



A REVIEW

Importance of endangered / rare, Astavarga medicinal plants in traditional system of medicine in Ayurveda

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Abstract : Astavarga means group of eight rare and threatened species of medicinal value plants in traditional system of Ayurvedic medicine. The important members of Astavarga group are Kakoli, Kshirkakoli, Jeevak, Meda, Mahameda, Rishbhak, Ridhhi and Vridhii which commonly occur in Himalayan region. But most of the Astavarga plant members have been included among 560 plants appearing in the red list of threatened and endangered species. Plants of Astavarga group make important ingredient of various classical Ayurvedic formulations like Chyavanprasha and many herbal drugs. According to ancient *Materia Medica* dealing with Ayurveda, Astavarga has been assigned various medicinal properties such as Jeevaniya (drugs strengthening vitality, immunity system etc.), Brhnaiya (increase flesh in the body by activating cell regeneration even in old age) and Vayasthapan (metabolic processes especially anabolism become active and leads to youthful body complexion). Taking in to consideration of their medicinal properties, there is an urgent need to protect, cultivate and popularize the demand of these medicinal value plants among common people. This review article discuss with the properties and medicinal importance of these rare and endangered Astavarga plant species in Ayurveda, traditional system of medicine as well as about their suitable alternative substitute.

Key Words : Astavarga, Ayurveda, Endangered, Medicinal plants

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INTRODUCTION

In Indian history Vedic period is popular known as Golden era. During Vedic period, India had contributed a lot to the different parts of the world. In India, origin and development of culture and the civilization was brought by our ancestors and at the same time, Indian

Rishis (sages) provide the knowledge about medical science, cosmic, yogic education, spiritual and the basic science principles to the world at a large scale. India is also known for its traditional medicinal systems like Ayurveda, Siddha, Homeopathy, and Unani etc. The Ayurvedic concept appeared and developed around thousands of year ago in India and it is mentioned very

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clearly in our ancient Vedas and other scriptures. The literal meaning of Ayurveda is “Science of life”. Ayurveda is also known as “Science of longevity” because it offers a complete system to live a long healthy life. Based on different literature survey, described as well as in ancient text, Astavarga seems to have antioxidant and anti ageing effects. In Ayurveda there are a number of treatments as well as methods to cure many common diseases such as food allergies, for which there are very few modern treatments are available (Pandey *et al.*, 2013).

Kala *et al.* (2006) mentioned that in production of herbal medicines, India has maintained its top position in all over the world. There are about 250,000 registered medical practitioners of the Ayurvedic system, which is very low in comparison to about 700,000 modern medicines present. In India, record of about 20,000 medicinal plants is well known, however, in present time, only 7000-7500 plants are being used for curing different diseases and infections. In comparison to this, Uniyal *et al.* (2002) reported that about 1,600 species of medicinal plants have been traditionally used in India. The proportion which is used by different systems of medicine is vary in India *i.e.* in Ayurveda 2000 plants are used, in Sidhha 1300, whereas about 1000 in Unani, 800 in Homeopathy, 500 in Tibetan, 200 Plants are also used in modern medicine and about 4500 in folk medicines of India and about 25,000 effective plant based formulations are being used in traditional as well as folk medicines (Pandey *et al.*, 2013). Pandey *et al.* (2008) studied that more than 1.5 million practitioners are using the traditional medicine system for health care in India and about 7800 manufacturing units are involved in the production of health products of herbal origin as well as traditional and plant based formulations and they require about 2000 tons of herbal raw materials each year, as reported by Patwardhan *et al.* (2005).

An effective source of traditional medicines e.g., Ayurvedic, Chinese, Homeopathy and Unani and modern medicine is constituted by medicinal plants. However, herbal medicine has been popularly known to have authentic utility from Vedic period. As per geographical distribution of herbal medicine market, Germany shares highest percentage of herbal medicines market (28%), whereas second largest shares of herbal medicine market is Asia (19%) whereas, Japan (17%), France (13%), rest of Europe (12%) and North America (11%) (Nirali and Shankar, 2015). According to recent report of The

Economic Times (Nov., 2016), estimated global herbal medicines market is around \$70 billion, India’s export of herbal product and medicines during 2015-2016 was \$358.60 million. As per available information, according to Global Industry Analysis, it is estimated that global herbal market will reach to \$107 billion by end of 2017.

In India, about 70- 80 per cent of the rural population depends on the traditional Ayurvedic system of medicine. Approximately 60-70 per cent of “synthetic” medicines are also derived from medicinal plants in different manner. The usage of medicinal plants/herbal drugs has been increased among common people and their popularity is at peak. In India use of plants as sources of medicine prepare formulation has been utilizing from the very ancient time and is an important component of the health care system. However, due to modern life style and urbanization, many of these plants are at the edge of extinction due to loss of their natural habitat and lack of attention for their *ex situ* conservation. The red list of rare and endangered species have been included almost 560 herbal species of India (Verk *et al.*, 2017). Hence, there is urgent need that Astavarga plants must be multiplied and protected because most of them are threatened and rare but have economic and medicinal value to cure several rare and uncommon diseases without harmful side effect in human being.

Meaning and members of ‘Astavarga’:

Joshi (1983) reported that ‘Astavarga’ word first of all was used in an ancient text book named as ‘Paryayaratnamala’. This book provides knowledgeable information about herbal description of Astvarga plants. ‘Ashta’ means eight and ‘varga’ means group, Astavarga literally meaning a group of eight medicinal plants in Ayurveda medicine, namely, (1) *Lilium polyphyllum* D. Don (Kshirakakoli), (2) *Crepidium acuminatum* (D. Wear) Szlach (Jeevak), (3) *Malaxis muscifera* (Lindl) Kuntze (Rishbhak), (4) *Habenaria intermedia* D. Wear (Riddhi), (5) *Habenaria edgeworthii* Hook.f. ex. Collett (Vridhhi), (6) *Polygonatum verticillatum* (Linn.) (Meda), (7) *Polygonatum cirrhifolium*(Wall.) Royle (Mahameda), (8) *Roscoeia purpurea* Smith (Kakoli) has been used in traditional medicine system of Ayurveda for various purpose (Dhyani, 2009). All of these medicinal value plants have their natural habitat between elevation of 1500 and 4000m range in North-West Himalayan (Jammu and Kashmir), Uttarakhand, Sikkim and Himachal Pradesh. (Balkrishna *et al.*, 2012; Pandey,

Table 1: Botanical description, habit and habitat, period of flowering and fruiting and taxonomical features of Astavarga plants (Pushpangadan, 1995; Chauhan, 1999; Chauhan *et al.*, 2007; Chauhan *et al.*, 2008; Uniyal *et al.*, 2002; Pandey, 2005; Singh, 2005 and 2006; Sharma *et al.*, 2007; Pant and Samant, 2010; Balakrishna *et al.*, 2012; Naqvi *et al.*, 2012; Subedi *et al.*, 2013; Gopal *et al.*, 2014 and Ingalhalli *et al.*, 2015)

Family	Local name	Botanical name	Habit and habitat	Flowering period	Fruiting period	Taxonomical features
Orchidaceae	Kshirakakoli	<i>Lilium polyphyllum</i>	A perennial herb upto 60-120 cm in height. In the world found in Pakistan, Nepal, west china, Tibet and Afghanistan. In India Jammu and Kashmir, Uttarakhand and Himachal Pradesh	Mid June- mid July	July- September	An erect, slender, hollow, leafy stem; leaves- sessile, alternate or whorled, 7-12.5 cm long and 5-12 cm broad, linear or narrow lanceolate or acuminate; flowers- pendulous 10-12 cm in diameter, showy, fragrant; fruits- 2-3cm long, oblong, 3 lobed capsule; seeds- numerous, circular, brown in colour
		<i>Crepidium acuminatum</i> (D. Wear) Szlach	A terrestrial, pseudo bulbous, 5- 25 cm in height In the world found in Cambodia, china and South-East Asia. In India Himachal Pradesh, Uttarakhand Arunachal Pradesh, Assam, Nagaland, Manipur, Mizoram, Tripura	July- August	September -October	Its stem is underground, fibrous roots downwards; Leaves- usually 2-4, sessile or petioled, ovate lanceolate, light green colour; flower- yellowish-green with purple centre, about 10 mm in diameter; fruits- 6 chambered capsule; seeds- minute, powdery, ovoid
	Rishbhak	<i>Malaxis muscifera</i> (Lindl) Kuntze	A perennial, terrestrial herb, variable in size, 15-45 cm in height In the world found in Afghanistan, Bhutan, Nepal, China and Pakistan. In India Sikkim, Himachal Pradesh, Jammu and Kashmir and Uttarakhand	July- August	September -October	Its stem long, erect, tuberous at the base with ovoid pseudobulbs; leaves-1 or 2 unequal, sessile, 5-10 cm long and 2-4 cm broad, ovate to ovate lanceolate; flowers-minute 3-4mm long pale yellow green in terminal raceme; pseudobulbs-round, shining white, conical, straight or slightly curved with mucilaginous substance
		Riddhi	<i>Habenaria intermedia</i> D. Wear	A stout, terrestrial perennial herb, 25-50 cm in height. In the world found in Pakistan, Bhutan and Nepal. In India found in temperate Himalaya to Kashmir to Sikkim, Uttarakhand and Himachal Pradesh	July- August	September -October
	Vridhhi	<i>Habenaria edgeworthii</i> Hook.f. ex Collett	A tuberous terrestrial orchid, growing up to 30-60 cm in height. In the world found in Nepal and Pakistan. In India found from Himachal Pradesh, Uttarakhand to North- west Himalaya	July- August	September -October	Leafy stems covered with hairs; Leaves-2-4 in number, 6-10 cm long, 4.5 cm wide, ovate to ovate-lanceolate; flowers- yellowish green, cylindrical inflorescence, spike 20-25 long and 3 cm broad; fruits- capsule; seeds- numerous, dust like small seeds

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Lilliaceae	Meda	<i>Polygonatum verticillatum</i> (Linn.)	A perennial herb, 0.3-1.2 m in height In the world found in Europe, Turkey, North and Central Asia, Pakistan, Afghanistan and Tibet. In India found in Kashmir, Sikkim, Himachal Pradesh and Uttarakhand	July- August	September- October	It is a perennial growing to 1.2m by 0.45m. The leaves four to eight in a whorl; the flowers, two to three in a bunch in the axils of the leaves, are greenish-white. The fruits are red when ripe, and remain hanging after the leaves have fallen. The flowers are hermaphrodite
	Mahameda	<i>Polygonatum cirrhifolium</i> (Wall.) Royle	A tall, perennial herb, 30-120 cm in height. In the world found in Northern Asia, China, Nepal, Bhutan and Pakistan. In India found in Himalayas, Himachal Pradesh, Sikkim, Manipur and Uttarakhand	July- August	September- October	Its stem is very weak, flexuosus, unbranched, glabrous by means of tendrils 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; flowers- white often greenish or slightly purple
Zinzibiraceae	Kakoli	<i>Roscoea purpurea</i> Smith.	A perennial rhizomatous herb upto 15-30 cm in height. In the world found in Pakistan, Bhutan and Tibet. In India central and eastern Himalaya and Sikkim.	June- July	August- September	Elongate, erect, robust and purple coloured leafy stem; leaves-5-6 lanceolate, 15 cm long and 1.2-2.5 cm wide, purple or reddish imbricated; flowers- few orchid like, on a sessile spike; fruits- capsule cylindrical; seeds- ovoid, minute; Rhizomes-root fibrous thick, fleshy

2005 and Singh, 2006). Other information related with botanical description along with habit and habitat, flowering and fruiting period as well as detailed taxonomical features of all the eight Astavarga plants has been described in Table 1. These herbal plants are considered as a very good source of many Ayurvedic drug formulations with rejuvenating and health-promoting properties, besides these it also help to strengthen the immune system, Astavarga plant members are also reported to work as antioxidants and have massive capacity of cell regeneration (Mathur, 2003; Pandey, 2005 and Sharma and Balkrishna, 2005). Some of these plant members make the valuable medicinal constituents of Chavanyaprasha, a health promotive and disease preventive tonic and also, from ancient time has been utilized in the form of oil, medicated clarified butter and powder also (Dhyani *et al.*, 2010). Different formulations of Astavarga plant members are used to cure various diseases such as seminal weakness, fever, abnormal thirst, diabetic conditions as well as a cure for vata, pitta, rakta doshas. Ayurvedic drugs/ formulations are classified

according to their medicinal properties such as: single herb, polyherbal, polymineral, herbo-mineral or minero-herbal. Astavarga plants are considering as polyherbal formulations. As an instance Astavarga drugs have Jeevaniya and Vayasthapana properties with nutritive and anti-ageing effects (Singh, 2006 and Dhyani *et al.*, 2010).

Present status and alternative of Astavarga plants members:

In ancient time Astavarga were flourished well and now due to immense uses in Ayurveda and over exploitation, these plants are at the edge of becoming extinct, therefore, they have been kept in rare and endangered plants list. Due to very less availability of these medicinally important plants, industries related with Ayurveda and herbalists, also try to search suitable alternatives of these plants by other medicinal plants which are available in sufficient quantity and have same or more or less same medicinal property due to similar chemical constituents. Some of these substitutions are as follows:

Table 2 : Parts used bioactive compound, formulation and their medicinal uses of Astavarga plants. (Uniyal and Issar, 1966; Hooker, 1988; Uniyal and Joshi, 1993; Chauhan, 1999; Gaur, 1999; Nautiyal *et al.*, 2004; Singh, 2005 and 2006; Anonymous, 2006; Khan *et al.*, 2010; Balakrishna *et al.*, 2012; Subedi *et al.*, 2013; Roy *et al.*, 2013; Singh and Brij, 2014 and Ingahlalli *et al.*, 2015)

Family	Botanical name	Parts used	Bioactive compounds	Formulation	Medicinal uses
Orchidaceae	Lilium polyphyllum D. Don	Bulb	Its globule contains linalool and - terpineol	Astavargachurna, Chyavanprashrasayan, Vachaditaila, Mahaklyan ghrita, Mahamayura ghrita, Jivaniya ghrita, Vajikaran ghrita, Brahini gutika and Jivaniya gana churna	Used in the cure of galactic, bronchitis, sensation, hyperdypsia, fever, haematemesis, rheumatagia and general debility
	Crepidium acuminatum (D. Wear) Szlach	Pseudobulb	The main constituent of its pseudobulb is alkaloid, flavonoids, glycosides and - sitosterol	Astavargachurna, Chyavanprashrasayan, Chitrakaditaila, Mahaklyan ghrita, Mahamayura ghrita, Jivaniya ghrita, Vajikaran ghrita, Brahini gutika, Himvana agada and Mahapadma taila	Utilized in the treatment of fever, sensation, tuberculosis and burning, general dibility and also consumed as health tonic
	Malaxis muscifera (Lindl) Kuntze	Pseudobulb	Its pseudobulbs contain alkaloid, glycosides and flavonoids	Astavargachurna, Chyavanprashrasayan, Chitrakaditaila, Mahaklyan ghrita, Mahamayura ghrita, Mahapadma taila, Himvana agada, Jivaniya ghrita, Vajikaran ghrita	Helpful in sterility, fever, sensation, dysentery, smoldering etc
	Habenaria intermedia D. Wear	Tubers	Its tuber contains a specific compound namely taxol an anticancer medication. Besides these starch and minerals are main constituents	Vachadi oil, Vajikaran ghrita, Astavargachurna, Chyavanprashrasayan.	This valuable plant is useful in treating thirst, fever, asthma, joint pain, cough, epilepsy, skin diseases, anorexia and herbal powder is used as rejuvenating tonic and cures blood diseases
Lilliaceae	Polygonatum verticillatum (Linn.)	Rhizome	Rhizome contains glucose, sucrose, lysine, serine, threonine and - sitosterol	Vachadi taila, Ashtavarga churna, Chyavanprashrasayan, Chitrakaditaila, Mahaklyan ghrita, Mahamayura ghrita, Mahapadma taila Jivaniya ghrita, Brahini gutika, Vajikaran ghrita, and Indrokta rasayan	Regular use of this medicine is helpful in feebleness, debility and other restoring properties
	Polygonatum cirrhifolium (Wall.) Royle	Rhizome	The main bioactive constituents is glucose, sucrose and two new steroidal saponins sibiricoside A and B	Astavargachurna, Chyavanprashrasayan, Chitrakaditaila, Mahaklyan ghrita, Mahamayura ghrita, Vachadi taila, and Indrokta rasayan	Different formulations are used in cure of skin problems, anorexia, worms, weakening, fever and sexual debility
Zinzibiraceae	Roscoea purpurea Smith	Rhizome	The main chemical constituents of rhizome is flavonoids, alkaloids, tannins, saponins, glycosides and phenolic mixes	Astavargachurna, Chyavanprashrasayan, Vachaditaila, Chitrakaditaila, Mahaklyan ghrita, Mahamayura ghrita, Jivaniya ghrita, Nagabala sarpi, Vajikaran ghrita, Brahini gutika and Jivaniya gana churna	Valuable in haematemesis, inordinate thirst and rheumatic torment

Roscoeia purpurea Smith (Kakoli) is a commonly occurred Astavarga plant member. (Gaur, 1999 and Nayar and Sastry, 1987) and its rhizome is utilized in herbal formulations because it contains flavonoids, alkaloids, tannins, saponins and other glycosides. Substitute for this viable economically important plant is Ashwagandha *i.e.* *Withania somnifera* (Linn.) Dunal and Kali musali (*Curculigo orchioides* Gaertn), (Chunekar, 1969).

Ashwagandha, Safed musali (*Chlorophytum arundinaceus* Baker) and *Frillaria roylia* Hook. *Fritillaria oxypetala* D. Don. are the substitute for *Lilium polyphyllum* D. Don. (Kshirakakoli), (Balkrishna *et al.*, 2012). It is an endangered plant species of Astavarga group member (Ved *et al.*, 2003).

Crepadium acuminatum (D-wear) Szlach (Jeevak) fall in rare category of Astavarga plant species (Ved *et al.*, 2003). And can be substituted by Vidarikand (*Pueraria tuberosa* (Wild.) DC), Safed behme (*Centaurea behem* Linn.) and Gaduchi (*Tinospora cordifolia* (Wild.) Miers, *Malaxis cylindrostachya* (Linn.) Kuntze and *Malaxis mackinnoni* (Duthie Ames) (Singh, 2006).

Pseudobulbs of *Malaxis muscifera* (Lindl.) Kuntze (Rishbhak) are utilized for obtaining intense standard, alkaloids, flavonoid, and glycosides and this plant can be substituted by Vidari Kand (*Pueraria tuberosa* (Wild.) DC) as well as Lal behmen (*Centaurium roxburghii* D. Don.) Druce. etc. (Chauhan, 1999). It is a rare/threatened Astavarga plant (Ved *et al.*, 2003).

Polygonatum verticillatum (Linn.) (Meda) is also valuable but lie in threatened category of plants member. (Ved *et al.*, 2003) and rhizome is used for making herbal formulations, but some substitutes are also available like Satavari (*Asparagus racemosus* Willd.) Salam mishri (*Eulophia compestris* wall.) and *Polygonatum verticillatum*. (Naquavi *et al.*, 2012).

Satawari (*Asparagus racemosus* Willd.), Nagbala (*Sida veronicifolia* Lam.), Shakakul Mishri (*Polygonatum multiflorum* (Linn.) All.) and Prasarni (*Paederia foetida* Linn.) can be used as substitute in place of rhizome of *Polygonatum cirrhifolium* (Wall.) Royle (Mahamed), (Balkrishna *et al.*, 2012). It is a rare group of Astavarga plant (Ved *et al.*, 2003).

Habenaria intermedia D. Wear, (Ridhhi) is a common Astvarga plant (Ved *et al.*, 2003). And its medicinally valuable part tubers can be substituted by a no. of plant of medicinal uses like Varahikand (*Tacca integrifolia* ker Gawl.), Bala (*Sida cordifolia* Linn.) and Chiriya Musali (*Asparagus filicinus* Buch.-ham.ex

D. Don) (Chauhan, 1999).

Tubers of *Habenaria elgewerthii* Hook.f.ex Colett can be substituted by Varahikand (*Tacca integrifolia* Ker Gawl.), salam Panja (*Dactylorhiza hatagirea* (D. Don) Soo) and Mahabala (*Sida acuta* Burm. F.) *Habenaria griffithii* Hook.f. (Chauhan, 1999). It is a member of rare Astvarga plant (Ved *et al.*, 2003).

Different parts of these plants are used according to the synthesis of bioactive compounds and their sink in the plant. Part of the plant which is used along with bioactive compound, their possible formulations and their effective medicinal uses has been explained in Table 2. Yet, there are suitable alternatives are available for these threatened and rare medicinal plants of Astavarga but it is necessary and need of time to save these plants by other methods like *ex-situ* cultivational approaches which can be prove very effective to maintain these plants in natural habitat as well as in *in-situ* and it can also help in producing raw material to meet the extensive demand of these plants in Ayurvedic formulations as well as pharmaceutical sector. Some of these plants have been prioritized for *ex-situ* cultivation and successful work has been done by Ahuja (1995); Nautiyal *et al.* (1997) and Badola and Pal (2002) etc.

Conclusion:

In Ayurvedic pharmacy, Astavarga being a significant constituent for making of different kind of herbal drug formulation. These compound formulation and its ingredients alone have various medicinal effects. Due to increased side effects, adverse drug reactions, and cost factor of the modern allopathic medicines, popularity of traditional medicines/herbal drugs among people is increasing rapidly at a fast rate. But nowadays, market fails to fulfill the demand, basically due to unavailability of genuine crude herbal raw material. It is because of variability in climatic condition, altitudinal and ecological habitats, overexploitation, deforestation etc. but one of the important factors being the extinction of these valued and rare medicinal plants from their flora. As already said many of these Astavarga plants are listed in rare and endangered category, therefore it's time to preserve these plants in their natural habitat as well as for their propagation and multiplication, suitable and cost effective horticultural methods must be employed (*ex-situ* and *in-situ* methods), so that these Astavarga plants remain enrich our biodiversity and available in good quantity to benefit different type of diseases. Methods

used in plant breeding, different agro-technology, tissue culture techniques can be proved very helpful to conserve these plants and for their multiplication at regular basis.

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