

A Review on *Euphorbia neriifolia* Plant

Chinmayi Upadhyaya* and Sathish S.

Department of Pharmacology, Srinivas College of Pharmacy,
Mangalore, Karnataka, India.

ABSTRACT

Plants have always been an asset as being used as medicinal plants for the treatment of various diseases. One such plant is *Euphorbia neriifolia* with poisonous milky white latex. The review aims to renew the knowledge about the plant, *Euphorbia neriifolia*, its distribution, uses, harmful effects, chemical constituents, etc.

INTRODUCTION

Medicinal plant usage is as old as humankind in the therapeutics. There are about 45,000 medicinal plants species in India. The officially documented plants with medicinal potential are 3000 but traditional practitioners use more than 6000. Indian holy books, Vedas do mention about use of medicinal plants in the treatment of illness. This concept has acquired renewed interest in the recent times, as herbal preparations are increasingly being used in both human and animal healthcare systems. Throughout our evolution, the importance of natural products for medicine and health has been enormous. Since our earliest ancestors chewed on certain herbs to relieve pain, squeezed the leaves to allow its juice to flow through the injuries, or wrapped leaves around the wounds to improve healing, natural products have often been the unshared means to treat diseases and injuries. In fact, it has only been during the past decades that natural products have taken a secondary role in drug discovery and drug development, after the advent of molecular biology and combinatorial chemistry made possible the rational design of chemical compounds to target specific molecules. 252 drugs are considered as basic and essential by the World Health Organisation (WHO) and out of those 11% are exclusively of plant origin and a significant number are synthetic drugs obtained from natural precursors.

Euphorbiaceae, the spurge family, comprises some 7,500 species and 275 genera of flowering plants distributed primarily in the tropical regions¹. The largest genus of family Euphorbiaceae is *Euphorbia* with about 1600 species. They range from annual weeds to

trees. It is characterized by the presence of white milky latex that exudes when broken and which is more or less toxic². The Euphorbias are named after a Greek surgeon called Euphorbus. He was physician of Juba II who was the Romanised king of a North African kingdom, and is supposed to have used their milky latex as an ingredient for his potions. *Euphorbia neriifolia* (Indian Spurge tree, Hedge Euphorbia), is one of the different species of Euphorbia genus plants, with wide range of local medicinal uses throughout the areas in which it is grown. They all have latex and a unique flower structure. A significant percentage is succulent, but they are mostly originating from Africa and Madagascar.

PLANT PROFILE

Synonyms: *Ligularia Rumph*, Five-tuberclad spurge, Hedge euphorbia, Indian spurge tree, Milk spurge, Oleander leafed spurge, *Euphorbia ligularia* Roxb, Snuhi, Sehund tree.

Botanical name: *Euphorbia neriifolia*,

Family: Euphorbiaceae

COMMON NAMES³:

San: Snoohi, vajra, vijri, patrasnuk, svarasna, Upavisha.

Hindi: Sehund, Sij, Patton-ki-send, Thohar

Ben: Mansasji, Hij-daom, Patasij

Tel: Akujimudu

Eng: Common milk hedge

Arab: Dih Minguta

Burm: Thasaung, Thazavn-mina

Kannada: Elekali, Muru kanina kalli

Gujarathi: Bhungara thor

Tamil: Ilai-k-kalli

Malayalam: Kalli, Kaikalli

Scientific classification:

Kingdom	: Plantae
Subkingdom	: Tracheobionta (Vascular plants)
Superdivision	: Spermatophyta (Seed plants)
Division	: Magnoliophyta (Flowering plants)
Subfamily	: Euphorbioideae
Tribe	: Euphorbieae
Class	: Magnoliopsida (Dicotyledons)
Subclass	: Rosidae
Order	: Malpighiales

DISTRIBUTION

Euphorbia neriifolia grows widely around the dry, rocky and hilly areas of north, central and south India. *Euphorbia neriifolia* Linn (Euphorbiaceae) is found throughout the Deccan Peninsula of India. It is indigenous plant of South Asia, but now locally cultivated and naturalising in Srilanka, India, Burma (Myanmar), Bangladesh, Thailand and throughout the Malaysian region except for Borneo; also occasionally cultivated in other topical regions⁴. It is also found in E. Asia – S. China, Vietnam, and New Guinea.

BOTANICAL DESCRIPTION⁴

Euphorbia neriifolia, is a xerophytic, erect, prickly, succulent, fleshy, large, much branched shrub, which sometimes grows into a small tree of 2-6 metres height or more with rounded branches. The tree looks somewhat like a cactus.

Stem: Green and cylindrical stem and large branches also being round and terete, spiral ridge portion, Sharp stipular thorns, with hollow space in centre containing white reticulate mass. The younger branchlets are somewhat verticillate, with two or more whorls without articulations, fleshy, cactus-like, swirled, light-

green, glabrous, 8-30(-40) mm thick, often leafless, and spine shield in 5 distinct rows on more or less distinct angles (not winged) which are visible for a long time.

Stipular thorns: The spines are short, about 1-4mm long, grayish brown to black in color, sharp, persistent, from low conical truncate distant, spirally arranged tubercles 2-5 mm height and 2-3 cm apart.

Leaves: plant is leafless for most part of the year, except during monsoon when fresh leaves appear. Apex rounded, base attenuated, margins entire, hairless, oval shaped leaves, fleshy, alternate, sub sessile, ovate, oblong or spatulate (5-)10-18(-30) cm long by (1.5-)3-4(-7.5) cm, are present towards the end of the branches. During vegetation period they are deciduous but in the late summer they fall.

Flowers: Both male and female flowers are found in the same bunch. 3 to 7 flowered cymes or panicles appearing laterally in the axils of the upper leaves on short, rigid and forked peduncles, Flattened-globose, 1.5-2 mm x 4-5 mm, reddish, prominent in groups of tree, the central one is subsessile, the lateral ones with a

peduncle of 6-7 mm, cyathial glands 5 oblong, 1-3 mm broad. Corolla absent but the involucre has two nearly round to ovate, bright red bracts 3-7 mm long. Inflorescence or the arrangement of flowers in a bunch on the plant is cyathium type (one female and several male flowers are found on a same bunch).

Fruits: Fruits (capsules) are three chambered or 3-lobed, smooth, 10-12 mm in diameter.

Phenology of flowers and fruits: They appear in different climatic conditions and can be seen only in February and March.



HARMFUL EFFECTS

The latex portion of the plant is actually regarded as the toxic part in the plant.

- The plant is poisonous and skin contact with the sap can cause blistering:

The milky latex or sap of Euphorbia species is found to be toxic and may cause intense inflammation of the skin and the eye. Ocular toxic reaction ranges from mild conjunctivitis to severe kerato-uveitis. Corneal involvement generally follows a typical sequence with worsening of edema with epithelial sloughing on the second day. It is believed that some species are more toxic than the others. Few cases have also been reported about the permanent blindness occurring due to the accidental inoculation of the *Euphorbia neriifolia* latex. When treated early and managed meticulously, the inflammation generally resolves without sequelae⁵.

- The leaves and roots is used as a fish poison⁵.
- The injection of the latex causes Irritation, Vomiting, Diarrhoea, Burning sensation in the abdomen, Convulsions and Coma. On contact with the skin there will be Burning of skin and vesication. There will be Inflammation of eye and temporally Blindness⁶.

Treatment for the person who has been come in contact with the latex can be washing the contact part with running water. It holds good even for the contact with the eyes.

The symptomatic treatment includes:

- On ingestion: Gastric lavage is recommended with normal saline or Activated charcoal.
- On contact: with the skin -Topical corticosteroids are used, with Eye-Antibiotic eye drops, Tears substitute, IOP (Intra ocular pressure) lowering medications.

The post mortem investigation showed the Signs of inflammation of contact part, gangrenous patches in the stomach and rotten spleen.

The medico-legal importance includes accidental poisoning, Homicidal and suicidal purposes, which are very rare and used for procuring criminal abortions.

CHEMICAL CONSTITUENTS

In one of the study, the hydroalcoholic extract of *E.neriifolia* was found to contain sugar, tannins, flavonoids, alkaloids, triterpenoidal saponins on preliminary phytochemical analysis. Several triterpenoids like Glut-5-en-3 β -ol, Glut 5(10)-en-1-one, taraxerol and β -amyryn have been isolated from the powdered plant, stem and leaves of *E. neriifolia*. Antiquorin has been

isolated from ethanolic extract of fresh root of *E. neriifolia*. Neriifolione, a triterpene and a new tetracyclic triterpene named as nerifoliene along with euphol were isolated from the latex of *E. neriifolia*⁷. Latex portion was found to contain Euphol, neriifoliol, neriifolene, Euphorbon, Resin, gum, caoutchouc, malate of calcium, etc. Euphol, monohydroxy triterpene, neriifoliol, taraxerol, beta- amyriol, glut-5-(10)-en-1-one, neriifolione, cycloartenol. Phytochemical investigations on *Euphorbia neriifolia* yielded in the isolation of several classes of secondary metabolites, many of which expressed biological activities such as triterpenes(neriifolione) flavonoids and steroidal saponins. *E.neriifolia* predominantly contains sugar, tannins, flavanoids, alkaloids and triterpenoidal saponin. 9,9-cycolanost-20(21)ene-24-ol; 8,24-euphadien-3 beta-ol-3-one(neriifolione)⁸. Fresh latex yields 10.95% solid with 18.32% total resinous matter, and 24.50% and 16.23% of total diterpene and triterpene respectively. Euphorbon, resin, gum, caoutchouc, malate of calcium.

CULTIVATION NEEDS

Needs full exposure to the sun but can also succeed to grow in light shade. They prefer rocky areas for the growth. They need well drained soil. Grows well in dry place and rocky area⁹.

TRADITIONAL USES

- The vaidhyas from ancient times used to use the milky juice exuded from the injured stems as drastic cathartic and to relieve earache. They are used as a drastic purgative in the enlargement of liver and spleen, syphilis, dropsy, general anasarca, leprosy, etc. It has been found beneficial for Asthma³. The method as found by a Ayurvedic doctor is by the prepared succus consisting of equal parts of the juice of this plant and simple syrup; administered in doses of 10 - 20 drops three times a day; has been found to relieve asthma attacks completely. In fact people in the villages use it as a home remedy for treating Asthma. Normally, as found by the survey, Asthma patients take the latex by mixing it with honey.
- Juice mixed with ghee is given in syphilis, in visceral obstructions and in spleen and liver enlargements due to long continued intermittent fevers.

Externally the juice is applied to remove warts³.

- Juice is largely used with clarified or fresh butter as an application to unhealthy ulcers and scabies. When applied to glandular swellings it prevents suppuration. Mixed with Margosa oil it is applied to rheumatic limbs. Turmeric powder mixed with the juice of *Euphorbia neriifolia* is recommended to be applied on piles. Thread steeped in the above mentioned mixture is used in ligaturing external Haemorrhoids³.
- Root- bark boiled in rice-water and arrack is given in dropsy³. Root mixed with black-pepper is employed in scorpion- stings and snake bites, both internally and externally. The stem is roasted in ashes and the expressed juice with honey and borax is given in small doses to promote expectoration of phlegm. Pulp of the stem mixed with fresh ginger is used to prevent hydrophobia.
- *Euphorbia* is an herb. The parts of the plant that grow above the ground are used to make medicine. *Euphorbia* is used for breathing disorders including asthma, bronchitis, and chest congestion. It is also used for mucus in the nose and throat, throat spasms, hay fever, and tumors. Some people use it to cause vomiting. In India, it is also used for treating worms, severe diarrhea (dysentery), gonorrhoea, and digestive problems.
- The tribal population of Chattishgarh region uses the milky latex as an ingredient of aphrodisiac mixture. The juice of the plant is used in Gujarat for smearing cuts made by tapers on *Borassus flabellifer* (Linn) in order to prevent the palm from the attack of red weevil. Stem or leaf juice is used in case of cough and cold mixed with honey.
- *E. neriifolia* latex is one of the constituents of "Kshaarasootra", which is used in Indian medicine to heal anal-fistula. A multicentric randomized controlled trial carried out by Indian Council of Medical Research revealed that the long term outcome with "Kshaarasootra" was better than with the surgery offering an effective, ambulatory and safe treatment for patients with fistula-in-ano¹⁰.

PHARMACOLOGICAL USES

- Plants are bitter laxative, carminative, improves appetite, useful in abdominal troubles, bronchitis, tumors, leucoderma, piles, inflammation, enlargement of spleen, anemia, ulcers, fever and in chronic respiratory troubles.
- In a study, *E. neriifolia* leaf extract was found to be a potent analgesic, anti-inflammatory, mild CNS depressant, wound healing activity along with humoral and cell mediated immunostimulating activity. *E. neriifolia* reduced serum lipid profile and glucose signifying catabolic property with added in vivo and in vitro antioxidant activity¹¹.
- The bark has been used as a strong purgative. The root is considered antiseptic. Mixed with black pepper, it is employed in the treatment of snake bites both internally and externally.
- The leaves are diuretic. The leaves are heated, squeezed, and the sap taken, sometimes with salt, to treat asthma; wheezing in babies; colds; and stomach upset. The leaves are also used to treat fevers, coughs and colds, and diabetes. Applied externally, the sap is used to treat infected nails and to relieve earaches¹².
- The latex also reported its oral efficacy and safety on adjuvant arthritis. In a 14-day repeated dose subacute toxicity study, the drug showed to possess striking anti-arthritic activity¹³.
- Water soluble fraction of *E. neriifolia* latex was evaluated for wound healing activity in guinea pig. *E. neriifolia* latex showed increase in collagen and DNA content improving the tensile strength¹⁴. It also showed increased epithelization and angiogenesis indicating potential wound healing property. There is report of its anti-inflammatory and antiarthritic activity of a novel triterpene (Nerifolione) isolated from the latex of *E. neriifolia* along with total extract of latex in acetone.
- Antibacterial effect was found in the ethanol and chloroform extract of *E. neriifolia* when was tested against the organisms and it was believed to be due to the presence of tannins and flavonoids which have been shown to possess antibacterial properties¹⁵.
- Analgesic and Anti-inflammatory study had been carried out on the hydroalcoholic leaves extract of *E. neriifolia* using tail flick method and the Carrageenen induced hind paw edema method, which had led to the confirmation of the analgesic and anti-inflammatory activity of *E. neriifolia*¹⁶.
- *E. neriifolia* leaf extract was found to be mild depressant on central nervous system at higher doses. *E. neriifolia* leaf extract at 400 mg/kg dose potentiates pentobarbitone-induced duration of sleep. Leaf extract did not have any motor incoordination or ataxia on muscle grip performance in mice effect in rota rod test and showed statistically insignificant reduction in locomotor activity. The elevated plus-maze introduced by Lister for mice is based on the apparent natural aversion of rodent to open and high spaces which forms the basis for its use in the measurement of anxiety as well as short-term memory. *E. neriifolia* at 400 mg/kg dose exhibited pronounced antianxiety activity by significantly increasing preference to open arm per cent number of open arm entries and per cent time spent in open arm. The results of the present study showed that the mice spent a significantly higher time in the open arm and also entered them more frequently signifying the anti-anxiety activity¹⁷.
- The EN extract significantly restored the antioxidant enzyme level in the kidney and exhibited significant dose dependant protective effect against DENA induced nephrotoxicity, which can be mainly attributed to the antioxidant property of the extract. This study paid way for the use of EN for protection against renal cancer¹⁸.
- The extract of EN leaves possesses antioxidant properties and could serve as free radical inhibitors or scavengers, acting possibly as primary antioxidants¹⁹.

REFERENCES

1. The Editors of Encyclopaedia Britannica. List of plants in the family Euphorbiaceae. Encyclopaedia Britannica. School and library subscribers. 2015.

2. The Wealth of India (Raw material). New Delhi: Council of Industrial and Scientific Research.2005;3..
3. Dr. K.M. Nadkarni, Indian material medica, Bombay popular prakashan publications. I: 524-526.
4. Medicinal and poisonous plants.Plant resources of South- East Asia No. 12(1): 1.
5. Samar K Basak, Partho K Bakshi, Sabitabrata Basu, Soham Basak. Keratouveitis caused by *Euphorbia* plant sap. Indian J of Ophthalmology. 2009;57(4): 311–313.
6. Modi's Medical Jurisprudence and Toxicology. Lexis Nexis Butterworths. 2013;24: 148.
7. Murali Krishna C , Gupta V , Bansal P , Kumar S , Sannd R , Narayana. A Review On Plants Mainly Used For The Preparation Of Kshar Sutra, International J of Ayurvedic medicines.
8. Shaikh Arshad A, Sayyed N, Shaikh Siraj, Patel M. Siddik, Chavda Ab. Wahid.Euphorbia neriifolia linn, A phytopharmacological review. IRJP. 2011;2(5):41-48.
9. Whistler. W. Arthur. Tropiocal ornamentals; a guide. Timber Press Inc. Oregon.2000: 0-88192-448-2.
10. ICMR report. Multicentric randomized controlled clinical trial of Kshaarasootra (Ayurvedic medicated thread) in the management of fistula-in-ano. Indian J of Medical Research (B). 1991; 94: 177-185.
11. Rasik A.M, Shukla A, Patnaik B.N, Dhawan D.K, Srivastava K.S. Wound healing activity of latex of *Euphorbia neriifolia*. Indian J of Pharmacology. 1996; 28: 107-109
12. P. Bigoniya, A.C. Rana. Subacute Effect of *Euphorbia neriifolia* Linn. On Hematological, Biochemical and Antioxidant Enzyme Parameters of Rat. Academic Journal of Plant Sciences. 2009;2 (4): 252-259.
13. Robert A. DeFilipps, Shirley L. Maina and Juliette Crepin. Medicinal Plants of the Guianas (Guyana, Surinam, French Guiana). Smithsonian Museum publications.2004.
14. Amin KMY, Faridi MA, Asif M, Khan NA. The efficacy and safety of *Euphorbia neriifolia*– Unani antiarthritic drug. Indian J of Pharmacology 1995; 27: 60.
15. Kumara swamy M., Neeraj Pokharen, Santosh Dahal and Anuradha M. Phytochemical and antimicrobial studies of leaf extract of *Euphorbia neriifolia*. Journal of Medicinal Plants Research. 2011; 5(24): 5785-88.
16. Kalpesh Gaur, A. C. Rana,R. K. Nema, M. L. Kori,C. S. Sharma. Anti-Inflammatory And Analgesic Activity Of Hydro-Alcoholic Leaves Extract Of *Euphorbia Neriifolia* Linn. Asian Journal of Pharmaceutical and Clinical Research. 2009; 2: 26-29.
17. Papiya Bigoniya & A C Rana. Psychopharmacological profile of hydro-alcoholic extract of *Euphorbia neriifolia* leaves in mice and rats. Indian Journal of Experimental Biology. 2005;43: 859-862.
18. Pracheta Janmeda, Veena Sharma, Lokendra Singh, Ritu Paliwal,Sadhana Sharma Sachdev Yadav, Shatruhan Sharma. Chemopreventive Effect Of Hydroethanolic Extract Of *Euphorbia Neriifolia* Leaves Against DENA-Induced Renal Carcinogenesis In Mice. Asian Pacific Journal of Cancer Prevention.2011;12: 671-682.
19. Pracheta,Veena Sharma, Ritu Paliwal,Sadhana Sharma. In Vitro Free Radical Scavenging And Antioxidant Potential Of Ethanolic Extract Of *Euphorbia Neriifolia* Linn. International Journal of Pharmacy and Pharmaceutical Sciences.2011;3: 238-248.