Asthavarga plants – threatened medicinal herbs of the North-West Himalaya

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Abstract: Astavarga eight medicinal plants viz., Kakoli (Roscoea purpurea Smith), Kshirakakoli (Lilium polyphyllum D. Don), Jeevak (Crepidotum acuminatum (D. Don) Szlach), Rishbhak (Malaxis muscifera) (Lindll.) Kuntze), Meda (Polygonatum verticillatum (Linn.) Allioni), Mahameda (P. cirrhifolium (Wall.) Royle), Riddhi (Habenaria intermedia D. Don) and Vridhhi (H. edgeworthii Hook. f. ex Collett). All of these plants have their natural habitats in Himalaya particularly the North-West Himalaya in Jammu & Kashmir, Uttarakhand and Himachal Pradesh between elevations of 1500 and 4000 m asl. Their natural habitats are specific in ecological environment and hence these occur only in small pockets. Astavarga is important ingredient of various Ayurvedic formulations such as Chayavanprasha. Although some work has been done on identification of medicinal plants mentioned under Astavarga, but still there is need to identify the true representatives of this Astavarga group. The present communication deals with the taxonomical and medicinal properties of these eight medicinal plants.

Keywords: Astavarga; Ayurveda; medicinal plants; herbs; formulations.

Introduction

The Ayurveda is the science of life and has been enhanced by numerous Rishis and Saints such as Aswani Kumars, Atreya, Bhardwaja, Dhanwantri, Charak and Susrut etc. During this early phase of Ayurvedic development, Ashwani Kumars, who had a vast reputation as Ayurvedic wonder healers, saw the old and frail, emaciated body of Rishi Chayavan, decided to rejuvenate his body through medication. Rishi Chayavan was born in the lineage of Maharishi Bhrigu (who was a great astrologist and made birth charts of Lacs of people which are valid even today). For this they invented Astavarga - a group of eight medicinal plants and did the miracle of rejuvenating the body of Rishi Chayavan and restored his youth. Since then after the name of Rishi Chayavan the preparation was called as Chayavanprash and has been a favourite and most demanding medicine for kings and rich people. With the disappearance of Gurukul system of ancient education, which had more practical and less theoretical approach, the knowledge (practical in natural habitats) of medicinal plants started fading away coupled with no written details most of the medicinal plants over the several centuries, a great confusion about their actual identity had taken its deep root (Sharma and Acharya Balkrishan, 2005). This was the case with Astavarga which included eight plants. All these plants have their natural habitats in Himalaya especially the North-West Himalaya. Their natural habitats are specific in ecological requirements and hence these occur only in small patches. These plants are considered as a very good rasayana with rejuvenating and health-promoting properties and are known to strengthen the immune system and have immense cell regeneration capacity. Astavarga is useful in promoting body fat, healing fractures, seminal weakness, fever, abnormal thirst, diabetic conditions and as a cure for vata, pitta, rakta doshas. Astavarga plants are also reported to restore health immediately and work as antioxidants in the body (Mathur 2003; Pandey 2005; Sharma and Acharya Balkrishna 2005). Due to high medicinal value, Astavarga...
plants are used in different forms, e.g. Taila (oil), Ghritam (medicated clarified butter), Churana (powder) and formulations in the traditional medicinal system (TMS) including Chyavanprasha, a health-promotive and disease-preventive tonic (Dhyani et al., 2010).

There was a mystery in the botanical description and the classification method of the Astavarga plants. Before one starts this work, it would be useful to know the traditional, ancient methods of their identification and their usage. The traditional Nighantu texts gave various synonyms for each plant and they together created an indicator for a guna (attribute) or its meaning. The names given to the plants were linked to other natural forms. This format was consistent with the times, when people lived in close association with nature. There was not much mystery in the matter of medicinal plants, because teaching was done in the forests; and was very practical. The dissemination of knowledge was verbal. Whatever may have been the history, a time came when a lot of literature was verbally transmitted from one generation to another. This was the era of codification after this period the gradual development of knowledge of Ayurveda and of medicinal plants got blocked. Many wrong perceptions developed in the identification of medicinal plants and its usage. The major traditions of Ayurveda became suspected and complicated, the correct identification of medicinal plants became very difficult.

The Dhanvantri Nighantu (ancient text) has the highest number of names for Astavarga. The Dhanvantri Nighantu also has the description of the pharmacological properties of the Astavarga plants. Other Nighants like Bhav Prakash, Shaligram and Rajnighantu also have the details of their names and properties. From the time of Bhavmishra, (around 1500 AD), confusing concepts and mystery surrounded these medicinal plants. The Bhav Prakash Nighantu had described that even Rajas (kings) would find it difficult to access the Astavarga plants. Therefore substitute plants for Astavarga were recommended.

Over the centuries of Ayurvedic history, much confusion about identity of the Astavarga plants prevailed. In Nighantus by various authorities and commentators concluded that the Astavarga was rare to kings and therefore suggested the use of substitutes instead of these plants. This suggestion put forth hampered further efforts to explore these plants in their habitats. After independence and restoration of interest in Ayurveda provided the necessary eagerness and also the modern taxonomic system of plant classification facilitated the task of correct identification of Astavarga plants. Effort by several authors on various aspects like distribution, their properties and propagation etc. of Astavarga plants have been discussed (Lattoo et al., 2001; Lattoo et al., 2005; Pandey et al., 2006; Wang et al., 2007; Chauhan et al., 2007 & 2008; Sharma et al., 2007; Rath et al., 2009; Khan et al., 2010; Sahu et al., 2010; Dhyani et al., 2010; Bish et al., 2011; Rana and Samant, 2011; Sharma et al., 2011; Rath et al., 2011; Lahoni et al., 2012; Ravi Kant et al., 2012; Javed et al., 2012; Giri et al., 2012), but till date no attempt made in perspective of the correct identification and representative of the Astavarga group, there is much uncertainty about the botanical names of Astavarga plant species, so the present communication deals with correct identification of Astavarga plants described in various Nighants and Samhitas with their taxonomical description from various floras. The present communication will help the researchers, scientists, farmers and cultivators to know about approved representative of Astavarga group.

Materials and methods

Information about the plants of 'Astavarga' group was collected from an extensive literature survey (Nighantus and Samhitas by various authorities; Uniyal, 1975; Osmaston 1978; Collet, 1980; Dey, 1982; Polanin and Stainton, 1984; Naithani, 1985; Deva and Naithani,1986; Uniyal, 1989; Chauhan, 1990; Warrier, 1994; Nayyar et al., 1995; Godagama, 1997; Uniyal, 1997; Gaur, 1999; Hooker, 1997-1999; Kaushik and Dhiman, 2000; Sharma and Acharya Balkrishna 2005; Singh, 2006; Acharya Balkrishna, 2012) for identification of natural habitats and various species of Astavarga plants in the Himalayan region. Extensive field surveys were conducted in temperate, sub alpine
and alpine regions of Uttarakhand during the years of 2008-2011 at Mussorrie, Jaberkhet, Dhanolti, Kyarphulli, Deoban, Nag Tibba, Jamuna valley, Kharshali, Har-ki-dun, Dayara, Bhanpura, The Valley of flowers, Rudranath, Tungnath, Kedarnath, Rambara, Dronagiri, Panwali Kantha, Madhyamaheshwer, Chaopta, Khirsu, Pauri, Gangotri, Bhjojasa, Chirbasa, Binsar, Pinder valley, Tejam Jankhola valley, Kali valley, Nanital, Ranikhet, Chabtia, Badrinath, Tons valley, Bhagirathi valley, Dodital, Chakrata, Vasukital, Hemkund, Yamunotri, Chamba, Deviyatal, Gangnani, Gaurikund, Mandal, Trijuginarayan, Kedarnath valley at an altitudes from 1200- 4000 m asl. The collected plant species were identified with the help of standard floras and notes prepared on their morphological attributes.

Results and Discussion

All the eight plant species which are used in 'Astavarga' group of Ayurvedic medicine occur mostly in Himalayan states viz., Himachal Pradesh, Jammu & Kashmir and Uttarakhand upto an elevation of 1200- 4000 m asl. These eight plant species belong to three different families, four species belong to the family Orchidaceae viz., (Crepidium acuminatum (D. Don) Szlach.), Malaxis muscifera (Lindl.) Kuntze, (Habenaria intermedia D. Don), (H. edgeworthii Hook.f. ex Collett) one species belong to the family Zingiberaceae viz., (Roscoea purpurea Smith) and three species belong to the family Liliaceae viz., (Lilium polyphyllum D. Don), (Polygonatum verticillatum (Linn.) Allioni) and (P. cirrhifolium (Wall.) Royle f. ex Collett). Details regarding their botanical names, synonyms, english names, distribution range, taxonomical features, flowering & fruiting time, active ingredients, medicinal uses, plant parts used, dosage, formulations and substitutes of these plant species were discussed. Many scholars attempted exploration and research on medicinal plants, but they were confused in many instances. Accurate identification of medicinal plants became complicated and difficult. But we have collected all the existing available ancient texts and also with the help of modern plant science, for the first time attempted to identify the Astavarga plants.

Members of Astavarga plants

1. Roscoea purpurea Smith

Botanical Name: Roscoea purpurea Smith
Family: Zingiberaceae
English Name: Roscoe’s Lily
Sanskrit/ Hindi Name: Kakoli

Habit and Habitat: A perennial rhizomatous herb upto 15-30 cm in height. Around the world found in Pakistan, Bhutan and Tibet between 1500-3100 m elevation. In India found in Central and Eastern Himalaya from Uttarakhand to Assam and Sikkim up to an altitude of 3300 m in alpine grassland, steep, grassy hill sides, damp gullies and stony slopes.

Taxonomic features: Purple coloured leafy stem, elongate, erect and robust; leaves- 5-6, lanceolate, 15 cm long, 1.2-2.5 cm wide, at flowering time, sheaths broad, purple or reddish, imbricated; flowers-few orchid like, on a sessile spike; bracts- oblong, hidden in the sheaths of the upper leaves; calyx-green, 3.8 cm long, slit deeply down one side as the flower expands; corolla tube-not longer than the calyx, dilated up wards, limb purple rarely pale lilac or white, upper segment about 2.5 cm long, obovate-cuneate, lower lanceolate, decurved, lip broad deeply bifid; staminode-oblanceolate, unguiculate, half as long as the upper segment, fertile stamen-as long as the staminode, anther-tails 0.4 cm long, lip 2.5-3.8 cm, deflexed; fruits-capsule cylindric, 2.5-3.8 cm long; seeds-ovoid, minute, arillate; rhizomes-root fibres thick, fleshy, fascicled (figure 1a).

Flowering: June-July.

Fruiting: August-September.

Active ingredients: Its rhizome contains flavonoids, alkaloid, tannins, saponin, glycosides and phenolic compounds.

Properties & Action: Antirheumatic, febrifuge, galactagogue, haemostatic, expectorant, sexual stimulant, diuretic, tonic, sweet, bitter and cooling. The ethanolic extract of its rhizomes showed immunostimulant potential in mice (Sahu et al., 2010).

Uses: It is useful in haematemesis, excessive thirst and rheumatic pain.
**Part used:** Rhizome.

**Dosages:** As directed by the Physician.

**Formulations:** Astavarga churna, Chyavanprash rasayan, Vachadi taila, Chitrakadi taila, Mahakalyan ghrita, Mahamayura ghrita, Jivaniya ghrita, Nagabala sarpi, Vajikaran ghrita, Brahini gudika and Jivaniya gana churna.

**Substitutes:** Aswagandha (Withania somnifera (Linn.) Dunal) and Kali musali (Curculigo orchioides Gaertn.).

There is much confusion about the identification of Kakoli, many authors considered *Fritillaria roylei* Hook. as *Kakoli* (Singh, 2006 and Dhyanvi et al., 2010) and some *Fritillaria cirrhosa* D. Don but according to *The Plant List, Fritillaria cirrhosa* D. Don is its first name and *Fritillaria roylei* Hook. is the synonym of this. Chunekar,1969, 2006; Sharma, 1976; Uniyal, 1989,1997; Sharma and Sharma, 1998, considered *Roscoea procera* Wall. and *Roscoea alpina* Royle as *Kakoli*, but according to Acharya Balkrishna (2012) the actual species of *Kakoli* is *Roscoea purpurea* Smith because of its purple coloured stout stem and also purple flowers as described in ancient text by Shaligram and Bhav Prakash Nighantus. There are three other species of *Roscoea* used as its substitute in Uttarakhand slightly differ from the above species are as follows-

1. **Roscoea capitata** Smith- A perennial rhizomatous herb, stem elongated; leaves many, linear; flowers many in a dense oblong, peduncled spike; corolla-tube not longer than the calyx; limb pale blue, upper segment oblong-cuneate, lip narrow- emarginate.

2. **Roscoea alpina** Royle- A perennial rhizomatous herb upto 15-25 cm in height; leaves several, leaf blade linear, rarely lanceolate 15-25 cm long and 1-2.8 cm wide, strongly keeled, base narrow, apex acuminate; inflorescence capitulate, densely flowered; peduncle 5-10 cm long; flower blue in colour; calyx 2.5 cm in diameter, pubescent especially along veins, split on one side, apex 2-toothed; corolla-tube shorter than calyx; limb pale blue, upper segment oblong -cuneate, lip narrow emarginated.

3. **Roscoea purpurea** Smith var. *procera* (Wall.) Baker- Stem is taller, green, more robust with broader leaf-sheaths; flowers at the apex, purple in colour and larger than *Roscoea capitata* Smith.

**2. Lilium polyphyllum** D. Don

**Botanical Name:** *Lilium polyphyllum* D. Don

**Syn-** *Lilium punctatum* Jacquem. ex Duch.

**Family:** Liliaceae

**English Name:** White Himalayan lily

**Sanskrit/ Hindi Name:** Kshirakakoli

**Habit and Habitat:** A perennial herb upto 60-120 cm in height. Around the world found in Pakistan, Nepal, West China, Tibet and Afghanistan upto an elevation of 1800-3700 m asl. In India found in Western Temperate Himalayas up to an elevation of 2000-4000 m in Jammu & Kashmir, Uttarakhand and Himachal Pradesh.

**Taxonomic features:** An erect, slender, hollow, leafy stem; leaves-sessile, alternate or nearly opposite or whorled, 7-12.5 cm long and 5-12 mm broad, linear or narrow lanceolate or oblanceolate, acuminate, with parallel venation, lower leaves sometimes whorled, margins papillose; flowers-pendulous, 10-12 cm in diameter, showy, fragrant, drooping, solitary, whorled or in 4-10 flowered, terminal raceme raised on the naked top of the stem; pedicel-7-9 cm long; bracts-leaf like, whorled, crenulate; perianth-tepals-6, 6-8 cm long, broadly infundibular, dull yellowish or greenish outside, white within speckled with long purple streaks and dots, segments 6, oblanceolate, 1.8 cm broad, revolute from the middle, usually narrowly nectariferous at the base; stamens-6, diverging exserted, filaments filiform, anthers large, yellow to orange, dorsiﬁxed, versatile, 1.2 cm long; ovary-superior, trilocular, style long, very decline; stigma capitulate, obesuredly 3-lobed; fruits- 2-3 cm long, oblong, three angled, erect, coriaceous, loculicidal, 3-lobed capsule; seeds-numerous, circular, brown in colour, vertically compressed; testa pale, membranous appressed; bulbs- narrow, loose mass of few long narrow subequal fleshy imbricating scales, without any outer coats, white in colour (figure 1b).
**Flowering:** Mid June-mid July.

**Fruiting:** July-September.

**Active ingredients:** Its bulb contains linalool and α-terpineol. The methanolic extract of bulb of *Lilium polyphyllum* yielded three steroidal glyceride β-sitosterol-3-glyceryl-2’-linoleyl-3’-linoleate, Glyceryl-1-n-octadec-9-enoyl-2-n-decanoyl-3-n-decanoate and Glyceryl-1-octadec-9’-enoyl-2-octadec-9”, 12”-dienoyl-3-tetracosanote (Javed et al., 2012).

**Properties & Action:** The bulbs are sweet, bitter, refrigerant, galactagogue, expectorant, aphrodisiac, diuretic, antipyretic and tonic. It mainly shows soothing, astringent and anti-inflammatory properties.

**Uses:** Bulbs are useful in agalactia, cough, bronchitis, vitiated conditions of pitta, seminal weakness, strangury, burning sensation, hyperdipsia, intermittent fevers, haematemesis, rheumatalgia and general debility.

**Parts Used:** Bulbs.

**Dosages:** Powder 3-6 gm or as directed by the Physician.

**Formulations:** *Astavarga churna*, Chyavanprash rasayan, Vachadi taila, Mahakalyan ghrita, Mahamayura ghrita, Jivaniya ghrita, Vajikaran ghrita, Brahini gutika and Jivaniya gana churna.

**Substitutes:** Aswagandha (Withania somnifera (Linn.) Dunal), Safed musali (Chlorophytum arundineaceum Baker), Fritillaria roylei Hook., Fritillaria oxyptala D. Don. One species of *Lilium* is also reported as substitute viz., *Lilium wallichianum* Schult. & Schult. f. which is a perennial bulbous herb, upto 120-180 cm long; leaves linear, 15-30 cm long and 6-18 mm wide; flowers sub-solitary, horizontal, sweet-scented very fragrant, trumpet-shaped, white or cream coloured tinged with yellow or green.

3. **Crepidium acuminatum** (D. Don) Szlach.

**Botanical Name:** *Crepidium acuminatum* (D. Don) Szlach.


**Family:** Orchidaceae

**English Name:** The gradually tapering Malaxis, Jeevak

**Sanskrit/ Hindi Name:** Jeevak

**Habit and Habitat:** A terrestrial, pseudo bulbous, 5-25 cm in height, perennial, tender herb. Around the world found in Cambodia, China and South-East Asia up to 1400 m height. In India found in temperate and subtropical Himalayas at an altitude of 1200-2100 m from Himalchal Pradesh, Uttarakahand to Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Tripura and in Khasi hills at an altitude of 1500-1800 m and also found in Andaman Islands, Travancore, Anamallay hills and Madhya Pradesh.

**Taxonomic features:** Its stem is underground, spreading, fibrous roots downwards, ribbed; leaves- Usually 2-4, sessile or petioled, 7.5-12.5 cm long, ovate-lanceolate, often discolored, light green, acute with prominent veins, leaves in whorls on the nodes directly raised upwards, angular, attenuate, stem covered by basal leaves forming a tubular structure; flowers- Scape-7.5-20 cm long, flower small shortly stalked in terminal raceme, about 10 mm in diameter, yellowish-green with purple centre; bracts- spreading shorter than the ovary; sepals-oblong, dorsal 1-3 nerved, lateral 3-5 nerved, 2 lateral rather shorter than the dorsal, margins recurved; petals-linear, slender, longer than sepals, margin recurved, lip-5, shield like, slightly convex, tip rounded, notched or bilobulate, adnate to the base, the column sides of the lip produced upwards into large auricles, auricle of the lip very variable, acute or obtuse, straight and slightly overlapping; staminal column-very short with short spreading arms; anthers-subterminal, pollinia-4; fruits-6 chambered capsule; seeds-minute, powdery, ovoid; pseudobulbs-three pseudobulbs 3-9 cm long and 1-3 cm in diameter, conical, fleshy, smooth, shining, in pairs, new one look like garlic cloves, greenish-white, covered with membranous sheath, slightly mucilagenous, remain alive over longer period (figure 1c).

**Flowering:** July-August.

**Fruiting:** September-October.
Active ingredients: Its pseudobulbs contains alkaloid, glycoside, flavonoids and β-sitosterol. Also contains piperitone, O-Methylbatatasin, 1, 8-cineole, citroenellal, eugenol, glucose, rhamnose, coline, limonene, p-cymene and ceryl alcohol.

Properties & Action: The pseudobulbs are sweet, refrigerant, aphrodisiac, ferbrifuge and tonic.

Uses: It is useful in haematemesis, fever, seminal weakness, burning sensation, dyspepsia, emaciation and general debility. The ethanolic extract of its pseudobulb showed analgesic and anti-inflammatory activity in experimental animals (Sharma et al., 2007).

Part used: Pseudobulb

Dosages: As directed by the Physician.

Formulations: Astavarga churna, Chyavanprash rasayan, Chitrakadi taila, Vachadi taila, Mahakalyan ghrita, Mahamayura ghrita, Mahapadma taila, Jivaniya ghrita, Vajikaran ghrita, Brahini gutika and Himvana agada.

Substitutes: Vidari kand (Pueraria tuberosa (Willd.) DC.), Safed behmen (Centaurea behen Linn.) and Guruchi (Tinospora cordifolia (Willd.) Miers).

Various species of Malaxis are found in North-West Himalaya (Uttarakhand) viz., Malaxis cylindrostachya (Lindl.) Kunze and Malaxis mackinnoni (Duthie) Ames are used in place of Jeevak.

4. Malaxis muscifera (Lindl.) Kunze

Botanical Name: Malaxis muscifera (Lindl.) Kunze

Syn- Microstylis muscifera (Lindl.) Ridl.

Family: Orchidaceae

English Name: Adder mouth orchid, The fly bearing Malaxis, Snake mouth orchid, Rishbhaka.

Sanskrit/ Hindi Name: Rishbhak

Habit and Habitat: A perennial, terrestrial herb, variable in size, 15-45 cm in height. Normally found in Afghanistan, Bhutan, Nepal, China and Pakistan up to an elevation of 2100-4100 m asl. In India found in temperate Himalayas up to an altitude of 2400-3600 m eastwards to Sikkim, Himachal Pradesh, Jammu & Kashmir and Uttarakhand.

Taxonomic features: Its stem long, erect, tuberous at the base with ovoid pseudobulbs, sheathed; leaves 1 or 2, unequal, sessile or petioled, 5-10 cm long and 2-4 cm broad, ovate to ovate-lanceolate, oblong or rounded, obtuse, narrowed at the base to sheathing petiole; flowers -minute, 3-4 mm long, pale yellow-green in terminal raceme, 10-25 cm long; pedicel 3-4 mm long erect; bracts equalling or shorter than the pedicels, lanceolate; sepals-broadly lanceolate; petals-linear, shorter than sepals; lip quite entire or bearded at the tip only, ovate, abruptly pointed, acute, margins thickened, sides of the lips not produced upwards into auricles; column sessile, very short with very short spreading arms; anthers-subterminal, pollinia 4; pseudobulb-round, shining white, bullock horn shaped, conical, straight or slightly curved, 2-7 cm long, 0.5-1 cm in diameter with mucilaginous substance (figure 1d).

Flowering: July-August.

Fruiting: September-October.

Active ingredients: Pseudobulb contains a bitter principle, alkaloid, flavonoid and glycoside.

Properties & Action: Pseudobulb-Sweet, refrigerant, aphrodisiac, haemostatic, antidiarrhoeal, styptic, antidysentric, febrifuge, cooling and tonic.

Uses: It is useful in sterility, vitiated conditions of pitta and vata, seminal weakness, internal and external haemorrhages, dysentery, fever, emaciation, burning sensation and general debility.

Part used: Pseudobulbs.

Dosages: As directed by the Physician.

Formulations: Astavarga churna, Chyavanprash rasayan, Chitrakadi taila, Mahakalyan ghrita, Mahamayura ghrita, Mahapadma taila, Jivaniya ghrita, Vajikaran ghrita and Himvana agada.

Substitutes: Vidari kand (Pueraria tuberosa (Willd.) DC.) and Lal behmen (Centaurium roxburghii (D. Don) Druce).
Figure 1: Showing Astavarga plant species; a- Kakoli (Roscoea purpurea Smith); b- Kshirkakoli (Lilium polyphyllum D. Don); c- Jeevak (Crepidium acuminatum (D. Don) Szlach); d- Rishbhak (Malaxis muscifera (Lindl.) Kuntze); e- Meda (Polygonatum verticillatum (Linn.) Allioni); f- Mahameda (P. cirrhifolium (Wall.) Royle); g- Riddhi (Habenaria intermedia D. Don); h- and Vriddhi (H. edgeworthii Hook. f. ex Collett).
5. *Polygonatum verticillatum* (Linn.) Allioni  

**Botanical Name:** *Polygonatum verticillatum* (Linn.) Allioni  
**Syn:** Convallaria verticillata Linn.  
**Family:** Liliaceae  
**English Name:** Whorled Solomon’s Seal, Whorled leaf Solomon Seal  
**Sanskrit/ Hindi Name:** Meda  

**Habit and Habitat:** A perennial herb, 0.3-1.2 m in height. Around the world found in Europe, Turkey, North and Central Asia, Pakistan, Afghanistan and Tibet up to an elevation of 4500 m asl. In India found in Temperate Himalayas from Kashmir (at an altitude of 2000-3600 m) to Sikkim (at an altitude 2600-4000 m asl), Himachal Pradesh and Uttarakhand (1600-3500 m asl).  

**Taxonomic features:** Erect, tall, angled, simple, leafy above, grooved, glabrous, sometimes mottled, very slender or stout, sometimes as thick as the middle finger (about 1 cm in diameter); leaves-in whorls of 4-8, sessile, linear or linear-lanceolate, 7.5-15 cm long and 0.4-2.5 cm broad, tip usually acute, sometimes obtuse or slightly enrolled to the midrib, membranous, green above, glaucous beneath, often ciliolate on the margins and nerves; flowers-in whorls of 2-3 flowered axillary raceme, on curved 6-18 mm long peduncle, flowers pendulous, 6-8 mm long, greenish-white or lilac; pedicel 6-18 mm long; jointed at the top; perianth-very variable in size, 4-12 mm long, constricted at the middle, tubular, tube slender, mouth 6-cleft, outer lobes subvalvate; stamens-6, inserted above the middle of the tube; anthers-subsessile, included, dorsifixed; ovary-3-locular or trigonous, style-straight, as long as the ovary, stigma-3; fruits-6-7 mm in diameter, globose berries, green when immature and red, orange or purple when mature; seeds-6-10, globose, testa thin; rhizomes-Thick, creeping, like ginger, shortly branched, 0.7-1.5 cm in diameter, comparatively less thick except in very old (7-8 yrs old) plants. Rhizome white or dull white in colour, flesh inside is white (figure 1e).  

**Flowering:** July-August.  
**Fruiting:** September-October.  

**Active ingredients:** Rhizome contains lysine, serine, aspartic acid, threonine, diosgenin, β-sitosterol, sucrose and glucose. Leaves contains glucomanone, glucofractone and hemicellulose.  

**Properties & Action:** It is diuretic and also indicated in pain, pyrexia, burning sensation, phthisis and weakness. Rhizome-Aphrodisiac, tonic and galactagogue, emollient, appetizer.  

The aerial parts extract showed leishmanicidal activity against *Leishmania major* which causes Kala azar (Khan et al., 2010).  

**Uses:** Regular usage of rhizome powder decreases senility, debility and enhances other rejuvenating properties.  

**Part used:** Rhizomes.  

**Dose:** Powder 2-3 gm or advised by the Physician.  

**Formulations:** Vachadi taila, Astavarga churna, Chyavanprash rasayan, Chitrakadi taila, Mahakalyan ghrita, Mahamayura ghrita, Mahapadma taila, Jivaniya ghrita, Brahini gutika, Vajikaran ghrita and Indroka rasayan.  

**Substitutes:** Satavari (Asparagus racemosus Willd.), Salam mishri (Eulophia campestris Wall.)  

*Polygonatum verticillatum* (Linn.) All. var. rubrum is also similar to Meda and used instead of this at some places of Uttarakhand. Its stem is about 60 cm in height, new stem pinkish-purple, later on turns green; leaves slender, verticillate; flowers small, 2-6 in the axis of upper leaves, pink-purple or dark purple in color, pendulous; fruit- blue –black berries; its rhizome is very bitter in taste.  

6. *Polygonatum cirrhifolium* (Wall.) Royle  

**Botanical Name:** *Polygonatum cirrhifolium* (Wall.) Royle  
**Syn:** Convallaria cirrhifolia Wall.  
**Family:** Liliaceae  

**English Name:** King’s Solomon’s Seal, Mahameda, Tendril leaf Solomon’s seal, Coiling leaf Solomon’s Seal. Coiling leaf Polygonatum.  

**Active ingredients:** Rhizome contains lysine, serine, aspartic acid, threonine, diosgenin, β-sitosterol, sucrose and glucose. Leaves contains glucomanone, glucofractone and hemicellulose.  

**Properties & Action:** It is diuretic and also indicated in pain, pyrexia, burning sensation, phthisis and weakness. Rhizome-Aphrodisiac, tonic and galactagogue, emollient, appetizer.  

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**Part used:** Rhizomes.  

**Dose:** Powder 2-3 gm or advised by the Physician.  

**Formulations:** Vachadi taila, Astavarga churna, Chyavanprash rasayan, Chitrakadi taila, Mahakalyan ghrita, Mahamayura ghrita, Mahapadma taila, Jivaniya ghrita, Brahini gutika, Vajikaran ghrita and Indroka rasayan.  

**Substitutes:** Satavari (Asparagus racemosus Willd.), Salam mishri (Eulophia campestris Wall.)  

*Polygonatum cirrhifolium* (Wall.) All. var. rubrum is also similar to Meda and used instead of this at some places of Uttarakhand. Its stem is about 60 cm in height, new stem pinkish-purple, later on turns green; leaves slender, verticillate; flowers small, 2-6 in the axis of upper leaves, pink-purple or dark purple in color, pendulous; fruit- blue –black berries; its rhizome is very bitter in taste.
**Sanskrit/ Hindi Name:** Maha meda

**Habit and Habitat:** A tall, perennial herb, 30-120 cm in height. Found in Northern Asia, in China, Nepal, Bhutan and Pakistan at an altitude of 2000-4000 m. In India found in temperate Himalayas from Himachal Pradesh eastwards to Sikkim at an altitude of 1500-3300 m, in Manipur at an elevation of 1200 m and in other regions of Uttarakhand upto an elevation of 2000-3000 m asl.

**Taxonomic features:** Its stem is very weak, flexuouos, unbranched, terete or grooved, puberulous or glabrous often climbing by means of tendril like tips of the leaves and grow generally in association with bushes; **leaves**-always in whorls of 3-6, sessile, linear, 7.5-12.5 cm long and 3-5 mm broad, narrowed into the slender revolute tips, cirsrose, membranous, glaucous and costate beneath, the margins usually inrolled to the midrib; **flowers**- whorled on 2-4 flowered peduncle, 5 mm in diameter, pendulous, white often greenish or slightly purple; peduncle 5-15 mm long; **bracts**-3-4 mm, white; pedicel 4-6 mm long; **perianth**-white, 8-11 mm long, slightly constricted in middle, lobes 2 mm long, subcylindric; **stamens**-6, inserted above the middle of the tube, filaments-ciliolate, 5 mm long, anthers-dorsifixed, included; **ovary**-trigonous, 2.5 mm, style straight as long as the ovary, stigma-3; **fruits**-6-8 mm in diameter, excessively variable in size, green and on ripening orange-red, globose or ellipsoid berries; **seeds**-variable in number, 4 mm in diameter, subglobose, testa thin; **rhizomes**-rhizome moniliform or terete, generally look like ginger but less thick, 1-2 cm in diameter, white or dull white in colour (figure 1f).

**Flowering:** July-August.

**Fruiting:** September-October.

**Active ingredients:** Its rhizome contains glucose, sucrose and two new steroidal saponins sibiricoside A and B. The main ingredients of n-butanol extract of rhizomes are steroid terpeneoide, polysaccharides, phenol and stannic. Recent spectroscopic studies identified following compounds, α-L-rhamnopyranosyl, β-D-glucopyranoside, dauvosterol, β-sitosterol, 6-nonadecenoic acid, 6-stearic acid and one inorganic compound.

**Properties & Action:** Cooling, mild laxative, galactagogue, aphrodisiac, depurative, wound healer, febrifuge, expectorant and tonic. Compounds extracted from its rhizome showed fungicidal activities (Wang et al., 2007).

**Uses:** It is useful in cough, leprosy, skin diseases, anorexia, worms, emaciation, gout, debility, fever, sexual debility and other seminal disorders.

**Part used:** Rhizomes.

**Dosages:** As directed by the Physician.

**Formulations:** Vachadi taila, Astavarga churna, Chyavanprash rasayan, Chitrakadi taila, Mahakalyan ghrita, Mahamayura ghrita and Indroktara rasayan.

**Substitutes:** Satavari (Asparagus racemosus Willd.), Nagbala (Sida veronicifolia Lam.), Shakakul mishri (Polygonatum multiflorum (Linn.) All.) and Prasarani (Paederia foetida Linn.).

7. **Habenaria intermedia D. Don**

**Botanical Name:** Habenaria intermedia D. Don

**Syn-** Ochyrorchis intermedia (D. Don) Szlach.

**Family:** Orchidaceae

**English Name:** Intermediate Habenaria, White wild orchid, The in-between Habenaria, Rein deer orchid

**Sanskrit/ Hindi Name:** Riddhi

**Habit and Habitat:** A stout, terrestrial perennial herb, 25-50 cm in height.

It is found in Pakistan, Bhutan and Nepal upto an altitude of 2000-3300 m asl. In India found in Temperate Himalayas at an altitude of 1500-2400 m from Kashmir to Sikkim, Uttarakhand and Himachal Pradesh.

**Taxonomic features:** Its stem is erect, cylindric, terete, robust, leafy on the nodes; **leaves**-3-5, ovate or oblong or ovate-lanceolate, scattered, 5-10 cm long, sheathing, acuminate, base rounded or cordate, 5-7 nerved; **flowers**- few, distant, very large 5 cm across, white or greenish white, 2-6 flowered raceme borne on a stout axis; **bracts**-leafy, broad, lanceolate, acuminate, equalling the ovary or more; **sepals**-
Astavarga plants

Balkrishna et al.

Botanical Name: Habenaria edgeworthii Hook.f. ex Collett

Syn- Platanthera edgeworthii (Hook.f. ex Collett) R. K. Gupta

Family: Orchidaceae

English Name: Edgeworth’s Habenaria, Edgeworth’s planthera

Sanskrit/ Hindi Name: Vriddhi

Habit and Habitat: A tuberous terrestrial orchid, growing up to 30-60 cm in height. In India found from Himachal Pradesh, Uttarakhand to North West Himalaya, it is also found in Nepal and Pakistan up to an altitudes of 2500-3000 m asl on grassy pastures.

Taxonomic features: Its stem somewhat flexuous leafy stem, covered with hairs; leaves-2-4 in number, sheathed, the second leaf largest, 6-10 cm long, 4.5 cm wide, ovate to ovate-lanceolate; flowers-yellowish green, deflexed in buds, in cylindrical inflorescence, spike 20-25 cm long, 3 cm broad, dense; bracts-lanceolate, equalling the ovary in length; sepals-green, margin ciliate, narrowly ovate; petals-bright yellow, sometimes greenish-yellow, thick, obliquely triangular, labellum-entire, 7-9 mm long, strap-shaped, bright-yellow, spur longer than ovary, 1.5-2.5 cm long, directed upwards; column-2-3 mm, anther canals short, stigmatic processes-short, oblong; ovary-twisted, glabrous; fruits-capsule, usually opening laterally; seeds-numerous, dust like small seeds; tubers-small, fusiform, ellipsoid to subglobose, 1-2.4 cm long, 0.4-0.9 cm in diameter, covered with fine white hairs, fleshy, white inside and mucilaginous (figure 1h).

Flowering: July-August.

Fruiting: September-October.

Active ingredients: Tuber contains bitter substances, starch and minerals. Also contains taxol an anticancer drug.

Properties & Action: Tuber-Sweet, cooling, emolient, brain tonic, aphrodisiac, depurative, appetizer, anthelmintic, rasayana and tonic.

Uses: It is useful in burning sensation, thirst, fever, cough, asthma, muscular pain, sprains, arthritis, sciatica, insanity, leprosy, skin diseases, anorexia, worms, emaciation, gout and general debility.

Part used: Tubers.

Dosages: Powder 2-3 gm or as advised by the Physician.

Formulations: Vachadi oil, Vajikaran ghrita, Astavarga churna and Chyavanprash rasayan.

Substitutes: Varahi kanda (Tacca integrifolia Ker Gawl.), Bala (Sida cordifolia Linn.) and Chiriya musali (Asparagus filicinus Buch.-Ham. ex D. Don).

8. Habenaria edgeworthii Hook.f. ex Collett

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**Dosages:** Powder 2-3 gm or as advised by the Physician.

**Formulations:** Mahamayura ghrita, Astavarga churna and Chyavanprash Rasayan.

**Substitutes:** Varahi kand (Taccia integrifolia Ker Gawl.), Salam panja (Dactylorhiza hatagirea (D. Don) Soo) and Maha bala (Sida acuta Burm.f.).

*Habenaria griffithii* Hook.f. is a perennial tuberous herb, 15-30 cm long; leaves 2-3 (2 larger near base of stem), 5-7 cm long and 2-3 cm wide, oblong-elliptic or oblong, upper leaves rapidly diminishing in size; flowers very small, greenish, somewhat tubular; perianth segments 3-4 mm long, spreading at their tips; petal linear lanceolate, widened towards base. It is used in place of *Riddhi* and *Vriddh* at various parts of Uttarakhand.

Some main characteristic features of all the species of *Astavarga* group is presented in table 1.

**Table 1:** Main characteristic features of *Astavarga* plants.

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Sanskrit name</th>
<th>Family</th>
<th>Main characteristic features for identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roscoea purpurea Smith</td>
<td>Kakoli</td>
<td>Zingiberaceae</td>
<td>Anthers bifurcated at the tip. Stem is slightly purple in colour, flower purple.</td>
</tr>
<tr>
<td>Lilium polyphyllum D. Don</td>
<td>Kshirakakoli</td>
<td>Liliaceae</td>
<td>Flowers are white in colour, purple coloured within, long-linear and dotted.</td>
</tr>
<tr>
<td>Crepidium acuminatum (D. Don) Szlach.</td>
<td>Jeevak</td>
<td>Orchidaceae</td>
<td>Tip of lip edge is straight - linear. Raceme is pencillate.</td>
</tr>
<tr>
<td>Syn-Malaxis acuminata D. Don, Microstylis wallichii</td>
<td>Rishbhak</td>
<td>Orchidaceae</td>
<td>Leaves 2, centrally bifurcated or 3 lipped. Pseudobulb resembles with the bull's horn.</td>
</tr>
<tr>
<td>Syn-Microstylis muscifera (Lindl.) Kuntze</td>
<td>Meda</td>
<td>Liliaceae</td>
<td>Leaves are arranged in whorls, four to eight in number, acute, pointed tips.</td>
</tr>
<tr>
<td>Polygonatum verticillum (Linn.) Allioni</td>
<td>Maha meda</td>
<td>Liliaceae</td>
<td>Leaves are arranged in whorls, 3-6 in number, tip of leaf is tendril like, ascending, occurs with support of nearby shrubs.</td>
</tr>
<tr>
<td>Syn-Convallaria verticillata Linn.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polygonatum cirrhifolium (Wall.) Royle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syn-Convallaria cirrhifolia Wall.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habenaria intermedia D. Don</td>
<td>Riddhi</td>
<td>Orchidaceae</td>
<td>Flowers are white in colour, lobes of petals fimbriated and long in size.</td>
</tr>
<tr>
<td>Syn-Ochyrorchis intermedia (D. Don) Szlach.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habenaria edgeworthii Hook.f. ex Collett</td>
<td>Vridhi</td>
<td>Orchidaceae</td>
<td>Spur is truncated above, petals and ligules are yellow in colour.</td>
</tr>
</tbody>
</table>

It seems that Inspite of an elaborate description of the *Astavarga* plants in the old texts (*Nighantus*), those experts who have done research in the modern times, have only expressed their opinions, perhaps due to lack of resources, government support and due to lack of motivation to work in Ayurvedic field, by government supported organizations or in the absence of thorough research and various other reasons have relied on information obtained from the market and traders on the basis of their research and botanical identification. No one got the right opportunity and optimistic environment for searching these plants through an extensive expedition to the Himalayas. Utilizing the available resources, they carried out research and instead of removing uncertainty, they made botanical identification of *Astavarga* plants even more doubtful and uncertain. For four *Astavarga* plants *Vridhi*, *Rishbhak*, *Mahameda* and *Kshirakakoli*, it was difficult to gather them even at small scale rather at large scale, either for business purpose or for some other work. Doubt and uncertainty was much more regarding these four plants. The major reason being unavailability and identity of the *Astavarga* plants. The difficulty in finding the natural habitat, lack of knowledge of the specific ecological conditions, difficulty in access and scare availability has also contributed to the mystery about their botanical identity. As these plants grow in small ecological niches. Even to collect small quantity of these four *Astavarga* medicinal plants, it is necessary to undertake a long expedition in the North-West Himalayas. Besides this, quick destruction of natural forests, many developmental programmes, environmental changes, changes in the natural habitat due to developmental programmes, environmental changes, changes in the natural habitat due to
geographical and climatic conditions, led to decrease in the ecological density and availability of these plants, as they required specific natural conditions and habitat for their growth. This is especially true for *Lilium polyphyllum* D.Don. Colonel Henry Collet in his book “Flora Simlensis (1980)” had written hundred years ago, that this plant was easily available in the forests around Shimla but now it is rarely found there. Other Astavarga plants like *Habenaria intermedia* D.Don and *Habenaria edgeworthii* Hook.f. ex Collet also have the same status, it is difficult to find these plants in large numbers. Another important reason for this decline was the harvesting of fodder for the domestic animals from forest area. Forest fire also destroyed lower vegetation in these areas. Due to the indiscriminate cutting of grasses and bushes alongwith the underground reproductive parts of the plants and the matured seeds were also destroyed. Due to the cutting, the seeds do not germinate in the soil. This results in the reduction in the population of these plants. After years of expeditions across the Himalayas, and constant study of the ancient Ayurvedic texts, this is the first attempt to create a reliable and easy identification of rare and hard to find medicinal plants like Astavarga.

Ravi Kant et al., 2012 concluded that, the demand of these orchids viz., Jeevak, Rishbhak, Riddhi and Vriddhi for various Ayurvedic formulations has been increased many folds especially in Himachal Pradesh and Uttarakhand where a large number of pharmaceutical units have been established recently by various companies such as Divya Pharmacy, Dabur, Himalaya, Baidhyanath etc. These plants are becoming so rare that different Ayurvedic formulations are now using other substitutes at their place. The species like *Habenaria intermedia* (Chauhan et al., 2007) and *Malaxis muscifera* (Chauhan et al., 2008) have been exploited at such a level, that they have been considered as endangered species. Similarly the other two species, *Malaxis acuminata* and *Habenaria. edgeworthii* are also facing the survival threats. Thus, there is an urgent need to take every possible measure to conserve the gradually declining natural population of these valuable plants both by *in-situ* and *ex-situ* means.

Recently Bisht et al., 2011 concluded that habitat specificity, narrow range of distribution, land-use disturbances, introduction of non-natives, habitat alteration, climatic changes, heavy livestock grazing, explosion of human density, fragmentation and degradation of plant density, population bottleneck and genetic drift are the potential causes of rarity in medicinal plant species. The women of these areas carry all the activities of domestication of cattle. They collect the food and fodder from the nearby forests and due to lack of identification cut these species along with the fodder grasses. This is therefore one of the reasons of threatened status of these plant species.

Although these species are listed as endangered but there is no proper management plan for conservation due to the lack of related information and collection of these species continues from the wild through illegal means. Domestification and cultivation of such medicinal orchids may be encouraged to fulfill market demand, which will increase the income of local people on one hand and reduce pressure on the natural habitat on the other. Such economically important orchids should be conserved with both *in situ* and *ex situ* methods of conservation. In addition, further studies may be initiated to increase seed germination, tissue culture, seedling establishment and detail ecological adaptation of species to strengthen the conservation programme (Chauhan et al., 2007& 2008).

**Conservation prioritization and future strategy**

*Ex-situ* cultivation of wild endangered medicinal plants has been considered as one of the most prioritized solutions to dilute the harvesting pressure on these taxa and at the same time an appropriate alternative to produce raw material and to meet the bulk demand of pharmaceutical sector. Based on the threatened status and the high utility, these species have been prioritized for *ex-situ* cultivation (Ahuja, 1995; Nautiyal et al., 1997; Badola and Pal, 2002). Additionally, it occupied the top rank among medicinal plants of the West Himalaya prioritized for conservation (Sastry and Chatterjee, 2000).
Realizing a huge gap in existing knowledge, considering high ethnobotanical as well as industrial values and the endangered status of these species, the following points need to be considered for its conservation and sustainable utilization: (1) These species have been listed as “Endangered” (Ved et al., 2003) for the globe, however, based on its low density, frequency and abundance in natural pockets in Himachal Pradesh, Jammu & Kashmir and Uttarakhand, it deserves to be categorized as “Critically endangered” for the globe; (2) the natural habitats of these species throughout the Himalayas need to be identified and officially protected for conservation; (3) harvesting and trade of these species need to be banned strictly; (4) mostly, underground parts like rhizome, bulbs, tubers and pseudobulbs of these species are used in traditional and modern medicine; phyto-chemical investigation of other similar species need to be carried out so that optimum use of these invaluable threatened species could be done; (5) the techniques developed for propagation and cultivation of these species need to be tested repeatedly; (6) lack of planting materials is one of the constraints in large scale cultivation of these species, micro-propagation techniques should be developed and germplasm from elite populations used for generating large scale healthy planning materials of the species; and (7) the native communities need to be sensitized to the sustainable use and conservation value of these species.

Acknowledgements: The authors are grateful to Param Pujya Swami Ramdev Ji, Patanjali Yogpeeth, Haridwar for providing all the necessary facilities for research and documentation work.

References:


