

Short Communication**MORPHOLOGICAL STUDY AND MEDICINAL IMPORTANCE OF *CLERODENDRUM INFORTUNATUM* GAERTN. (VERBENACEAE), FOUND IN TADOBA NATIONAL PARK, INDIA**

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Clerodendron infortunatum Gaertn (Verbenaceae) is an important and widely used medicinal plant, reported to contain active bitter substance like clerodin, has been widely used as tonic and ant-helmintic agent in the countrysides of North India. Though, variously used in Ayurveda, Unani system of medicine and Homeopathy in case of ailments like diarrhea, skin disorders, venereal and scrofulous complaints, wounds, post-natal complications, as vermifuge, laxative and cholagogue, for the removal of ascarids in anus, as external applications on tumours, etc., the plant needs thorough investigation for its specific medicinal activity. Leaves and roots are used for external applications on tumours are due to the presence of Clerodolone, Clerodone,

Clerodol and a sterol now designated as Clerosterol. Leaves and root extract is useful for the treatment of fresh wound. Percentage of haemoglobin increased due to leaf extract. Pile patient treated with leaf extract gives considerable relief. Sugar percentage reduced in diabetic patient. Slightly warm leaves applied with edible oil on the painful part of human body gives considerable relief within twelve hours. Seven sugars namely raffinose, lactose, maltose, sucrose, galactose, glucose and fructose were also identified from root extract. Pollen viability was assessed on the basis of hanging drop method. Reproductive success was assessed on the basis of fruit and seed set

Key words: *Clerodin, Clerodendron infortunatum, Clerodolone, Clerodone, Clerodol Clerosterol,*

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INTRODUCTION:

The genus *Clerodendrum* (*verbenaceae*) is widely distributed in the tropical and subtropical regions of the world with few species extending into the temperate regions. The species number has been estimated to be five hundred sixty (Moldenke, 1971) and five hundred eighty (Munir, 1989). The genus was first described by Linnaeus in 1753, based on the type species *Clerodendrum infortunatum* from India. In 1763, Adanson changed the Latinized form *Clerodendrum* into Greek form *Clerodendron*. In 1942, Moldenke re-adopted Linnaeus original Latinized form, and practiced has been followed by most taxonomists. (Hsiaosm,1995)

Clerodendrum infortunatum Gaertn. is synonymous to *Clerodendrum viscosum* Vent. belongs to family Verbenaceae, found along margin of evergreen to semi-evergreen forests up to 1800 m. and distributed in the Indomalaysia, throughout Western Ghats. It is large shrubs or small trees ca. 4 m tall. Branchlets are quadrangular, fulvous and tomentose. The leaves simple, opposite, decussate; petiole 2.5-8 cm long, terete, fulvous tomentose; lamina 7-17 (-23) x 7.5- 15 cm, broad elliptic-ovate or suborbicular, apex acuminate, base cordate, margin entire or dentate, subcoriaceous, fulvous tomentose; midrib raised with tomentose above; 5-7-nerved at base; secondary_nerves ca. 2-3 pairs; tertiary_nerves distantly and horizontally percurrent. Inflorescence terminal panicle, up to 18 cm long, fulvous pubescent; flowers zygomorphic, white. Fruit is drupe black, nearly globose seated on enlarged pinkish accrescent calyx.

Clerodendrum infortunatum Gaertn is known in Ayurveda by the Sanskrit names “Bhargi”, “Bhrigubhava”, “Padma”, “Fanjji” and “Brahman yastika” (Shashtri, 1977), as “peruvelam” in Kerala, and in Hindi as “Bhant” or “Bharangi”. *Clerodendron infortunatum*, Gaertn. is a common shrub of 2-4' height (Fig.1) found along roadsides in North India and elsewhere, and, flowering during February-May (Haines, 1925) with protandry. The plant has extra-floral nectaries on the petiole and calyx. The attracting smell generated during evening hours suggests that the plant may probably be

pollinated by a moth or some related insect species. However, reddening of calyx after maturity indicates some intricate mechanism of pollination.

Clerodendrum infortunatum Gaertn. is an important medicinal plant and its leaves are used as bitter tonic, vermifuge, laxative and cholagogue. Fresh leaf juice is introduced in the rectum for the removal of ascarids. Leaves and roots are used for external applications on tumours are due to the presence of Clerodolone, Clerodone, Clerodol and a sterol now designated as Clerosterol. Seven sugars namely raffinose, lactose, maltose, sucrose, galactose, glucose and fructose were also identified from root extract. (M. Manzoor-Khuda and S. Sarela). In spite of its importance and wide distribution no information is available on its reproductive biology, particularly pollination biology. This communication presents the result of studies on reproductive biology of *Clerodendrum infortunatum* Bhat. The primary objectives were to study floral phenology, identify effective pollinators and to investigate pollination efficiency, breeding system, reproductive success and medicinal importance

Studies were carried out during (January to March 2010) the peak of flowering on the population growing on Anandwan farm near Worora, located about 100km from Nagpur, Maharashtra. The comparative studies were also carried on another population growing about 45km away from this population. To study floral phenology, the flower buds that would open the next day were tagged and were kept under observation (every hour on the first day and every morning, noon and evening on subsequent days until senescence) to record the time of anthesis, anther dehiscence and structural changes associated with aging of flowers.

Pollen viability was assessed on the basis of hanging drop method. Pollen samples were collected in the morning from freshly opened flowers and maintained under laboratory conditions for viability each day until they lost viability completely.



Fig.1 Plant of *Clerodendron infortunatum* Gaertn. (Plant in flowering condition)



Fig.2: Plant of *Clerodendron infortunatum* Gaertn. (Plant showing initiation of floral buds)



Fig.3: Plant of *Clerodendron infortunatum* Gaertn. (Plant showing blooming)



Fig.4: Plant of *Clerodendron infortunatum* Gaertn. (Plant showing flower with pollinators)

Initial observations revealed that several insects visit the flowers throughout the day from 0600 to 1800 h. The frequency of visits and foraging time were continuously recorded from 0600 to 1800 h for three days (36 h of total) (Fig. 3) Reproductive success was assessed on the basis of fruit and seed set. As the bracts, bracteoles and sepals are persistent and continue to be green until all the flowers in the inflorescence have opened and the fruits have reached maturity, it was possible to count, from the older inflorescences, the number of flowers produced and the number of fruits developed from each inflorescence. The per cent fruit set under field conditions was calculated by counting the total number of flowers produced in each inflorescence ($N = 30$) and the number of fruits developed. The fruits were excised when they started turning brown and the number of seeds was counted.

Reported medicinal properties:

In present study it was reported that the leaves and root extract is useful for the treatment of fresh wound caused due to sharp knife. Some of the anemic patients treated with fresh juice of leaves and it was reported that percentage of haemoglobin increased considerably in their blood. Leaves extract is also found to be useful in the pile patient. It was also experimentally proved that sugar percentage reduced in diabetic patient. Slightly warm leaves applied with edible oil on the painful part of human body gives considerable relief within twelve hours. The leaves and root of the plant are employed externally for tumours and certain skin diseases, and internally as tonics (Maisch, 1885). The root is useful in venereal and scrofulous complaints. In Indian homeopathy, it is used as a remedy for diarrhea, post natal care, and also to dress fresh wounds (<http://www.keralaayurvedics.com/>).

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Leaves are used as bitter tonic, vermifuge, laxative and cholagogue. Fresh leaf juice is introduced in the rectum for the removal of ascarids. Leaves and roots are used for external applications on tumours (<http://www.naturemagics.com/ayurveda/>). The juice of the leaves is also believed to possess distinct anthelmintic properties (<http://www.lankachronicle.com>).

Recent scientific studies:

Clerodendron infortunatum extract showed activity against microorganisms such as *Staphylococcus aureus* (S. aur), *Bacillus subtilis* (B sub), *Enterobacter faecalis* (E. fae) and *Mycobacter phlei* (M. phlei) (Rajakaruna *et al.*, 2002). Roy *et al.* (1996) reported antifungal activities of the plant extract. Jirovetz *et al.* (1999) attempted to study active principles in essential oil content of the leaves and bark of the plant. A diterpenoid *Clerodin* (C₁₃H₁₈O₃) was successfully extracted from the plant, and, it is supposed to be the main active compound that may interact with some target molecules of the human system (Barton *et al.*, 1961)

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