

A LITERATURE REVIEW ON *ARGYREIA NERVOSA* (BURM. F.) BOJER

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ABSTRACT

Various herbal drugs individually or in combination have been recommended for the treatment of different diseases. *Argyrea nervosa* Burm. F. (Syn. *Argyrea speciosa*) commonly known as 'Vridha daraka' in Sanskrit belongs to family Convolvulaceae has been used in different system of traditional medication for the treatment of diseases and ailments of human beings. It is reported to contain several phytochemical constituents like Alkaloids, Carbohydrate, Tannins, amber-colored resin, Sterols, Saponin. Economically it is used as folklore medicine as well as for ornamental purpose. *Argyrea nervosa* is an important source of compounds like 1-triacontanol, β -sitosterol, epifriedelene, Kaemperol-3-o-1-rhamnopyranoside, agroclavine, ergine, isoergine, isolysergic acid amide, pennidavine, caffeic acid, Et-caffeate, chanoclavine-I, chanoclavine-II, racemic chanoclavine-I, festuclavine, lysergine, lysergol, isolysergol, molliclavine, penniclavine, steoclavine, isosetoclavine, tetradecanyl palmitate, 5,8-oxidotetracosan-10-one, stigmasteryl p-hydroxycinnamate, n-tricontanol, β -sitosterol and p-hydroxy innamoyloctadecanolate which are useful as Aphrodisiac, Immunomodulators, Hepatoprotective, Hypoglycemic, Anti Inflammatory, Anticonvulsant and Nootropic etc.

KEYWORDS : *Argyrea nervosa*, *Argyrea speciosa*, Convolvulaceae, Ethanobotanical, Phytoconstituents, Pharmacological, Toxicological.

INTRODUCTION

The use of naturally occurring plant & mineral do indicate their philosophy of mutual beneficial effect of living & non living earthly components on the evolution & existence in human beings. The modern scientist must take up the task of investing or unearthing the scientific principles & put in a global language.

The folk medicines in various countries gave rise to traditional system of medicines. Most of our disabilities, disorders and diseases have come to us from our ancestors as apart of evolutionary package. Every human community was conscious of the burden of diseases & developed its own 'Medical System' which may define as "the pattern of social institution and cultural tradition that evolves from deliberate behaviors to enhance health"¹⁻².

Argyrea nervosa (Burm. f.), Syn. *A. speciosa* (Sweet Hawaiian Baby Woodrose) belongs to family Convolvulaceae is a perennial climbing shrub with woody tomentose stem. It is commonly known as Bryddhotareko in Oriya, Samudra- sok in Hindi and Elephant Creeper, Woolly Morning Glory in English. It is native to the Indian subcontinent (up to an altitude of 300m.) and introduced to numerous areas worldwide, including Hawaii, Africa, Deccan and the Caribbean. Throughout India except in dry, western regions up to 900 ft elevation, often cultivated³.

The plant is a rare example of a plant whose hallucinogenic properties have only recently been discovered by non-Hawaiians. While its cousins in the Convolvulaceae family, such as the *Rivea corymbosa* (Ololiuhqui) and *Ipomoea tricolor* (Tiltliltzin), were used in shamanic rituals of Latin America for centuries, the Hawaiian Baby Woodrose was not traditionally recognized as a hallucinogen. Its properties were first brought to attention in the 1960s, despite the fact that the chemical composition of its seeds is nearly identical to those of the two species mentioned above, and the seeds contain the highest concentration of psychoactive compounds in the entire family.

Within the first one to two years of growth, this plant grows into a compact bush. After that, some of the leaves will fall off and it will elongate into vines. The vines have been known to grow up to 31 feet (10 meters) in length. If consistent water availability is not maintained, these vines may die out and be replaced by fresh growth. The vine will dry out to the closest node during this point. Hawaiian Baby Woodrose is very well adapted to a dry tropical climate such as areas near rivers and creeks but with a distinct wet and dry season. It is not naturally found in the Wet tropics^{4,5}.

Leaves are green, simple, broadly ovate, 9-30 × 7.5-25cm., apex obtuse or rounded, white tomentose beneath, appressed hairy or pilose above, base cordate. Petiole 2-12.5cm. Flowers pink, 1.2-2cm. long, impeded capitate cymoses. Peduncle 0.5-10cm., tomentose. Bracts broadly obovate or orbicular, hard, silky, persistent, resembling outer sepals. Two outer sepals concealing the rest, white-silky or in fruit hirsute, 8.7-10mm., inner oblong, 7.5mm., white silky. Corolla campanulate with spreading petals, midpetaline bands hirsute. Stamens far exserted. Ovary 2-celled. The plant can start growing flowers as early as 18 months from seed. For this to occur, there must be sufficient watering and adequate room for the roots to grow; it can take up to five years for the first signs of flowering to become visible. Berry red, fleshy, globose, 6-8mm. diameter, surrounded by the enlarged sepals which are red within. Root brown, cylindrical, 1 to 1.5 cm thick; smooth, round wood is scant, flexible, and smooth, latex oozes at cuts. Seeds are black, subglobose, 4-4.5mm. diameter grey, minutely tomentose round the large areole. The seeds are found in the pods of dried flowers. These cannot be harvested until the pods are completely dried. There are 3 to 5 seeds, commonly 4, per flower.

In the indigenous system of medicine, the plant is prescribed in gleans, gonorrhoea, strangury and chronic ulcer. It is also grown an ornament. In Assam, Bihar the leaves are eaten as vegetable. The leaves are emollient and vesicant. They are used externally in the treatment of ringworm, eczema, itch and other skin diseases and internally to cure boils swellings, etc.

The leaves are also used as local stimulant and rubefacient. Traditionally leaves used by Rajasthani tribes to prevent conception. The seeds mixed with those of *Hygrophila auriculata* are used as a tonic. Seeds of *A. nervosa* found to possess hypotension, spasmolytic, and anti-inflammatory action. Roots of *A. nervosa* have immunomodulatory activity.

It contains triterpenoids, flavonoids, steroids, argyreoside, 1-triacontanol, epifriedelinol, β -sitosterol and lipids. Hawaiian Baby Woodrose seeds may be consumed for their various lysergamide alkaloids, such as ergine, which can produce psychedelic effects³.

Taxonomical Classification

Domain: Eukaryota

Kingdom: Plantae

Subkingdom: Viridaplantae

Phylum: Tracheophyta

Subphylum: Euphyllophytina

Infraphylum: Radiatopses
 Class: Magnoliopsida
 Subclass: Lamiidae
 Superorder: Solananae
 Order: Convolvulales
 Family: Convolvulaceae
 Subfamily: Asteroideae
 Tribe: Ipomoeae
 Genus: *Argyreia*
 Species: *nervosa* - (Burm. f.) Bojer
 Botanical name: *Argyreia nervosa*⁶

Parts Used

Apart from whole plant leaves, fruit, seeds and root are also used.

Synonyms

Argyreia speciosa (L. F.) Sweet, *Convolvulus nervosus* Burm. F., *Convolvulus speciosus* L. F., *Lettsomia Nervosa*, *Lettsomia nervosa* (Burm. F.) Roxb., *Rivea nervosa* (Burm. F.) Hallier F³⁻⁵

Vernacular Name

Oriya : Bryddhotareko
 Sanskrit : Vridha daraka
 Hindi : Samudra Shokha
 Bengali : Bijarka
 Gujrathi : Samudarsoka
 Marathi : Samudarsoka
 Unani : Samudar sokh
 Tamil : Kadarpalai, Samuddirapacchai
 Telgu : Chandrapada
 Kannada: Chandrapada
 English : Elephant creeper, Baby wood-rose, Elephant-climber, Elephant-creeper, Elephant-vine, Silver-morning-glory, Wood-rose, Woolly-morning-glory
 Nepales : Samudra phool
 Sinhalese: Vriddadaru
 Spanis : Hojas De Seda³⁻⁵

Ayurvedic Description

Rasa : Katu, tikta, kasaya
 Guna : Laghu, snigdha
 Veerya : Ushna
 Vipak : Madhur⁷

ETHANOBOTANICAL REVIEW

Whole Plant

In stomach complaints, sores on foot, small pox, syphilis, dysentery and diarrhoeal, antifertility, anti-rheumatic, antifungal. It is also used during recanalisation in vasectomies⁷⁻⁹.

Leaves

Antiphlogistic, emollient, poultices of wounds, anorexia, diabetics, externally for skin disease, gleet, gonorrhoea and chronic ulcers. Also used as a local stimulant and rubefacient^{3,9,10}. Externally used in the treatment of ringworm. Eczema, itch and other skin diseases^{3,7,11}. Fresh leaves ponded into alump and taken during empty stomach for three consecutive days from 4th day of menstruation and repeated for three successive months to avoid conception for a few years.

Roots

Roots of *A. nervosa* is widely used as appetitiser, anaemia, aphrodisiac, anti-inflammatory, brain-tonic, cardiogenic, cerebral disorders, diabetes, expectorant, obesity, syphilis, tuberculosis, ulcers and wounds, astringent, sweet, appetizer, digestive, carminative aphrodisiac, antiphlogistic, antiseptic, tonic, emollient, rubifacient, dyspepsia, brain tonic, diuretic and used in gonorrhea, rheumatism, diseases of the nervous system¹²⁻¹⁴.

The root of this plant is regarded as alterative, tonic and useful in rheumatic affections, and diseases of the nervous system. It is used as an alterative and nervine tonic. It is traditionally in various ways

like- the powdered root is soaked, seven times during seven days, in the juice of the tubers of *Asparagus racemosus* (stimuli) and dried. The resulting powder is given in doses of a quarter to half a tola, with clarified butter, for about a month. It is said to improve the intellect, strengthen the body and prevent the effects of age. In synovitis the powdered root is given with milk¹⁵.

Seeds

It is used for treatment of anorexia, diabetes, and various skin diseases and also shows significant hypotensive and spasmolytic activity⁷

Fruits

It is used for treatment of anorexia, diabetes, and various skin diseases¹⁶.

PHARMACOLOGICAL REVIEW

Although a lot of pharmacological investigations have been carried out based on the ingredients presents but a lot more can still be explored, exploited and utilized. A summary of the findings of these studies is presented below.

Aphrodisiac Activity

The root, flower and to some extent, leaf (homogenate in 2% gum acacia) of the plant showed aphrodisiac activity as evidenced by an increase in mounting behavior of mice. When different extracts of the root were tested, the activity was found in the alcohol extract (200 mg/kg; p.o. single dose). The extract, 1 h after administration, stimulated mounting behavior of male mice in a concentration dependent manner. The root- or flower-treated male mice also exhibited a remarkable increase in mating performance. Further, the number of males was found to be more among the pups fathered by the herbal drug-treated mice compared to those by the control mice. Thus, the plant has promising potential to be developed into an effective medicine for stimulating male sexual activity with an influence on sex ratio flavouring males¹⁷.

Immunomodulatory Activity

Oral administration of the ethanolic extract of *A. speciosa* root at the doses of 50, 100 and 200 mg/kg in mice, dose-dependently potentiated the delayed-type hypersensitivity reaction induced both by sheep red blood cells (SRBC) and oxazolone.

It significantly enhanced the production of circulating antibody titre in mice in response to sheep red blood cells. ASEE failed to show any effect on macrophage phagocytosis. Chronic administration of ASEE significantly ameliorated the total white blood cell count and also restored the myelosuppressive effects induced by cyclophosphamide¹⁸.

Hepatoprotective Activity

The ethanolic extract and ethyl acetate extract (200 and 400 mg/kg) of *A. speciosa* roots decreased the elevated enzyme levels induced by CCl₄, thus protecting the structural integrity of hepatocyte cell membrane or regeneration of damaged liver cells. These two extracts are found to be capable of enhancing or maintaining the activity of hepatic enzymes which are involved in combating Reactive Oxygen Species. The hepatoprotective effect of *A. speciosa* roots was evidenced by the amelioration of biochemical indicators of liver damage and pathological disturbances caused by CCl₄¹⁹.

Central Nervous System Activity

The n-hexane (n-HF), chloroform (CF), ethyl acetate (EAF) and water (WF) fractions of hydroalcoholic extract of roots of *A. speciosa* were tested on the central nervous system. All the fractions (100, 200 and 500 mg/kg, p.o.) were evaluated for neuro-pharmacological activity using spontaneous motor activity and pentobarbital-induced sleeping time in mice. Chlorpromazine was used as a positive control. Central nervous system depressant activity was observed with all the fractions as indicated by the results in which they reduced spontaneous motor activity and

potentiated pentobarbital induced hypnosis in mice²⁰.

Hypoglycemic

The hypoglycemic and antihyperglycemic activities of methanolic extract of stem of *A. speciosa* were done in normal and alloxan induced diabetic rats. The blood glucose levels were measured at 0 h and 1, 2, 4, 6, 8, 12, 16 and 24 h after the treatment. Oral glucose tolerance test was performed in normal, diabetic control, plant extract treated normal and diabetic groups and tolbutamide also treated normal and diabetic groups. It was found that alcoholic extract of *A. speciosa* showed significant ($P < 0.05$) dose dependent percentage blood glucose reduction in normal (26.42% at 250 mg/kg, 28.50% at 500 mg/kg and 34.25% at 750 mg/kg body weight) and in diabetic rats (24.72% at 250 mg/kg, 31.10% at 500 mg/kg and 40.47% at 750 mg/kg body weight) respectively at 8 h. The hypoglycemic and antihyperglycemic effect of *A. speciosa* was compared with the reference standard drug tolbutamide (40 mg/kg)²¹.

Nootropic

According to Hanumanthachar et al. effectiveness of aqueous extract of *A. speciosa* on ageing, scopolamine and diazepam induced memory deficits in mice was evaluated. Elevated plus maze and passive avoidance paradigm were employed to assess short-term and long term memory. In order to delineate the possible mechanism through which *A. speciosa* elicits the anti-amnesic effects the whole brain acetyl cholinesterase (AChE) activity was also assessed. Two doses (100 and 200 mg/kg, p.o.) of aqueous extract of *A. speciosa* were administered orally for 6 successive days to both young and aged mice. *A. speciosa* decreased transfer latencies and increased step down latencies in both young and aged mice *A. speciosa* (100 and 200 mg/kg, p.o.) successfully reversed amnesia induced by diazepam, scopolamine and natural ageing²².

Anti Inflammatory Activity

The alcoholic extract of *A. speciosa* root exhibited statistically significant anti-inflammatory activity against granuloma formation technique in albino rats which comparable to acetylsalicylic acid. The extract did not show much activity against formalin induced arthritis in rats²³.

Anticonvulsant Activity

The hydroalcoholic extract of *A. speciosa* at the dose of 200 and 400 mg/kg significantly delayed the latency to the onset of the first clones as well as onset of death in unprotected mice and exhibited protection in 16.66 and 33.33% of pentylenetetrazole treated mice respectively. Whereas in case of maximal electroshock seizures, the dose of 200 and 400 mg/kg significantly reduced the duration of hind limb extension and both the doses were statistically found to be equipotent the reference standards, clonazepam (0.1 mg/kg) and phenytoin (20 mg/kg.) provided complete protection²⁴.

TOXICOLOGICAL REVIEW

A few of the ergoline alkaloids reported in this plant are hallucinogenic²⁵.

PHYTOCHEMICAL REVIEW

Whole plant

Tannin and amber-colored resin, soluble in ether, benzole; partly soluble in alkalis and fatty oil. The seeds have shown the presence of alkaloids, viz., chanoclavine, ergine, ergonovine, and isoergine. Tannin and Resins acidic in nature, are obtained from this plant.

Leaves

1-triacontanol, β -sitosterol, epifriedeline³, The petroleum ether extract of the leaves yielded 1-triacontanol, epifriedelinol acetate, epifriedelinol and β -sitosterol²⁶. The leaves were found rich in quercetin²⁷. Extraction of the leaves with 90% methanol led to the isolation of the flavonoids, quercetin and kaemperol

together with the latter's glycoside kaemperol-3-o-l-rhamnopyranoside²⁸. Two new flavone glycosides characterized as 7, 8, 3', 4', 5'-pentahydroxyflavone-5-o-l-rhamnopyranoside and 7, 8, 3', 4', 5'-pentahydroxyflavone-5-o-l-glucopyranoside were also reported from leaves²⁹.

Seeds

It contains 0.5-0.9% of Ergoline alkaloids, agroclavine, ergine, isoergine, isolysergic acid amide, pennidavine, caffeic acid, Et-caffeate, chanoclavine-I, chanoclavine-II, racemic chanoclavine-I, festuclavine, lysergine, lysergol, isolysergol, molliclavine, penniclavine, steoclavine, isosetoclavine, lysergic acid, alpha-hydroxyethylamide³.

The seeds yielded fatty oil which found to contain the glycerides of alminate, stearic, linoleic, linolenic and oleic acids^{30,31}. In another study, the seed oil revealed the presence of myristoleic, myristic, palmitic, linoleic, linolenic, oleic, stearic, nonadecanoic, eicosenoic, eicosanoic, henei-cosaoic and behenic acids identified as their corresponding methyl esters through GLC³². The ethanolic extract of the seeds revealed the presence of a mixture of three alkaloids, out of which only one was characterized as ergometrin. The other constituents isolated were caffeic acid and ethyl caffeate³³, another study also revealed the presence of ergoline alkaloids in the seeds. The ergolines were indicated to be of clavine type³⁴. The free amino acids reported in the seeds were glutamic acid, glycine, isoleucine, leucine, lysine, phenylalanine, tyrosine, praline and amino butyric acid^{12,35}.

Roots

The hexane extract of the root yielded tetradecanyl palmitate, 5,8-oxidotetracosan-10-one³⁶ and two novel aryl esters characterized as stigmasteryl p-hydroxycinnamate and hexadecanyl p-hydroxycinnamate along with scopoletin³⁷, coumarin glucoside³⁸ and scopoletin³⁹ as important phytoconstituents.

Fruits

The fruits were reported to contain n-triacontanol, β -sitosterol, p-hydroxy cinnamoyloctadecanolate and caffeic acid³⁹.

CONCLUSION

In this review, we have presented information on the botanical description, traditional uses, pharmacology & toxicology and phytochemistry of *A. nervosa* (*syn: A. speciosa*), medicinal plant found in throughout the India, central and southern Europe western Asia, Africa, Deccan, Caribbean and the United States amongst others.

There are over 400 different tribal and other ethnic groups in India which constitute about 7.5% of India's population. Tribal, rural and primitive societies have discovered solution for treatment of disease to almost all their needs and problems from the natural resources around them hence, in recent years Ethanomedicinal studies received much attention as this brings to light the numerous little known and unknown medicinal virtues especially of plant origin which needs evaluation on modern scientific lines such as phytochemical analysis, pharmacological screening and clinical trials.

A. nervosa (*syn: A. speciosa*) possesses various pharmacological activities as discussed in earlier. However, it is imperative that more clinical and pharmacological studies should be conducted to investigate the unexploited potential of this plant.

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Fig. I: *Argyrea nervos*



Fig. II: *Argyrea nervosa* Leaves



Fig. III: *Argyrea nervosa* Flowers



Fig. IV: *Argyrea nervosa* Fruits



Fig. V: *Argyrea nervosa* Seeds