



E-ISSN: 2321-2187
P-ISSN: 2394-0514
www.florajournal.com
IJHM 2020; 8(5): 88-95
Received: 08-07-2020
Accepted: 12-08-2020

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Traditional resources and use of aromatic and ethno-medicinal plants in Uttarakhand: Compliment of nature

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Abstract

Medicinal plants are considered as a rich resource of ancient medicines and so many of them are used as a major ingredient of today's panacea that can be pharmacopoeic, non-pharmacopoeic, or synthetic drugs. They have been used to cure health disorders for the past thousand years. The ubiquitous use of folk remedies and health preparations is outlined in the Vedas and the Bible. Plant safety, quality, and efficacy assurance has now become a major issue in developing and developed countries. Cultural consequence and importance showing great demand for herbal and aromatic plants and following highlight point needed for the immense response in this field like encouraging the cultivation of medicinal plants having large market prospects. Research and evolution need to stand together for improving the manufacturing and efficiency of plants by establishing massive outcome through expanding collaboration between farmers and researchers.

Keywords: Traditional medicinal plants, chemical constituents, herbal remedies, poverty alleviation, Uttarakhand

1. Introduction

Every living creature depends on nature for their necessary requirements like medicines, wood, shelters, food, fertilizers, clothing, tonics and means of transportation over centuries^[1, 2]. Their extreme modifications of human life-style and food habits escort to the exposure of various clinical pathologies^[3]. Drugs, toxins present in food, chemicals, and residues of pesticides are common carcinogenic agents which are responsible for polluting our environment and increasing the rate of cancer in the human population.^[4] All over the globe, there is a visible phenomenon called 'Renaissance' which has been suggested two-thirds part of the world's plant species having medicinal values^[5]. Constituents like carotenoids, cinnamic acids, tannins, flavonoids, benzoic acids, ascorbic acid, saponin, tocopherols, alkaloids, folic acid, and tocotrienols, etc showing beneficial therapeutic potential produced by the plant^[6, 7]. The traditional medicine practice is widespread in China, Srilanka, India, Japan, Thailand, and Pakistan^[8]. Forty percent of the total medicinal expenditure is credited to patrimonial alone by China^[9]. The Caesalpiniaceae, Fabaceae, and Mimosaceae make use of legumes in Thailand while in Japan herbal remedies are in demand than the mainstream pharmaceutical products^[10].

1.1. Indian traditional Ayurvedic system

India sits on a gold mine of such countless species and traditionally holds a strong knowledge of herbal medicines with an abundance of medicinal plants generally of prevailed ecosystems. Around 17000 higher plants species approximately out of which 8000 species are taken into consideration. India is one among in 12 mega diversity countries of the world. The principal repository of a huge number of aromatic plants is forests in India. They are practicing a different medical system based on Ayurveda, Siddha, and Unani system. Among these Ayurveda is the oldest medicinal system using approximately 2000 plants species^[11].

Plant contribution is remarkable such as fine chemicals, cosmetics and industrial raw materials for making extracts of active compounds which used in different drugs synthesis. Some plants are considered as a significant source of nourishment which makes their therapeutic values recommended, which play a vital role in the human culture development around the whole world. In spite of the current state of the art, we now have an urgent need to identify and develop new healing agents for modern drugs. Medicinal plants used not only for the treating diseases but also as a prospective source for building good health and maintaining conditions. Herbal medicines provided mankind a large variety of potent drugs to alleviate or eradicate infections and suffering from diseases^[12].

Modern allopathic medicine has its roots in ancient medicine that may have many new remedies will be come across and profit-oriented in future. Since, today having a better knowledge and understanding towards how different organs can work together to perform a common function. We are also in a superior post to fully appreciate the relieve power of plants and their future for treating intricate health conditions. Synthetic materials are deemed insecure and products of the plant appear to represent security. Few clinical trials and legal proceedings of high quality to ensure the safety and effectiveness of herbal medicines have yet been conducted. Ordinary therapies are certainly needed in the form of dosage because the plant material could be harmful due to the presence of naturally occurring toxic constituents, heavy metals, pesticides and bacteria [13]. Peculiarly and particularly without side effects has been realized that the herbal drugs immunes the system of human body.

Around the world, about 21,000 plants listed by World Health Organization (WHO) which are used for health resolution. Out of which 2500 plant species are delineated from India and 150 species are used profitably and economically on wide-reaching for drugs manufacturing [14]. For curing various disorders in India, central company's states like Madhya Pradesh, Jharkhand, Chhattisgarh, Orissa and Maharashtra adopted herbal medicinal practices. Infinite wild plants are used by local people of this region are Baiga, Bhil, Khairwar, hill, Rawat, Bhariya, Sahariyas, Gond, Korwa and Birhorfor their good physical condition and fitness [15].

The Indian Himalayan Region (IHR) is the natural territory of major ancestral communities such as Bhotias, Kharvar, Baiga tribe, Bhoksa, Tharus, Chenchu people, Shaukas, gurjar, jarawas, Jaunsariesand Mahigiri, which use medicinal plants for curing the diseases and ailments through the use of natural medicine [16, 17]. Total plants of red data book of IHR also maintaining unique diversity of traditional folk plants in the

region demonstrated by the manifestation of a number of native (31%) and Endemic (15.5%) where threatened elements remains only 14% [18].

1.2. Uttarakhand: Indian Heritage

It is a hilly state, located between 77°34'27" to 81°02'22"E longitude and 28°53'24" to 31°27'50"N latitude. About 17.3% of India's total land area is occupied with 53,483 km² of which 92.57% and 7.43% under hills and plains having international borders of state touché with China (Tibet) and Nepal in the north and east. On its north-west lies Himachal Pradesh and while on the south is Uttar Pradesh. It is geographically diverse from the snow-covered mountain summit to the Subtropical Teri region with the giant Nanda Devi (7,817m) [19]. Uttarakhand has a potential to become an herbal state by using trump card of comparatively higher erudition and literacy rates. Many new advanced approaches of Biotechnology and conservation strategy plans can help in preserving and utilizing the aboriginal understanding of traditional plants for humanity. Thus, their command must be examined as a key element of all attempts for conserving and developing pastoral rural areas [20]. Few studies show that locals still rely on various plants inherent their daily requirements, particularly for medicinal products. In low rainfall and moisture state, many traditional plants can be grown on low-grade soils, where other crops don't cultivate. A total of 964 species of herbal plants are known to occur in this Himalayan state of India [21]. Herbs dominate the pool of medicinal plant species, as out of total medicinal plant species, 614 are herbs, 190 are shrubs and 160 are trees distributed over 158 families [22]. Various plant species parts like flower, wood, fruit, leaf, roots, gum, tuber, resins, fatty oil, bark, stem, aerial part, and essential oil are used for preparing herbal formulations and herbal drugs as shown in Table 1.

Table 1: Traditional resources aromatic and ethno-medicinal plants in Uttarakhand and their indigenous and medicinal uses

Scientific name	Family	Local name	Habit	Part used	Indigenous uses/ Medicinal uses	Mode of use	Native	References
<i>Aconitum heterophyllum</i>	Ranunculaceae	Atis	Herb	Root	Stomachache, fever, cough, diarrhea, vomiting	Dried root powder is taken after meals	HR	31
<i>Angelica glauca</i>	Apiaceae	Choraka/choru	Herb	Root	Stomach troubles, bilious complaints, menorrhagia, infantile atrophy and as a stimulant	-	HR	32, 33,34
<i>Arnebia benthamii</i>	Boraginaceae	Balchhari	Herb	Root and bark	Piles, hair tonic, antiseptic and in throat problems.	Root mixed with mustard oil used as hair tonic, antiseptic and in throat problems. Root powder with butter given in piles	-	35
<i>Asparagus racemosus</i>	Liliaceae	Shatavari	Herb	Root	Female tonic	Root decoction used	IO, Australia, Africa	36
<i>Berberis aristata</i>	Berberidaceae	Kingor	Shrub	Root, Bark	Fever, eye complaints	Root decoction mixed with rose water is useful during eye infection	HR	37
<i>Eclipta alba</i>	Asteraceae	Bhringaraj/ kehraj	Herb	Stem, leaves, seeds and roots	Treatment of liver cirrhosis, jaundice, gall bladder problems and hepatitis.	-	-	38
<i>Ficus palmate</i>	Moraceae or Urticaceae	Bedu/ wild fig	Shrub or small tree		Treatment of diabetes, digestivedisorders and small tumors	Fruit paste is used externally for boils and small tumors. Latex for removal of warts and spines from skin.	IO	39
<i>Nardostachys grandiflora</i>	Valerianaceae	Jatamansi	Herb	Root	Treatment of digestive system, circulatory system, nervous system, respiratory system, urinary system, reproductive system and skin	-	HR	40

					diseases			
<i>Prunus cerasoides</i>	Rosaceae	Painya/ wild himalayan Cherry	Tree	Bark, fruit	Cut, wounds, muscular pain and body swellings	Bark applied on body swellings confusions.	HR	41
<i>Rubus ellipticus</i>	Rosaceae	Hisalu	Shrub	Root	Skin diseases	Root paste applied on skin diseases	IO	35
<i>Saussurea obvallata</i>	Asteraceae	Brahma Kamal	-	Leaf, flower, root and seed	Wounds, cuts, cardiac disorder, reproductive disorder, mental disorder, headache and body pain	Whole plant paste used for the treatment of headache and other body pain	HR	42
<i>Zanthoxylum armatum</i>	Rutaceae	Timroo	Shrub	Bark and fruits	Toothache	Branches are used as toothbrush	Tropical	43
<i>Taxus baccata</i>	Taxaceaceae	Thuner	Tree	Leaf, fruit	Cancer	-	Europe, Africa, Asia	37
<i>Rubus niveus</i>	Rosaceae	Kali-hisole	Shrub	Leaf	Headache	Leaf paste is applied on forehead in headache	IO	44
<i>Berberis asiatica</i>	Berberidaceae	Kilmora	Shrub	Roots and stem	Used for curing diabetes, jaundice and rheumatism.	-	HR	45
<i>Carum carvi</i>	Apiaceae	Kala zeera	Herb	Fruit and seed	Fever, headache, stomachic, carminative, uterine complaints, swelling of breast, testicles and muscular	Fruit juice is used for muscular swellings and raw fruits are stomachic and carminative.	-	46
<i>Bombax ceiba</i>	Bombacaceae	Semal	Tree	Flower and leaf	Cutaneous troubles, digestive disorders and snake bite	Flowers and fruits are used in snake bite. Flowers and leaves paste is applied in cutaneous troubles	Australia	46
<i>Perilla frutescens</i>	Lamiaceae	Bhanjiri	Herb	Leaf	Earache and arthritis	Leaf juice is used in earache and seed oil is massaged twice a day in arthritis	Eastern Asia	47
<i>Melia azedarach</i>	Meliaceae	Dainkan	Tree	Leaf, seeds, bark and root	Itching and treating skin disease	Decoction used in bathing for itching in groins region	Asia and Australia	48
<i>Origanum vulgare</i>	Lamiaceae	Jungali tulsi	Herb	Whole plant	Respiratory disorder, urinary disorders, bronchitis, diarrhoea, diarrhoea, dysentery, skin diseases, insect bite, earache, cough and cold.	Leaf paste is applied for skin diseases, insect bite and earache and leaf with hot water is useful for cough and cold.	-	49
<i>Prunus armeniaca</i>	Rosaceae	Choole	Tree	Fruit	Stomachache fever and body pain	Seeds paste mixed with water is given to children in stomachache, seed oil edible and also used medicinally in fever and massaged in body pain	Caucas	41
<i>Pyrus pashia</i>	Rosaceae	Molu	Tree	-	Gastrointestinal disorders, fever and headache, sweating of body (diaphoretic), hysteria and epilepsy	-	HR	50
<i>Quercus leucotrichophora</i>	Fagaceae	Baanj	Tree	Seed	Gonorrheal, asthma, hemorrhages, diarrhea, dysentery, digestive disorder and urinary disorder	Uses gum resin of the plant by making its paste to cure gonorrheal, asthma, hemorrhages, diarrhea, dysentery	-	51, 52
<i>Bergenia ciliata</i>	Saxifragaceae	Silphodi	Herb	Rhizome and leaves	Cough, cold, kidney and gall bladder stone	To treat old wounds dried powder of leaves and rhizomes are used and to cure cold and cough, boiled water of leaves and rhizomes are given	HR	53
<i>Butea monosperma</i>	Leguminosae	Dhak / palas	Tree	Flowers	eye disease, chronic fever, enlargement of spleen, leucorrhoea, epilepsy, leprosy, antifungal activity, anti-inflammatory activity, liver disorders antifertility activity and gout	Form of extract, juice, infusion, powder and gum	-	54
<i>Callicarpa macrophylla</i>	Verbenaceae,	Daiya	Shrub	Root, bark, leaves,	Tumour, polydipsia, diarrhoea, dysentery, diabetes, fever,	-	-	55

				flowers, fruits				
<i>Cassia tora</i>	Leguminosae	Chakunda	Shrub	Leaves, seed, and root	Treatment of leprosy, ringworm infection, ophthalmic, skin diseases and liver disorders. Several chemical compounds such as anthraquinone glycosides, naphthopyrone glycosides, phenolic compounds, flavonoids etc. Have been isolated f	-	-	56
<i>Celastrus paniculatus</i>	Celastraceae	Malkangi/ jyotishmati	Tree	Root, stem, leaves, fruits, seeds	Headache, dysentery, diarrhea, fever, malaria and arthritis.	The powdered root bark of <i>c. Paniculatus</i> is used in treatment of malaria	IC	57
<i>Centella asiatica</i>	Apiaceae	Brahmi	Herb	Whole plant	Asthma, skin disorders, ulcers, dysentery and body aches	Leaf extract is taken orally to cure dysentery	IO, tropical	58, 59
<i>Cinnamomum tamala</i>	Euphorbiaceae	Dalcheenee		Bark, leaf and seed	Rheumatism, colic, diarrhea, nausea, bronchitis, vomiting, fever, anemia, body odor, dysentery, cough	Dried leaves and bark of this plant were prescribed for fever, anemia and seeds were crushed and mixed with honey or sugar and Administered to children for dysentery or cough	HR	60
<i>Cleome viscosa</i>	Cappardaceae	Jakhiya	Herb	Leaves and seeds	Gastro intestinal disorders, gastrointestinal infections, ringworm, flatulence, colic, dyspepsia, cough, bronchitis, cardiac disorders, rheumatism, fever and headache	-	-	61, 62, 63, 64
<i>Cucumis sativus</i>	Cucurbitaceae	Kheera/kakdi	-	Fruit	Removal of dead skin and urinary problem	Juice removes dead skin from the face and seed paste mixed with water is useful in urinary problem.	Asia	48
<i>Glycine max</i>	Fabaceae	Kala bhatt	Herb	Seeds	Cholesterol, cancer and useful in eyesores	-	-	16; 65
<i>Syzygium cumini</i>	Myrtaceae	Jamun	Tree	Seeds and bark	Sore throat, bronchitis, diabetes, excessive menstruation, asthma, stone, thirst, biliousness, dysentery and ulcers	Powder used orally for diabetes, bark with milk is used for curing of excessive menstruation and ripe fruits are useful for stone	America and Australia	66
<i>Tinospora cordifolia</i>	Menispermaceae	Giloya/ guduchi	Shrub	Stem	Diabetes, arthritis, allergy, ulcer and malaria	-	-	67
<i>Acorus calamus</i>	Araceae	Vacha/ bauj	Herb	Leaves and root	Appetite loss, bronchitis, chest pain, colic, cramps, diarrhea, digestive disorders, flatulence, gas, indigestion, nervous disorders, rheumatism, sedative, and vascular disorders	Decoction is given orally.	-	68, 69
<i>Betula utilis</i>	Betulaceae	Bhojpatra	Tree	Bark, resin	Wound healing, skin disinfectant, cancer, jaundice, bronchitis, convulsions, leprosy and diseases of the blood and the ear	-	HR	70
<i>Aegle marmelos</i>	Rutaceae	Bell/bael	Tree	Leaf, root and fruit	Melancholy, intermittent fevers, cold, palpitation, eye disorders, stomachache, ulcer, dysentery and diarrhea	Fruit pulp is useful in chronic cases of stomachache and dysentery, dried fruit is mixed with sugar is taken orally during fever and cold	-	71
<i>Phyllanthus amarus</i>	Euphorbiaceae	Tamalki	Herb	Leaf	Skin allergy, diarrhea, dysentery, dropsy, jaundice, intermittent fevers, urogenital disorders, scabies and wounds	The crushed leaves are made into paste and applied externally on skin allergy	-	69, 72
<i>Ziziphus mauritiana</i>	Rhamnaceae	Jujab	Tree	Seed	Chest pain, cough and cold	Chest pain in patient with cough and cold with roasted seed powder's paste.	-	73
<i>Bauhinia variegata</i>	Caesalpinaceae	Karal/ kachnar	Tree	Flower, leaf and bark	Constipation, skin diseases and blood pressure.	Flowers used orally for constipation, leaf paste is used in skin diseases and bark powder is	-	48

						useful in blood pressure.		
<i>Withania somnifera</i>	Solanaceae	<i>Ashwagandha</i>	Shrub	Leaf, root	Urinary disorders and fever, scrofula, insomnia	Juice or powder orally	-	68

IO: Indian oriental; HR: Himalayan region, IS: Indian subcontine

1.3. Characteristics of Medicinal plants

Medicinal plants have many characteristics when used as a treatment such as (i) Synergic medicines depend on their action enhanced by the activity of the constituent which can interact at the same time and actually responsible for the effect (ii) Preventive medicine its goals is to promote, protect and well -being to prevent the occurrence of a disease, any disability and death [23, 24].

1.4. Impact of Ethnopharmacology in western medicine

For biological activities, herbal medicines are strong and solid origin sources, based on bioactive compounds present in plants. They run through by various ethnic categorized groups having a little access to western medicines [25]. It is not just a science of the past for using an outmoded approach. Their urge to western medicine can lead to establishing many useful drugs, but 21st century latest and traditional herbal uses may be exclusively unique. The analysis showed that in the modern armament system, the proportion of natural products is substantial, with approximate ranging from 35 to 50%. Virtually almost every class of drug contains a replica structure obtained from nature, showing the long-established effects of that particular pharmacological category. Ethnopharmacology endmost ultimate aim is the acceptance of traditional composing, either through the isolation of bioactive compounds or by uncovering pharmacological properties. The uncovering of new biological chemical structures depends to a large extent on chance. In recent years, the screening of human receptors was built on biochemical tests and receptor line binding studies with an increasing molecular cloning availability. Compounds could be tested for direct linkage with the suspected health giving target protein. Non-western societies having a great interest in long-established system of medicines obtain from medicinal plants.

1.5. Contribution and involvement of medicinal plants in poverty easement

Inheritor medicinal and aromatic plants kindness is widely spreading between different stakeholders having quite interests which are dispensed off-site and on-site both. Gardners and collectors are the main collaborators, commonly called as the poor man helping in reducing poverty in local areas and community. Meanwhile, farmers may be revitalizing for growing aromatic plants which help in increasing yield and strengthen their income but the current scenario is medicinal plants farming. Which are being managed, controlled on a small platform and constricted in the state up to few hectares [26]. Identify an investor or a shopper in the market who can ensure that the entire product is purchased at an economical rate with a higher profit as other crops. The millennium ecosystem assessment has highlighted for paying attention towards the wellbeing of the global poor, whose livelihoods are often directly dependent on services nearby to their environment.

1.6. Conservation inventiveness for sustainable cultivation

Agriculture and processed food products development

government authorized setting two phases which are promoting by Agri Export Zones. In the first, phase 6 districts are covered Chamoli, Haridwar, Uttarkashi, Pithoragarh, Udhamasingh nagar, and Dehradun, where 10 high-value plant species will be cultivated. In district Chamoli the herbal research and development institute is established at Gopeshwar for monitoring, inventorisation developmental issues of medicinal plants in the state [27]. In the second phase with the support and management of Infrastructure Development Finance Company Ltd., cultivation area would be increased by adding nearby districts under the supervision of Agriculture Export Zones for boosting export and strengthen India's share in the world market by cultivating other medicinal and aromatic plants. Protecting and conserving medicinal plant species having high-value need serious and profound venture by collaborators and shareholders. For successful long- term conservation master plan, attentively focused farmers, who play an important role in developing cultivation demonstrative attempts [18].

1.7. Ex-situ conservation

Developing measures is needed in the mentioned time period to encircle the activities like identification and engrossment for conservation. For maintaining ex situ plant populations, number of institutes are includes like Forest research institute (FRI), Botanical gardens, and Agricultural research centers, which are attempting and practioning following methods such as:

- Gene banks are collection and accumulation of very different plant varieties of genetic diversity of particular area for characterization, evaluation and utilization when needed. Freezing cuttings from the plant parts and stocking the seeds which are collected, and conserved for breeding, history study, research, and other motivational purposes. This method is convenient for trees and shrubs long living enduring.
- Botanical gardens customized for the collection, safeguarding, maintenance, displaying, cultivating wide range of plant species. They help in preserving endangered plant species.
- Seed bank is the reservoir of viable seeds or vegetative propagator. They are well organized, potent and constructive for sexually reproducing seeds for preserving genetic diversity for long term storage depends on firm power supply, accurate monitoring and testing of seed capability. Living seeds can be found in or on the soil in different durations, seasons, depths, quantities and states of dormancy or procession to germination. Seed life is very unstable and based on several factors, they can be found in. There are a number of seed banks in the world with differentiation in the nature of the collections, geographical area and taxonomic groups, etc.
- *In vitro* storage refers to the conservation of all tissues, cells, genomes, genes, and germplasm through meristem tissues in test tubes under controlled environmental conditions.

1.8. Depletion of medicinal plant bio-diversity

There are many factors affecting depletion of medicinal plant

of bio-diversity such as

1. high demand for raw plant parts causing immense threat on natural habitat for herbal products used in medicines and cosmetics,
2. the decline of medicinal plants due to the increase in human population and other developmental actions and activities,
3. over exploitation and aimless target from natural sources,
4. no serious attempt for trading scale cultivation and lack of agro-technology for highly required traditional plants,
5. Forest fire burn trees and plants that prevented erosion and also play a very disastrous role in the demolition of medicinal plants,
6. commercialization of prohibited herbal plants illegally,
7. large browsing and over grazing by domestic as well as wild animals can have an intense impact on the physiognomy profile, soil composition and vegetative function without sufficient recovery periods,
8. Trees cutting down for day to day uses and do not plant new ones, it can affect the discovery of new herbal medicines,
9. immense change in climate and weather pattern.

1.9. Untimely reactions and safety in herbal medicines

One common dispute in favor of herbal medicinal products is that such products have a long history and lead to extensive understanding, information and experience regarding their desired and undesirable effects. Traditional encounter is an energetic stalwart for identifying adverse effects in the majority of users and for rapid development at the beginning of treatment. It can highlight such dose dependence and can help in detecting treatment methods that lessen the risk of acute problems.

2. Ethnobotanical route of medicinal plants

It is mandatory to confirm and certify that the traditional medicinal plants knowledge has been correctly passed from one generation to another one. Moreover, it must be recalled that the ethno-pharmacological inspection and analysis may conduct uncovering of unfamiliar biological activities and their individual eccentric chemistries, which may lead to the evolution and blooming of equivalent fitting for pharmaceutical development. Various strategies for the discovery of drugs from natural resources described by Mukherjee, 2002 [28].

2.1. Medicinal plant education

Spreading knowledge of medicinal plants in the state can produce new implementation in the areas such as plant science, diseases and their herbal treatments, food science, agronomy, horticulture, agribusinesses and a particularly noteworthy provision have passed to educate children in schools. The children's recognition, awareness and understanding of our ecosystem are vitally important for ensuring the future of our biodiversity is in safe hand. This can become the foundation of high-spirited medicinal plants businesses [29].

2.2. Modes of action of secondary metabolites

Plant drugs also known as phytomedicines which are derived from plants that consist of many different chemicals and bioactive compounds called secondary metabolites. They act independently or in composition of two or more on the human body for maintaining health and to intercept disorders which interfere with a particular organ, group of cell, tissue and

eventually with a molecular target site. Generally they occur in complex mixtures. A medicinal plant extract influences more than one molecular objective, which is likely to be pretentious by several targets in phytomedicines simultaneously. The application of such extracts increases the chances of "hitting" one or several relevant targets. Every small change in chemistry can be the basis for a new pharmacological activity. This aspect is important for quality control in phytotherapeutics. In conclusion, phytotherapy is a traditional approach to use the right plants in the right concentrations to restore health or to relieve symptoms of disorders and disturbances [30].

2.3. Future prospects

Around the world there are more than half million medicinal plants with hidden potential of medicinal properties which are not investigated yet. Progressing and developed countries of the world facing high demand, excessive use of herbal medicines and rapidly spreading of healthcare green products which may lead with confirmation of safety, effects and quality on high public demand. Consequences are herbal medicine trails remain embracing in progressing countries while in developed countries interdependent substitute medicine showing immense response day by day. Few medicinal plants have many bad impacts and drawbacks as they had a long history on their use of specific part and whole plant. Which include many factors like changes in climate may lead to changes in compounds present in plant, drastic modification in bioactivity due to the lacking uniformity, assembling, preparing, stockpiling, and maintenance of plant raw material.

3. Conclusion

Treating disease is not only the main aspect in the research sector but also for maintaining health. Human lifestyle is now moving towards technology, in other words, we abandon from nature. There is a requirement to stand for promoting them worldwide to save human lives because we are part of nature. However, with all protection, welfare and assured future people are coming back to nature by getting over from synthetics products.

4. Disclosure statement

The authors confirm that this article content has no conflicts of interest.

5. Acknowledgements

We acknowledge the Bioinformatics Centre, Banasthali Vidyapith supported by DBT and DST for providing computation and networking support through the FIST and CURIE programs at the Department of Bioscience and Biotechnology, Banasthali Vidyapith, Rajasthan. D. Mitra is grateful to Government of West Bengal, India for Swami Vivekananda Merit Cum Means Ph.D. Scholarship (WBP191584588825).

6. References

1. Dar RA, Shahnawaz M, Qazi PH. General overview of medicinal plants: A review. *Journal of Phytopharmacology*, 2017; 6(6):349-51.
2. Hamilton AC. Medicinal plants, conservation and livelihoods, *Biodiversity Conservation*, 2004; 13(8):1477-1517.
3. Fleming JA, Holligan S, Kris-Etherton PM. Dietary patterns that decrease cardiovascular disease and increase

- longevity, Journal of Clinical and Experimental Cardiology, 2013, 6.
4. Mendam K, Mangesh V, Vamshi S, Naik SJ. A comprehensive review on natural sources against cancer. World Journal of Pharmaceutical Research, 2015; 4(12):1553-1564.
 5. Sanghi DK, Tiwle R. Herbal drugs an emerging tool for novel drug delivery systems, Asian Journal of Research Chemistry, 2013; 6(9):962.
 6. Ramamoorthy PK, Bono A. Antioxidant activity, total phenolic and flavonoid content of Morindacitrifolia fruit extracts from various extraction processes, Journal of Engineering Science and Technology, 2007; 2(1):70-80.
 7. Bharti R, Ahuja G, Sujana GP, Dakappa SS. A review on medicinal plants having antioxidant potential, Journal of Pharmacy Research, 2012; 5(8):4278-4287.
 8. Hoareau L, DaSilva EJ. Medicinal plants: a re-emerging health aid, Electronic Journal of biotechnology, 1999; 2(2):3-4.
 9. Strauss J, Hong H, Lei X, Li L, Park A, Yang L, Zhao Y. Healthcare and insurance among the elderly in China: evidence from the CHARLS pilot. In Aging in Asia: Findings from New and Emerging Data Initiatives, National Academies Press (US), 2012.
 10. Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H. Medicinal plants: Past history and future perspective, Journal of herb herbmed pharmacology, 2018; 7(1).
 11. National Academy of Sciences. Biodiversity. Washington, DC: The National Academies Press, 1998.
 12. Bhat KKP. Medicinal plant information databases. In: Non-wood forest products. Medicinal plants for conservation and health care, Rome: F. Agri. Org, 1995.
 13. Mathur M. Phyto-complex and their role in enhancing efficacy of herbal drugs, Medicinal Plants, 2013; 5(3):118.
 14. Modak M, Dixit P, Londhe J, Ghaskadbi S, Devasagayam TP. Recent advances in Indian herbal drug research guest editor: Thomas Paul AsirDevasagayam Indian herbs and herbal drugs used for the treatment of diabetes, Journal Clinical Biochemistry and Nutrition, 2007; 41(1):12-17.
 15. Rai R, Nath V. Use of medicinal plants by traditional herbal healers in Central India, Indian Forester, 2005; 131(3):463-468.
 16. Tiwari P. A review on traditional plants and herbs are used to evaluation for their anticancer potential. Journal of Pharmacy Research, 2017; 11(5):547-553.
 17. Topwal M, Uniyal S. Review on important ethno-medicinal plants in Uttarakhand, International Journal of Pure Applied Biosciences, 2018; 6(2):455-464.
 18. Kumari P, Joshi GC, Tewari LM. Diversity and status of ethno-medicinal plants of Almora district in Uttarakhand, India, International Journal of biodiversity and conservation, 2011; (7):298-326.
 19. Singh A, Singh R. A review on Medicinal plants and herbs of Uttarakhand (India): its traditional, ethnomedicinal and antimicrobial potential, Nature and Science, 2016; 14(12):90-107.
 20. Joshi K, Chavan P, Warude D, Patwardhan B. Molecular markers in herbal drug technology, Current science, 2004, 159-165.
 21. Kala CP. Medicinal and aromatic plants of Uttarakhand: An important ecosystem service for human well-being. In Ecosystem Services and Its Mainstreaming in Development Planning Process; Bishen Singh Mahendra Pal Singh Dehradun, 2015, 145-154.
 22. Kala CP. Medicinal plants of Uttarakhand: diversity, livelihood and conservation, Biotech books, 2010.
 23. Gilbert B, Alves L. Synergy in plant medicines, Current medicinal chemistry, 2003; 10(1):13-20.
 24. Rasool Hassan B. Medicinal plants (importance and uses). Pharmaceutical Analytical Acta, 2012; 3(10).
 25. Leonti M. Traditional medicines and globalization: current and future perspectives in ethnopharmacology, Frontiers of Pharmacology, 2013; 4(92).
 26. Kala CP. Editor. Medicinal Plants & Sustainable Development. Nova Science, 2011.
 27. Sati VP. Towards sustainable livelihoods and ecosystems in mountain regions. Springer International Publishing, 2014.
 28. Mukherjee PK. Quality control of herbal drugs: an approach to evaluation of botanicals, Business Horizons, 2002.
 29. Joshi BC, Joshi RK. The role of medicinal plants in livelihood improvement in Uttarakhand, International J Herbal Medicine, 2014; 1(6):55-58.
 30. Van Wyk BE, Wink M. Medicinal plants of the world. An illustrated guide to important medicinal plants and their uses, Times edition, 2004, 54.
 31. Upadhyay Ak, Kumar K. Studies on Medicinal Plant-lore and Orientalism of Jaunsari Tribe. International Journal of Ayurveda and Pharmacy, 2018; 8(2):162-172.
 32. Arya D, Bhatt D, Joshi GC, Tewari LM. Trade, population study and conservation aspects of Choraka/Choru in Kumaun Himalayas, Scientific Research and Essays, 2015; 10(2):64-70.
 33. Bisht NS, Gera M, Sultan Z, Gusain MS. Status of collection, cultivation and marketing of medicinal and aromatic plants in Pithoragarh, Uttaranchal, Indian Forester, 2005; 131(3):346-357.
 34. Sarin YK. Principal Crud Herbal Drugs of India-An Illustrated Guide to Important, Largely Used and Traded Medicinal Raw Materials of Plant Origin. Bishen Singh Mahendra Pal Singh, Dehradun, 2008, 176-177.
 35. Bisht VK, Negi JS, Bh AK, Sundriyal RC. Traditional use of medicinal plants in district Chamoli, Uttarakhand, J Medicinal Plants Research, 2013; 7(15):918-929.
 36. Sharma K, Bhatnagar M. Asparagus racemosus (Shatavari): a versatile female tonic. International journal of Pharmaceutical Biological Archives, 2011; 2(3):855-863.
 37. Jaiyati R, Rajdeo K, Ashish C, Archana S, Ruchi B. A Survey to explore the herbal wealth and its utility as edibles, ethno-medicine and ethno-veterinary practices in Nanda Devi Biosphere Reserve (NDBR), Uttarakhand as a Step to Bio Prospection, Pharmaceutica Analytica Acta, 2016; 7:514.
 38. Dhaka N. A review on tissue culture studies in Eclipta alba—an important medicinal plant, International Journal of Pharmaceutical Science Review and Research, 2013; 22(2):269-275.
 39. Joshi K, Bhardwaj N. Traditional health care practices: A women centric study in lesser Himalayan region of Uttarakhand (India), Journal of Pharmacology and Phytochemistry, 2017; 6(3):617-23.
 40. Sahu R, Dhongade HJ, Pandey A, Sahu P, Sahu V, Patel D. Medicinal properties of *Nardostachys jatamansi* (a review), Oriental J Chemistry, 2016; 32(2):859-866.
 41. Khanduri DV. Diversity, Quantitative availability and Livelihood Support of Wild Edible Plants in a Part of

- TehriGarhwal Region, Uttarakhand, (Doctoral dissertation, College of Forestry, Ranichauri, VCSG Uttarakhand University of Horticulture and Forestry), 2016.
42. Semwal P, Anthwal P, Kapoor T, Thapliyal A. Preliminary investigation of phytochemicals of *Saussurea obvallata* (Brahm Kamal) and *Pittosporumeriocarpum* (Agni): two endangered medicinal plant species of Uttarakhand. *International J Pharmacognosy*, 2014; 1(4):266-269.
 43. Kala CP. Medicinal plants conservation and enterprise development, *Med Plants*, 2009; 1(2):79-95.
 44. Semwal DP, Bhatt KC, Mamgain A, Uniyal PL, Bahuguna YM. Role of potential ethno-medicinal plants resources of Kalimath valley (District Rudraprayag) Uttarakhand, India in health care, *Medicinal Plants*. 2013; 5:223-30.
 45. Uniyal SK, Singh KN, Jamwal P, Lal B. Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. *Journal of Ethnobiology Ethnomedicine*. 2006; 2(1):14.
 46. Vidyarthi S, Samant SS, Sharma P. Traditional and indigenous uses of medicinal plants by local residents in Himachal Pradesh, North Western Himalaya, India. *International J Biodiversity Science, Ecosystem Services & Management*, 2013; 9(3):185-200.
 47. Prakash A. Uses of some threatened and potential ethnomedicinal plants among the tribals of Uttar Pradesh and Uttarakhand in India, *International Conference on Forest Biodiversity-Earth's Living Treasure*. 2011, 93-99.
 48. Senthilkumar MK. Commonly used medicinal plants in Tehsil Baijnath, district Kangra, Himachal Pradesh, India, *Research in Pharmacy*, 2014; 4(5):11-15.
 49. Ratha KK, Rungsung W, Dutta S, Joshi GC, Hazra J. Some important herbaceous medicinal flora of Alpine and Sub-Alpine ecosystem of Western Himalaya. *American Journal of Pharmacy & Health Research*. 2014; 2(9).
 50. Siddiqui SZ, Ali S, Rubab K, Abbasi MA, Ajaib M, Rasool ZG. *Pyrus pashia*: A persuasive source of natural antioxidants, *Pakistan Journal of Pharmacy Science*, 2015; 28(5).
 51. Kumar M, Sheikh MA, Bussmann RW. Ethnomedicinal and ecological status of plants in Garhwal Himalaya, India, *Journal of Ethnobiology and Ethnomedicine*, 2011; 7(1):32.
 52. Rawat VS. Medicinal plants and sustainable livelihood in Pauri district of Garhwal Himalaya, Uttarakhand, India, *International Journal of Bioassays*, 2016; 5(6):4589-4592.
 53. Singh L, Kumar A, Paul A. *Bergenia ciliata*: The medicinal herb of cold desert, *International Journal of Chemistry Studies*, 2018; 6(3):3609-3613.
 54. Roshan S, Sharma P, Gupta R. *Butea monosperma*: A traditional medicinal plant:-An Overview. *Pharmatutor*, 2017.
 55. Shankar PA, Bhavana S, Manish WM, Kumar PN, Ankush JD. *Callicarpamacrophylla*: a review of its phytochemistry, pharmacology, folklore claims and ayurvedic studies, *Global Journal of Research Medicinal Plants Indigenous Medicine*, 2014; 3(3):91.
 56. Pawar HA, D'mello PM. *Cassia tora* L. An overview, *International Journal of Pharmaceutical Sciences and Research*, 2011; 2(9):2286-2291.
 57. Kamalinee, AD, Nanda WS. *Celastrus paniculatus*; medicinal and pharmacological properties: a review, *International Journal of Development Research*, 2015; 5(9):5526-5531.
 58. Rajendran K, Balaji P, Basu MJ. Medicinal plants and their utilization by villagers in southern districts of Tamil Nadu, *Indian Journal of Traditional Knowledge*, 2008; 7(3): 417-420.
 59. Singh S, Gautam A, Sharma A, Batra A. *Centella asiatica* (L.): a plant with immense medicinal potential but threatened, *International J Pharmaceutical Sciences Review and Research*, 2010; 4(2).
 60. Mehta S, Purohit VK, Andola HC. Pharmacological Activities of *Cinnamomum tamala* Nees & Eberm. Medical Implication: A Review, *Medicinal Aromatic Plants*, 2014; 3(174), doi: 10.4172/2167-0412.1000174.
 61. Edeoga HO, Omosun G, Osuagwu GG, Mbaebie BO, Madu BA. Micromorphological characters of the vegetative and floral organs of some *Cleome* species from Nigeria, *American-Eurasian Journal of Scientific Research*, 2009; 4(3):124-127.
 62. Devi BP, Boominathan R, Mandal SC. Evaluation of anti-diarrheal activity of *Cleome viscosa* L. extract in rats, *Phytomedicine*, 2002; 9(8):739-742.
 63. Ahmed S, Sultana M, Mohtasheem M, Hasan U, Azhar I. Analgesic and antiemetic activity of *Cleome viscosa* L, *Pakistan Journal of Botany*, 2010; 43:119-122.
 64. Joshi T, Kumar N, Kothiyal P. A review on *Cleome viscosa*: an endogenous herb of Uttarakhand, *International Journal of Pharmaceutical Review and Research*, 2015; 4:25-31.
 65. Sharma A, Baluja Z. Therapeutic Effects of *Glycine max* (Soybean): A Summary, *International Journal of Research in Pharmacy and Biosciences*, 2015; 2(1):22-27.
 66. Ayyanar M, Subash-Babu P. *Syzygium cumini* (L.) Skeels: A review of its phytochemical constituents and traditional uses, *Asian Pacific Journal of tropical Biomed*, 2012; 2(3):40-246.
 67. Saha S, Ghosh S. *Tinosporacordifolia*: One plant, many roles, *Ancient science of life*, 2012; 31(4):151.
 68. Bhatti VP, Vashishtha DP. Indigenous plants in traditional healthcare system in Kedarnath valley of western Himalaya, *Indian Journal of Traditional Knowledge*, 2008; 7(2):300-310.
 69. Dhanik J, Dhanik J, Arya N, Nand V. A brief review on some medicinal plants of Uttarakhand, *Journal of Pharmacogn Phytochem*, 2017; 6:74-84.
 70. Singh S, Yadav S, Sharma P, Thapliyal A. *Betulaulis*: A potential herbal medicine, *International Journal of Pharmaceutical and Biology Sciences Archives*, 2012; 3(3):493-8.
 71. Dutta A, Lal N, Naaz M, Ghosh A, Verma R. Ethnological and Ethno-medicinal importance of *Aeglemarmelos* (L.) Corr (Bael) among indigenous people of India, *American Journal of Ethnomedicine*, 2014; 1(5):290-312.
 72. Sharma J, Gaur RD, Gairola S, Painuli RM, Siddiqi TO. Traditional herbal medicines used for the treatment of skin disorders by the Gujjar tribe of Sub-Himalayan tract, Uttarakhand. *Indian Journal of Traditional knowledge*, 2013; 12(4):736-746.
 73. Ayyanar M, Ignacimuthu S. Medicinal plants used by the tribals of Tirunelveli hills, Tamil Nadu to treat poisonous bites and skin diseases, *Indian Journal of Traditional Knowledge*. 2005; 4(3):229-236.