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Ethnobotanical survey of poisonous plants and their medicinal uses in Chamba block, district Tehri Garhwal, Uttarakhand, India

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Abstract. The current research is based on the documentation of poisonous plants in the Chamba block of Tehri Garhwal district, Uttarakhand, India. Documentation and identification of poisonous plants provide scientifically authentic ethnobotanical information on their perceived toxic potential based on local knowledge and traditional use. It provides valuable insights into the cultural, economic, and ethnomedicinal relevance of these poisonous natural plants across the different communities in the study site. A systematic, intensive ethnobotanical survey was conducted from June 2023 to July 2024 to document the traditional use of poisonous plants by local communities. Many of these poisonous plants are used to treat ailments like diarrhea, diabetes, fever, joint pain, and snake bites, often without awareness of their toxic effects. The study identified 30 poisonous species across 24 genera and 18 families, including 14 dicots, 2 monocots, and 2 gymnosperms. *Euphorbiaceae* was the most dominant family. Each plant's scientific and local details, toxic parts, and medicinal uses were recorded. This first regional study highlights the need to raise awareness and preserve traditional knowledge and offers valuable insights for researchers and students.

Keywords: poisonous plants, toxicity, ethnomedicinal uses, botanical documentation, Chamba block.

1. Introduction

Noxious plants are the group of plants species which contain a variety of toxins that can be dangerous to living organisms if ingested or touched in sufficient amount such as *Lantana camara*, *Solanum virginianum*, and *Ricinus communis* (Chopra et al., 1984). There are various toxins in these plants like calcium oxalate, calotropin, saponin, berberin, abrin, serotonin, protopine, zanthoplanin, amino compounds, alkaloids, resins, and other harmful chemicals (Joshi et al., 2013). These compounds, often toxic or unpalatable, help deter predators, suppress competing plants, and inhibit microbial infections. Through such biochemical strategies, plants actively protect themselves and enhance their survival (Dauncey & Larsson, 2018).

Noxious plant species has attracted human attention since ancient times. In modern scientific terms, its systematic study began in the 16th century with the work of Paracelsus, a Swiss physician and alchemist, who conducted early investigations into the chemical nature of poisons. However, native medical systems in India had studied and documented the toxic properties of plants as early as 1500 BC (Banerjee & Sinhababu, 2017). Beyond the Indian subcontinent, the toxic effects of noxious plants have also been recognized in other parts of the world in more recent history. For example, in South Africa, a government veterinary officer in

Ermelo reported a serious disease known as gausiekte, later attributed to a toxic plant, which caused the sudden death of more than 1,000 sheep in 1915 (Kellerman, 2009).

Globally, around 620 toxic plant species have been reported from South Africa, the southernmost country of the African continent (Vahrmeijer, 1981). In Brazil, ingestion of certain toxic plants by livestock causes severe neurological and neuromuscular disorders, often producing rabies-like or botulism-like clinical symptoms, leading to substantial economic losses and more than 100,000 animal deaths annually. (Furlan et al., 2012). In the U.S., 5–10% of poison center calls involve plant-based exposures, mostly affecting children under six (Lawrence, 1997). In India, traditional systems like Ayurveda, Unani, and Siddha have long used medicinal plants (Kumar et al., 2010).

Humans consume millions of plants in their daily diets. But, when absorbed, some plants and herbs cause dangerous life-threatening diseases in living individuals like skin irritation, allergy, photodynamic disease, wormer's disease (vomiting disease), respiratory problems, etc (Pittenger, 2002). These toxic plants adversely affect multiple organ systems, including the skin, cardiovascular system, nervous system, and gastrointestinal system. (Botha & Penrith, 2008; Katewa et al., 2008). The virulence of plant species varies within populations and among species and is influenced by several variables, including biological, physical, chemical, and environmental factors, such as humidity and temperature. (Stegelmeier et al., 2013).

About 80% of residents of developing countries depend on natural remedies, mainly herbal medicine, for their essential fitness services (Tamilselvan et al., 2014). The toxic plants owing to their toxic character, are widely circulated all over the earth, being utilized by indigenous communities for stalking, fishing, and disease management (Jamloki et al., 2022).

Besides toxic plants used for ethnomedicinal purposes, fishermen in various regions of the Garhwal Himalaya also utilize several ichthyotoxic plant species. During the pre-monsoon season, traditional fish-harvesting festivals, locally known as the Maun (Matsya) fair, are celebrated along river tributaries, waterfalls, and waterways in areas such as New River (Pauri), Juul (Tehri), Raven Valley (Uttarkashi), and the Bhabar region (Dehradun). During these events, natural fish poison is traditionally prepared from the powdered bark, leaves, pounded seeds, and roots of Timur (*Zanthoxylum armatum*) (Negi & Kanwal, 2009).

Livestock deaths caused by plant toxicity, particularly those that occur suddenly and in large numbers, have attracted greater attention than other forms of mortality (James et al., 1992). Harmful flora has been a part of our everyday life for various generations and some are so general that we don't even realize their poisonous nature that threatens the lives of humans and animals because of insufficient knowledge (Bhatia et al., 2014).

In India, earlier researchers have done various research work on poisonous plants (Chopra et al., 1984; Katewa et al., 2008; Negi & Kanwal, 2009; Bhatia et al., 2014), but very little exploration of ethnobotanical studies on the Chamba block (Uniyal et al., 2022; Lal et al., 2024; Dangwal & Lal, 2024), and there was no prior research work carried out to document the poisonous plants of Chamba block, Tehri Garhwal, Uttarakhand. Keeping this in mind, the present ethnobotanical survey aims to document and identify highly poisonous plants and their traditional medicinal uses, thereby providing scientific and reliable information about their toxic potential.

2. Materials and Methods

2.1. Study area

The research work was performed in the Chamba block of district Tehri Garhwal, Uttarakhand, India. This area is rich in vegetation and situated in the outer ranges of the middle Himalayas (Dangwal et al., 2010). It is located between 30° 26′ to 30° 40′ N latitude and 78° 36′ to 78° 55′ E longitude. It has an altitude ranging from about 400 to 2600 m with a geographical area of 3796 km². There are three agroclimatic zones- Subtropical (300–1200 m), Sub temperate (1200–2000 m), and temperate (2000–2800 m) in this block. The topography of the study area was hilly slopes and a monsoonal sub-mountain climate with average minimum temperatures of 4.0°C and maximum temperatures of 36.0°C, and an average annual rainfall of 1,395 mm (Dobhal et al., 2023). Its distance from Tehri Dam is 20 km. The region is covered by Dehradun in the west, Rudraprayag in the east, Uttarkashi in the northeast, and Pauri in the south. The trail extends from the snow-capped Himalayan peaks of Jonli, Thalaiya Sagar, and Gangotri to the lower slopes close to Rishikesh (Dangwal et al., 2024; Uniyal & Dangwal, 2022). The current study was conducted in 12 villages (Dharsal gaon, Kanda, Saundkoti, Kandakholi, Budogi, Danda, Lamkot, Chhamund, Dobhal gaon, Pursol gaon, Kemwal gaon, and Dargi) of the study area.

2.2. Data collection

The systematic and intensive ethnobotanical field survey was conducted over a one-year period from June 2023 to June 2024 in the Chamba Block of District Tehri Garhwal, Uttarakhand. Regular field visits were carried out to engage with local inhabitants of distinct villages and hamlets for the collection of primary ethnobotanical data.

Prior Informed Consent (PIC) was obtained verbally from all informants before conducting interviews. The objectives of the study were clearly explained, and participants were assured that the information provided would be used solely for academic and research purposes. The study followed ethical guidelines for ethnobotanical research and respected local customs and traditional knowledge systems.

A purposive sampling approach was primarily adopted to select knowledgeable informants such as Vaidyas, elderly residents, and individuals recognized within the community for their expertise in traditional medicine. In addition, a limited number of informants from the general population were selected opportunistically during field visits, resulting in a mixed purposive–opportunistic sampling strategy rather than purely random sampling.

The questionnaire was designed to capture detailed information on plant species, including local names of plant species, toxic parts, effects on humans and livestock, useful parts, ethnomedicinal uses, and methods of preparation. For the convenience of local informants' discussions were kept with them in their local tongue (Garhwali).

All participants responded to the same set of open-ended questions, ensuring consistency in the information gathered. To support accurate plant identification, specimens, and photographs were shown to informants during interviews. In several cases, participants either brought plant samples or guided researchers to the plants' natural habitats, helping confirm the correct species, especially those with toxic properties.

All the collected plant specimens are authenticated by regional Herbaria at the Botanical Survey of India, Northern Circle (BSD) and Forest Research Institute Herbarium (DD), Dehradun, using standard methods for collection, preservation, and maintenance (Jain & Rao, 1977; Singh & Subramaniyam, 2008). The gathered plant specimens were deposited in the herbarium of S.R.T. Campus, Badshahithaul, H.N.B. Garhwal University, (A Central University), Tehri Garhwal, Uttarakhand. The current (accepted) botanical name of plant species were adopted using online database i.e., 'Plants of the World Online' (POWO, 2024).

2.3. Data analysis

Three quantitative indices—use value (UV), informant consensus factor (ICF), and fidelity level (FI%)—were employed to analyze the ethnobotanical information obtained through repeated interviews with local informants. The relative significance and importance of local plant species were assessed using the use-value approach and other quantitative indices, following Phillips et al. (1994)

$$UV = \sum U/n$$

where "n" represents the total number of local informants and "U" denotes the number of use reports provided by each informant for a given plant species. The use value increases with a higher number of use citations and decreases when the number of reported uses is low.

The informant consensus factor (ICF) was used to assess the degree of agreement among informants regarding ethnomedicinal plant use reports by grouping related ailments into different categories, following Heinrich et al. (1998). The ICF was calculated as:

$$ICF = \frac{Nur - Nt}{Nur - 1}$$

where, "*Nt*" refers to the total number of plant taxa reported by all informants for a specific use category, while "*Nur*" indicates the total number of use reports within that category. Low ICF values (close to 0) suggest random plant selection or a lack of information exchange among informants. Conversely, high ICF values nearing one (1) reflect strong agreement among informants, indicating consistent plant selection and effective transmission of ethnobotanical knowledge within the community (Sharma et al., 2012).

It is important to identify the plant species most frequently selected for treating a particular ailment, as several species may be used within the same use category (Musa et al., 2011). This preference can be evaluated using the fidelity level (Fl%), which indicates the proportion of informants who agree on the use of a given species for a specific illness (Friedman et al., 1986).

$$Fl = \frac{Np}{N} \times 100$$

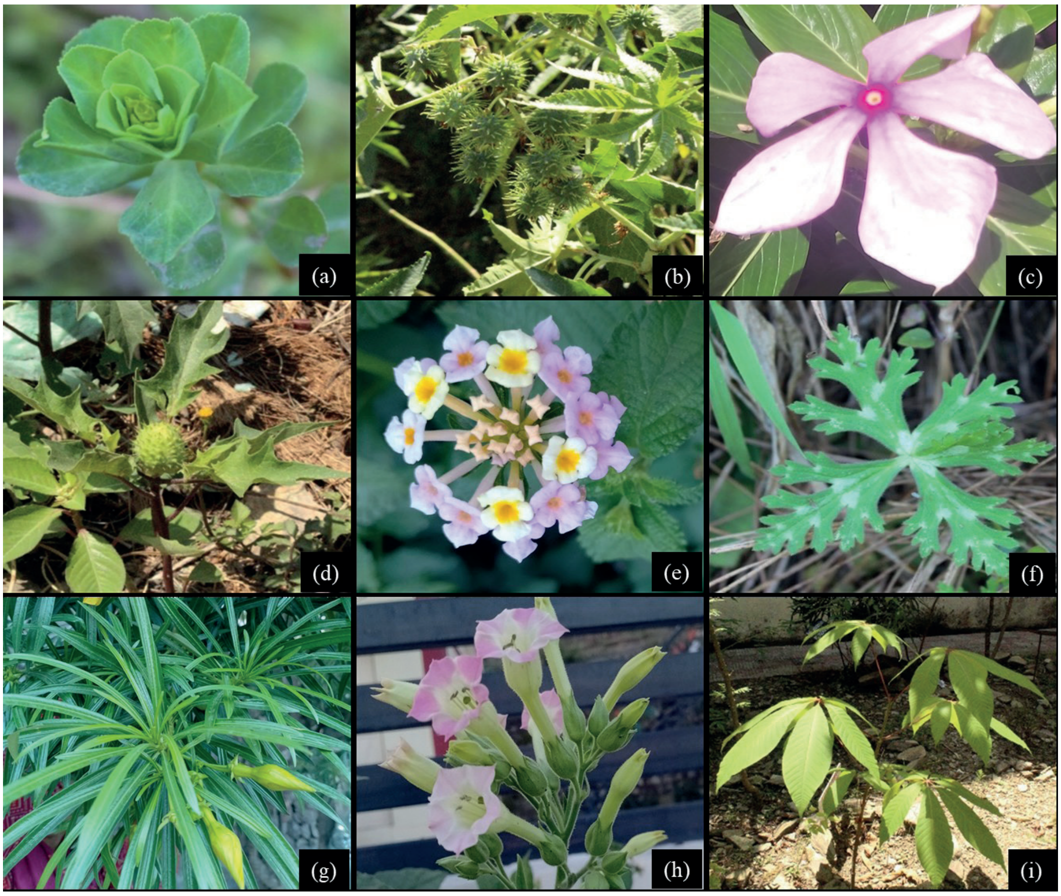
where "N" is the total number of use reports noted for any given species, and "Np" is the number of use reports cited for a given species for a specific illness.

Table 1. List of Poisonous Plants from Chamba Block, Tehri Garhwal

S. No	Botanical Name	Family	Common Name	Local Name	Habit	Toxic plant part	Effects	Plant part used	Ethnomedicinal uses	Mode of preparation	Total citations/ Use Value
1.	*Aesculus indica* (Wall. ex Cambess.) Hook.	*Sapindaceae*	Horse chestnut	Pangar	Tree	Young leaves, flowers, seed	Destroys red blood cells in humans. Paralysis, and even death in animals.	Seed, bark	Treat skin disease (72), and wounds (8), reduce swelling, and arthritis pain (12).	Powder and paste	92/0.92
2.	*Argemone mexicana* L.	*Papavera-ceae*	Mexican poppy	Bish Kandara	Herb	Whole plant	Vomiting, diarrhea, blurred vision, and swollen legs.	Root, seed	Used in diarrhea (54), insect bites (15), and pimples(20).	Paste and powder	89/0.89
3.	*Arisaema jacque-montii* Blume	*Araceae*	Cobra Lily	Meen, syapak ghwag	Herb	Whole plant	Vomiting, swelling, and burning in the mouth.	Tuber	Pain relief (70) and snake bite (25).	Powder	95/0.95
4.	*Arisaema tortuo-sum* (Wall.) Schott	*Araceae*	Whipcord cobra lily	Meen	Herb	Whole plant	Burning, swelling in the mouth, and vomiting.	Tuber	Tuber is used in snake bites (65). Dry tuber powder is taken with honey for breathing as well as sound problems (11).	Paste and powder	76/0.76
5.	*Aristolochia indica* L.	*Aristolochi-aceae*	Indian birthwort	Bichaldo	Herb	Whole plant	Vomiting, skin irritation, and kidney damage.	Leaves, root	Small doses are used to Treat stomach pain (50), and digestive issues, and reduce fever (20).	Paste, decoction, and powder	70/0.70
6.	*Calotropis procera* (Aiton) W.T. Aiton	*Apocyna-ceae*	Milkweed	Aak	Shrub	Leaves, flowers, roots, latex	Vomiting, abdominal pain, and death.	Leaves, root	Cold cough (58), warts (22), and pain (16).	Decoction	96/0.96
7.	*Cascabela thevetia* (L.) Lippold	*Apocyna-ceae*	Yellow oleander	Pila kaner	Shrub	Whole plant	Abdominal pain, heart block, and vomiting.	Root, leaves, flower, stem	Eye infection, fevers (55), ringworm, rashes, and Joint pain (30).	Extract and paste	85/0.85
8.	*Catharanthus roseus* (L.) G. Don	*Apocyna-ceae*	Rosy periwinkle	Sadhabhar	Shrub	Whole plant	Vomiting, dysentery, irritation, and breathing problems.	Leaves, root	High blood pressure (60), diabetes, and anti-inflamma-tion (33).	Decoction	93/0.93
9.	*Coriaria napalensis* Wall.	*Coriaria-ceae*	Nepalese coriaria	Rikhol	Shrub	Whole plant	Vomiting, paralysis, and diarrhea.	Leaves, stem, berries	Skin infection (39), joint pain, and stomach pain (35).	Decoction and powder	74/0.74
10.	*Crotalaria albida* B.Heyne ex Roth	*Fabaceae*	White hamp	-	Herb	Stem, leaves, flower	Respiratory issues and liver damage.	Root, leaves, flower	Skin disease (38) and wounds (30).	Powder and paste	68/0.68
11.	*Cycas revoluta* Thunb.	*Cycadaceae*	King sago	Sago's palm	Tree	Whole plant	Gastrointestinal problems, and liver damage.	Stem, seed	High blood pressure (40), bone pain, and headache (31).	Powder	71/0.71

S. No	Botanical Name	Family	Common Name	Local Name	Habit	Toxic plant part	Effects	Plant part used	Ethnomedicinal uses	Mode of preparation	Total citations/ Use Value
12.	*Datura metel* L.	*Solanaceae*	Devil's trumpet	Datura	Herb	Whole plant	Coma, body pain, and even death.	Leaves	Joint pain, back pain, swelling (82), and painful tumors (15).	Powder, and paste	97/0.97
13.	*Datura stramonium* L.	*Solanaceae*	Jimson weed	Datura	Herb	Whole plant	Blurred vision, suppressed salivation, body pain, and skin irritation.	Leaves	Asthma, cough (52), cold, and Joint pain (31).	Paste	83/0.83
14.	*Delphinium ajacis* L.	*Ranuncula-ceae*	Rocket larkspur	Nir-bishie	Herb	Whole plant	Gastrointestinal problems, and skin problems.	Leaves	Snake bite (75), and treat intestinal worms (21).	Decoction	96/0.96
15.	*Erythrina variegata* L.	*Fabaceae*	Indian coral tree	Mandara	Tree	Whole plant	Burning, swelling, and body pain.	Leaves	Warts and skin problems.	Paste	45/0.45
16.	*Euphorbia canar-iensis* L.	*Euphorbia-ceae*	Canary island spurge	Suru	Shrub	Whole plant	Skin irritation, redness, and swelling.	Sap	Warts, reduce pain (50) & swelling (10).	Extract	60/0.6
17.	*Euphorbia heliosco-pia* L.	*Euphorbia-ceae*	Sun Spurge	Aglenud, bishie	Herb	Milky sap	Skin irritation, gastro-intestinal problems, diarrhea, and vomiting.	Leaves, roots, stem	Fungal, bacterial infection, cough, bronchitis (74), indigestion, stomach ache, and diarrhea (24).	Extract	98/0.98
18.	*Euphorbia hirta* L.	*Euphorbia-ceae*	Hairy spurge	Chota dhudiya	Herb	Whole plant	Swollen eyes, kidney infection, abdominal pain lesions in throat and mouth.	Leaves	Asthma, diarrhea, bronchitis, dysentery (23), cough, and cold (15).	Powder	38/0.38
19.	*Euphorbia pulcherrima* Wild. ex Klotsch	*Euphorbia-ceae*	Poinsettia	Khina	Herb	Leaves, stem	Skin dermatitis, body pain, and swelling.	Sap, leaves	Reduce fever (25), and inflammation (25).	Extract	50/0.50
20.	*Gloriosa superba* L.	*Colchica-ceae*	Flame lily	Bagh ki mungri	Herb	Whole plant	Weakness, damage of the liver and other organs.	Seed, root	Applied on ulcers and skin disease.	Paste	78/0.78
21.	*Lantana camara* L.	*Verbenaceae*	Wild or red sage	Lalten	Shrub	Leaves	Skin redness, and vomiting.	Whole plant	Used in the treatment of injuries to prevent cancerous growths (60), and to treat diarrhea and jaundice in animals. (30)	Paste	90/0.90

S. No	Botanical Name	Family	Common Name	Local Name	Habit	Toxic plant part	Effects	Plant part used	Ethnomedicinal uses	Mode of preparation	Total citations/ Use Value
22.	*Lantana indica* Roxb.	*Verbenaceae*	Indian lantana	Safed lalten	Shrub	Leaves, unripe berries	Skin irritation, and breathing problems.	Leaves	Skin irritation(60) and cuts (16).	Paste	76/0.76
23.	*Leptopus cordifolius* Decne.	*Phyllanthaceae*	Heart-leaved leptopus	Bhatla	Shrub	Leaves, stem, seed	Vomiting, dysentery, and skin irritation.	Leaves	Balance diabetes (12), and reduce fever (22).	Powder	34/0.34
24.	*Lyonia ovalifolia* (Wall.) Drude	*Ericaceae*	Himalyan stag bush	Anyar	Shrub	The whole plant in the early stage	Organ damage and death.	Leaves, shoot	Wounds (10), boils, and fungal infection (5).	Paste and powder	15/0.15
25.	*Melia azedarach* Linn.	*Meliaceae*	Indian bead-tree	Dainkan	Tree	The whole plant in the early stage	Confusion, weakness, and breathing problems.	Leaves	Skin irritation, itching (72), and fever of animals (23).	Paste, powder, and decoction	95/0.95
26.	*Nerium oleander* L.	*Apocynaceae*	Oleander	Kaner	Shrub	Whole plant	Stomach pain, and vomiting.	Leaves, flowers, seed	Reduce pain, and treat cardiovascular problems.	Paste, and decoction	80/0.8
27.	*Nicotiana tabacum* L.	*Solanaceae*	Tobacco	Tambakhu	Herb	Leaves, stem, seed	Hypertension, Vomiting, and nausea.	Leaves	Cuts, wounds (70), and toothache.	Paste and powder	79/0.79
28.	*Ricinus communis* L.	*Euphorbiaceae*	Castor oil plant	Anda	Shrub	Leaves, seed	Body pain, vomiting, and diarrhea.	Root, fruit, bark	Fruits used in jaundice (30). Leaf with hot steam applied on knee pain (30).	Powder and paste	60/0.6
29.	*Taxus wallichiana* Zucc.	*Taxaceae*	Himalayan yew	Thuner	Tree	Whole plant	Gastrointestinal problems, and vomiting.	Bark	Headache, induced menstruation, and abortions.	Powder	72/0.72
30.	*Vitex negundo* L.	*Lamiaceae*	Chaste tree	Khyrana, sewali	Shrub	Seed, leaves	Skin irritation, and allergic irritation.	Leaves	kill pests, and insects in crops (10), and used in rheumatic pain (15).	Powder and extracts	25/0.25



Photographic Plate 1. Some poisonous plants (a) *Euphorbia helioscopia,* (b) *Ricinus communis,* (c) *Catharanthus roseus,* (d) *Datura stramonium,* (e) *Lantana camara,* (f) *Delphinium ajacis,* (g) *Cascabela thevetia,* (h) *Nicotiana tabacum,* (i) *Aesculus indica*

Photographic Plate 2. (a) Interview with famous Vaidya's of Chamba, (b–d) Interview with local inhabitants

3. Results

3.1. Characteristics of Informants

A total of 100 informants, aged between 20 and 85 years, were interviewed, comprising 35 males and 65 females. The informants represented a diverse cross-section of the community, including local elders, Vaidyas, Hakims, traditional healers, housewives, farmers, livestock owners, and forest-visiting youth. The number of male informants was lower because many migrated to cities for employment to support their livelihood. However, younger or less experienced respondents often recognized the plants or their uses but lacked detailed knowledge about their harmful effects or methods of preparation.

3.2. Floristic attributes of ethnomedicinal plants

The current research deals with 30 poisonous plant species. They belong to 24 genera and 18 different families. Out of 18 families, 2 were monocotyledons, 14 were dicotyledons, and 2 were gymnosperms, respectively. These species are presented alphabetically (Table 1) along with specific details such as botanical name, family, common name, local name, toxic plant part, toxic effect, plant part used, ethnomedicinal uses, and mode of preparation. *Euphorbiaceae* was the most prominent family with 5 plant species, followed by *Apocynaceae* with 4 plant species. The other most dominant family was *Solanaceae* with 3 plant species. Least dominant plant families were *Araceae, Fabaceae, Verbenaceae* (2 species each), followed by *Sapindaceae, Papaveraceae, Aristolochiaceae, Coriariaceae, Cycadaceae, Colchiceae, Ericaceae, Phyllanthaceae, Meliaceae, Taxaceae, Lamiaceae,* and *Ranunculaceae* with 1 plant species. *Arisaema tortuosum*, *Ricinus communis*, *Gloriosa superba*, *Nerium oleander*, *Cascabela thevetia*, and *Euphorbia hirta* were some highly poisonous plants that caused serious health issues and even death among livestock, and humans. Among total record species, 13 were herbs (43.33%), 12 were shrubs (40%), and 5 were trees (16.66%). The common toxic plant part was whole plant (41.30%), leaves (21.73%), Seeds (10.86%), flowers (8.69%), stems (8.69%), roots (2.17%), latex (2.17%), sap (2.17%), and unripe berries (2.17%). These plants caused serious health issues like fever, body pain, swelling, swollen legs, burning, confusion, blurred vision, gastrointestinal problems, kidney, and liver damage, neurological disorders, coma, and even death in cattle, as well as humans. The mode of preparation method was powder (36.9%), paste (36.9%), decoction (15.21%), and extract (10.86%). The common plant part used leaves (40%), roots (18%), seeds (10%), stems (8%), barks (6%), flowers (6%), tubers (4%), sap (4%), berries (2%), and fruits (2%). The local inhabitants used poisonous plants to cure various conditions including vomiting, diabetes, fever, diarrhea, cough, cold, inflammation, joint pain, gastrointestinal problems, stomach pain, wounds, headache, anaemia, kidney disease, urine problems, etc.

3.2. Use value of medicinal plants

Based on use value (UV), the most valuable and important ethnomedicinal plants of the present study site were categorized into three groups. Group I comprised species with a UV > 0.80, *Euphorbia helioscopia* (UV=0.98), *Datura metel* (UV=0.97), *Calotropis procera* (UV=0.96), *Delphinium ajacis* (UV=0.96), *Arisaema jacquemontii* (UV=0.95), *Aesculus indica* (UV=0.92) *Argemone mexicana* (UV=0.89), *Cascabela thevetia* (UV=0.85), *Catharanthus roseus* (UV=0.93), *Lantana camara* (UV=0.90), *Melia azedarach* (UV=0.95), *Datura stramonium* (UV=0.85). In group ii category, UV= 0.60 to 0.80 were: *Arisaema tortuosum* (UV=0.76), *Aristolochia indica* (UV=0.70), *Coriaria napalensis* (UV=0.74), *Crotalaria albida* (UV=0.68), *Cycas revoluta* (UV=0.71), *Gloriosa superba* (UV=0.78), *Taxus wallichiana* (UV=0.72), *Nicotiana tabacum* (UV=0.79), *Nerium oleander* (UV=0.80). In group iii category, UV= <0.60 were: *Ricinus communis* (UV=0.60), *Vitex negundo*

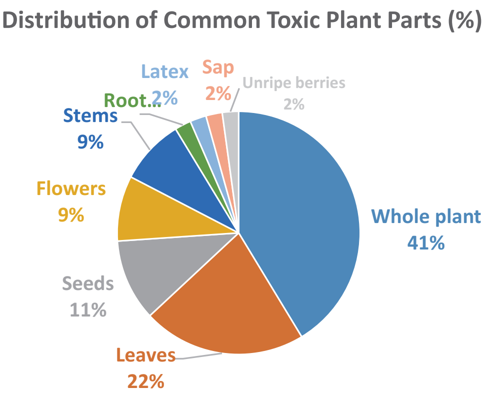


Figure 1. Pie chart showing the common toxic plant parts

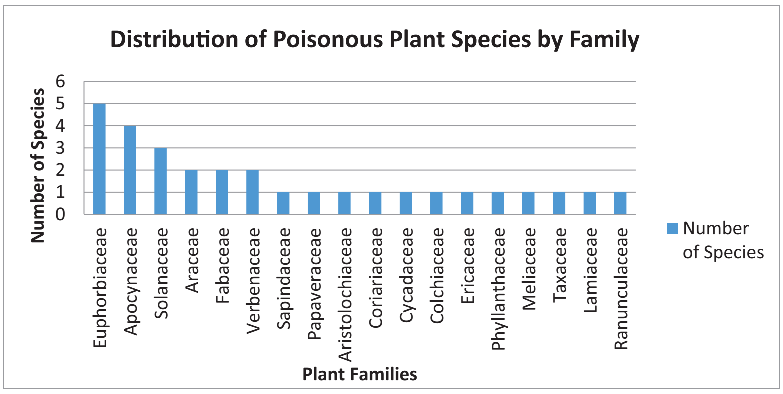


Figure 2. Number of species vs family

(UV=0.25), *Lyonia ovalifolia* (UV=0.15), *Leptopus cordifolius* (UV=0.34), *Euphorbia pulcherrima* (UV=0.50), *Euphorbia hirta* (UV=0.38), *Erythrina variegata* (UV=0.45) (Table 1).

3.3. Informant consensus factor (ICF)

In the investigated area, 30 plant species were studied to treat as many as 15 different diseases. The higher number of species was (10) were utilized for curing different type of fever, followed by pain relief (9), skin problems (8), diarrhea & dysentery (5), cuts and wounds (5) cough and cold (4), snake bite (3), anti-fungal and anti-bacterial properties (3), high blood pressure (1). The informants were more in agreement with the way that high blood pressure (ICF=1), skin problems (ICF=0.98), skin problems (ICF=0,98) diarrhea and dysentery (ICF=0.97), snake bite (ICF=0.97) and fever (ICF=0.94) (Table 2).

Table 2. Ailment category and informant consensus factor (ICF)

Ailment Category	Number of Species (Nt)	Use Citations (Nur)	Informant Consensous Factor (ICF)
Fever	10	159	0.94
Pain relief	9	462	0.93
Skin diseases	8	382	0.98
Cough & cold	4	285	0.98
Diarrhea & dysentery	5	190	0.97
Cuts & wounds	5	206	0.98
High blood pressure	1	111	1
Snake bite	3	122	0.97
Anti-fungal & anti-bacterial	3	68	0.65

Note: Nt = "Number of species", Nur = "Use citation", and ICF= "Informant consensus factor".

3.4. Fidelity Level

Fidelity level (FL) analysis revealed strong informant consensus for several medicinal plants used to treat specific ailments. In skin diseases, *Erythrina variegata* and *Gloriosa superba* showed the highest fidelity (100%), followed by *Lantana indica* and *Aesculus indica* (>78%), indicating ailment-specific use. For fever, *Cascabela thevetia* and *Leptopus cordifolius* showed relatively high FL (64.7%). In cough and cold, *Euphorbia helioscopia* exhibited the highest fidelity (75.5%), while *Datura stramonium* and *Calotropis procera* showed moderate values. Gastrointestinal disorders were mainly treated with *Aristolochia indica* (71.4%) and *Argemone mexicana* (60.6%). For cuts and wounds, *Nicotiana tabacum* showed very high fidelity (88.6%), indicating strong traditional agreement. *Cycas revoluta* (56.3%) was the only species reported for high blood pressure. In pain management, *Datura metel* (84.5%) and *Euphorbia canariensis* (83.3%) showed high fidelity. Snake bite treatment showed high consensus for *Arisaema tortuosum* (85.5%) and *Delphinium ajacis* (78.1%). For antimicrobial uses, *Euphorbia helioscopia* recorded the highest FL (75.5%).

Table 3. Fidelity index (FI%) of significant species for different ailment categories

Ailment Category	Significant Species	Fidelity Level (FL)
Skin Diseases	*Aesculus indica*	78.2%
	Coriaria napalensis	52.7%
	Crotalaria albida	55.8%
	Erythrina variegata	100.00%
	Gloriosa superba	100.00%
	Lantana indica	78.9%
	Melia azedarach	75.7%
	Calotropis procera	22.9%
Fever	*Aristolochia indica*	28.5%
	Cascabela thevetia	64.7%
	Euphorbia pulcherrima	50%
	Leptopus cordifolius	64.7%
Cough & Cold	*Calotropis procera*	60.4%
	Datura stramonium	62.6
	Euphorbia helioscopia	75.5%
	Euphorbia hirta	39.4%
Diarrhea & Dysentery	*Argemone mexicana*	60.6%
	Aristolochia indica	71.4%
	Euphorbia helioscopia	24.4%
	Euphorbia hirta	60.5%
	Lantana camara	33.3%
Cuts & Wounds	*Aesculus indica*	8.6%
	Crotalaria albida	44.1%
	Lantana indica	21.0%
	Lyonia ovalifolia	66.6%
	Nicotiana tabacum	88.6%
High blood pressure	*Cycas revoluta*	56.3%
Pain Relief	*Aesculus indica*	13.0%
	Aristolochia indica	71.4%
	Calotropis procera	16.6%
	Cascabela thevetia	35.2%
	Coriaria napalensi	43.2%
	Datura metel	84.5%
	Euphorbia canariensis	83.3%
	Ricinus communis	50.2%
	Vitex negundo	60.0%
Snake Bite	*Arisaema jacquemontii*	26.3%
	Arisaema tortuosum	85.5%
	Delphinium ajacis	78.1%
Anti-fungal & Anti-bacterial	*Catharanthus roseus*	35.4%
	Euphorbia helioscopia	75.5%
	Lyonia ovalifolia	33.3%

Results from current study revealed that the, female informants, especially those caring for animals and managing household health, had good knowledge about the harmful effects of plants on livestock and their use in home remedies. Older male informants and traditional healers shared more detailed information about how to identify toxic plants and how to prepare and use them safely. Livestock owners and farmers showed the best understanding of which plants are poisonous to sheep and goats.

4. Discussion

The present study highlights the diversity, toxicity, and ethnomedicinal applications of 30 poisonous plant species found in the study area, encompassing 24 genera and 18 families. The dominance of dicotyledonous plants (14 species) over monocotyledons (2 species) and gymnosperms (2 species) is in line with the general floristic composition of most terrestrial ecosystems, where dicots exhibit greater diversity and adaptability. Among all families, *Euphorbiaceae* emerged as the most dominant with five toxic species, followed by *Apocynaceae* (4 species) and *Solanaceae* (3 species). These families are well-known for their bioactive compounds include alkaloids, diterpenes, and glycosides, which often serve both medicinal and toxic roles (Benamor et al., 2020).

Structurally, the toxic flora was largely composed of herbs and shrubs, with trees being relatively few. This prevalence of herbaceous and shrubby species may reflect the accessible and commonly encountered vegetation in local landscapes, particularly in anthropogenic and semi-natural habitats. Notably, plants like *Ricinus communis*, *Gloriosa superba, Nerium oleander,* and *Cascabela thevetia* are well-documented for their severe toxic effects including fatal outcomes, especially in livestock and children (Gautam et al., 2017).

Despite their toxicity, local communities have ingeniously utilized these plants for various ethnomedicinal purposes. The dual nature of these species, being both harmful and curative—demonstrates a deep-rooted traditional knowledge system, emphasizing the importance of dosage, plant part selection, and preparation methods. The most common methods of preparation were powder and paste followed by decoctions and extracts, reflecting indigenous preferences likely based on efficacy, availability, and cultural practices. Leaves were the most frequently used plant part in traditional medicine, possibly due to ease of collection and high concentrations of bioactive compounds. Other parts such as roots, seeds, and stems were also utilized depending on the ailment being treated.

These medicinal applications ranged from common conditions like fever, diarrhea, cough, and wounds, to more serious issues such as joint pain, kidney disease, and gastrointestinal problems. The data also underscore the potential risks associated with the use of toxic plants, particularly when misidentified or not properly prepared. Documented adverse effects such as neurological symptoms, gastrointestinal distress, and even organ failure highlight the necessity of preserving and scientifically validating traditional knowledge systems to ensure both safety and efficacy.

The results from the present study revealed the plant with highest use value i.e., *Euphorbia helioscopia* and *Datura metel* and lowest is *Lyonia ovalifolia and Vitex negundo.* Use values are dynamic and change over time; therefore, the observed decline in use values for certain plant species may reflect generational shifts in preferences and transformations in traditional use practices (Camou-Guerrero et al., 2008). Plant species exhibiting low use values and/or low fidelity levels are not necessarily unimportant; rather, such values indicate that the associated traditional knowledge is at risk of poor transmission and gradual erosion (Chaudhary et al., 2006). Moreover, the low use value of some species may also be attributed to their limited availability or increasing scarcity in the study area (Benz et al., 2000).

5. Conclusions

The present ethnobotanical study concluded that there are about 30 poisonous plants were reported from the Chamba block, district Tehri Garhwal, belonging to 18 distinct families, in which Euphorbiaceae was the most prominent family with the maximum number of plant species (5 spp). Documentation and identification of poisonous plants provide scientific and authentic information about the toxic potential of plants and is valuable knowledge that signifies the cultural, economic, and ethnomedicinal importance of these poisonous natural plants among different communities in the various study sites of Chamba block.

Poisonous plants like *Ricinus communis, Nicotiana tabacum,* and *Delphinium ajacis* can cause severe health issues and economic losses by affecting both humans and animals. Some toxic species, such as *Gloriosa superba* and *Taxus wallichiana,* are endangered due to overuse and habitat loss. Their toxicity varies based on factors like plant age, part used, dosage, and environment. While dangerous, these plants have long been used in traditional medicine to treat various ailments when used correctly. Raising awareness and preserving traditional knowledge is crucial. Scientific research is needed to better understand their toxic effects and medicinal potential, aiding in safe use and conservation.

The sustainability of natural medicinal resources in the region is seriously threatened by over-exploitation, forest fires, landslides, road development, and construction activities, leading to a rapid decline in important ethnomedicinal plant populations. At the same time, traditional ethnomedicinal knowledge is diminishing, as it is largely confined to elderly practitioners in villages. The younger generation has limited knowledge of ethnomedicinal plants due to migration to urban areas for education and employment, where reliance on modern medicine is common. Consequently, this valuable traditional knowledge faces the risk of disappearing, highlighting the urgent need for its documentation and conservation.

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Conflict of Interest

The author has declared no potential conflicts of interest.

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