

Yellow bleeding heart: A widely used hypotensive and hypoglycemic medicinal plant of North-east India

***Dactylicapnos scandens* (D. Don) Hutch (Syn. *Dicentra scandens* (D. Don) Walp.), is a perennial scandent herb that belongs to the family Fumariaceae. It has horizontal tubers with a network of fibrous roots, and yellow heart-shaped blooms. It can be found in the Central and Eastern Himalayan regions. The plants feature four petals, two of which are actinomorphic whorls that are located opposite each of the outer petals. Ovary is superior, unilocular, bicarpellate, narrowly linear to broadly ovate-oblong in form, with parietal placentation and thin style. Fruit is an indehiscent, fleshy capsule that is ovate to oblong in shape, pale yellow-white when young, and turns reddish. Corydine, isocorydine, protopin, aporphine alkaloids, glaucine and isocorydine are the chemical compounds present in the plant. Certain tribal people in North-East India have historically utilized this significant ethno-medicinal plant as a treatment for various health concerns.**

INDIA ranks as the world's 18th most biodiversity nation and is the origin of many medicinal plants. There are about 46,000 plant species, including higher plants like gymnosperms, lower groupings, and angiosperms. For their various requirements, including food, fuel, medicine, wood, fiber, fruit, colours, and other products, humans are reliant on plants. Our traditional healthcare system benefitted greatly from the ancient practices of employing plants as medicines. India's north-eastern states form a distinctively narrow route connecting the Indian sub-continent to East Asia and Southeast Asia. They are bordered in the north by the Himalayas and in the south by the Bay of Bengal. Arunachal Pradesh, Assam, Mizoram, Manipur, Meghalaya, Nagaland, Tripura, and Sikkim are the eight states that make up the nations landlocked northeast. Arunachal Pradesh is the largest in the north-eastern region of India, covering an area of about 83,743 km², and is situated in the Trans-Himalayan region. It is one of the Eastern Himalayan biodiversity hotspots. The family Fumariaceae is distinguished from the Papaveraceae on the account of their zygomorphic flowers and their watery (vs. usually coloured or milky) juice. The botanists include all fumariaceous taxa with iso-bilaterally symmetrical flowers and non-fused corollas in the genus *Dactylicapnos* Bernh. In the Fumariaceae family, the genus *Dactylicapnos* consists of approximately 20 species of biennial and perennial climbing herbs that are found all over temperate North America and Eastern Asia. The genus was first monographed by Hutchinson (1921).

Distribution

Dactylicapnos scandens (D. Don) Walp. synonymously known as *Dicentra scandens* is a herbaceous perennial climber, which belongs to the family Fumariaceae and is locally known as *Rhodo* by Chakesang tribes of Nagaland, India. The plant grows well in temperate and sub-tropical conditions and is naturally distributed in the Central and Eastern Himalayan Region, viz. Bhutan and Sikkim, Nepal and Nagaland, between altitudes ranging from 1500–2500 m amsl and prefers cool climatic conditions; hot and dry weather is unfavourable for growth and development of plants. The plant prefers moist soil rich in organic matter and generally flowers between July and November in the wild and July and October in cultivation.

Morphology

Dactylicapnos scandens is a glabrous perennial climber with horizontally extended tubers, thicker, branched tap roots that resemble Dahlias and a web of finer, fibrous roots (Fig. 1). It is 2-4 m at maturity, half-hardy, slender throughout, pale green with scattered red linear markings, occasionally almost rugose, with slight yellow staining exudate present; nodes slightly swollen, appearing disjointed (i.e. main stem offset); petioles and peduncles arising in various planes, frequently horizontal, internode length variable hollow. *Dactylicapnos scandens* leaf is dorsiventral and the upper and lower epidermises are single layered. Two layers make up the palisade. The mesophyll is a tiny, spherically celled structure with a short diameter and lots of air gaps. There are 2–3 layers in the collenchyma. Palisade and lower midrib oil



Dactylicapnos scandens plants parts: A. Whole plants; B. Leaves; C. Flowers; D. Pods; E. Seeds; F. Rhizomes

glands are seen. More trichomes are present in the lower epidermis than the top epidermis. Six lower epidermises have anomocytic stomata, cauline leaves are alternating, bi- or tri-ternately decompose, exspitulate; petioles are 5 to 10 mm long, and leaflets are 2 to 9 mm wide; Lamina glaucous, darker green above, whitish below, membranaceous, palmately veined typically with 7–8 veins running lengthwise from the base, midrib pinkish at apex, veins prominent beneath and streaked with pink, ultimate leaflets frequently tendriliform; tendrils branched 3–4 times, reflexed at the tip into slight hook, 0.5–1 mm diameter, pink at tip.

The inflorescence is a raceme with 6 to 8 (or 9) spirally arranged pendant flowers that emerge opposite a leaf and are typically held horizontally. The raceme has peduncles that are 20 to 35 mm long, pedicels that are 9 to 23 mm long (and elongate when in fruit), filiform, and bracteate bracts that are 6 to 7 mm long and about 1 mm wide, linear-lanceolate. Sepals 3 mm long, 2 mm wide, vary in shape, generally ovate-acuminate, caducous, edges green with whitish membranous edge, entire. Petals 4, in 2 whorls of 2, actinomorphic, compressed in a plane, cordate in outline. Outer petals 21–23 mm long and 11–12 mm wide at the shoulder, flattened, fused border region with erose margin, large and coherent forming a heart-shaped tube, saccate or spurred at divergent tips, carinate at distal apices, keeled portions known as hoods, with expanded fleshy border of variable width (5 mm), the hooded region tinged pinkish brown and becomes increasingly brown.

Inner petals measure 16 to 18 mm in length (claw 12 mm long, 0.5 to 1 mm wide, blade 6 to 7 mm long, 3 to 4 mm wide), with two inner petals apically connate to enclose anthers and stigma. The claw is long and narrow, broadening into a blade at the distal portion. The stamens are arranged in two bundles of 3, with each bundle of filaments fusing and flattening just below the anthers to create a phalange opposite each of the outer petals. A nectariferous spur emerges from the base of each phalange. Phalanges are united to the outer petals in turn for two-thirds of their length, measuring 4 mm long and 2 mm wide. Pollen grains are 4 to 8-rugate and have an exine that is delicately verrucate. Ovary superior, unilocular, bi-carpellate, narrowly linear to broadly ovate-oblong in shape, with parietal placentation; style slender, 10 mm long with flattened, quadrangular stigma with two horn-like projections or notches at apex; maturing ovary forcing its way out of fused inner petals, resulting in petals and sepals being shed.

Fruit consists of an indehiscent, fleshy capsule that is ovate to oblong in shape, pale yellow-white when immature, turning purplish (in this stock, though other collections are said to have red capsules), and smooth on the inside. Seeds are numerous, 50–60, separating easily from funiculi and falling into the centre of the fruit. They are purplish black, about 1–2 mm in diameter, and reniform in shape, with some papillae larger away from the funiculus. Elaiosomes are small, rudimentary, whitish and translucent.

Chemical composition and pharmacological activity

A new subtype of aporphines, Dactyllactone A (1) isolated from *Dactylicapnos scandens* is an isoquinoline alkaloid with a rearranged and built D-ring. The average recovery of Protopine and Isocorydine is 97.9%, 98.6% respectively, and RSD 1.3%, 1.4%. *Dactylicapnos scandens*, and two aporphine alkaloids, (+) corydine (1) and (+) glaucine (2), were discovered in the roots and identified using UV, IR, MS, and ¹H NMR spectroscopy. Alkaloids from *D. scandens* were separated using equipment with an adjustable length of the separation column and it was found that, 1.0 g of the crude extracts yielded 70 mg of protopin, 30 mg (+) corydine, 120 mg (+) isocorydine, and 40 mg (+) glaucine. HPLC determined the purity of each sample to be 99.2%, 96.5%, 99.3%, and 99.5%, and the chemical structures of these compounds were supported by successful ESI-MS and ¹H NMR results. The antidermatophytic and antibacterial activity of *D. scandens* tuberous root is due to crude alkaloids extract. The crude alkaloids extract was tested against seven fungi, including *Candida albicans*, *Trichosporon beigelii*, *Trichophyton rubrum*, *Trichophyton tonsurans*, and *Microsporum gypseum*, as well as four bacteria, including *Bacillus mycoides* and *Escherichia* spp. The researchers have discovered that the crude alkaloids extract displayed antibacterial activity against all infections tested. Although the percentage of growth inhibition varied from species to species, a maximum of 53.13% inhibition was seen against *T. mentagrophytes*. Research revealed the potential for broad range antibacterial action in *D. scandens*, which could be investigated for the potential for pharmaceutical uses.

Importance and uses

All around the world, there is a “renaissance” of herbal use as a result of the return of herbs. Contrasted with synthetics, which are viewed as hazardous to both humans and the environment, herbal products today represent safety. Despite the fact that herbs had been valued for their therapeutic, flavouring, and aromatic properties for ages, their significance was briefly eclipsed by modern synthetic products. *D. scandens* has been

used traditionally as an important ethno-medicinal plant by certain tribal communities of North-East India and Nepal. The extract of the plant is prescribed as remedy against fevers, high blood pressure, high sugar levels, gastrointestinal disorders and as diuretic. The leaves of the plant are taken as raw for asthma problem and paste is applied on cut and injury to control bleeding and for wound healing. The paste made from the crushed root tuber is applied to get relief from tooth ache. Some tribes of Arunachal Pradesh use the paste from the fresh tuber in snake bite and the powder prepared from dried tubers is used in gastric problem. In Nepal, the plant is fed to animals as an anthelmintic medicine and is also used in religious ceremonies such as Shradda (rituals and offering to the dead). Plant is used to treat dysentery and its juice extract is also used to treat fever and is applied to treat wounds between the toes brought on by repetitive barefoot walking in muddy water during rainy seasons.

SUMMARY

This vine known as ‘Yellow bleeding heart’ due to the large yellow heart shaped flower gives ornamental and medicinal appeal in Himalayas. All parts are toxic and also cause skin irritation. It is used in morden, pharmacological, ayurvedic and homeopathic medicines from long ago. This ethno-medicinal plant is used to treat various inflammations and tumours by several tribes of India, Nepal and China. It is used for animals as an anthelmintic medicine, to treat wounds, fevers, high blood pressure, high sugar levels, urinal and gastrointestinal disorders. However, much needs to be investigated with respect to safe herbal raw drugs production and bringing it under cultivation.

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