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Research Article

Exploration, Identification, and Digitalization of Some Medicinal Plants of Khaddar area of District Shamli, a Part of the Western Uttar Pradesh, India

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Abstract

The identification and digitalization of some medicinal plants of Khaddar area of District Shamli, (U.P.) was carried out under the comprehensive exploration, identification, and digitalization of the angiospermic flora of the area during 2018-2022. Digital herbarium of the selected plants has been constructed. The paper illustrates an account of 14 species of medicinal plants.

Keywords: *Medicinal Plants, Digital herbarium, western Uttar Pradesh.*

Introduction

Documentation of the plant species of a particular area is a crucial activity which has many benefits: it can support in assessment of the biodiversity of the region that can become insight for further research in the areas such as plant animal interactions, ecological resilience and resistance studies and climate change indications.

The old conventional method was documentation & preservation of actual specimens in the herbarium. The task of making physical herbarium is very painstaking and needs a long-term continuous maintenance of the herbarium specimens. Now with the advancement in the camera quality and easy preservation of visuals in digitalised form has made it possible to construct a digital herbarium. The digital herbarium is a very cost effective and better option for long term preservation of the specific information about the species that can be used in future.

The region of the exploration from where the Angiosperm plant species were photographed for making Digital Herbarium is a part of the Uttar Pradesh; a north Indian state.

The specific region of exploration is the district *Shamli* which is located at 29.45N and 77.32E. at an average elevation of 248-meter. It is around 92km from Delhi, 38km from Panipat, 66km From Meerut, 40km From Karnal (Haryana) and Saharanpur (U.P.). The district lies in the fertile Doab region between the Ganga and Yamuna River.

Material and Method

A digital herbarium is better alternative because of possibility of long-term preservation of visible plant description in a more effective way. With the help of the DELTA software, the descriptive taxonomic information of the species can be stored along with photographs of the different plant parts. The authors clicked the digital images with the help of digital camera and used the DELTA software which is a is worldwide accepted software used in Taxonomy.

The DELTA software can encode all types of characters commonly used for identification and classification. The program has *Intkey file* through which we can compare unmistakably two or more than two Taxa based on any defined character.

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The most noteworthy works on flowering plants of northern India that were taken into account are: "Flora of British India" by Hooker (1872-1897), "Flora of upper Gangetic Plains" by Duthie (1903-1929), "Flora of Delhi" by Maheswari and Maheswari (1963,1966), "*The Common grasses of United Province*" by Bor, *The* digital flora of Saxena & Shishodia etc. These floras were referenced for confirmation of plant identity. Some specimens which were hard to identify were matched and confirmed with the herbarium specimens at Forest Research Institute(FRI), Dehradun, and Botanical Survey of India (BSI) Dehradun, India.

Here the taxonomic data of the plants was recorded and the data was fed into the DELTA software. Here are some of the prominent medicinal plants recorded from the area during the exploration of the angiosperms.

Taxonomic Description of the Medicinal Plants:

1.Achyranthes aspera L.
Family: Amaranthaceae

A. aspera L., Sp. P1. 204. 1753. ***Centrostachys aspera*** (L.) Standl. in J. Washington Acad. Sci. 5: 75 (1915).; ***Stachyarpagophora aspera*** (L.) M.Gómez in Anales Inst. Segunda Enseñ. 2: 312 (1896) Vern. Chirchita, Latjira.

Plant description:
Perennial. herb, 20–120 cm. tall, stem quadrangular, erect, pubescent, branches striate, pubescent. leaf entire, petiole 0.5-1.5 cm, hairy, spikes terminal, erect10-30 cm, rachis angular, stout, densely hairy. bracts lanceolate, 3-4 mm, apex acuminate; bracteoles spiny, shiny, 2.5-4.5 mm, rigid, base 2-winged; wings 1.5-2 mm, membranous, margin entire. Tepals lanceolate, 3.5-5 mm, with a vein. Stamens 2.5-3.5 mm; pseudo-staminodes truncate or crenate at apex, fimbriate and ciliate. Utricles ovoid, 2.5-3 mm. Seeds brown, ovoid, ca. 2 mm.

Local name: Burcitta Fig.-1

Collection: Block Thana Bhawan, Village Ahmadpur.

Fl. & Fr.: most part of the year.

Medicinal Uses:
Anti-Inflammatory and Analgesic, hepatoprotective activity, possesses anti-fungal activity
Traditionally, it has been used for treating respiratory disorders, boils, for managing asthma, as home remedies for snake and scorpion bites, used for skin eruptions, eczema, and other skin-related issues. the leaves' juice is sometimes applied to relieve toothache.

2. *Cannabis sativa* L., Roxb.
Family: Cannabaceae

C. sativa L., Sp. P1. 1027. 1753; ***C. indica*** Lam., Encycl. 1: 695. 1783. Vern. Bhang, Ganja. Annual, mesophyte. plant height 75 cm to 1.5 meters tall, with a few exceptions up to 2.5 meters, stems and branches are slightly angular with appressed hairs, denser on younger shoots, leaves are alternate, palmately 3-9 (foliolate. Petiole is (.5 -10 cm long and pubescent, leaflets are usually lanceolate to linear, with serrate margins and acuminate apices, upper leaf surface is scabrid with stiff hairs topping the cystoliths, while the lower surface is more or less densely pubescent and covered with sessile glands. Stipules are linear, 4-6 mm long, dioecious, male inflorescences are approximately 25 cm long, female inflorescences are crowded in apical leaf axils among leaflike bracts and bracteoles, male flowers, the androecium with filaments (0.5-1 mm) and oblong anthers, male flowers yellowish-green, nodding, with ovate to lanceolate sepals, and oblong anthers, female flowers have a single ovary, surrounded closely by bract and bracteoles, female flowers are green, sessile, with sparsely pubescent calyx, Ovary is globose, ± enclosed by appressed calyx. Persistent bracts are yellow,the achene is flattened ovoid, 2-5 mm, with a crustaceous pericarp and finely reticulate surface, Seeds shining, yellowish-brown, minutely pilose to glabrous, ovate, with fleshy unilateral endosperm. The plant exhibits glandular hairs on various parts, including leaves and bracts,

Local name: Bhang/Black Charas/Ganja. Fig.-2

Fl. & Fr.: flowering April to September.

Collection: Block Thana Bhawan, Village Kail Sikharpur.

Note: common invasive species.

Medicinal Uses:
Antibacterial and Antioxidant, analgesic, anti-inflammatory, nausea and Vomiting Control, Sedative and Relaxant, anticonvulsant, in managing epilepsy, it can lower intraocular eye pressure, making it useful for treating glaucoma, it stimulates hunger and helps combat weight loss, useful for relaxation and stress relief.

3. ***Mucuna pruriens*** (L.) DC. Prodr.
Family: Fabaceae

M. pruriens (L.) DC. Prodr. 2 : 405, 1825.; ***Dolichos pruriens*** L. Amoen. Acad. 4 : 132, 1759.; ***Mucuna pruriens*** Hook Bot. Misc. 2 : 348, 1831.

Perennials, herbaceous, twiner. Leaflets 3, rounded at base, glabrescent above, appressed hairy beneath, 7–12 x 4.5–6 cm; petiole 10–12 cm long; stipels subulate. Flowers purple on tubercles. Calyx 1–1.2 cm long. Corolla 2–3.5 cm long. Pods sigmoid, 5–8 cm long, densely clothed with brown, stinging bristles. Seeds oblong, funicular hilum.

Local name: Kaunch Fig.-3

Fl. & Fr.: Aug. – Sept. & Nov. – Dec.

Collection: Block- Unn, Village- Chausana

Note: Bristles cause skin irritation.

Medicinal Uses:
Anti-Venom and Anti-Inflammatory, the leaves of Mucuna pruriens are used to treat bone fractures, pain, and sores, it acts as a nerve tonic and is considered an aphrodisiac to enhance sexual vigour and fertility. Traditionally, it has been used for snakebite and scorpion stings due to its potential anti-venom properties. The roots are believed to be useful in treating cholera, elephantiasis, and as a diuretic and purgative.

4. ***Terminalia arjuna*** (Roxb.ex DC) Wt. & Arn.
Family: Combrietaceae

T. arjuna (Roxb. ex DC.) Wt. & Arn., Prodr. 314, 1834.; ***Pentaptera arjuna*** Roxb., Hort. Beng. 34. 1814. ***P. glabra*** Roxb., Hort. Beng. 34. 1814. ***Terminalia glabra*** Wt. & Arn., Prodr. 314. 1834; FUGP. 1: 336. Vern. Arjun.

Perennial. Large tree. Stem erect. Young parts rusty pubescent. Much branched. 10–40 ft. High/tall. Leaves opposite. Subopposite. Leaf blade elliptic-oblong. Margin entire or minutely toothed. Flower sessile. Greenish-yellow. Fruit drupe.

Local name: Arjun. Fig.-4

Fl. & Fr.: April-June. Fr.: July-Aug.

Collection: Block Unn, Village Toda.

Note: Bark is precious.

Medicinal Uses:
The bark of Terminalia arjuna is used as a styptic, tonic, and febrifuge.

It provides relief in symptomatic hypertension and acts as a diuretic in cirrhosis of the liver. The preparation Arjunarishta, derived from its bark, is mainly used for cardiac problems. The juice of leaves is used to alleviate earache. Historically, it has been considered an antidote to various poisons. Traditionally believed to enhance sexual vigour and fertility.

5. ***Argemone mexicana*** L. (Mexican poppy)
Family: Papaveraceae

A. mexicana L., Sp. Pl. 508. 1973.; Vern. Pilikatali.

Annual, or occasionally short-lived perennial. Herbs. Mesophyte. Root tap root. Stem mostly short. Erect. Sometime woody at the base. Glabrous. Much branched, or branching from the base. 1–2 ft. High/tall. Sap yellow watery sap. Latex absent. Leaves sessile. Basal leaves dense. 3–7 in. long, 1/2 amplexicaul, sinuate-pinnatifid, white spotted,. Alternate. Leaf blade glaucous with blue-green markings on

veins. Apex acute. Base cuneate. Margin pinnatipartite. Prickly. Flower solitary. Sometimes in few flowered cymes. 1–3 in. diam., subsessile, yellow, or rarely white; Buds ovoid. Sepals horned at the top & bristle pointed, apex spurred. Cymbiform. Calyx present. Petals 6, yellow or orange, broadly obovate, base broadly cuneate, apex rounded. Fruit capsule. Indehiscent. 3/4–1.5 in. long, sparsely fulvous spiny, elliptic, or oblong, bristly. Grains obviously tessellate. Dicotyledonous. Spherical.

Local name: Prickly Poppy. Fig.-6

Fl. & Fr.: Feb. - April

Collection: Block Thana Bhawan, Village Thana Bhawan Dehat.

Note: common weed

Medicinal Uses:
The plant is used to treat non-healing wounds due to its potential healing properties.

It may also be beneficial for managing various skin conditions, including tumours and warts. Argemone mexicana is employed to alleviate constipation. Traditionally, it has been used in the treatment of malaria and chronic fever. In Ayurveda, it finds application in purgation during Panchakarma treatment.

6. *Abutilon indicum* Sweet Hort.
Family: Malvaceae

A. indicum (L.) Sweet., Hort. Brit. 54. 1827.; ***A. asiaticum*** Wt & Arn., Prod. 56.; ***Sida indica*** L., Cent. Pl. 2. 26. 1756. Vern. Kanghi.

Family Malvaceae. Annual, or Perennial. Herbs, or under-shrub. Leaves aerial. Simple. Leaves cordate, ovate, acuminate, up to 10 cm. long; petioles equalling the blade; stipules lanceolate, subulate, reflexed. Calyx lobes ovate apiculate, pubescent. Fruit black, flat topped, scabrous. Seeds sparsely stellate.

Local name: Kanghi Fig.-6

Fl. & Fr.: July - Oct

Collection: Common throughout the district.

Note: The plant can be easily identifiable after fruit formation that is unique kind of pod.

Medicinal Uses:
Anti-Inflammatory and Antioxidant, Aphrodisiac. The plant is beneficial for managing general debility, nervous disorders, and headaches. It provides support for conditions related to muscular weakness and paralytic disorders. The plant is used to treat heart diseases and various bleeding disorders. It may help regulate intestinal secretions and control convulsions. Abutilon indicum is employed to address liver problems and lung diseases. It has been traditionally used for tuberculosis and ulcers. A decoction made from its leaves can be useful for treating toothache and tender gum.

7. *Tinospora Cordifolia* (Willd.) Miers.
Family: Menispermaceae

T. cordifolia (Willd.) Hook.f. & Thomson, Fl. Ind. 1: 184 (1855).; ***Menispermum cordifolium*** Willd. in Sp. Pl., ed. 4. 4: 826 (1806).

Perennial. Shrub. Epiphyte. Sub-erect or climbing. Leaves Bright green both surfaces. Leaf apex acute. Glabrous. Style very short, red. Ovary on a fleshy receptacle.

Local name: Giloey. Fig.-7

Fl. & Fr.: July – Sep.

Collection: Block Kairana, Village Akabarpur Sunheti.

Note: The leaves resemble paan(chewing leaf)

Medicinal Uses:
Antimicrobial, anti-inflammatory, antioxidant, antirheumatic, and antidiabetic properties. *Tinospora cordifolia* is used in the treatment of jaundice, fever, and urinary diseases. It has been traditionally employed for managing asthma, gout, diabetes, and diarrhoea. plant is also beneficial for skin diseases, rheumatism, and snakebites. However, the drug demonstrated mild to moderate adverse changes in kidney, liver, intestine, and stomach at therapeutic equivalent doses.

8. *Urena lobata* L.
Family: Malvaceae

U. lobata L., Sp. Pl. 692. 1753.

Under-shrub.. Stem Erect. Sometime woody at the base. 2–4 ft. High/tall. Branchlets stellate tomentose. Stipules filiform, 2 mm., Leaves branchlets stellate tomentose. Simple. Thick. Variable, 2–3 in. long, rounded, linear-lanceolate, cordate at the base, Calyx lobes 5, slightly shorter than bracteoles, cup-shaped. Corolla 15 mm. in diam., reddish; petals 5, obovate. Petals rounded on the back. Style branched 10, hirsute. Fruit globose. Mericarps stellate puberulent, or spiny.

Local name: Congo jute Fig.-8

Fl. & Fr.: July-Oct.

Collection: Block Unn, Village Akaburpur Fushgarh.

Medicinal Uses:
Emollient and Anti-Inflammatory, externally, it is employed for rheumatism, lumbago, and skin diseases associated with pain and inflammation. The decoction of dried root treats conditions such as enteritis, dysentery, and rheumatic pains. Boiled and crushed leaves of Urena lobata serve as a poultice for bladder and intestinal inflammation.

9. ***Ricinus communis*** L.
Family: Euphorbiaceae

R. communis L., Sp. P1. 1007. 1753. Vern. Arandi, Arand.

Perennial. Herbs, or tree like shrub. Tap root. Stem erect. Reddish, or reddish-purple. Glabrous. Node present. Watery. Leaves membranous, palmately lobed. Stipule caducous. Male flower calyx membranous; petals 0; stamens numerous. Female flower calyx spathaceous.. Fruit capsule. Ellipsoid-ovoid. Echinate. Caruncle depressed-conical. Oblong.

Local name: Arand. Fig.-9

Collection: Block Thana Bhawan, Village Ahmadpur.

Fl. & Fr.: Throughout year.

Note: Seeds yield castor oil and used as an industrial lubricant.

Medicinal Uses:
Plant chemicals show antioxidant, anti-inflammatory, and hepatoprotective effects. Plant is used for Abdominal Disorders, Arthritis and Rheumatism, Castor oil, derived from the seeds, is well-known for its laxative properties and is used to relieve constipation. It is employed for managing conditions such as arthritis, chronic backache, sciatica, constipation relief, backache, muscle aches, and chronic headaches, sleeplessness, and insomnia.

10. *Bergera koenigii L*.
Family: Rutaceae
B. koenigii L. Mant. 563, 1771., **M. koenigii** (L.) Spreng. Syst. 2 : 315, 1825.

A large, deciduous shrub or small tree. Leaves 15–25 cm long; rachis pubescent. Leaflets shortly stalked, ovate-lanceolate. Flowers white, 0.2–0.4 cm long, in terminal corymbose panicles. Sepals 5, acute. Petals 5, oblong. Berries, glabrous, black 1–1.2 x 0.5–0.7cm.

Local name: Mitha Neem Fig.-10

Fl.: Sept - Nov; Fr.: Feb – May

Collection: Block Thana Bhawan, Village Babri.

Note: common throughout the district at roadsides. Leaves are used for flavouring curries. Roots and bark are used in medicines.

Medicinal Uses:
The green leaves of B. koenigii are used in treating piles, inflammation, itching, fresh cuts, dysentery, bruises, and oedema. The roots are purgative to some extent and are stimulating, often used for common body aches. The bark of B. koenigii is helpful in treating snakebites B. koenigii contains bioactive compounds with potential antioxidant effects. These compounds contribute to its various activities, including antidiabetic, anti-inflammatory, antitumor, and neuroprotective effects.

11. Stellaria media (L.) Vill.
Family: Caryophylleceae.

S. media (L.) Vill., Hist. Pl. Dauph. 3: 615. 1789.; ***Alsine media*** L., Sp. Pl. 272. 1753. Vern. Buchh-buchha.

Annual. Herbs. Tap root. Stem Erect. Light or pale green. decumbent, glabrous, flaccid, green. Leaves basal leaves petiolate. Flower in sparse axillary & terminal cymes. Pedicels slender, elongate & nodding. Petals oblong shorter than sepals. Style 3, linear. Fruit capsule. Ovoid. Slightly longer than persistent sepals, 6-valved. Seed red-brown. Ovoid to compressed. Acutely tubercled.

Local name: Common Chickweed. Fig.-11

Fl. & Fr.: Jun. –Aug

Collection: Block Unn, Village- Nai nangla Naveen.

Medicinal Uses:
Different parts of the plant have been used to treat various gastrointestinal disorders, including diarrhoea, inflammation, and swelling. It has been employed for conditions related to the renal, digestive, reproductive, and respiratory tracts. Chickweed has also been used as plasters for broken bones. It has been used as a remedy to treat itchy skin conditions and managing pulmonary diseases. Historically, 17th-century herbalist John Gerard recommended it as a remedy for mange. Modern herbalists prescribe it for iron-deficiency anaemia (due to its high iron content), as well as for skin diseases, bronchitis, rheumatic pains, arthritis, and period pain.

12. ***Euphorbia hirta*** L.
Family: Euphorbiaceae.
E. hirta **L.,** Sp. P1. 454. 1753.; ***E. pilulifera*** acut. p1 (non L. 1753) FBI. 5: 250. ***Chamaesyce hirta*** (L.) Millsp. Vern. Dudhi.

Annual herb, Root fibrous. Ascending, or rarely prostrate. nodes present. old nodes swollen; young ones normal. Milky. Leaves opposite. Simple; stipules membranous, triangular; leaf blade lanceolate-oblong, long elliptic, or ovate-lanceolate, opposite. Apex obliquely-cordate. Base narrow. Margin dentate. Female flower pedicel short. Ovary 3-angular, sparsely; stigma slightly 2-lobed. Fruit capsule. 1/20 in/ diam. Seed Trigonous.

Local name: Asthma weed Fig.-12

Fl. & Fr.: major part of the year.

Collection: Common throughout the district.

Medicinal Uses:
Traditionally, Euphorbia hirta has been used as an anti-asthmatic. Beyond its anti-asthma properties, *Euphorbia hirta* offers potential relief for various gastrointestinal issues: Diarrhea, Constipation, Intestinal parasites, Nausea, Vomiting, Heartburn, Peptic ulcers

13. Withania somnifera (L.)Dunal.
Family: Solanaceae

W. somnifera **(**L.) Dunal in DC. Prodr. 13 : 453. 1852.; ***Physalis somnifera*** L. Sp. Pl. 182. 1753.; ***P . flexuosa*** L. Sp. Pl. 1 : 82. 1753.

An erect, stout, undershrub. Leaves 5–8.8 x 2–5 cm, elliptic ovate, obtuse, or acute; petiolate. Winged. 1.2– 2.5 cm long. Flowers greenish-yellow, subsessile umbelliform cymes;. Calyx campanulate, stellate tomentose. Corolla rotates, tube 0.3–0.4 cm long; lobes 4– 5, ovate, obtuse, stellate pubescent outside. Stamens 5. Ovary glabrous. Berry, globose, 0.6–0.8 cm across. Seeds sub-reniform, wrinkled.

Local name: Ashwagandha Fig.-13

Flowering and fruiting: Jan. – Jun.

Collection: Common throughout the district.

Note: The plant possesses coagulating milk.

Medicinal Uses:
Ashwagandha exhibits potential neuroprotective properties, making it beneficial for preventing or managing neurodegenerative diseases such as Alzheimer's, Parkinson's, and Amyotrophic Lateral Sclerosis (ALS) Traditionally, it has been used to combat stress, anxiety, and depression. Adaptogenic properties help the body cope with stressors and maintain balance. Ashwagandha possesses anti-inflammatory properties, which may contribute to its overall health benefits. It also modulates the immune system, supporting

overall well-being. It is considered an aphrodisiac and is used to enhance sexual vigour and fertility. Ashwagandha supports endocrine health, including thyroid function.

14. *Tribulus terrestris* L.
Family: Zygophyllaceae
T. terrestris L. Sp. Pl. 387. 1753.

A prostrate, or decumbent-ascending, annual herb. Stem densely covered with white silky hairs. Leaves 2–4.5cm long; leaflets 6–7 pairs, acute. Flowers solitary axillary, yellow. Sepals 5. Petals 5, oblong. Stamens 10. Ovary hairy. Cocci 5, each with 2 divaricate spines.

Local name: Gokhru Fig.-14

Fl. & Fr.: July – Dec.

Collection: Throughout the district in wastelands and roadsides.

Note: Seeds and fruits are used in backache.

Medicinal Uses:
Tribulus contains bioactive compounds with potential anti-inflammatory and antioxidant properties. *Tribulus terrestris* has been traditionally used to enhance sexual vigour, improve libido, and address erectile dysfunction. It is believed to support overall reproductive health in both men and women. It may have a positive impact on the heart and circulatory system. Traditionally, it has been used to address urinary tract issues, including kidney stones. It may have a diuretic effect, promoting healthy urine flow.

Fig.-1 *Achyranthes aspera* L.

Fig.-2 *Cannabis sativa* (L.) Roxb.

Fig.-3 *Mucuna pruriens (L.) DC. Prodr.*

Fig.-4 *Terminalia arjuna* (Roxb.ex DC) Wt. & Arn.

Fig.-5 *Argemone mexicana* L.

Fig.-6 *Abutilon indicum* Sweet Hort

Fig.-7 *Tinospara cordifolia* (Willd.) Miers.

Fig.-8 *Urena lobata L.*

Fig.9 *Ricinus communis* L.

Fig.10 *Bergera koengii L*.

Fig-11 *Stellaria media* (L.) Vill

Fig.-12 *Euphorbia hirta* L.

Fig.-13 *Withania somnifera* (L.) Dunal.

Fig.-14 *Tribulus terrestris* L.

Conclusions

The research conducted from 2018 to 2022 focused on the medicinal plants found in the Khaddar area of Shamli. During this period, samples of these plants were gathered at both their vegetative and reproductive stages. On-site photographs were taken, and detailed characteristics were recorded to create a digital database. To accurately identify these specimens, various botanical resources such as " Flora of British India" by Hooker (1872-1897), "Flora of upper Gangetic Plains" by Duthie (1903-1929), "The Flora of Delhi" by Maheswari, and digital floras by Saxena & Shishodia were consulted.

For specimens that proved challenging to identify, comparisons were made with herbarium specimens at prestigious institutions like the Forest Research Institute (FRI) and the Botanical Survey of India (BSI) in Dehradun, India. Through these meticulous processes, the medicinal plants of western Uttar Pradesh emerged as crucial resources for treating a wide array of human ailments including asthma, backache, leprosy, tuberculosis, blood vomiting, gonorrhoea, syphilis, leucorrhoea, kidney and gall stones, fever, pile problems, coughs, colds, bronchitis, and diabetes.

Considering these findings and ensuing discussions, it is evident that the medicinal flora of this region plays a vital role in healthcare provision. Therefore, it is imperative to prioritize the protection and conservation of these plants to ensure continued access to natural remedies and promote sustainable development.

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