifungal, treats urinary tract infection and Athlete's foot</td>
</tr>
<tr>
<td>Sesamum indicum</td>
<td>Sesame</td>
<td>Boosts metabolic functions, facilitates hair and skin health and aids aging</td>
<td>Reduces hypertension, prevents damage from radiations, relief from pain associated with gout and arthritis</td>
</tr>
<tr>
<td>Murraya koenigii</td>
<td>Curry leaves</td>
<td>Beneficial for eyesight and cures gastrointestinal issues and diarrhoea</td>
<td>Lowers cholesterol levels, fights diabetes and helps in weight loss</td>
</tr>
<tr>
<td>Syzygium aromaticum</td>
<td>Clove</td>
<td>Toothache, cold, nausea and headaches, antimicrobial, improves digestion</td>
<td>Arthritis, controls diabetes, skin care</td>
</tr>
<tr>
<td>Coriandrum sativum</td>
<td>Coriander</td>
<td>Treats diarrhoea, good for oral hygiene and ulcers</td>
<td>Prevents anaemia, good for bones, reduces cholesterol levels</td>
</tr>
</tbody>
</table>

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The International Day of Biological Diversity (IBD), an initiative of United Nations, which is celebrated on May 22nd of every year for raising awareness, understanding the biodiversity and its conservation. Firstly on 29 December 1993, date of the Convention on Biological Diversity (CBD) was designated as the International Day for Biological Diversity by the second committee of the UN General Assembly. But due to the number of holidays in many countries during the designated month and day, UN General Assembly adopted 22nd May as IDB from 2000 onwards. Theme of IBD this year (2019) was “Our biodiversity, our food, our health” means biodiversity is the foundation of our food and health, which works as key catalyst to transforming food systems and improving human well-being. According to the UN Secretary-General, António Guterres- “From individual species through entire ecosystems, biological diversity is vital for human health and well-being. The quality of the water we drink, the food we eat and the air we breathe all depend on keeping the natural world in good health.”

According to the Executive Secretary of the United Nations Convention on Biological Diversity, Dr. Cristiana Paçã Palmer- “Biodiversity is the food we eat, the water we drink, and it is also the air we breathe. More than that, biodiversity is part of us, as we humans are part of nature.” The main aim of the above mentioned theme was to disseminate the knowledge and spread awareness about importance of biodiversity for our food, nutrition, health and healthy ecosystem. Nowadays, we are using different kinds of food for our survival but we have forgotten the traditional foods which were used by our ancestors. This is a undesirable practice for us and our next generation also. More than 90% crop varieties have disappeared from farmers’ fields in last 100 years. Our indigenous, traditional and local knowledge is going to extinct which is a severe threat for our food production systems. The loss of traditional food production system is directly related with diseases or health risk factors, which is a serious threat to human beings. Many studies shows that the leafy and green vegetables are the main source for Vitamins and Iron, which is a good indicator of healthy food as well as healthy survival.

Functional Diversity (FD) metric is the essential ecological concept for knowing the linkages between biodiversity composition and nutrition. 70% of the world’s poor live in rural areas and depend directly on biodiversity for their survival and wellbeing. The average abundance of species is declining - 40% loss between 1970 and 2000. Unsustainable consumption continues as demand for resources worldwide exceeds the biological capacity of the Earth by about 20%. Hence, urgent and decisive action is needed to conserve and maintain biodiversity in different ecosystems, with a view of sustainable management and use of biological resources.

Life is unique to our planet. The extraordinary richness of life that surrounds us is called biodiversity, and is the basis of our civilization. Biodiversity also has immense aesthetic, cultural, and spiritual value. India, like almost all other places in the world, has unique biodiversity. The richer the biodiversity, the more organized and balanced our environment will be. Different types of flora and fauna also contribute to make the earth habitable. Each region of India is very diverse in its food habits. The Himalayan region has its unique identity in the world. It supports rich flora and fauna across its diverse habitats. Himalaya is one of the global biodiversity hotspot that harbours nearly 8000 species of flowering plants including 25-30% endemic ones (Singh et al., 1996; Samant et al.,1998). The occurrence of 1748 medicinal plant species, 675 wild edibles; 279 species of fodder; 118 species of essential oil yielding medicinal plants and 155 species of sacred plants justifies the diversity and uniqueness of Indian Himalaya region (Samant et al., 1997; Samant et al., 2000). Phyto-diversity of Indian Himalaya region are used for variety purposes, i.e. fodder, fuel wood, timber, in making agriculture implements, fibre, medicine, spices, dyes, etc. (Pant et al., 2009).

Presently, the conservation of biodiversity occupies a very important place in the agenda of all conscious nations because the possibility of life on earth can remain as long as the innumerable biodiversity living in it can be saved. There are many species of flora, fauna, sand-soil, rivers-ocean, plateau-mountains and island-oceans on earth which play their important role in maintaining the balance of our environment in one way or the other. The theme aims to enhance knowledge and spread awareness of the dependency of our food, nutrition and health on our biodiversity.

Biodiversity plays a crucial role in human nutrition through its influence on world food production. Human health depends upon ecosystem services and products. Good nutrition depends on healthy food and healthy food directly or indirectly depends on biodiversity. Healthy diet requires a balance between vegetables, fruits, pulses and grains; hence its basis is biodiversity. Biological diversity especially phyto-diversity is the backbone of Uttarakhand. Biodiversity and food are connected in many ways. Biodiversity is an important resource for humanity. Plants and plant based products have been used both by humans and animals since ancient times. A large population in developed countries depends on the products derived from plants for curing human diseases and livestock ailments. Production of food such as fruits, nuts, vegetables, meat and condiments are sourced from agriculture, forests, uncultivated fields, water bodies, etc. Food provides necessary nutrients and leads to production of energy (calories) which is a combination of protein, fat, carbohydrates, minerals, etc. More than 6000 plant species have been cultivated for food. Biodiversity, food and health interact on a number of key issues. It contributes directly to food security, nutrition and wellbeing. Biodiversity, food and nutrition (health) leads to a healthy planet. Loss in biodiversity may limit the discovery of treatments for many diseases and health problems of human and livestock. If biodiversity disappears we will lose the food wealth on our plates not only this but we will also lose nature and the knowledge that links it to food and nutrition. We need to create a mandate for the biodiversity-rich foods that have served generations before us, and we need to protect the environment where these plants grow. So that we can connect our lives with food, nutrition and nature and can celebrate the joy of living.

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The term "wild" refers to those plants grow without being cultivated and found in different environment / ecosystems. Wild edible plants could be weeds growing in urban areas to native plants growing in deep wilderness. Wild edible plants played an important role in human life since time immemorial. They provide easy, inexpensive way to sustain our physical and mental health. The Himalayan region has a repository of wild edible plants and over 675 are represented in the region. Diversity of wild edible plants (WEPs) has traditionally played a great role in meeting significant part of the nutritional and mineral requirements of indigenous communities all across the globe. Human health depends on the quality of the environment. People are getting aware for the healthy lifestyle and are seeking added health benefits from their dietary intake. WEPs and medicinal herbs are widely used as dietary supplements, in daily foods with the aim of promoting health. WEPs are selected for food application because of their pleasant taste and aroma, and positive pharmacological effects as these are abundant source of dietary fiber, vitamins, minerals and phytochemicals. They are frequently associated with biological properties such as antioxidant, anti-inflammatory, neuro-protective and cardio-protective (Brown et al., 2010). These plants have medicinal, functional food, nutraceutical, pharmaceutical,ocosmeceuticals and many health benefits.

**Wild edibles as herbal medicine**

The use of herbal medicines and phytonutrients or nutraceuticals continues to expand rapidly across the world with many people now resorting to these products for treatment of various health challenges in different national healthcare and as an important component towards alternative medicine. Wild edible plants play significant role in herbal medicine system. These plants are important for nutritional, flavoring, beverages, dyeing, cosmetics and many industrial uses. Extracts of wild edible fruits from various blackberry, raspberry, and gooseberry cultivars act effectively as free radical inhibitors (Wang et al., 2000) because it provide significant health benefits because of their high levels of polyphenols, antioxidants, vitamins, minerals, fiber and used as herbal remedies. Herbal medicine is well documented for treating several diseases in traditional system of medicine. The leaves of *Pyracantha crenulata* are used to make herbal tea which has antioxidant, immunomodulatory, anti-inflammatory activities and leaves of *Pyracantha* (Fig. 1C) and Ginkgo used as nervine tonic and also used in tea formulation. Fruits and roots of *Myrica esculenta* (Fig. 1A) used to prepare ayurvedic formulations such as Chwayanprash and Brahmarasayan to enhance digestion, memory, intelligence, concentration and physical strength. According to Schroeder et al., (1995), sea buckthorn berries are among the most nutritious and vitamin-rich fruits found in the plant kingdom. Dietary flavanoids and high antioxidant activity are found in *Rubus ellipticus* (Fig. 1D) and it prevents coronary heart disease. *Prunsepia utilis* (Fig. 1B) used in skin disease and seed oil are equal to like olive oil and *Berberis aristata* extensively used in ayurvedic system for many skin diseases and diabetics (Table 1). Some edible plants such as cinnamon, mint are used to heal wounds and boils. Research is in progress to validate the traditional uses of the wild edibles, positive pharmacological effects of edible plants included in a pharmacopeia is one of probably safe and effective way for development of functional products with new beneficial effects.

**Conclusion and future direction**

The use of wild edibles as the herbal medicines offers their sustainable utilization for several health benefits. The demand for herbal/value added extracts of medicinal/wild plants is gradually increasing in many countries, especially in European and other developed countries because of less toxicity and side effects of the medicines. It is more important in the present scenario when global community is looking towards the source of natural antioxidant and health promoting substitute and therefore, wild edibles could be a natural choice of the consumers. There has been a tremendous upsurge in the demand for phytopharmaceutical raw medicinal herbs of Indian origin from the Western nations. The demand for traditional herbal drugs is also increasing rapidly mainly because of the harmful effects of synthetic chemical drugs and also because of an expansion of pharmacies manufacturing natural drug formulations. Our country is the proud possessor of an impressive medical heritage which encompasses various systems of medicine, viz., Ayurveda, Siddha, Unani and grandma medicine. India has an invaluable treasure trove of various scriptures on diverse medical systems. India is endowed with incredible natural plant resources of pharmaceutical and nutraceutical value and can become a potential supplier of phytopharmaceutical, alkaloids and raw medicinal herbs for the emerging word market.

**References**


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Food: A Source of Nutraceuticals

Nutraceuticals is defined as the products prepared using edible ingredients but sold in medicinal forms of either, a capsule, tablet, powder, or solution, and believed to have demonstrated physiological benefits along with protection against chronic diseases (ElSohaimy 2012). In 1989 Dr, Stephen DeFelice, introduced the term “nutraceutical” a syncretic neologism of the words “nutrient” and “pharmaceutical” and defined it as “food or part of a food that provides medical or health benefits, including the prevention and/or treatment of a disease” (Chaturvedi 2011). Nutraceuticals being a diverse product category have various synonyms such as “Functional foods,” “nutraceuticals,” “pharmaconutrients,” and “dietary integrators” (Palthur et al., 2010). Nutraceuticals include isolated nutrients in the form of dietary supplements, herbal formulations, processed products of cereals, soups and beverages which have the potential to provide bioactive constituents which can be helpful for maintaining health (ElSohaimy 2012). The principle, “Let food be thy medicine, and medicine be thy food”, advocated by Hippocrates (460–377 BC), the well-recognized father of modern medicine, and the concept of “Medicine and food are isogonics” emphasize the association between nutrition and human health, and conceptualized the relationship between the use of appropriate foods for health and their therapeutic benefits. This concept of using food as medicine is receiving a lot of interest today as food scientists and consumers realize many health benefits of certain foods. These foods contain ingredients that aid specific body function and improve our health and well-being (Palthur et al., 2010, Gul et al., 2016). The demand for food with a positive impact on human health and wellness has exploded globally over the past two decades. Modern food preferences and progress made in the food industry have led to a completely new definition of nutrition and health through eating food which can even help to reduce the risk of endemic to modern society from the diseases such as, obesity, osteoporosis, cancer, diabetes, allergies, and dental problems, which can occur at an early age and could be related to eating habits and preferences (Cenic et al., 2010). The “vital nutrients” that are needed to prevent particular diseases have been a major focus of human nutritional research over decade. The Indians, Egyptians, Chinese and Sumerians are among few civilizations that have provided evidences suggesting that, foods can be effectively used as medicine and can be helpful to treat and prevent disease (Parasuram et al., 2011 and El Sohaimy, 2012).

Table 1. List of few nutraceutical food products

<table>
<thead>
<tr>
<th>Product</th>
<th>Category</th>
<th>Ingredients</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kellogg's Cornflakes, Oats</td>
<td>Nutritional Supplement</td>
<td>Corn* (88%), sugar, salt, barley malt extract, vitamins (vitamin C, vitamin E, niacin, riboflavin, thiamin, folate), minerals (iron, zinc oxide)</td>
<td>Kellogg Battle Creek, Michigan, U.S.</td>
</tr>
<tr>
<td>GRD</td>
<td>Nutritional Supplement</td>
<td>Sugar, skimmed milk powder*, whey protein concentrate, thickener (ins 466), preservative (ins211), minerals &amp; vitamins</td>
<td>Zydis Cadila Ltd. Ahmedabad, India</td>
</tr>
<tr>
<td>Patanjali Choco Flakes, Corn Flakes, Oats, Power Vita</td>
<td>Nutritional Supplement</td>
<td>Wheat Flour* (62.29%), Sugar (32.15%), Cocoa Powder (4.69%), Salt (0.62%), Ashwagandha, Shatavari, Brahmi, Shankhpushpi, Soya, Gram, Coco powder, Guar gum, Sugar, Milk, Samudri lavan, Sajikhar, Moti pisti, Praval pishi, Liquid malt, Chocolate, Choco b</td>
<td>Patanjali Ayurved Limited, Haridwar, India.</td>
</tr>
<tr>
<td>Yakult: Probiotic Drinks</td>
<td>Vitamin Supplement</td>
<td>Water, skimmed milk*, glucose-fructose syrup, sucrose, citrus aroma, and live Lactobacillus paracasei Shirotia bacteria</td>
<td>Yakult Honsha, Japan and Groupe Danone of France</td>
</tr>
<tr>
<td>Coral Calcium</td>
<td>Calcium Supplement</td>
<td>Acacia gum*, dibasic calcium phosphate, gelatin (capsule) and magnesium stearate</td>
<td>Nature's answer, Hauppauge, NY, USA</td>
</tr>
<tr>
<td>Chyawanprash</td>
<td>Immune booster</td>
<td>Ashwagandha (Winter cherry), asparagus, amla*, bamboo manna, blue Egyptian water lily (Makhana), cardamom, chebulic myrobolan, cinnamon, clove etc.</td>
<td>Dabur India ltd.</td>
</tr>
<tr>
<td>Pediasure</td>
<td>Nutritional Supplement</td>
<td>Corn Maltodextrin*, Sugar, Blend of Vegetable Oils (Canola, Corn), Milk Protein Concentrate, and Soy Protein Isolate, Nonfat Milk, Less than 0.5% of Natural &amp; Artificial Flavor, Cellulose Gel, Tuna Oil, Lechitin, Cellulose Gum, Salt, Carrageenan, Stevia Leaf Extract, Monk Fruit Extract</td>
<td>Abbot Nutrition, India.</td>
</tr>
<tr>
<td>Omega woman</td>
<td>Immune Supplement</td>
<td>Omega 3- fish oil**, phytochemicals (e.g. Lycopene and resveratrol)</td>
<td>Wassen, Surrey, U.K.</td>
</tr>
<tr>
<td>Amiriprash (Gold)</td>
<td>Good Immuno modulator</td>
<td>Chyawanprash Avaleha, Swarna bhasma and Ras Sindur</td>
<td>Uap Pharma Pvt. Ltd.</td>
</tr>
<tr>
<td>Nestle ActiPlus Dahi, Ceregrow, MILO, Baby &amp; Me</td>
<td>Nutritional Supplement</td>
<td>Milk solids* (28%), Wheat flour* (21.5%), Sugar, wheat pomegranate puff (6%), Pomegranate juice concentrate (0.9%), Maltodextrin, Starch, Antioxidant (307), Oat flour* (5.7%), Rice flour (5.3%), Soybean oil, Apple juice concentrate (4%), Cereal corn mix flakes, Corn flour (3.5%), Malt extract, Sodium chloride, Antioxidant(307), Orange juice concentrate(2.9%), wheat mango puff (2.9%), Mango pulp (0.4%), Mango powder (0.2%), Maltodextrin, Starch, Antioxidant(307), Wheat blackcurrant puffs(2.4%), Blackcurrant juice concentrate(0.4%), Maltodextrin, Starch, Antioxidant(307), Beetroot rice* flakes, Minerals and Vitamins</td>
<td>Nestle, Vevey, Vaud, Switzerland</td>
</tr>
<tr>
<td>Amway Nutrition and Energy Drink</td>
<td>Nutritional Supplement</td>
<td>Acacia gum*, microcrystalline cellulose, alfalfa, corn starch, spinach*, acerola cherry, parsley, carrot*</td>
<td>Amway, Ada Township, Michigan, United States</td>
</tr>
</tbody>
</table>

Source: (Sarin et al., 2012). * Ingredients consumed directly in the form of food. ** Fish oil is obtained from fish.
Chemical Pesticides and Nutraceuticals

The medicinal importance of foods is being explored for thousands of years. Nutraceuticals and functional food industry has grown together with the expansion and exploration of modern technology (Cencic et al., 2010). Example of such advancement in the food industry can be understood through Table 1. Today nutraceuticals market consists of both traditional as well as non-traditional foods. Traditional foods are simply natural, whole foods with new information about their potential health benefits making no change to the actual foods. Example, include lycopene in tomatoes, omega-3 fatty acid in salmon, curcumin in turmeric, piperine in black pepper, cymene in cumin, coumarin in fengreek and eugenol in clove. These bioactive compounds having high nutritional properties can be used in value addition of food items.

Non traditional nutraceuticals, are foods resulting from agricultural breeding or added nutrients and/or ingredients, to boost their nutritional value. Examples include ß-carotene-enriched rice, and soybeans, orange juice fortified with calcium, cereals with added vitamins and minerals (Nema et al., 2018). Now days various products are being launched globally focusing on both nutritional as well as therapeutic effects. These products are of keen interest to the people as they are interested in the health benefits of food and have begun to look beyond the basic nutritional benefits of food to the disease prevention and health enhancing compounds contained in many foods.

Thus direct food consumption can be considered as a good source of nutraceutical which can provide all the essential substances required for day to day life to human.

References


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Mahesh Nand (maheshlyf87@gmail.com) and Vipin Chandra Sharma ENVIS, GBPNIHESD, Kosi-Katarmal, Almora (Uttarakhand)
Role of Spices in Our Food and Health

Food is the basic need of life and India is well-known for its spicy and tasty food which is extremely nutritious and healthy as well. One such ingredient which makes food healthy and nutritious is Spices and Condiments. According to the International Organization for Standardization, the term “spices and condiments” applies to natural vegetable products that are used for flavoring, seasoning, and imparting aroma to foods. They refer to the dried part of a plant that contain volatile oils or aromatic flavors such as, buds (cloves), bark (cinnamon), root (ginger), berries (black pepper), seeds (cumin, coriander). The variety of spices that give flavor and color to food comes from different family of plants. The most popular ones are Apiaceae, Fabaceae, Lamiaceae, Lauraceae, Piperaceae and Solanaceae etc. Right from the kitchen and medicinal uses in homes, spices have an important role to play in different places. The volatile oils from spices give the aroma and the oleoresins impart the taste. They stimulate appetite by increasing the flow of gastric juice and possess antimicrobial, antibacterial, anti-inflamamatory properties (Table 1). The consumption of garlic has the potential to reduce arterial plaque and possess antioxidant properties on skin cancer, ginger led to reduction in blood cholesterol and also served as a potential antioxidant and antithrombotic agent. Pepper is used to treat inflammatory and antithrombotic properties. This year’s celebrations of the International Day for Biological Diversity, on 22 May 2019, focused on biodiversity as the foundation for our food and health, a one day event was organized at GBPNIHESD, Kosi-Katarmal, Almora. Our group focused on role of spices in our food and health. Although the school children’s were able to recognize the common spices but most surprisingly they have not seen or aware about the plants from where these spices originates. With the help of charts (containing packets of spices and photographs of plant species) and our live demonstration site “Surya-Kunj” (an ex-situ conservation site) students were exposed to different plants species of spices along with their general uses and the properties they possess.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Botanical name/ Family</th>
<th>Part used</th>
<th>Active constituents</th>
<th>Therapeutic properties</th>
<th>Common uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turmeric</td>
<td>Curcuma longa Linn. (Zingiberaceae)</td>
<td>Rhizome</td>
<td>Curcumin, bisabolane, α- and β-tumerone</td>
<td>Anti-inflammatory, anti-oxidant, chemopreventive, antimicrobial and antimalarial</td>
<td>Cold and cough, wound healing, immunity booster</td>
</tr>
<tr>
<td>Bay Leaf</td>
<td>Cinnamomum tamala (Lauraceae)</td>
<td>Dried leaves</td>
<td>α-pinene, camphene, eugenol, limonene</td>
<td>Antioxidant, anti-inflammatory, anti-diabetic, antimicrobial, anticancer</td>
<td>Stomach ache, skin, migraine, tooth ache, cold and cough, activities against neurological disorders, such as Parkinson's and Alzheimer's diseases</td>
</tr>
<tr>
<td>Cumin</td>
<td>Cinnamomum zeylanicum L. (Apiaceae)</td>
<td>Fruit and Seed</td>
<td>Cumin aldehyde, limonene, α- and β-pinene, 1,8-cineole, α- and p-cymene, α- and γ-terpinene, safranal and linalool</td>
<td>Antimicrobial, anti-diabetic, anticancerogen/anticancer, antimitogenic, antistress, antiulcerogenic</td>
<td>Used in treatment of mild digestive disorders, diarrhea, flatulence, morning sickness, colic, dyspeptic headache</td>
</tr>
<tr>
<td>Coriander</td>
<td>Coriandrum sativum Linn. (Apiaceae)</td>
<td>Seeds and leaves</td>
<td>Coriandrol, monoterpenoids-linalool, borneol</td>
<td>Antioxidant, anti-diabetic, anti-lithogenic and anti-inflammatory</td>
<td>Beneficial for cough and cold, indigestion, menstrual problems, rheumatism and pain in the joints, relief of anxiety and insomnia</td>
</tr>
<tr>
<td>Clove</td>
<td>Eugenia caryophyllus (Myrtaceae)</td>
<td>Buds</td>
<td>Eugenol, acetyl eugenol, sesquiterpenes (α- and β-caryophyllenes) and small quantities of esters, ketones &amp; alcohol</td>
<td>Anti-oxidant, anti-bacterial, anti-pyretic, local anesthetic, and aphrodisiac</td>
<td>Used in dentistry, oral and pharyngeal treatments. It is widely used as an aromatic stimulant, antispasmodic and carminative spice</td>
</tr>
<tr>
<td>Ginger</td>
<td>Zingiber officinale Linn. (Zingiberaceae)</td>
<td>Rhizome</td>
<td>Gingerol, shogaols, Zingiberene</td>
<td>Antioxidant, anti-inflammatory and antitumor</td>
<td>Common cold, heartburn, nausea, diarrhea, headaches, minor body aches and even some cases of arthritis</td>
</tr>
<tr>
<td>Black Pepper</td>
<td>Piper nigrum L. (Piperaceae)</td>
<td>Fruit</td>
<td>Piperine, limonene</td>
<td>Immunomodulatory, anti-oxidant, anti-asthmatic, anti-carcinogenic, anti-inflammatory, anti-ulcer, and anti-amoebic</td>
<td>Reduces blood pressure and contains iron. Increases appetite, helps in weight loss, prevents gastric problem and depression</td>
</tr>
</tbody>
</table>

Vibhash Dhyani (vibhashdhyani@gmail.com), Renu Suyal and Amrita Sharma
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Mountains cover nearly a quarter of the Earth’s land surface, and home to about a tenth of the global population. The global importance of mountains are reflected, as (i) provider of goods and services to at least half of humankind, (ii) provider of 70-80% of all freshwater resources for our planet, and (iii) half of the world’s biodiversity hotspots are concentrated in mountains and support approximately one-quarter of terrestrial biological diversity. Himalaya characterized by high degree of ecological and geological fragility, and contains the largest deposit of snow and ice outside the poles. This mountain range has great ecological and economic relevance for its enshrined values as; a climate regulator, source of major rivers, rich repository of biodiversity, culturally & ethnically rich diversity, spiritual & recreational values, and rich source of traditional/indigenous knowledge base. The Indian Himalayan region constitutes a large portion of the Himalayan Biodiversity Hotspot and, therefore, contributes greatly to richness and representativeness of its biodiversity components at all level i.e. genes, species and ecosystems. The flora of the region consists of 8000 Angiosperms, 44 Gymnosperms, 600 Pteridophytes, 1737 Bryophytes, 1159 species of Lichens and 6900 Fungi (Samant et al., 1998). The flora of the region also includes 1748 plant species of medicinal importance, 675 plants that are being used as wild edibles and 355 Agricultural crops, that forms a major component of traditional health care system, nutritional supplements and food. The fauna diversity of the region is also vast. Altogether, 30,377 species/subspecies of both Protozoa and Animalia have been recorded from the region of which 372 are Protozoans and 30,005 comes under Animalia group, that represents more than 30% of the fauna of India (Chandra et al., 2018). Among the various regions within the IHR, Central Himalaya has the highest fauna diversity (14,183 species/subspecies) followed by West Himalaya (12,022), North West Himalaya (8,731), East Himalaya (5,542), Ladakh Mountains (1,561), Tibetan Plateau (1,320), and Trans Himalaya-Sikkim (1,112). The region has 280 species of mammals, >940 species of birds, 316 species of fishes, 200 species of reptiles, and 80 species of amphibians that accounts about 27.6% of the total vertebrate diversity of the country (Chandra et al., 2018). The region is bestowed with some of the majestic faunas of the world i.e. Snow Leopard, Himalayan Monal, Satyr Tragopan, Himalayan Quail, Red Panda, etc. The region is home to more than 940 species of birds, of which 15 are endemic to Himalaya and four big cats i.e. Snow Leopard, Bengal Tiger, Clouded Leopard and Indian Leopard.

References

Wild Edibles as an Option of Livelihood in the Indian Himalayan Region

Forest based resources, since time immemorial, has been associated with human civilization and serving a large number of human populations throughout the world in sustaining the livelihood, food and health needs. Forest products constitute an important source of livelihood for millions of people from forest fringe communities across the world. Forests provide a wide range of products that are crucial for day-to-day needs of people dependent on them. These products include: timber products and non-timber forest products (NTFPs). Timber products include timber and fuelwood, whereas, NTFPs include resin, wild edibles, medicinal plants, etc. Wild edible fruits are one of the precious groups of non-timber forest products that played a prominent role in uplifting the socio-economy of human beings, particularly in tribal and rural areas for thousands of years. They are rich source of protein, carbohydrates, fats, vitamin, antioxidants (Bhatt et al., 2017) and minerals, and thus are known to play important role in fulfilling the dietary needs of indigenous communities. They are not only a source of nutritional value but also a source of income generation for mountain peoples (Negi et al., 2011). Indian Himalayan region (IHR), is one among the 34 biodiversity hot-spots of the globe. The rich plant diversity of the IHR is utilized by the native communities in various forms as medicine, edible/food, fodder, fuel, timber, agricultural tools, etc. Majority of tribal population in the IHR live close to or inside the forests, and has higher dependence on wild products and biomass for food and energy need. Among these, wild edible plants form an important source as a supplement/substitute food in times of scarcity and traditional medicine for native communities, and also play an important role in tribal and rural livelihoods throughout the IHR (Maikhuri et al., 2004). In many parts of the IHR, these resources are critical, especially for the poor, in securing subsistence needs in times of hardship and emergencies when quick cash is required or when casual food stores run out (Maikhuri et al., 2004). Dwindling forest resources, low agricultural productivity, lack of required infrastructure facilities and growing number of rural and traditional societies to move to semi-urban and plain areas has necessitated, the role of wild edibles in our daily lives. Uses of non cultivated foods, of which wild fruits form a part, as a diet supplement, and as coping mechanisms at times of food shortage, seasonally as gap filler, or in times of emergency provides an important fallback option or safety net for rural poor world over. The recent increase in interest in potential wild bioresources has been a consequence of a number of shifts in development focus. With the growing concerns for hill area development and poverty alleviation led to explore hitherto untapped and underutilized wild bioresources that may contribute to household’s food, nutrition and livelihood security (Maikhuri et al., 2004; Negi et al., 2011). Among others, a number of wild edibles i.e. Hippophae salicifolia, Rhododendron arboreum, Embelica officinalis, Myrica esculenta, Spondias axillaris, Berberis asiatica and many more have begun to draw attention as being one of the income generating option through value added products such as squash, juice, sauce, jam by the rural and tribal population in the region. Although these wild plants for food and other valuable means are not consumed and utilized in large quantity but their role in local communities cannot be ignored. Most of these species are not only known for their nutritional value but also for their preventive properties against various diseases. Thus playing a vital role in traditional system of health care in the Himalaya. Commercial opportunities for wild edibles are emerging throughout the world as economic liberalisation is opening new markets and decentralisation and democratisation is enabling communities to have a greater role in the management of forest resources. The recent increase in consumer interest on the wild edibles has been accompanied by attention from conservation and developmental agencies. However, access to information about management, sustainable harvest, use and marketing of wild edibles is an important task of raising awareness and can help to ensure a long term future for both wild produce and the people who depend upon them.

References

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**ENVIS Activities (April-June-2019)**

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Celebration of IBD and World Environment Day – 2019

Mass Plantation and Cleanliness Drive at Nanda Van, Almora, Uttarakhand –2019

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- National Science Day: 28 February
- World Forestry Day: 21 March
- World Water Day: 22 March
- World Meteorological Day: 23 March
- World Health Day: 07 April
- World Heritage Day: 18 April
- Earth Day: 22 April
- World Environment Day: 05 June
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- World Ozone Day: 16 September
- World Tourism Day: 27 September
- World Habitat Day: 03 October
- World Wildlife Week: 1-7 October
- World Animal Welfare Day: 04 October
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- Bhopal Tragedy Day: 02 December
- International Energy Day: 04 December
- International Mountain Day: 11 December
- Kisan Divas (Farmer’s Day): 23 December