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Research Article

SOCIO-ECONOMIC IMPORTANCE AND POTENTIAL OF WILD AYURVEDIC MEDICINAL PLANTS OF THE WESTERN HIMALAYAS, INDIA

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ABSTRACT

India's Ayurvedic medicine system is becoming popular worldwide because these medicines are based on natural herbal products and have no side effects on health; somewhat, it improves and strengthens the body's immunity. Today people's awareness is increasing about health, the side effects of allopathy medicines on health, and their inclination and faith toward Ayurvedic treatments are railing with time. Ayurvedic medicine system is based on traditional herbal knowledge, identification of herbs in natural habitats, and formulations. The present study involves the survey and analysis of local healers of Shivalik hill in the Western Himalayas to discover the most used herbs and their economic potential from national and international market perspectives. Therefore, a survey and analysis were conducted in randomly selected 37 villages of six development blocks. The survey interviewed 195 local healers and people based on the scientifically designed questionnaire. During the 2019-2022, the thirty-one wild medicinal plant species were identified with, highlighting ten highly valued plants. These plants have high demand from local healers, vendors, or the pharma industry. Further analysis of the importance and value of each part of the plant shows this: leaves (15%), flowers (13%), roots (21%), seeds (27%), oil (2%), wood (4%), juice (11%), tuber (4%) and whole plant (4%). Study shows that local healers can. This study also emphasizes the cultivation of these herbal plants on a large scale and can potentially raise the financial status of local people and healers. The study highlights the potential of these herbal plants found in the study area to enhance rural livelihood and community resilience and calls for the integration of medicinal plants in conservation and development strategies.

INTRODUCTION

India has one of the most established, extravagant, and different social customs related to the utilization of medicinal plants. Traditional knowledge is the utilization of herbal plants by the ancient people and transmitting this knowledge from one generation to the next and has thousands of years of clinical research behind it. So it is fully tested and proven. Ethno-prescription incorporates the examination of local convictions, thoughts, data, and practices among the ethnic gatherings of ancestral and natural people for thwarting, easing, and treating different diseases.

The destitution and the absence of current solutions among different nations and tribal people, it is evaluated that around 70-80% of the people worldwide depend upon nearby restorative plants for their fundamental clinical care system WHO, 2022. Ancestral practitioners have their own arrangement of prescriptions, which are age-old and some of which are not recorded in writing. Conventional prescriptions are effective in arranging homegrown drugs to improve individuals' health (Negi, 2002). Restorative and ethnobotanical uses of various herbal plant species are recorded by different researchers from various areas of Himachal Pradesh in the light of the data given by the neighborhood ethnic individuals. It is one of the Himalayan domains of India, which has been seen as the most excessive resource of biodiversity. The importance of the Ayurvedic herbal medicinal system in indigenous healthcare practices provides a new field of research and biodiversity protection. (Uniyal et al.,

2006). The relationship between local communities and plant abundance is emphatically uncovered by well-developed traditional herbal practices and a variety of plants involves in functions, the routine family uses rituals, and trading for monetary increase (Singh, 1999). Herbal medicine plants play an important role in rural areas, and locally produced drugs, are still being used as household remedies for different ailments (Qureshi & Ghufran, 2005). No socio-economic data is available about the herbal wealth and traditional healers utilize for ailments in the study area. So there is a need to know the potential of the Ayurvedic medicinal plants and suggest ways to improve the socio-economic status of these healers.

Herbal market will increment to USD 104.78 billion by 2026 with a yearly increase of 6.5% (Bareetseng, 2022). Indian herbal medicine market is 50 billion rupees with 14% annual growth. According to WHO financial report Global herbal market in 2050 will reach up to 5 trillion Indian rupees (Sarmah, 2022). Himachal Pradesh is enriched with a rich variety of plants, which incorporates 3500 higher plants, and of these, 1500 plants are related to therapeutic and have medicinal properties (Chauhan, 1999). Shivalik Hills are situated at latitude 30°22'30"N to 32°36'53"N and longitude 75°45'55"E to 77°49'48"E covering a total area of 8170Km² covering under eight districts of Himachal Pradesh (Yadav *et al*., 2015). The percentage of the total geographical area covered under Shivalik Hills is highest in Himachal Pradesh (14.67%), so it has rich biodiversity resources and scope for Ayurvedic medicines.

MATERIALS AND METHOD

Study Area

An extensive survey was conducted in randomly selected thirty seven villages of the six development blocks of district Hamirpur in the Shivalik Hills of the Western Himalayas of Himachal Pradesh. The Methodology and approach followed during Medico-Ethno Botanical (MEB) Survey are: i). Participatory Rapid Appraisal (PRA) ii). Semi-Structured Interview iii). Inventory Interview Approach (Silva *et al*., 2014). Although these areas are mainly emphasized, an attempt is made to cover almost all the adjoining areas. The present study is conducted in the district Hamirpur, Himachal Pradesh. It is between 76°18′ to 76°44′ East Longitudes and 31°25′ to 31°52′ North Latitude. The elevation varies from 400 meters to 1100 meters.

Medico-Ethno Botanical (MEB) Survey

During MEB Survey, three age groups of people (20-40 yrs., 40-60 yrs., and above 60 yrs.) were formed, and a total of 195 people (both males and females) were interviewed. About 34 people from the age group 20-40 yrs., 70 people from the age group 40-60 yrs., and 91 people above 60 yrs. (Graph 1).

Collection, Preservation, and Identification of Plants Specimens

They identified plants and their parts (such as seeds, roots, bark, tubers, leaves, fruits, and flowers) used by local people in herbal medicine were identified by them in their natural habitat (Fig.1). Plants specimens collected during the MEB survey were processed and preserved according to the methodology suggested by Jain and Rao (1988). The collected plant specimens were scientifically identified, submitted, and deposited with the help of the herbarium repository of the Department of Bio-Sciences, Career Point University - Hamirpur, Himachal Pradesh.

RESULTS AND DISCUSSION

This study aims to contribute to the documentation of ethnobotanical traditional knowledge, local herbal practitioners, and assessment of the socio-economic potential of important wild medicinal plant species compared to conventional crops (wheat, maize and paddy). During 2019-2022, study was done on the traditional knowledge, local healers use of herbs in herbal medicinal, collection and trading practices of medicinal plants as well as conventional crops in 37 villages in the Shivalik Hills of Himachal Pradesh. Herbalists, traditional healers, elderly villagers, farmers and, shepherds were interviewed on herbal plant species.

The traditional knowledge has been tested over the years by ancestors of local people. These local people are curing various diseases with the help of this knowledge. There are many such diseases to which allopathy has no solution today but these people are doing successful treatment of various diseases. Allopathic medicines have also several side effects. Hence the value and importance of this knowledge has been realized and recognized by the people, scientists, and governments all around the world to conserve it. So, a detailed survey has been conducted in the given study area to know which herbs are used by people. Data collected during the exploration trips shows that these people used one plant or different parts in combination with other plants to cure different ailments. Different plants parts of same or others plants are used in separate drugs singly or in combination. The frequency of percent of use of different plant parts by healers is shown in Graph 2.

Graph 1: Various Age Group Participant Interviewed
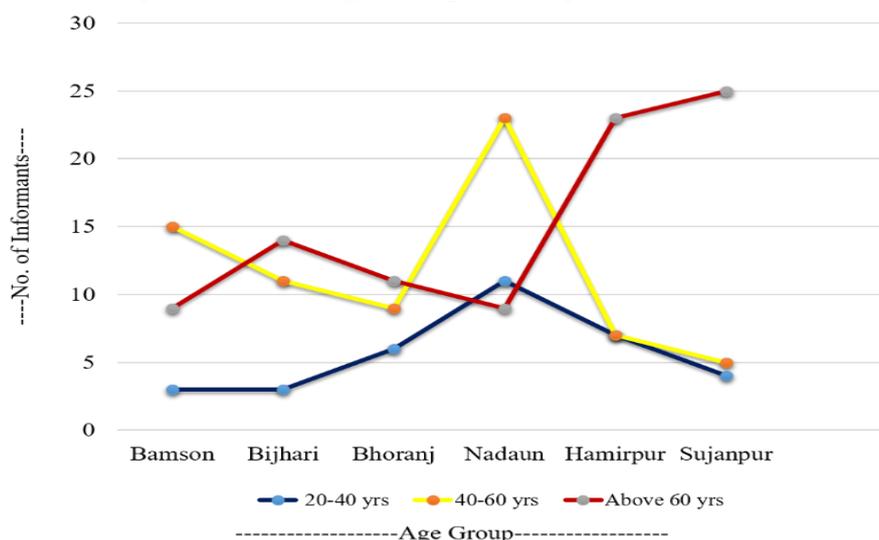
Graph 2: Frequency % of Plant Parts Used in Herbal Medicines by Local Healers
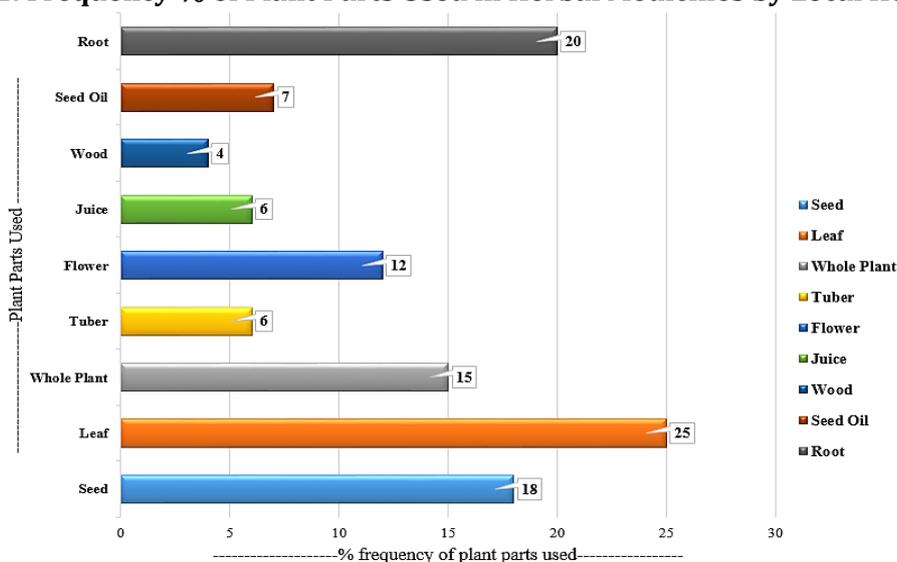
There are numerous confirmed reports that a combined form of a plant species can be a better and more effective remedy for treating ailments. Local people are using several local herbal plants during the treatment of various ailments. Present study identifies various important plants which are being used by the local people in their herbal medicines in the study areas. The market value of these plants was assessed (Table 1). The list of these plants is as follow:

**Table 1: Herb Plants used by Traditional Healers to Treat Various Ailments and Cost/Kg.**

S. No.	Name of Plant	Common Name	Family	Flowering /Fruiting	Elevation	Part Used	Market Price (Rs./Kg)
1.	*Acacia catechu* (L.) Wild.	Khair, Khadir, Black Catechu	Fabaceae	May-December	894m	Bark, heartwood, flower, extract	300-400
2.	*Acorus calamus* L.	Barya, baryan, bach	Araceae	April-August	845m	Rhizome, Leaves, Roots	45-50
3.	*Aegle marmelos* (L.) Correa.	Bil-Patri, Bil, Bael Tree	Rutaceae	May - June	877m	Fruit	35-40
4.	*Andrographis paniculata* Nees	Kalmegh, King of Bitters	Acanthaceae	September-December	512m	Medicine: Leaves, roots, whole plant	45

5.	*Argemone mexicana* L.	Satayanasi	Papaveraceae	December-February	866m.	Roots, leaves, seeds, and juice	200-250
6.	*Asparagus adscendens*	Sattavar, Sanspai	Asperagaceae	August-November	1052m	Tuberous roots	250-300
7.	*Azadirachta indica* A. Juss	Neem, Margosa	Meliaceae	March-April	592m	Bark, root bark, leaves, fruit, seeds	35-40
8.	*Bambusa vulgaris* L	Bans, Bainj, Bamboo	Poaceae	Once in 50-60 years	1017m	Leaves, roots, *Vanshlochan*	600-700
9.	*Berberis aristata* DC	Kashmalu, Daru Haldi, Rasaont	Berberidaceae	May-June/ August-September	1202m.	Fruit, root bark	250-300
10.	*Boerhavia diffusa* L	Punerva, Punarnava	Nyctaginaceae	July-September	563m.	Leaf, root	270-300
11.	*Brassica juncea* (L.) Czern. & Coss.	Rai, Indian Mustard	Brassicaceae	June-September	495m.	Flowers, fruits, seeds	150-200
12.	*Broussonetia papyrifira* (L.) Vent.	Jungle Toot, Japani Toot	Moraceae	May-June	990m	Leaves, roots, fruits, seeds	4000-5000
13.	*Butea monosperms* (Lam.) Taub.	Flame Of The Forest, Palash, Palah	Fabaceae	Feb - April	904m	Gum, leaves, flowers, bark, and seeds	45
14.	*Calotropis gigatea* (Linn.) Ait.f.	Aak, Akanda	Asclepiadaceae	November-January/ throughout the year	411m	Leaves, latex, flower, latex, and roots	800-900
15.	*Cannabis sativa* L.	Bhang, Hemp	Cannabaceae	June-October	812m.	Leaves, seeds	350
16.	*Celastrus paniculatus* Willd.	*Malkangni, Jyotishmati,*	Celastraceae	February - May	658m	Root, leaves, seeds	110
17.	*Centipeda minima* (L.) A. Braun & Asch.	Nak Chhikni, Sneeze Weed	Asteraceae	December - January	560m	Herb, seed	1200-1500
18.	*Cinnamomum camphora* L.	Kapoor, Muski Kapoor	Lauraceae	April - May	560m	Leaves, fruits, inflorescence	600-700
19.	*Cymbopogon citralus* (DC) Stapf.	Lemon Grass	Poaceae	March - April	657m	Leaves, oil	120
20.	*Datura stramonium* L.	Dhatura, Safed Dhatura	Solanaceae	March-September	573m	All parts of the plant	300-350
21.	*Ecliptica prostata* Roxb.	Bhringraj, Bhangra	Asteraceae	August-November	600m	Roots, seeds, leaf, whole plant	55-60
22.	*Elaeocarpus ganitrus* Roxb.	Rudraksha, Rudraki	Elaeocarpaceae	April-June	898m	Bark, leaves, fruit, seed	500-600
23.	*Elettaria cardamum* L.	Chotti Elaichi	Zingiberaceae	April-June	898m	Fruit, seeds	1250-1400
24.	*Euphorbia heterophylla* L.	Badi Dudhali, Milkweed	Euphorbiacece	September-March	616m	Leaves, roots, stem	500

25.	*Euphorbia hirta* L.	Asthma Herb, Dudhli	Euphorbiacece	Throughout the year	603m	All parts	1500-1800
26.	*Ferula asafoetida* L.	Hing Plant	Apiaceae	March-April	527m	Stem, leaves, flowers and resins	3000
27.	*Ficus benghalensis* L.	Banyan, Bargad Tree	Moraceae	April-July	891m	Bark, leaves, latex, fruit powder	1100-1200
28.	*Foeniculum vulgare* Mill.	Meethi-Saunf	Apiaceae	May-June	912m	leaves, seeds, fruits, extract	1100-1200
29.	*Justica adhatosa* Linn	Basooti	Acanthaceae	Feb-May	866m	Leaves, stem, flower and roots	1300
30.	*Mallotus philippinensis* Muell. Arg	Kamal, Sindoor plant	Euphorbiaceae	Oct-April	821m	Leaves, roots, fruits	1100
31.	*Melia azedarach* L.	Drek, Bakaayan	Meliaceae	Nov-Feb	760m	Bark, leaves, fruit, roots	1400

The market value of conventional crops (wheat, maize and paddy) is very low as compared to the medicinal herbs (Graph 3). Farmers are getting very low selling value (approx. Rs. 30-35/kg) for their conventional crops in market. So their input in growing these crops is high and they get low output. That is the reason; farmers are turning away from agriculture.

Graph 3: Income Index of Conventional Crops. Minimum Support Prices (MSP), 2021-2022 (Rs./Quintal)
(Source: Farmers Portal, Govt. of India)
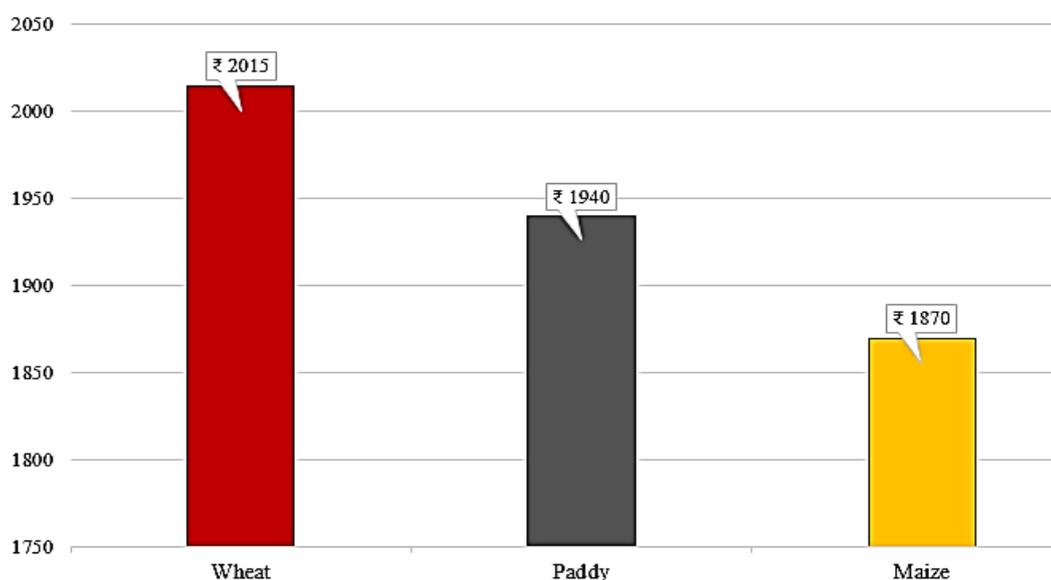
Present study identifies thirty one plants from study area which are repeatedly used by the healers of the study area in one medicine or another. The market potential of all these medicinal plants is very high compared to conventional crops as shown in Graph 4.

Both the price and medicinal value of these thirty one plants are very high as compared to the conventional crops. But, out of thirty one valuable plants, further, more important plants were identified and analyzed. Ten such high valued plants amount thirty one were identified in their natural habitat (Fig.2). These plants have the highest market value and medicinal properties (Table 2). The present study advises to cultivate these plants, which has miraculous potential to increase the income of farmers and healers their cultivation on large scale. Large scale cultivation will help to conserve traditional knowledge, biodiversity and environment.

Figure 1: Identification and Collection of Medicinal Herb and Interaction with Local Healers

Table 2: High Valued Medicinal Plant with their Medicinal Value

S. No.	Name of Plant	Part Used in Medicines	Disease Cured by Local Healers
1.	*Broussonetia papyrifira* (L.) Vent.	Leaves, roots, fruits, seeds	Bleeding, impotency, oedema
2.	*Calotropis gigatea* (Linn.) Ait.f.	Leaves, latex, flower, latex, and roots	Piles, epilepsy, feet pain, asthmatic cough, leucoderma
3.	*Centipeda minima* (L.) A. Braun & Asch.	Herb, seed	Cols, throat pain, worm infection, nasal congestion
4.	*Cinnamomum camphora* L.	Leaves, fruits, inflorescence	Scar on face, hairfall, itching, labour pain, skin diseases
5.	*Euphorbia hirta* L.	All parts	Asthma, leucorrhea, breathing problems
6.	*Ferula asafoetida* L.	Stem, leaves, flowers and resins	Sweating, diarrhea, hemorrhoids, indigestion
7.	*Ficus benghalensis* L.	Bark, leaves, latex, fruit powder	Bloody urine, miscarriage, bloody vomiting, piles
8.	*Justica adhatosa* Linn	Leaves, stem, flower and roots	Cough, toothache, asthma, tuberculosis, leprosy
9.	*Mallotus philippinensis* Muell. Arg	Leaves, roots, fruit	Eczema, ulcer, renal stone, blood purification
10.	*Melia azedarach* L.	Bark, leaves, fruit, roots	Piles, dysmenorrhea, dog bite

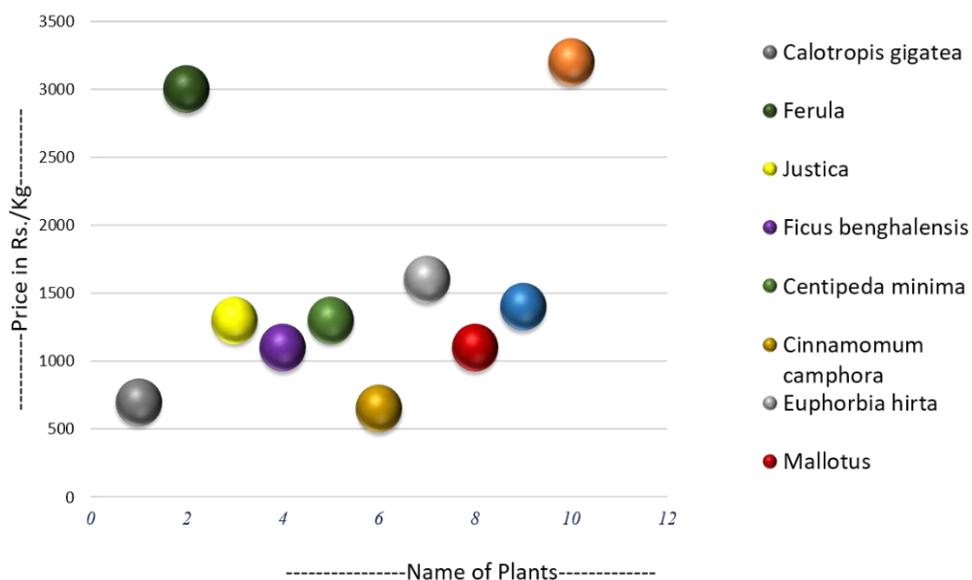**Graph 4: Income Index from Most Potential Herbal Plants (Rs. /Kg)**

Figure 2: Highly Valued Ayurvedic Medicinal Plants in Natural Habitat

Broussonetia papyrifira

Cinnamomum camphora

Calotropis gigatea

Euphorbia hirta

Centipeda minima

Ferula asafetida

Ficus benghalensis

Mallotus philippinensis

Justica adhatosa

Melia azedarach

CONCLUSIONS

The study highlights the potential of these herbal plants found in study area to enhance rural livelihood and community resilience and calls for the integration of medicinal plants in conservation and development strategies. The present study's findings suggest that the herbal market value is high due to its high demand in the pharma industry and in local treatment. The study also highlights the need for awareness among these healers so that they can use these herbs sustainably. Sustainable use of medicinal plants is essential to meet our generations' present and future demands of our generations. However, the government is taking many steps for this. But it needs more attention so that traditional knowledge can be conserved before it is lost with death has tremendous potential and opportunities to boost the socio-economic status of the local people and the growth engine of any country at the grass root level. Therefore, it is necessary to convert this traditional knowledge into a well-planned medicinal plant sector as it is a multi-billion dollar industry when adopted commercially. This potential of the traditional herbal wealth of India is so high that it can convert every individual into a doctor.

ACKNOWLEDGMENTS

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