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Taxonomic Study and Medicinal Importance of Three Selected Species of the Genus *Artemisia* Linn

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Abstract: The study was confined to the 3 medicinally important species of the genus *Artemisia* Linn. The morphological features, such as, plant size, leaf-shape and size, petiole length, the inflorescence type and the details of capitulum, i.e., the disc and ray florets were studied from the herbarium specimens preserved in the Quaid-i-Azam University Herbarium. Many properties and the uses of these species were determined. The studies on morphological characters revealed that the characters like, heads either homogamous or heterogamous and the receptacle either glabrous or hairy, number of the florets per head were taxonomically most important to differentiate these species. Among these species it was observed that *A. absinthium* Linn. was mostly used against liver diseases.

Key words: *Artemisia*, *Afsanthin*, wormwood, medicinal, morphology

Introduction

The relationship between the man and plants is as old as the history of mankind since antiquity man has studied plants and animals, particularly as a source of food and to ward off the ailments. Therefore with the passage of time man was able to distinguish between harmful and useful plants. Some plants were useful as food source while some others showed beneficial effects against various types of diseases. This is how the knowledge of drugs from plants developed (Said, 1982).

The use of plants as a source of medicine is based on the experience of many generations of traditional physicians and herbal practitioners found in different ethnic societies. For centuries, plants with medicinal properties have been utilized successfully in the treatment of ailments of varying degrees of severity.

Many simple people, knowing nothing of such useful medicinal plants that nature has secreted treasures in the root, stem, bark, leaves, juice, flowers and seed of plants. So in this way, the taxonomy play an important role:

- To provide convenient method of identification
- To provide a true Scientific names to the plants
- To provide a diversity of plants
- To provide a system of classification of plants

Artemisia Linn. known as 'Worm Wood', is a large genus of herbs with 200 species belonging family Asteraceae. It has strongly scented leaves, alternate, entire, and flowers not very distinctly grown on heads. It is reported that 30 species of *Artemisia* are grown naturally in Pakistan but no significant work on this has been reported before. However, reports on 10 species found in Pakistan are available from Japan, China and Russia (Junshen *et al.*, 1996).

Artemisia Linn., *A. brevifolia* Wall. ex DC. and *A. scoparia* Waldst. & Kit. are highly used in herbal medicine. Herbal medicine is a recognized system of medicine throughout the world. The Margalla hills in Islamabad are rich in medicinal plants and still it stands almost neglected due to the less awareness of such useful plants. So this area demands extensive entobotanical survey. Davis (1975) studied that the *Artemisia* Linn. were annual or mostly perennial herbs usually erect much branched stem; the leaves are sessile or petiolate, pinnatisect and the involucre is ovoid or globose. He also found that considerable variations in habit, leaf shape and other morphological characters occurs due to change of environmental condition.

Kirtikar and Basu (1975) studied that *A. brevifolia* Wall. ex DC. was used against intermittent Fever, Jaundice and also act as vermifuge. Huang *et al.* (1991) studied a chemical 'scoparone' found in *A. scoparia* Waldst. & Kit. which is useful for the

development of better immunosuppressive agents with vasorelaxant actions which use against transplantation rejection and autoimmune disease. Nin and Magher (!1995) studied that in *A. absinthium* Linn. high variability was found in number of branches per plant, growth habit, flowering period, fresh, dry matter field and the plant height due to change of ecological habitat and variations in environmental conditions. Michael *et al.* (1996) reported that 'Afsantin' was used against some type of hyperbibrinaemia suppression of cardiac activity, Jaundice, Hepatitis and Epilepsy. Hammond *et al.* (1997) studied that *A. brevifolia* Wall. ex DC. used in manufacturing of Anthelmintics which play an important role in the control of Helminth infections in the tropics. Tahir *et al.* (1997) studied that *A. absinthium* Linn. provides a relatively safe and effective treatment for amoebiasis. Arino *et al.* (1999) extracted the essential oil from the leaves of *A. absinthium* Linn. which was used in food industry.

Materials and Methods

Taxonomic study: The taxonomic study was conducted in the Herbarium, Quaid-i-Azam University, Islamabad. For systematic study the specimens were collected in flowering and fruiting conditions during the field trips. Taxonomic characters including stem, leaf, inflorescence and description of flower were studied with the help of simple microscope. After studying the taxonomic characters, the key to specie was made for the identification and differentiation of selected species. The specimens were identified and then deposited as Herbarium sheets at Quaid-i-Azam University, Islamabad, for further references.

Survey: For the medicinal properties and uses the survey was conducted in Rawalpindi and Islamabad. The method adopted was to interview the Hakims. The Questionnaire was devised to identify the knowledge of Hakims about the collection of selected plants area of collection, part used and the diseases against which the selected plants were used.

Results and Discussion

Morphology

Artemisia: Linn., Gen. Pl. ed. 5:357 (1754); Benth. & Hook., Gen. Pl. 2: 435(1873); Hook. fil., Fl. Brit. Ind. 3: 321 (1875); Cullen in Davis, Fl. Turk. 5: 311 (1975); Podleth in Rech. fil., Fl. Iran. 158: 159 (1986).

Annual, biennial or perennial usually aromatic herbs or sub-shrubs. Stem erect, much branched, leaves alternate, sessile or petiole, often much dissected or 1-3-pinnatifid, basally petiolate; cauline leaves sub-sessile or sessile, aromatic. Inflorescence a panicle, spicate or globose raceme, sometimes a dense corymb. Capitula small heterogamous or homogamous, disciform, broadly

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Table 1: Medicinal properties and uses of selected species (Ahmad and Rahman, 1989)

Name of species	Vernacular	Area of collection	Part used	Use against diseases
<i>Artemisia absinthium</i> Linn.	Afsantin	Margalla hills, Hazara, Abbottabad, Swat, Parachinar, Northern areas, Azad Kashmir, Bagh. etc.	Leaves and flowers were used. Leaves were important because they contain active principle that is santonin, whereas flowers also contain essential oil. Afsanteen tablets, safoof and syrup were manufactured from these parts of plant.	Mostly used against liver diseases, Hepatitis, a,b,c, Blood purification, Jaundice, Diabetes, Skin, diseases, Allergy, Brain tonic, Scabies and Tetanus etc.
<i>Artemisia brevifolia</i> Wall. ex DC.	Afsantin-ul-Bahr	High altitude, (7000-14000 ft), Baluchistan, Hazara, Chitral, Swat, Baltistan, Kashmir etc.	Whole plant used	Swollen joints, Dyspepsia, pain due to bite of venomous reptiles, scorpion and intestinal parasites.
<i>Artemisia scoparia</i> Waldst. & Kit.	Dona john	Sind, Baluchistan, Islamabad, Pothwar, Peshawar, Swat, Gilgit, Baltistan, etc.	Whole plant used	Different types of fever, Bronchitis, Cough, Jaundice, Diuretic, Purgative, Earache etc.

campanulate with or without peduncle. Involucre bracts oblong to ovoid or campanulate rarely sub-orbicular or hemispheric or almost globose. Disc florets hermaphrodite, rarely male, fertile or sterile, corolla regular, tubular-campanulate, 5-toothed. Outer florets female, very rarely sterile, tubular. Receptacle flat, convex or hemispheric. Achenes oblong-ellipsoid, sub-ovoid, cylindrical or somewhat compressed, smooth or faintly striated, pilose, sometimes prominently ribbed and glabrous. Pappus absent or very rarely represented by a small scarious ring. Respresented by about 400 species distributed in S. America, Asia, N. America, Canada and New Zealand. In Pakistan it consists of 32 species (Stewart, 1972).

Key to the species

- 1a Heads heterogamous, shortly peduncled, more than 10-flowered; involucre 3-4-seriate; outer phyllaries glabrous to appressed-canescent; receptacle conspicuous, hemispherical or convex _____ 2
- 2a Plants hairy to mostly glabrous, uppermost leaves in the floral region acicular with auricles; receptacle conical, glabrous; florets 10-12 in number; outer phyllaries glabrous, corolla glandular _____ 1. *scoparia*
- 2b Plant appressed silky-canescent; uppermost leaves in the floral region 3-fid or entire; receptacle ± flat, densely white-hairy; florets 20-25 in number; outer phyllaries appressed-canescent; corolla glabrous _____ 2. *absinthium*
- 1b Heads homogamous, sessile, less than 10-flowered; involucre 5-6-seriate; outer phyllaries densely arachnoid-hairy; receptacle very small, conical _____ 3. *brevifolia*

A. scoparia: Waldst. & Kit., Pl. Rar. Hung. 1:66.t.65 (1802); Bess. in Bull. Soc. Nat. Mosc. 8: 92 (1836); DC., Prodr. 6: 99(1837); Boiss., Fl. Or. 3: 364. (1875); Hook. fil., op. cit. 3: 323(1881); Stewart in Nasir & Ali, Ann. Cat. Vasc. Pl. W. Pak. & Kashm. 719 (1972); Cullen in Davis, Fl. Turk. 5:322 (1975); Podlech n Rech. Fil., op. cit. 158:189(1986).

Syn.: *A. kohatica* Klatt, Sitz., Ber. Math.-Phys. Cl. Acad. Wiss. München 1878: 91(1978).

A biennial to perennial herb with a thick rootstock. Stem 40-60-80 cm in length, basally woody, branched, slightly hairy to mostly glabrous, brown or dark purple. Radical leaves petiole, pinnatisect. 2.5 cm long, glabrous, upper most leaves in the floral region acicular; petiole of basal leaf 0.7 cm long, where as, petiole of upper leaf 0.6 cm long, heads heterogamous, sessile in racemose panicles, 10-flowered; receptacle conical, glabrous, Involucre glabrous oblong. Florets 10-12; ray florets 5-6, fertile, tube 1-10 mm in length, disc florets 5-6, functionally staminate, tubular, tube 2-3 mm long, corolla glandular. Ray florets white and disc florets yellow. Fruit on achene.

A. absinthium Linn: Sp. Pl. 848(1753); Hook. f., op. cit. 3: 328(1881); Stewart, op. cit. 714(1972); Tutin & Persson in Tutin

et al. Fl. Europ. 4: 180(1976).

A perennial aromatic plant with erect flowering stem. Stem 30-90 cm in length, woody below, cylindrical, minutely glandular-punctate. Leaves petiolate, lower stem leaves tripinnate, middle stem leaves bipinnate and the uppermost leaves in floral region sessile, 3-fid or entire. Inflorescence narrow or broad panicle. Heads heterogamous, short peduncled. Involucre 3-4-seriate, outer phyllaries linear, appressed-canescent, silky hairy, 0.5 cm long, pedicle 0.5 cm long, ray florets yellowish in color whereas disc florets brownish in color. Ray florts 0.6 cm long disc florets 0.32 cm long. Receptacle with long hairs. Hermaphrodite all fertile Cypsellae oblong.

A. brevifolia Wall. ex DC., Prodr. 6: 103(1838); R.R. Stewart, op. cit. 715(1972); Podlech in Rech. fil., op. cit 212(1986).

Misapplied name: *A. maritima* sensu Hook. fil., op. cit. 3: 323(1881) proparte; Kitamura, Pl. W. Pak. And Afghan. 142(1964); R.R. Stewart, op. cit 716(1972) non Linn., Sp. Pl. (1753).

A basally woody shrublet with many, erect, strict upto 35(-50) cm tall, striate-costate, demsely drachnoid, greyish hairy to soon glabrous, greenish to brownish-yellow, rarely reddish vegetative and flowering stems from upright, thick, much-branched woody rootstock. Leaves greyish-hairy; basal and lower stem leaves with 10-20 mm long petiole, lamina rotundate orbicular 2-3x2-3.5 cm, 3-pinnatisect into narrowly linear, 2-5(-7) x C. 0.5 mm ± rigid, divdricate segments: middle and upper stem leaves subsessile to sessile, basally auriculate, gradually smaller vpwward; uppermost in floral region undivided, linear, capitate homogamous, sessile, erect, oblong-ovate, 3-4 (-4.5) x C. 1.5 mm, remote or contiguous, usually congested in glomerulus of 2-6 towards branch apices, in narrow panicle with 1-3 cm long, obliquely erect or appressed branch or mostly raceme-like receptacle conical, glabrous. Involucre 5-6 seriate, phyllaries imbricate, outermost narrowly ovate, ca. 2x1.5 mm, green densely arachnoid hairy, hardly scarious marginate, median and inner ones oblong-elliptic, c. 2.25x2 mm, obtuse, straw-colored with brownish tinge, laxly arachnoid hairy towards tip, broadly scarious marginate innermost oblanceolate- obovate, C. 3 mm long, obtuse. Florets 4-5 with C. 2.5 mm long, glandular corolla.

The 3 species of *Artemisia*, i.e., *A. absinthium*, *A. brevifolia* and *A. scoparia* were similar to one another. But these species were differentiated from each other mostly on the basis of their leaves. Leaves of *A. absinthium* were petiolate, tripinnate the leaves of *A. brevifolia* were bipinnate, upper leaves sessile, lower leaves petiolate and leaves of *A. scoparia* were subsessile, pinnatisect and upper leaves were acicular that is thread like or needle like. Systematic study provides good and distinguishing characters which can be utilized for further delimitation of these species.

A total of 15 Hakims were questioned throughout the survey. During the survey information of Hakims about the vernacular names area of collection, and medicinal uses of these species were collected. The 3 species were used in Herbal medicine for the

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treatment of various diseases like hepatitis, jaundice, diabetes, different types of fevers, Intestinal parasitic diseases etc. (Table 1). From survey it is concluded that *A. absinthium* is more used in Herbal medicine where as the *A. brevifolia* and *A. scoparia* are less used due to less awareness. The survey revealed that, these species are collected throughout the year and these species are mostly grown in March and April.

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