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## Uses of invasive alien plants in Kumaun Himalayan folk medicinal system

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### Abstract

Kumaun Himalayan region of Uttarakhand is characterized by a rich diversity of medicinal plants. This region occupies an important place in traditional medicinal system of India. The present investigation is carried out on invasive plants and their medico potentialities. It reveals that there are 48 invasive plants species belonging to 25 families used by the local people for curing various kinds of ailments including cut, wounds, indigestion, itching, headache, jaundice, diabetics etc. The part used and their traditional use of these plant are described in this study. A detail documentation of the utilization of invasive plants by the natives of Nainital, Kumaun Himalaya in traditional medicine system is provided here under.

**Keywords:** kumaun himalaya, invasive/alien plants, folk medicine, ailments, traditional uses

### 1. Introduction

India is rich in wealth of medicinal plants and is one of the centers of the 12 mega biodiversity centers of the world. Nearly 65% population of India is dependent on the traditional system of medicine [1]. The plant based traditional medicinal systems play an important role in curing the health and about 80% people of the world use traditional medicines for their primary health care [2]. The plant use for medicines must containing inherent active ingredients use to cure disease [3]. Several medicinal system are utilized in India in which medicinal plants are described as Ayurveda (700), Siddha (600), Amchi (600), Unani (700), Allopathy (30) plants species for curing various diseases [4]. The Uttarakhand region of Indian Himalaya takes a great place in having good number of medicinal plants. It is the major habitat of some glacially and non-glacially born medicinal plants and ethno-medicinal plants used in curing the disease of locals since long time.

The flora of any country is usually composed of two types of plants i.e, natives or indigenous plants and invasive/ alien or exotic plants. The invasive species is a species that is not native to a specific location, and having a tendency to spread prolifically to cause damage to the environment and economy [5]. The available literature showed that a total of 190 invasive alien species have been recorded in Indian Himalayan region. Out of these 163 plant species of 105 genera belonging to 46 families are recorded from the Kumaun Himalayan region of Uttarakhand [6]. The majority of invasive plants are reported from the native of American continent. Many invasive species, once they are dominant in the area, become essential to the ecosystem of that area. Although invasive species are not always harmful, sometimes they are beneficial too. They can provide a suitable habitat or food source for other organisms [7]. They may be beneficial from the medicinal point of view, the areas where native species has become extinct invasive species can fill their role to increases the biodiversity in an ecosystem [8].

The Indian Himalayan region is also the habitat of many tribal communities such as Bhotias, Boxaus, Tharus, Jaunsaries, Saukas, Karvar and Mahigiri which use these plants as medicine for curing the various kinds of ailments [9]. The practices of plant based traditional medicine are of hundreds years of belief and observations which predate the development and spread of modern medicine by passing on orally from generation to generation without any written document [10], [11]. The present study is an attempt to highlight the medicinal value of some invasive plants of Kumaun Himalaya used by the tribal people for curing various types of ailments.

### 2. Material and Methods

The present study is carried out at Nainital district and its suburb in Kumaun Himalaya Uttarakhand India. It lies in between the 29° 5' N latitudes and 77° 48' to 81° 0' E Longitudes in the western part of central Himalaya. An extensive and intensive survey was made by visiting 6 villages viz, Ranibagh, Jyolikot, Maholi, Rusee, Bhumiadhar and Doganv of Nainital district. The invasive plants species distributed in the Nainital district of Kumaun Himalaya

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were collected. The documentation was made on the field observation, discussions with local and knowledgeable people as well as scrutinizing the literature review. Collected plants specimens were brought to the lab. All the specimens were critically examined and identified with the help of available literature and plant taxonomist of the department. The specimens were processed for the preparation of Herbarium by standard methods [12]. The voucher specimens were also deposited in the herbarium of the department for future reference. Moreover, all available information including local names, habitat, part used etc. were recorded. Indigenous uses and ethno botanical notes were recorded from the local people and available literature [13, 14].

### 3. Result and Discussion

Altogether 48 species belonging to the 25 different families were recorded (Table-1). Among these, Asteraceae family is at the top with 11 plant species and it is predominated with Solanaceae and Amranthaceae 4 plant each followed by Malwaceae and Asclepidaceae 3 plant each followed by Berberidaceae and Poaceae 2 plant each which is followed by Primulaceae, Liliaceae, Crassulaceae, Saxifrageae, Canabinaceae, Caesalpinaceae, Caparaceae, Convolvulaceae, Cyperaceae, Chenopodiaceae, Apocyanaceae, Euphorbiaceae, Verbinaceae, Mimosaceae, Oxalidaceae, Portulacaceae, Rosaceae and Urticaceae single plant each (Table-1&Figure-1). Out of these plant species 37 plants are herb, 9 plants shrub, 1 plants under shrub, and 1plant climber (Table-1& Figure-2). Among the invasive plant their root, stem, leaf, fruit and even whole plant has the medicinal properties. The root of 11 plants viz, *Asparagus racemosus*, *Amranthus spinosus*, *Berberis asiatica*, *Berberis aristata*, *Rubus ellipticus* *Calotropis procera*, *Berginia ciliata*, *Mimosa pudica*, *Sida acuta*, *Urnea lobata* and the stem of 1 plant species i.e, *Berberis aristata* has medicinal application. The leaves of 21 plant species i.e, *Artemecia sacrorum*, *Azeratum coenizoides*, *Anagalis arvensis*, *Amranthus spinosus*, *Alternathera sessilis*, *Berginia ciliata*, *Bryophyllum pinnatum*, *Calotropis procera*, *Calotropis gigantea*, *Canabis sativa*, *Chenopodium album*, *Cassia tora*, *Datura stramonium*, *Emlia sonchifolia*, *Euphorbia hirta*, *Eupatorium adenophorum*, *Lantana camara*, *Mimosa pudica*, *Oxalis corniculata*, *Physalis minima* and *Tridax procumbens* are used by natives in curing various

types of ailments. The fruits of *Anagalis arvensis* is used in curing the disease. The whole plant of 19 plant species viz, *Acyranthus bidentata*, *Artemicia nilagirica*, *Acyranthus aspera*, *Bidens pillosa*, *Cleome gynandra*, *Cuscuta reflexa*, *Cyanodon dactylon*, *Cyperus rotundus*, *Cathranthus roseus*, *Eclipta prostrata*, *Gnaphalium pensylvanicum*, *Malvestrum coromandelianum*, *Portulaca*, *oleraceae*, *Solanum nigrum*, *Sonchus asper*, *Saccharum spontaenum*, *Urtica dioica* and *Xanthium indium* have also various medicinal uses (Table-1 & Figure-3).

A similar study made by Topwal and Uniyal [15] on ethno medicinal plants in Uttarakhand India, states that, local people especially people of tribal communities and women of Indian Himalayan region (Uttarakhand Himalaya) use frequently the traditionally available medicinal plants for health purpose. It is because these are easily available, less expensive and have no side effects as compare to modern medicine. Another study carried out by Samy and Ignacimuthu [10] on invasive alien plant species in Africa revealed that exotic species are extensively exploited in Africa. However some species of invasive plants are used in day to day life by natives of Africa for curing of various types of their ailments. The large scale use of invasive alien plant species seem to be helpful for their ultimate control and play a great role in their management strategy. It is also important to note that the people that should be aware of about the use of invasive plants because some of these plants are harmful too. Their role is well played by Vadiyas, traditional healers because they prefer various plant/ plant parts for curing the different kinds of ailments of human beings. The traditional knowledge which includes systematic, holistic and experimentally based can serve as a useful tool in such investigations and also serves as powerful discovery engine for newer, safer and easily available medicines. Thus the use of invasive alien plant species in the development of traditional medicine system with quality, safety and efficacy will help to preserve this traditional knowledge. The invasive species may cause a change in soil texture, its profile, decomposition, nutrient content, moisture availability and a threat to biodiversity and economy. But on the other hand they can be used in the development of reliable medicine for health care system. Thus the medicinal potentialities of invasive alien plant species which are least recognized by others would be proved a new area of the research.

**Table 1:** Invasive/ alien plant species of Nainital Kumaun Himalayas and their medicinal uses

S. No.	Botanical name	Local name	Family	Life forms	Part used	Medicinal applications
1.	<i>Acyranthus bidentata</i> Blume	Latjeera/ Dansh	Amranthaceae	Herb	Whole plant	Root infusion taken in malarial fever, used as laxatives [15].
2.	<i>Artemisia nilagirica</i> L.	Patti/ Kunj	Asteraceae	Shurb	Whole plant	Used in urinary tract infection, skin diseases, cuts, burns and wounds [15].
3.	<i>Artemisia sacrorum</i> L.	Kaparpatti/ Jhol patti	Asteraceae	Shurb	Leaf, Bud	Used to remove hair fall problem [15].
4.	<i>Acyranthus aspera</i> L.	Chirchira	Amranthaceae	Herb	Whole plant	Used in teeth problem [15].
5.	<i>Azeratum coenozoides</i> L.	Gamlwa/ Ajgandha	Asteraceae	Herb	Leaf	Used in the treatment of diarrhea, headache, leprosy, cut and wounds [16].
6.	<i>Anagalis arvensis</i> Linn.	Vish khapra	Primulaceae	Herb	Leaf, Fruit	Used as pain killer [15].
7.	<i>Asparagus racemosus</i> Willd.	Satavari	Liliaceae	Shurb	Root	Antiseptic, apordisiac with fresh wateror milk reduced B.P, in liver problem, used in ulcers and in acidity [15].
8.	<i>Amranthus spinosus</i> L.	Chauli	Amranthaceae	Herb	Leaf, Root	Used in the treatment of internal bleeding, diarrhea, excessive menstruation [17].
9.	<i>Asclepias curassivica</i> L.	Madhar	Asclepidaceae	Herb	Whole plant	Used in traditional medicine as an purgative, hemostatic in bleeding, in fever and in pneumonia [18].
10.	<i>Alternathera sessilis</i> L. Dc.	Matsyakshi	Amranthaceae	Herb	Leaf	Used in treating cuts and wounds, antidotes for scorpion sitting and snake bites [19],[20].
11.	<i>Berberis aristata</i> Dc.	Kingore	Berberidaceae	Shurb	Root, Stem	Used in fever and weakness [16].

12.	<i>Berberis asiatica</i> Rox ex. Dc	Kilmora	Berberidaceae	Shurb	Root	Used in inflammation, diabetics, jaundice and stomachache [15].
13.	<i>Bidens pilosa</i> L.	Kumra	Asteraceae	Herb	Whole plant	Used in inflammation, rheumatism and in urogenital system [21].
14.	<i>Berginia ciliate</i> (Har.) Stemb	Silpari	Saxifragaceae	Herb	Leaf, Root	Decoction used in kidney stone trouble, cough and in diarrhea [22].
15.	<i>Bryophyllum pinnatum</i> Linn.	Patharchatta	Crassulaceae	Herb	Leaf	Used in kidney stone trouble, hypertension, skin disorder, cold [23].
16.	<i>Calotropis procera</i> R.B.R	Madar/ Ank	Asclepidaceae	Shurb	Leaf, Root, Flower	Used in indigestion, roots bark are used as tonic, sudorific antispasmodic, flowers stomachic [19].
17.	<i>Calotropis gigantea</i> L.	Amadar	Asclepidaceae	Shurb	Leaf, Root Latex	Used in asththama, body ache and bronchitice [16].
18.	<i>Canabis sativa</i> L.	Bhang	Canabinaceae	Herb	Leaf, Seed	Used as pain killing, antipyretic, diuretic and antiinflammatory [24].
19.	<i>Cleome gynandra</i> L.	Safed hurhur	Capparaceae	Herb	Whole plant	Root used in fever, leaves are useful in rheumatism and in fever [25], [26].
20.	<i>Cassia tora</i> L.	Chakwad	Caesalpinaceae	Herb	Leaf	Leaf paste used in skin diseases, also used in tumour and ulcers [27].
21.	<i>Cuscuta reflexa</i> Roxb.	Amarbel	Convolvulaceae	Climber	Whole plant	The plant paste is used for headache, bodyacheing, fevers [11], [6].
22.	<i>Chenopodium album</i> L.	Bathuwa	Chenopodiaceae	Herb	Leaf, Seed	Used in the treatment of rheumatism, bugbites, sunstroke, urinary problems [28].
23.	<i>Cyanodon dactylon</i> (L.) Pers.	Doov	Poaceae	Herb	Whole plant	Used to cure nasal bleeding [29].
24.	<i>Cyperus rotundus</i> L.	Motha	Cyperaceae	Herb	Whole plant	Used to cure fever, cough, malaria, bronchitis, loss memory, stomach disorder and in indigestion [30].
25.	<i>Cathranthus roseus</i> L. Don.	Sadabahar	Apocyanaceae	Shurb	Whole plant	Plant used as remedy for diabetes [16].
26.	<i>Dhatura stramonium</i> L.	Dhatura	Solanaceae	Herb	Leaf	Used in injury as pain killer [31].
27.	<i>Emlia sonchifolia</i> (L.) Dc.	Hirankuri	Asteraceae	Herb	Leaf	Juice used in nightblindness [32].
28.	<i>Eclipta prostrata</i> L.	Bhangara	Asteraceae	Herb	Whole plant	Used in spleen enlargement, liver disorder and in eye, ear trouble [33].
29.	<i>Euphorbia hirta</i> L.	Dudhi	Euphorbiaceae	Herb	Leaves	Used in cough, kidney stones, abscess and in bronchial asthma [34].
30.	<i>Eupatorium adenophorum</i> Spreng.	Kala basa	Asteraceae	Herb	Leaf	Crushed leaves applied on wounds and cuts [35].
31.	<i>Gnaphalium pensylvanicum</i> Willd.	Buglya	Asteraceae	Herb	Whole plant	Used in the treatment of antiinflammatory diseases, cough, rheumatism and in arthritis [36].
32.	<i>Lantana camara</i> L.	Kuri	Verbenaceae	Herb	Leaf	The decoction used in curing rheumatism, diuretic, old leaves applied on wounds [37].
33.	<i>Malvestrum coromandelianum</i> (L.) Garcke	Bala	Malvaceae	Herb	Whole plant	Used in curing antiinflammatory diseases, hepatitis, liver infection, diarrhea, arthritis and leaves in wounds [38].
34.	<i>Mimosa pudica</i> L.	Lajwanti	Mimosaceae	Herb	Leaf, Root	Leaves and root are used in leprosy, dysentery, vaginal and uterine complaints asthma and in leucoderma [39].
35.	<i>Oxalis corniculata</i> L.	Khatti buti	Oxalidaceae	Herb	Leaf	Leaf juice used in skin diseases and in conjunctivitice [35].
36.	<i>Physalis minima</i> L.	Rusperry	Solanaceae	Herb	Leaf	Used in inflammations, abdominal troubles, diuretic and laxative [40].
37.	<i>Portulaca oleraceae</i> L.	Kulfa	Portulacaceae	Herb	Whole plant	Used in stanch bleeding, fever, dysentery and in diarrhea [41], [42], [43].
38.	<i>Rubus ellipticus</i> Smith.	Hisolu	Rosaceae	Herb	Root	The juice of the root is used in the treatment of fever, gastric trouble, diarrhoea and dysentery [44].
39.	<i>Solanum nigrum</i> L.	Makoi	Solanaceae	Herb	Whole plant	Plant used in fever, diarrhoea, eye disease, liver disorder, chronic and in skin ailments [45].
41.	<i>Saccharum spontaenum</i> L.	Kasa	Poaceae	Herb	Whole plant	Used in dyspepsia, burning, piles, in sexual weakness and in respiratory troubles [46].
42.	<i>Solanum pseudocapsicum</i> L.	Jangali- Mirch	Solanaceae	Undershurb	Seed	Used in the treatment of boils and gonorrhoea and for abdominal pain [47].
43.	<i>Sida acuta</i> Burm. F.	Fard buti/Boriyara	Malvaceae	Herb	Root	Roots are used in fever and in rheumatism [48].
44.	<i>Sonchus asper</i> L. Hill.,	Karnfool	Asteraceae	Herb	Whole plant	Plant used as a tonic to purify blood and applied on fresh injuries on wounds, cough, bronchitis and asthma [49].
45.	<i>Tridax procumbens</i> L.	Phuliya	Asteraceae	Herb	Leaf	Used in diarrhea, dysentery, cut and wounds [50].
46.	<i>Urnea lobata</i> L.	Chatkura	Malvaceae	Herb	Root	Used in body pain, in rheumatism, diarrhea and in rheumatism [51].
47.	<i>Urtica dioica</i> Roxb.	Bicchu ghas	Urticaceae	Shurb	Whole plant	Used in rheumatism and in skin diseases and in body pain [35].

48.	<i>Xanthium indicum</i> Koeing.	Chota gokhru	Asteraceae	Herb	Whole plant	Antihelmentic, digestive, antipyreic and improves appetite [52].
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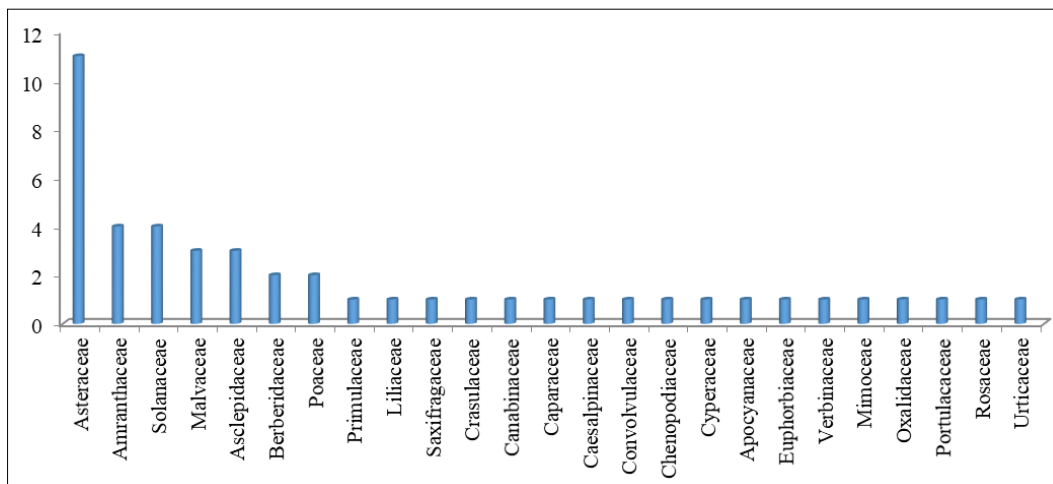


Fig 1: Bar diagram showing family wise the number of invasive/alien plant species

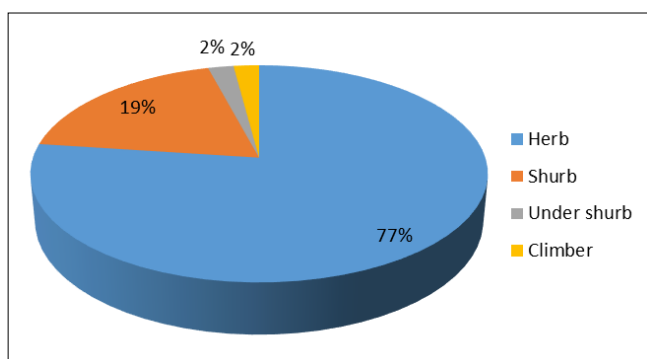


Fig 2: Pie chart showing percentage distribution of plant life forms according to their medicinal use

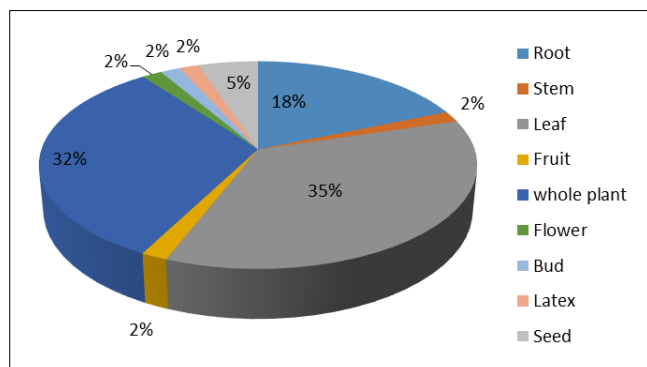


Fig 3: Pie chart showing part of plant used for medicinal purpose

**4. Conclusion**

The Indian Himalayan region (I H R) is well known for the medicinal plants and it supports 1748 medicinal plants [15]. The medicinal plant of this region are used by local people especially tribal people and a large scale to these traditionally available medicinal plants for health care because of very poor health care facilities in this region. The present study clearly demonstrates the diversity, distribution and traditional uses of invasive alien plant species. The invasive alien plants are a threat to the native plants, society and ecosystem, but on the other hand they may be beneficial as used in various medicinal purpose. As the native medicinal plants are depleting day by day due to development activities, deforestation and population explosion as well as indiscriminate exploitation. So these invasive/alien plants can

fill the gap and also become a new area of research in medical sector.

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