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LESSER KNOWN ETHNOMEDICINAL USES OF ASTERACEOUS PLANTS IN TARAI AND BHABAR REGION OF UTTARAKHAND, INDIA

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ABSTRACT

Ethnic and rural people play crucial role in preserving traditional knowledge wealth of a particular area. They are still engaged in exploring the effects of various plant species for better human health. Among these, Asteraceae stands out as a dominant and medicinally significant family. During extensive and intensive field exploration in tarai and bhabar region of Uttarakhand, a total of 96 Asteraceous plants were collected and their ethnomedicinal uses were documented. The present communication focuses on the notably lesser known ethnomedicinal uses of 19 Asteraceous plants. Out of these 84.21% were wild and 15.79%, cultivated. As far as habit is concerned, there were 79% herbs, 11% undershrubs, 5% each shrub and tree. These plants were noted to have 23 less known ethnomedicinal uses for arthritis, bone fractures, dog bite, eye problems, kidney stones, piles, dermatological problems, etc.

Key words : Asteraceae, Ethnomedicine, Lesser known uses, Tarai and Bhabar.

Introduction

Plant wealth is a valuable gift of nature for the human race. Mankind's association with plants is as old as the appearance of man on this earth (Jain and Jain, 2016). In spite of modernization, rural and ethnic people still depend on plant wealth for their livelihood and socioeconomic life. They have their own unique traditional knowledge which fulfills their immediate medicinal needs. Uttarakhand is adorned with luxuriant beautiful vegetation and a rich tribal population. The state is home to five ethnic tribes *viz.* Tharu, Buksa, Jaunsari, Bhotiya and Raji. In tarai and bhabar region, Tharu and Buksa are predominantly found. However, the Jaunsari tribe is also living in scattered areas at some places.

Recent floristic study reveals that Uttarakhand harbours a total of 4800 species under 1400 genera and 215 families, which is approximately one fourth of the total flowering plants of India. Asteraceae, an important Angiospermic family with maximum number of species among dicot, is represented by 370 species under 134

genera in Uttarakhand. It is also a dominant medicinally important family with 103 species in the state (Pushalkar and Srivastava, 2018). In Uttarakhand, several researchers have documented various uses of Asteraceous plants along with other plants in tarai and bhabar regions (Ahmad *et al.*, 2024; Akash and Bhandari, 2021; Arya *et al.*, 2018; Balkrishna *et al.*, 2019; Chopda *et al.*, 2019; Joshi *et al.*, 2019; Kumar *et al.*, 2023; Sharma *et al.*, 2022). A total of 85 medicinally significant Asteraceous plants have been recorded by Bisht and Purohit (2010) in the state. Jagwan and Singh (2009) have documented lesser known uses of 86 plant species including some Asteraceous plants in Kedar valley of Western Himalaya, Uttarakhand. Recently, Sharma and Lata (2022) have reported ethnobotanical uses of 51 Asteraceous plants used by Tharu tribe in Udham Singh Nagar district which lies in tarai region of the state. During field study and literature review, it was noted that various unique ethnomedicinal uses of several Asteraceous plants are still unscripted which have been discussed in present study.

Materials and Methods

Study area

Present study was conducted in tarai and bhabar region of Uttarakhand. Tarai is the lowermost area of the state characterized by superficial abundance of water. Bhabar belt, located northward above the tarai region includes Siwalik foothills and typically spans a width of 20-45 km, while the Tarai belt is a narrow strip of low-lying plains with a width of 10-25 km (Gaur, 1999). Uttarakhand's varied topography results in diverse climatic conditions. In the study area, climate is subtropical (warm) with precipitation of 200-250 cm and average temperature 30°C for more than 6 months (Uniyal *et al.*, 2007).

Field study

To collect primary and authentic data collection, several extensive and intensive field trips were conducted in winter, summer, monsoon and autumn seasons during 2018 to 2022. With the help of Jain and Mudgal (1999), a semi structured questionnaire was prepared and used for interviews with tribal people and forest dwellers. Information such as demographic data of informants, local name of plants, locality, field characters of plants, parts used, medicinal uses, method of utilization, mode of administration were recorded and also observed personally during stay with them in their shelter. The effects of remedies were also monitored regularly through frequent field visits and communication with tribal people (Fig. 1 A-D).

During the present study, a total of 96 plant species were collected and identified with the help of relevant floras such as Agarwal (2017), Babu (1977), Duthie (1903-1929), Gaur (1999), Gupta (1968), Hajra *et al.* (1995 a & b), Hooker (1882), Osmaston (1927), Pant (1986), Uniyal *et al.* (2007) and compared with the specimens available in regional herbaria *viz.* Herbarium of Botanical Survey of India, Herbarium of Forest Research Institute and digital herbaria (Dehradun Virtual Digital Herbarium and Indian Virtual Herbarium) etc. Nomenclature was updated with the help of Plants of the World online (POWO). Plant specimens were processed following Jain and Rao (1977) and herbarium sheets were deposited in the Taxonomic laboratory, Department of Botany, R.H. Government P.G. College Kashipur, Udham Singh Nagar, Uttarakhand.

Data analysis

The collected ethnomedicinal information was analyzed and compared with about 100 research articles and review papers based on ethnobotanical studies in



Fig. 1(A-D) : A. Plant collection in Bazpur, B. Tribal interview with a Buksa man in Gadarpur C. Tribal interview with a Tharu lady in Khatima, D. Tribal interview with Jaunsari people in Kalsi.

Uttarakhand. Some of the research papers published during last 15 years are by Adhikari *et al.* (2010), Ahmad *et al.* (2024), Akash and Bhandari (2021), Balkrishna *et al.* (2019), Bisht and Bhatt (2012), Bisht and Adhikari (2018), Bisht *et al.* (2018), Ballabha *et al.* (2013), Bargali *et al.* (2013), Bhatt *et al.* (2013), Bhatt *et al.* (2023), Bisht *et al.* (2013), Chandra *et al.* (2013), Chopra *et al.* (2019), Dangwal and Sharma (2011), Dangwal *et al.* (2010), Deoli *et al.* (2014), Devi *et al.* (2024), Diwivedi *et al.* (2019), Gangwar *et al.* (2010), Gaur *et al.* (2010), Ghildiyal *et al.* (2014), Gupta *et al.* (2023), Joshi and Pant (2012), Joshi *et al.* (2019), Kanika and Panda (2024), Kaparawan *et al.* (2024), Kapkoti *et al.* (2014), Kavidayal and Uniyal (2020), Khajuria *et al.* (2021), Kumar and Pandey (2015), Kumari *et al.* (2011), Kumar *et al.* (2023) Mathur and Joshi (2013), Mehra *et al.* (2014), Negi *et al.* (2010), Pala *et al.* (2010), Pandey *et al.* (2017), Parihaar *et al.* (2014), Phondani *et al.* (2010), Prakash (2015), Prasad and Tomar (2020), Rawat and Upadhyaya (2020), Saini and Singh (2021), Samal *et al.* (2010), Semwal *et al.* (2010), Semwal *et al.* (2021), Shahid *et al.* (2017), Sharma *et al.* (2011), Sharma *et al.* (2013), Sharma *et al.* (2014), Sharma *et al.* (2022), Singh *et al.* (2019), Srivastav *et al.* (2015), Tewari *et al.* (2015), Tewari *et al.* (2020), Tiwari *et al.* (2010), Topwal and Uniyal (2018). Collected information was also compared with Compendium, and different ethnobotanical books (Arya *et al.*, 2018; Gaur, 1999; Jain, 1991; Jain and Jain, 2016; Pande *et al.*, 2006; Shah, 2006; Shah, 2007).

Results

In the present study, ethnobotanical information was collected for 96 plant species growing in tarai and bhabar

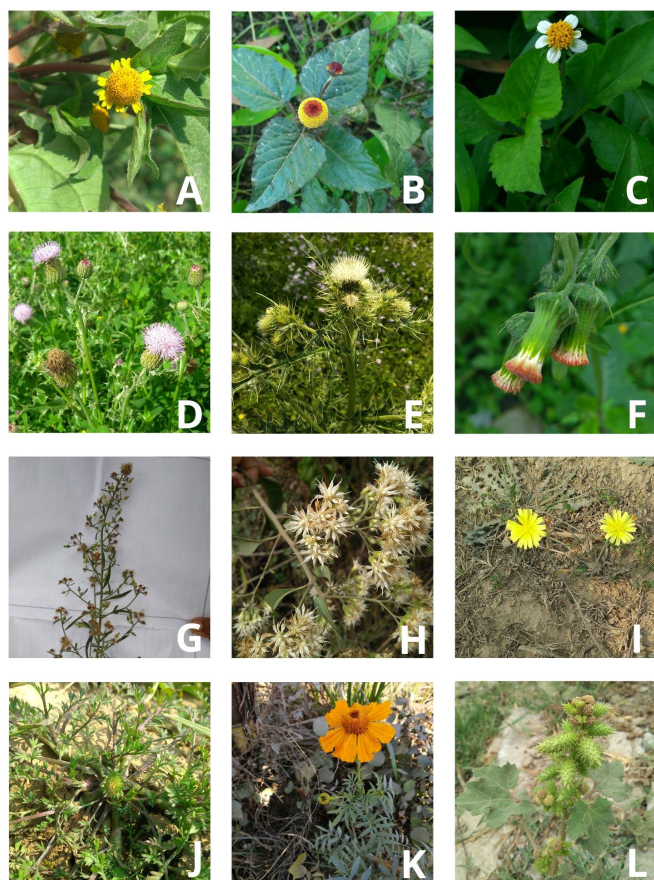


Fig. 2 (A-L) : A. *Acmella calva*, B. *Acmella oleracea*, C. *Bidens pilosa*, D. *Cirsium arvense*, E. *Cirsium wallichii*, F. *Crassocephalum crepidioides*, G. *Erigeron sumatrensis*, H. *Gymnanthemum amygdalinum*, I. *Launaea procumbens*, J. *Soliva anthemifolia*, K. *Tagetes erecta*, L. *Xanthium strumarium*.

regions. Extensive field as well as literature survey reveals that ethnomedicinal uses of 19 plant species belonging to 14 genera of the family Asteraceae were found to be unique and lesser known in the state (Fig. 2). These plant species are enumerated alphabetically with botanical name followed by local name (LN), collection number (CN), accession number (AN), habit (Ht), habitat (Hbt), plant description, flowering- fruiting time (Fl, Ft), parts used (PU) and ethnomedicinal uses.

***Acmella calva* (DC) R.K. Jansen**

LN- Chunchunia, CN- 255, AN- GPGCKSP 342, Ht- Herb, wild, Hbt- Wetland, drainage side

Perennial herb up to 30 cm. Stem sparsely pubescent, solid. Leaves opposite, ovate-lanceolate. Involucre bracts pubescent, ovate. Inflorescence 1.8 cm in diameter, disc flower yellow or creamy white, tubular and corolla 5 lobed. Cypsela 2.5 mm long eciliate, dark brown. **Fl & Ft-** Jan-July, **PU-** Leaves

Uses- One teaspoon of dry leaves powder is mixed

into milk and taken orally for the de-addiction. Leaf juice is applied externally on boils, cracked heels and cuts and wound. One full teaspoon juice of fresh crushed leaves is taken orally before breakfast and dinner to cure spermatorrhea. Tribal people chew leaves of young plant to relieve constipation.

***Acmella ciliata* (Kunth) Cass.**

LN- Badi Chatpati, CN- 296, AN- GPGCKSP 354, Ht - Wild herb, Hbt- road side

Prostrate herb, stem purplish green, sparsely hairy, solid. Leaves are opposite and ovate. Flower head 1.2 cm in diameter, yellow, in ray florets corolla 3 dentate, disc florets numerous. Cypsela 3 mm, ciliate at margins, black in colour. **Fl & Ft-** Throughout the year, **PU-** Twig

Uses- Twigs are crushed and applied on boils for 3-5 days.

***Acmella oleracea* (L.) R.K. Jansen**

LN- Gorakhsundi, CN- 275, AN- GPGCKSP 343, Ht - Herb, cultivated, Hbt- Garden

Annual, herbaceous, erect plant. Stem solid, often hairless. Leaves opposite, ovate, apex obtuse to acute. Head solitary, 1.2 cm in diameter, discoid. Outer florets of head yellow and inner reddish brown. Cypsela 2 mm, ciliate at the corner. **Fl & Ft-** Nov- Jan, **PU-** Flower head

Uses- Dry powder of flower head is applied externally to cure excessive sweating in hands and legs.

***Bidens pilosa* L.**

LN- Sarware, CN- 217, AN- GPGCKSP 225, Ht- Herb, wild, Hbt- Roadside, waste land

Erect herbaceous, branched plant, up to 15 to 20 cm. Stem glabrous or sparsely hairy. Leaves opposite, imparipinnate, acute. Flower head 1.5-1.75 cm in diameter, involucre bracts spatulate, ray florets white in colour, disc florets yellow. Cypsela 0.7 to 1.0 cm, black, spindle shaped with setae at apex. **Fl & Ft-** Throughout the year, **PU-** Leaves.

Uses- Fresh leaves are chewed to cure dog bites.

***Blumea sinuata* (Lour.) Merr.**

LN- Peela Gidauna, CN- 338, AN- GPGCKSP 366, Ht- Herb, wild, Hbt- Roadside, waste land.

Erect herb up to 3 m. Stem solid, ribbed, hairy. Leaves spirally arranged, margins irregularly or sinuate lobed, apex acute, pilose on both surfaces. Head terminal, involucre bracts linear-lanceolate, inner florets are yellowish, pappus size 3mm. Cypsela 1.5 mm, yellowish brown. **Fl & Ft-** January-April, **PU-** Leaves.

Uses- Fresh or dry leaves are boiled in water with some amount of tea leaves and applied externally on the infected part to treat hydrocele.

***Chromolaena odorata* (L.) R.M. King & H.Rob.**

LN- Badi fuliya, **CN-** 302, **AN -** GPGCKSP 358, **Ht-** shrub, wild, **Hbt-** roadside.

Bushy shrub up to 3 m much branched. Stem hard and somehow woody at base, glandular pubescent. Leaves opposite, petiolate, deltoid- ovate, acute, leaves emit a pungent smell. Flower head size 1.4cm, discoid, corolla tube 0.5cm long, Pappus 0.5 cm long. Cypsela 0.4 cm long, black. **Fl & Ft-** December-March, **PU-** Leaves.

Uses- To cure body itching, 100 grams of fresh leaves are boiled in about two liters of water for 15 minutes, then the filtrate is mixed with water and used for bathing.

***Cirsium arvense* (L.) Scop.**

LN- Gulabi Kateela, **CN-**252, **AN-** GPGCKSP 231, **Ht-** Herb, wild, **Hbt-** Roadside, waste land

Erect herbaceous thistle up to 1.2 m. Stem solid, woolly. Leaves sessile, arranged spirally, spiny at the margins, lower surface woolly. Flower head 1.5 cm in diameter, pinkish purple, involucre bracts multiseriate, pappus up to 2.1 cm, dirty white. Cypsela 3 mm long, brownish yellow. **Fl & Ft-** February-April, **PU-** Stem, fruit, root, leaves

Uses- Stem juice is used to treat eye disorders. The fruits are mixed with *Datura metel* seeds and fried in mustard oil; the filtrate is then applied to painful contusions. The plant root is crushed and mixed with saliva, then applied externally to areas infected with ringworm. Crushed leaves are applied externally for 2-3 days to heal boils.

***Cirsium wallichii* DC.**

LN- Safed Kateela, **CN-** 383, **AN-** GPGCKSP 404, **Ht-** Undershrub, wild, **Hbt-** Roadside, waste land

Erect undershrub up to 2 m. Stem angular with strong base. Leaves with large spines up to 1.5 cm present on margins. Flower head 2.5- 3 cm long, 2 cm in diameter, milky white, involucre bracts multiseriate, spiny at margins, corolla tube 1.7cm long, pappus dirty white, 1.5cm. Cypsela 0.2 cm long, dark brown. **Fl & Ft-** April-July, **PU-** Root

Uses- Roots are ground with water to form tablets, which are taken orally with milk to alleviate weakness.

***Crassocephalum crepidioides* (Benth.) S.Moore**

LN- Chidchida, **CN-** 309, **AN-** GPGCKSP 373, **Ht-**

Herb, wild, **Hbt -** Roadside, waste land

Annual herb up to 0.5 to 1m. Stem erect branched, pubescent. Leaves oblanceolate-lyrately lobed, apex acute, attenuate. Head homogamous, pedunculate, dark orange red in colour. Cypsela **0.5×1.5** mm, dark brown, pappus persistent. **Fl & Ft-** November – February, **PU-** Leaves

Uses- Leaf juice is applied on wounds to facilitate healing.

***Eclipta prostrata* (L.) L.**

LN- Bhangrayya, Bhangra, **CN-** 293, **AN-** GPGCKSP 252, **Ht-** wild, herb, **Hbt-** Cropland, roadside and wetland

Prostrate herb up to 40 cm. Stem cylindrical, sparsely hair present, solid. Leaves, sessile or subsessile, opposite arrangement, oblanceolate, entire or serrate, apex acute. Flower head approximately 1 cm in diameter, Involucre bracts free, ovate- lanceolate, peduncle long, corolla white. Cypsela size 0.25cm long×0.15cm, dark brown or black and tip green. **Fl & Ft-** Throughout the year, **PU-** Leaves, Twig

Uses- Leaf juice is applied externally to heal cracked heels. Twigs of the plants along with twigs of *Euphorbia hirta* are boiled in water and the decoction is taken orally to treat infertility.

***Erigeron sumatrensis* Retz.**

LN- Ramasan, **CN-** 224, **AN-** GPGCKSP 339, **Ht-** Herb, wild, **Hbt-** Roadside,

Erect annual herb, up to 2-2 m. Stem hairy, branched at the upper side. Leaves alternate, sessile, pubescent on both surfaces, linear- lanceolate, margin entire, lower leaves oblanceolate, serrate. Flower head 0.6 cm long and 0.4 cm in diameter Involucre bracts biseriate, linear, small hairs on outer surface. Cypsela 0.2cm long having bristle like pappus. **Fl & Ft-** August to January, **PU-** Twig

Uses- Twigs of the plants are immersed in a bucket of water for 2-3 hours under sunlight. This water is used for bathing for relief from heatstroke.

***Gymnanthemum amygdalinum* (Delile) Sch. Bip.**

LN- Safeda, **CN-** 374, **AN-** GPGCKSP 405, **Ht-** Tree, cultivated, **Hbt-** Near roadside

Branched tree, up to 4 m height. Stem solid, cylindrical, fine short hair on upper stem, lower stem glabrous. Leaves ovate, entire. Head 0.75-1cm in diameter. Pappus milky white 0.6 cm long brush like; corolla tube milky white 0.8cm, 5 connate, style 1 cm, bifid. Cypsela 0.3× 0.15 cm, ciliated. **Fl & Ft -**

December- March, **PU**- Twig

Uses- Plant twigs are ground and the paste is applied externally to treat bone fracture. The twig paste is also applied externally to the affected area to alleviate arthritis.

***Launaea aspleniifolia* (Willd.) Hook. f.**

LN- Gobi ghass, **CN**- 292, **AN**- GPGCKSP 351, **Ht**- wild, herb, **Hbt**-Cropland, roadside

Annual herbs up to 30 cm with hard rootstock. Branched from basal region, stem glabrous. Leaves basal rosette, oblanceolate- pinnatifid or runcinate pinnatifid. Flower head 1.8 cm in diameter and 1.8 cm long. Pappus white 7.5 mm, corolla yellow up to 1.5 cm. Cypsela size up to 1- 2 mm, dark brown. **Fl & Ft**- January to September, **PU**- Whole plant

Uses- The whole plant is crushed and mixed with 200 ml of curd or buttermilk and taken orally before breakfast to cure piles.

***Launaea procumbens* (Roxb.) Ramayya & Rajagopal**

LN- Dudhiya ghass, **CN**- 321, **AN**- GPGCKSP 389, **Ht**- Herb, wild, **Hbt**- cropland, Wasteland

Herb up to 10 to 30 cm with yellow latex. Stem solitary, glabrous. Leaves sessile, glabrous, toothed at margins with white teeth. Flower head up to 1.7 cm in diameter, ligule yellow and margins toothed. Involucre bract glabrous & 2-3 seriate, inner bracts size up to 1.4 cm, linear-oblong and outer bract size 0.3-0.6 cm, ovate. Pappus soft, simple, 7 mm long. Cypsela size 1.5- 4 mm. **Fl & Ft**- December to July, **PU**- Whole plant

Uses- The entire plant is dried, crushed with water, and formed into tablets approximately 0.5 cm in diameter. These tablets are taken orally twice a day with water before meals to treat piles.

***Soliva anthemifolia* (Juss.) Sweet**

LN-Sag, **CN**- 305, **AN**- GPGCKSP 390, **Ht**- Wild, herb, **Hbt**- cropland.

Herb found as a weed commonly in wheat fields. Stem sparsely hairy, leaves arise from the base of the stem. Flower head sessile, size up to 1.5 cm in diameter, in flower head many florets are found in clusters. Cypsela size is 2.5 mm, brown in colour. **Fl & Ft**- December-April, **PU**- Leaves

Uses- Leaves are used to prepare vegetables which are beneficial for arthritis and body ache.

***Sonchus asper* (L.) Hill**

LN- Peela kateela, **CN**- 325, **AN**- GPGCKSP 394, **Ht**- Herb, wild, **Hbt**- wetland, roadside

Erect herb up to 1.5 m. Stem hollow, purplish green.

Leaves, runcinate, spinous, arranged spirally, attachment amplexicaul. Flower head yellow, up to 2 cm in diameter, Involucre bracts 2-3 seriate, pappus silky white. Cypsela ovate, size up to 2.5×1.5mm, yellowish-brown. **Fl & Ft**- January – March, **PU**- Leaves

Uses- Two leaves are boiled in 250 ml water till it remains half. This decoction is taken orally once a day to remove kidney stone.

***Sonchus wightianus* DC.**

LN- Choori, **CN**- 381, **AN**- GPGCKSP 406, **Ht**- wild, herb. **Hbt**- Roadside, wetland, wall

Erect perennial herb up to 1 m. Stem cylindrical, glandular hairy on the upper side. Involucre bracts lanceolate, brownish green, glandular hairy, Flower head 1.5-2 cm in diameter, ligulate, pappus 0.7cm long, white; corolla tube reddish yellow 1 to 1.2cm long. Cypsela 4 mm, brownish yellow in colour. **Fl & Ft**- September – April, **PU**- Root

Uses- The root is ground to prepare powder which is taken orally in the treatment of stones.

***Tagetes erecta* L.**

LN- Genda, **CN**- 269, **AN**- GPGCKSP 347, **Ht**- Cultivated, herb, **Hbt**- Garden

Erect aromatic herbs up to 1.3 m. Stem solid, with strong base. Leaf linear- lanceolate, acute. Flower head solitary, terminal, heterogamous, yellow to brownish yellow, peduncle long and hollow. Cypsela 04 mm long, dark brown or black in colour. **Fl & Ft**- September to March, **PU**- Leaves

Uses- The Juice of leaves is applied on the scalp to remove lice from hair.

***Xanthium strumarium* L.**

LN- Charchita, **CN**- 227, **AN**- GPGCKSP 340, **Ht**- wild, undershrub, **Hbt**- Wasteland, roadside

Erect undershrub up to 1-2 m tall. Stem solid, reddish

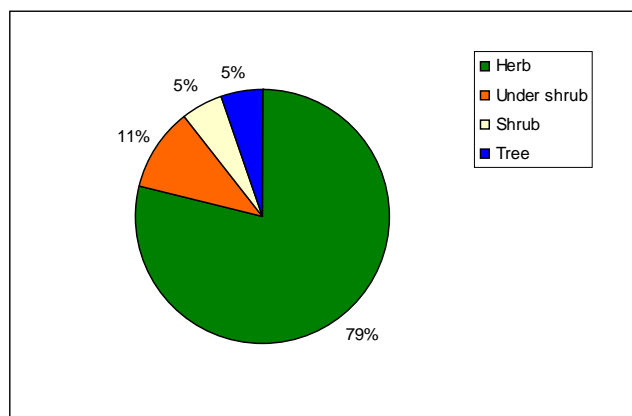


Fig. 3: Percentage contribution of life forms.

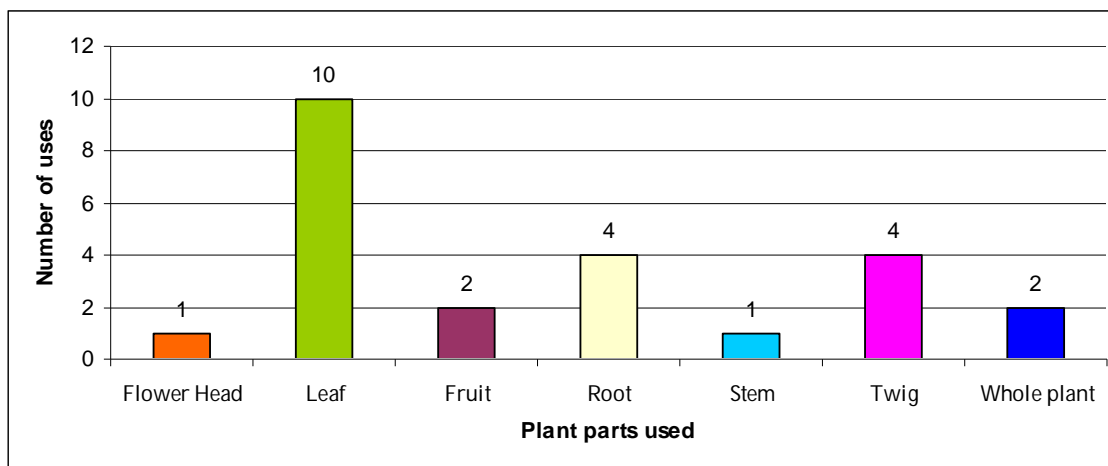


Fig. 4: Different plant parts used in preparation of traditional medicines.

green, stout hairy. Leaves, petiolate, 3-5 lobed, deltoid, margins serrate in irregular manner, both surface hispid. Flower heads occur in racemes at the end of branches. **Fl & Ft-** September to December, **PU-** Root, fruit.

Uses- Fresh root is ground and taken with water to alleviate intoxication. A paste of fruit is applied on the scalp to promote better hair growth and to treat hair fall.

Discussion

During the present field study, literature survey and data analysis, a total of 19 species were found with lesser known uses in tarai and bhabar region. Out of these, 16 (84.21%) were wild and 03 (15.79%) were cultivated. These plant species exhibited various life forms such as herbs (15 species, 79%), under shrubs (02 species, 11), shrub (01 species, 5%) and tree (01 species, 5%) (Fig. 3). Nine plant species were used to prepare traditional remedies for external application, while seven species were taken orally in the form of powder, pills and decoctions and 03 species were utilized for both external as well as oral formulation. Leaves were the major plant part used for treating ten different diseases, followed by roots and twigs for 04 diseases each (Fig. 4). These plants were used for 23 different diseases such as arthritis, bone fracture, dog bite, eye problems, kidney stones, piles, dermatological problems, etc.

This indigenous knowledge is valuable asset that should be systematically recorded and preserved for future generations. The present paper specifically highlights the lesser-known ethnomedicinal uses of nineteen Asteraceae plants, which are not popular among different tribal communities and thus not scripted earlier. This information holds potential benefits for the well-being of humanity as a whole and can significantly contribute to further research across various disciplines. Therefore, there is an urgent need to carefully analyze ethnomedicinal

information and document these lesser-known taxa comprehensively.

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