



A REVIEW OF THE PHYTOCHEMICAL AND PHARMACOLOGICAL CHARACTERISTICS OF THE SEVEN MEDICINALLY IMPORTANT ARGYREIA SPECIES

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Abstract:

The genus *Argyreia* is known as 'woolly morning glory' or 'small wood rose' and is the second largest genus of the family Convolvulaceae. This review focuses on the Ethnobotanical uses, phytochemical analysis, and pharmacological studies done on the seven *Argyreia* species. Qualitative phytochemical studies showed the presence of Alkaloids, Flavonoids, Phenols, Terpenoids, Steroids, Saponins, Tannins, Glycosides, Proteins, and Amino acids in most of the *Argyreia* species. *Argyreia nervosa* possesses various Alkaloids and many other compounds having hallucinogenic, analgesic, anti-inflammatory, antiviral, antidiabetic, antioxidant, anticancer, and antidiarrheal activities. Compounds like Embelin, Mupirocin, Lupeol, and many other compounds present in *Argyreia cuneata* and *Argyreia setosa* have antioxidant, antimicrobial, anti-inflammatory, and antidiabetic activities. *Argyreia Pilosa*, *Argyreia roxburghii*, *Argyreia cymosa*, and *Argyreia pomacea* contain Alkaloids, Flavonoids, Phenols, Tannins, Steroids, Fixed Oils, Glycosides and Amino acids containing antipyretic, antioxidant, wound healing activities and Cardiovascular effects.

Key words: *Argyreia nervosa*, *Argyreia pomacea*, phytochemistry, pharmacology, Ethnobotany.

Introduction:

The genus *Argyreia* Lour. is usually known as 'woolly morning glory' or 'small wood rose'. It comprises about 90 species and is found in tropical continental Asia, Australia, and Malaysia. 46 species are found in India and is the second-largest genus of the family Convolvulaceae (Biju S D, 1997). It is native to India, Sri Lanka, Andaman Islands, Nepal, Bangladesh, Pakistan, China, Malaya, Thailand, Borneo, Vietnam, Cambodia, Taiwan, Himalaya, Hainan, Jawa, Laos, Madagascar, Myanmar and the Philippines. It is known by their synonyms like *Argyreon* St.-Lag, *Blinkworthia* Choisy, *Cryptanthela* Gagnep, *Lettsomia* Roxb, *Moorcroftia* Choisy, and *Samudra* Raf. (POWO, 2023).

Literature review on the ethnobotanical uses, phytochemical characteristics and pharmacological activities of the seven medicinally important *Argyreia* species viz. *Argyreia nervosa* Burn.f, *Argyreia cuneata* (L.), *Argyreia setosa* (L.), *Argyreia Pilosa* Wight & Arn, *Argyreia roxburghii* Choisy, *Argyreia cymosa* (Roxb.) Sweet and *Argyreia pomacea* (Roxb.) Choisy have been presented in this study.

The genus *Argyreia*:

The genus *Argyreia* comprises lianas plants, herbaceous climbers, or wiry trailers from woody caudex. Stem is woody and perennial or herbaceous. Leaves are petiolate, entire, rounded to cordate, base cuneate. Inflorescences are axillary or rarely terminal cymes, or loose or compact capitula. Flowers are few to many and have small or large, persistent or early deciduous bracts. Flowers are diurnal. Corolla may be purple, pink, red or white in colour. Petals are large showy, erect, campanulate, funnel shaped or tubular. Limbs are almost entire or deeply 5-lobed with pubescent mid petaline bands. Sepals are herbaceous or leathery, pubescent outside and glabrous inside. Sepals in the fruit are persistent, enlarged, reddish inside. Stamens are included or exerted. Filaments are inserted near the base of corolla, dilated and usually pubescent or glandular or rarely glabrous, filiform. pollen is globose, pantoporate, finely spiny. Pollen grains are spinulose. pistil is included or exerted. Disc is ring like or cupular, entire or shallowly 5-lobed. Ovary is 2 – 4 celled, 4-ovuled, pubescent or glabrous. Style -1, filiform. Stigma – 2, globose. Fruit is a berry, purplish, red, orange or black, fleshy inside, pulpy or mealy. Seeds 4 or fewer, rarely 1 (e-Flora of Thailand, 2023).

Ethnobotanical uses:

Argyreia nervosa is used in stomach complaints, smallpox, sores on foot, syphilis, dysentery, diarrhoeal anti-rheumatic, antifertility, and antifungal. Leaves are used as Antiphlogistic, emollient, anorexia, diabetics, chronic ulcers, ringworm, Eczema, and skin diseases. Root extract is used as an appetizer, anemia, aphrodisiac, brain-tonic, diabetes, anti-inflammatory, cerebral disorders, expectorant, cardiogenic, obesity, syphilis, tuberculosis, ulcers, wounds, appetizer, digestive, astringent, carminative aphrodisiac, antiseptic, antiphlogistic, emollient, rubefacient, dyspepsia, diuretic and gonorrhoea diseases. It is used as an alternative

nervine tonic. Fruits and seeds are used to treat diabetes, anorexia, skin diseases and have significant hypotensive and spasmolytic activity. (Meher *et al*, 2011).

Argyreia cuneata is conventionally used for the treatment of arthritis, bone fractures, diabetes, and scabies. The root extract is used to initiate labor pain and to ease delivery and expel the placenta. The leaf extract is given to cattle to treat swelling of the throat and anorexia. Leaf paste is applied to cure intermittent fever. The leaves are used for the treatment of diabetes (Prashith TR and Vinayaka KS, 2018). *Argyreia setosa* is used in the ailments like diabetes and urinary disorders (OSADHI, 2023).

The roots of *Argyreia pilosa* is used to cure sexually transmitted diseases like gonorrhoea, syphilis and blood diseases. The leaf paste is applied in the neck for treating coughs, quinsy, itching, eczema and skin diseases. It is used as antiphlogistic, antidiabetic and for rheumatism and burning sensation. The root decoction is used to treat diarrhoea and cathartic conditions (Prasanth D *et al*, 2018). The root extract of *Argyreia roxburghii* is used in epilepsy, senselessness and as anti-spasmodic (Baruah N.C *et al.*, 2014).

Argyreia cymosa is used against sexually transmitted ailments, cough, quinsy, skin problems, rheumatism and diabetes (Venkateswarlu G & Ganapathy S, 2018). The leaves of *Argyreia pomacea* are used for diabetes mellitus, peptic ulcer, cardiovascular diseases, wounds and to give cooling effect to eyes. The root extract is used to treat jaundice. Fruits are used to cure ulcers (Vidya dharshini K, 2016; Noorunnisa Begum S *et al*, 2011; Balasubramanian *et al*, 1997; Dhivya S & Kalaichelvi K, 2016; Binu Thomas and Divya M S, 2019; Paulsamy S, 2011).

Phytochemical and pharmacological characteristics:

Literature reviews on the phytochemical screening studies showed the presence of alkaloids, flavonoids, phenols, terpenoids, steroids, saponins, tannins, glycosides, proteins, and amino acids in most of the species (Table1) of *Argyreia* (Sahu *et al*, 2019; Kale *et al*, 2022; Prasanth D *et al*, 2018; Baruah N C *et al*, 2014; Bokhad MN *et al*, 2018; Mahendraraja H *et al*, 2020).

The secondary plant constituent, Ergot alkaloid, Lysergic acid amide (LSA) is mainly present in large amounts in the genus *Argyreia* (Kale *et al*, 2022). This genus comprises secondary metabolites like Simple pyrrolidines alkaloids, Ergoline alkaloids, tropane alkaloids, β -Carboline alkaloids, nicotine, Triterpenoids, Calystegines, calystegine-negative, Loline alkaloids, loline-negative long chain alkyl ester of p-coumaric acid, Flavones, Flavonols and their glycosides and Flavonol sulfates etc. (Convolvulaceae Unlimited, 2023). The Ergoline alkaloids have been identified in some species viz. *A. nervosa*, *A. barnesii*, *A. maingayi*, *A. capitata*, *A. obtusifolia*, *A. luzonensis*, *A. cuneata*, *A. philippinensis*, *A. splendens*, *A. reticulata*, *A. ridleyi*, *A. mollis*, and *A. rubicunda* by using 2-D TLC procedures (Jew-Ming C *et al*, 1973).

Table 1: Qualitative phytochemical screening of various *Argyreia* species

<i>Argyreia</i> - species name	<i>Argyreia nervosa</i> Burn.f. (= <i>Argyreia speciosa</i>)	<i>Argyreia cuneata</i> (L.)	<i>Argyreia setosa</i> (L.)	<i>Argyreia pilosa</i> Wight & Arn.	<i>Argyreia roxburghii</i> Choisy	<i>Argyreia cymosa</i> (Roxb.) Sweet	<i>Argyreia pomacea</i> (Roxb.) Choisy (= <i>Argyreia zeylanica</i>)
Plant part and Extract used	Aerial Parts - Methanol	Leaves - Methanol	Leaves - Methanol	Entire plant – Methanol	Root - Methanol	Leaf - Ethanol	Leaf - Ethanol
References	Sahu <i>et al</i> , 2019	Kale <i>et al</i> , 2022	Kale <i>et al</i> , 2022	Prasanth D <i>et al</i> , 2018	Baruah N C <i>et al</i> , 2014	Bokhad MN <i>et al</i> , 2018	Mahendraraja H <i>et al</i> , 2020
Alkaloids	+	+	+	+	-	+	-
Saponins	-	+	+	-	+	-	+
Flavonoids	+	+	+	+	+	-	+
Phenols	+	+	+	+	+	+	NR
Terpenoids	+	+	+	NR	-	NR	-
Steroids	+	+	+	+	-	-	NR
Tannins	+	+	+	+	+	+	+
Glycosides	+	+	+	NR	+	-	-
Fixed oils and Glycosides	+	NR	NR	-	NR	-	NR
Proteins and amino acids	NR	NR	NR	+	+	+	-
	+	+	+	+	NR	+	NR
	+ Present			- Absent		NR – Not reported	

Argyreia nervosa contains bioactive compounds (Table 2) like Psychotropic LSD, Ergoline Alkaloids, Coumarin Glycosides, Kaempferol, Quercetin, Lysergamides, Eragine and Isoeragine having Anti-Aging, Nootropic, Hallucinogenic, Analgesic, Anti-Inflammatory, Gastroprotective, Antiviral, Antidiabetic, Aphrodisiac, Anticonvulsant, Antioxidant, Anticancer, Antidiarrheal, Antiulcerand Nematocides activities (Jaiswal BS & Tailang M, 2018).

Compounds like Embelin, Citronellal, Propafenone, Baicalin, Tentoxin, Ricinoleic acid, Mupirocin, Lupeol and Zingerone have been identified in *Argyreia cuneata* and *Argyreia setosa* having antioxidant, antimicrobial, anti-Inflammatory and antidiabetic activities. (Kale *et al*, 2022)

Argyreia Pilosa, *Argyreia roxburghii*, *Argyreia cymosa* and *Argyreia pomacea* contain Alkaloids, Flavonoids, Phenols, Tannins, Steroids, Fixed Oils, Glycosides, Amino acids, Carbohydrates and Proteins. They are responsible for antipyretic activities, antioxidant activities, wound healing activities and Cardiovascular effects (Prasanth D *et al*, 2018; Baruah N C *et al*, 2014; Bokhad MN *et al*, 2018; Dhar M *et al*, 1974).

Table 2: Pharmacological activities of the seven *Argyreia* species

S.no	Name of the <i>Argyreia</i> species	Bioactive compounds present in the species	Pharmacological activities	References
1	<i>Argyreia nervosa</i> (= <i>Argyreia speciosa</i>)	Psychotropic LSD, Ergoline Alkaloids Coumarin Glycosides, Kaempferol, Quercetin, Lysergamides, Ergaine, Isoeragine etc.	Anti-Aging, Central Nervous System Depressant, Nootropic, Hallucinogenic, Analgesic, Anti-Inflammatory, Gastroprotective, Antiviral, Antidiabetic, Aphrodisiac, Anticonvulsant, Antioxidant, Anticancer, Antidiarrheal, Antiulcer and Nematocides activities etc.	Jaiswal BS & Tailang M, 2018
2	<i>Argyreia cuneata</i>	Embelin, Citronellal, Tentoxin, Baicalin, Propafenone, Lupeol, Ricinoleic Acid, Mupirocin and Zingerone	Antioxidant, Antimicrobial, Anti-Inflammatory and Antidiabetic Activities.	Kale <i>et al</i> , 2022
3	<i>Argyreia setosa</i>	Embelin, Citronellal, Tentoxin, Baicalin, Propafenone, Lupeol, Ricinoleic Acid, Mupirocin and Zingerone	Antioxidant, Antimicrobial, Anti-Inflammatory and Antidiabetic Activities.	Kale <i>et al</i> , 2022
4	<i>Argyreia pilosa</i>	Flavonoids (Quercetin and Rutin), Alkaloids, Phenols, Tannins, Steroids (B-Sitosterol), Fixed Oils, Glycosides, Amino Acids, Carbohydrates and Proteins.	Antipyretic Activity	Prasanth D <i>et al</i> , 2018
5	<i>Argyreia roxburghii</i>	Phenols, Glycosides, Tannins, Saponins, Reducing Sugars and Flavonoids	Antioxidant activity	Baruah N C <i>et al</i> , 2014
6	<i>Argyreia cymosa</i> (Roxb.) Sweet	Alkaloids, Flavonoids, Phenols, Saponins and Tannins	Wound healing activity	Bokhad MN <i>et al</i> , 2018
7	<i>Argyreia pomacea</i> (Roxb.) Choisy (= <i>Argyreia zeylanica</i>)	Alkaloids, Flavonoids, Phenols, Saponins and Tannins	Cardiovascular effects	Dhar M <i>et al</i> , 1974

Conclusion:

The literature review of the seven medicinally important *Argyreia* species showed that they have a lot of ethnobotanical uses, phytochemical characteristics and pharmacological activities. They have many of bioactive compounds like alkaloids, flavonoids, phenols, tannins, steroids, fixed oils, glycosides, amino acids, carbohydrates and proteins. They are responsible for anti-aging, central nervous system depressant, nootropic, hallucinogenic, analgesic, anti-inflammatory, gastroprotective, antiviral, antidiabetic, aphrodisiac, anticonvulsant, antioxidant, anticancer, antidiarrheal, antiulcer and many other activities. Hence, the potent bioactive compounds present in these species may be utilized as components in herbal medicines. Though, the *Argyreia* species have numerous pharmacological activities, it is imperative that more clinical and pharmacological studies are required to investigate the unexploited potential of these plant species.

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