



REVIEW ARTICLE

A Review on Pharmacognostical and Pharmacological Prospective *Euphorbia thymifolia* L.

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ABSTRACT:

Euphorbia thymifolia L. (*Euphorbiaceae*) is a small branched, hispidly pubescent, prostrate annual herb, commonly known as *laghududhika* or *choti-dudhi*. The leaves, seeds and fresh juice of whole plant are used in worm infections, as stimulant, astringent. The use of plant extracts to cure many diseased conditions has been the traditional method in many parts of the world. The plant extracts are found to be effective in their mode of action and do not cause any side effects to the patient treated. Many plants and trees are found to have various medicinal values and among all the plants found all over the world many plants are found in India.

Keywords: *Euphorbia thymifolia* L., Pharmacological activity.

INTRODUCTION:

Euphorbia thymifolia L. is belong to family Euphorbiaceae, commonly known as 'Rati -Dudheli'. It is an annual hairy plant. It is rich in waste places over the roadsides and also available open grasslands. The *Euphorbia thymifolia* L. have been documented to be able to include saponins, alkaloids, flavonoids, tannins phenolic acids and amino acids¹⁻². *Euphorbia thymifolia* L. is a prostrate annual plant producing stems up to 25cm long. The stems usually produce numerous adventitious roots. The plant is a very popular medicinal herb in much of Africa and also in many

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other areas of the tropics. It is commonly harvested from the wild and is also sold in local markets. *Euphorbia thymifolia* is commonly known as laghududhika or choti-dudhi³.

Classification

Kingdom: Plantae

Division: Magnoliophyta

Class: Rosopsida

Order: Euphorbiales

Family: Euphorbiaceae

Species: *Euphorbia thymifolia* L.



Figure 1: *Euphorbia thymifolia* L

Synonyms

Euphorbia thymifolia L. also Known as Chamaesyce thymifolia, Dudhi, Dugdhikaa, Naagaarjuni and Swaaduparni⁴. *Anisophyllum thymifolium* (L.) Haw, *Aplarina microphylla* (Lam.) Raf, *Euphorbiathymifolia* F. *laxifoliata* Chodat and Hassl, *Ephedra foliata* Buch.-Ham, *Dillwyn*, *Epipactis microphylla* Lam.; *E. rubicunda* Blume, *E. rubrosperma* Lotsy, *Chamaesyce microphylla* (Lam.) Soják; *C. rubrosperma* (Lotsy) Millsp, *C. thymifolia* (L.) Millsp⁵.

Plant description

Softly hispid prostrate herbs. **Stem** puberulous, slender, cylindrical, pale green but often pink in color when fresh, becoming grayish green or dark purplish on drying. Stems are with white latex, spreading on the ground, 10-20 cm in length with a diameter from 1 to 3 mm.

Branches radiating, slender, reddish and pubescent.

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Leaves are simple, opposite, elliptic, oblong or ovate, 4-8 mm long and 2-5 mm wide with rounded apex, oblique base, small, unequal sided at base. The petiole, 3-6 mm long, 2-4 mm wide, mostly green, but often coppery red when fresh, becoming grayish green or dark purplish on drying.

The **lamina** is oval-oblong or obliquely oblong.

Apex is obtuse or rounded. Margin is dentate towards apex and smooth towards the base and venation is reticulate. Petiole is small, thin, slender, pale green and often pinkish in color. Cyathia in axillary clusters. Involucre campanulate, 8 mm long; glands 4. Male flowers 1-4, ebracteolate. Female laterally pendulous; ovary tomentose; style 3-forked from base.

Fruits are ovoid-globose, acutely 3-lobed, almost sessile capsule 1 mm × 1 mm base truncate, short-hairy. They are cocci when mature.

Seeds are conical, log, ovoid and obtusely quadrangular, up to 1 mm long, acutely 4-angled, reddish brown without caruncle⁶.

Cultivation

A common weed of cultivated and waste ground, often on sandy or gravelly soils, at elevations up to 1,650 meters *Euphorbia thymifolia* grows very rapidly and completes its life cycle in 3 - 4 months; it can be found flowering and fruiting throughout the year in warm tropical conditions.

Chemical constituents

Plant contains an essential oil, flavonoids, n-alkanes, n-hexacosanol, two derivatives of deoxyphorbol acetate, ester, sterol, epitaraxerol, euphorbol, methylene cycloartenol, quercetin galactoside and a large number of hydrolysable tannins. Roots contain taraxerol, tirucallol and other sterols. Triterpenoids are organic compounds which are very diverse in their structure. 4,14-dimethylergosta-8, 24(28)-dien-3 β -ol present in the ethanolic extract of the *Euphorbia thymifolia*. Its structure was completely studied using ¹H, ¹³C-NMR and IR and also by using mass spectroscopy⁷.

Medicinal uses

Euphorbia thymifolia is traditionally used as a blood purifier, sedative, hemostatic; aromatic, stimulant, astringent in diarrhea and dysentery, anthelmintic, demulcent, laxative; and also in cases of flatulence, constipation; in chronic cough; as an antiviral in bronchial asthma and paronychia⁸⁻⁹. The dried leaves and seeds are given along with butter-milk to children in bowel complaints. Root is given in amenorrhea and gonorrhoea. The oil is used in medicinal soaps for the treatment of

erysipelas. Oil is also used as a spray to keep off flies and mosquitoes. It is also used as a vermifuge for dogs and farm foxes. The fresh plant is considered vulnerary and galactagogue, used in ophthalmic and other eye troubles, ardor, sores, atrophy, dysentery and breast pain⁶. The plant is widely used in Africa in decoction or infusion as a treatment for dysentery, enteritis, diarrhea and venereal diseases.

Pharmacological activities of *Euphorbia thymifolia*

Anti-microbial activity: *Euphorbia thymifolia* is considered to possess anti-microbial activity due to the presence of alkaloids. The microbes like *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Salmonella typhi*, *Staphylococcus aureus*, and *Klebsiella pneumonia* were tested to show the anti-microbial activity of *Euphorbia thymifolia*. These experiments show a great result by blocking the growth of the microbes¹⁰.

Hepatoprotective activity: The hepatoprotective activity along with anti-oxidant activity of ethanolic extract of *Euphorbia thymifolia* was determined. Carbon tetrachloride (CCl₄) is a hepatotoxin which damages the hepatocytes. When the extract of *Euphorbia thymifolia* is given to rats before treating them with CCl₄, showed to have hepatoprotective activity when CCl₄ is administered¹¹.

Anti-inflammatory activity: Anti-inflammatory activity was studied using ethanolic plant extract of carrageenan-induced rat paw edema method. The reduction in the edema was observed with the dose of 100 mg/kg body weight when compared to Indomethacin which is a standard drug (10 mg/kg) and thus the extract produced sufficient anti-inflammatory response¹².

Anti-oxidant activity: The anti-oxidant activity of *Euphorbia thymifolia* was studied using nitric oxide scavenging activity. Many anti-oxidants like beta-carotene, vitamin C, chlorophyll (a and b), tannins and phenolics are found to be present in the plant extract. The anti-oxidant activity was found in the ethanolic extract of *Euphorbia thymifolia*¹³.

Reported activity of *Euphorbia thymifolia* L.

S. No.	Topic	Author	Year	Work done
1.	Anti-stress activity of <i>Euphorbia thymifolia</i> L. aqueous root extract in female rats	Sivaprasad gudipudi, Dayanand subrao puranik, Ramoji alla, Upendranadh Thirupathi kistammagari	2015	Evaluated the anti-stress activity of aqueous extract of <i>Euphorbia thymifolia</i> root in treating female reproductive dysfunction induced by stress.
2.	Flavan-3-ol Isomers Isolated from <i>Euphorbia thymifolia</i> Linn	Sushma Kainsa, Randhir Singh	2016	Isolated Flavan-3-ol Isomers from <i>Euphorbia thymifolia</i> Linn Spectral analysis revealed compound (I) and (II) as catechin and epicatechin respectively. These compounds have been reported for the first time in this plant
3.	Assessment of <i>Euphorbia hirta</i> L. Leaf, Flower, Stem and Root Extracts for Their Antibacterial and Antifungal Activity and Brine Shrimp Lethality	Mohammad Abu Basma Rajeh, Zakaria Zuraini, Sreenivasan Sasidharan, Lachimanan Yoga Latha and Lanthanum Amutha	2010	Worked on antimicrobial activities of the methanolic extracts of <i>Euphorbia hirta</i> L. Leaves, flowers, stems and roots were evaluated against some medically important bacteria and yeast using the agar disc diffusion method.
4.	Antioxidant and Antiviral Activities of <i>Euphorbia thymifolia</i> L	Lin C.C. Cheng H. Y. Yang C.M, Lin T.C.	2002	Investigated the antioxidant and antiviral activities of <i>Euphorbia thymifolia</i> L. (Euphorbiaceae). The range of IC ₅₀ of anti-lipid

- formation, anti-superoxide formation and free radical scavenging assays for all fractions and pure compounds were 2.81–7.63, 0.03–2.18 and 0.013–2.878 mg/ml, respectively. Electron spin resonance studies showed that water extract and pure compounds of *E. thymifolia* exhibited superoxide radical and hydroxyl radical scavenging activities. Besides antioxidant activities, 3-*O*-galloyl-4,6-(*S*)-HHDP-*D*-glucose and EtOAc fraction also showed anti-HSV-2 activity.
5. Anti-inflammatory and anti-oxidant activities of ethanolic extract of *Euphorbia thymifolia* Linn whole plant Nagaraju Chinnalalaiah Nagaraju Potnuri and Ravi Kumar Pigili Garipelli, 2012 Runja, Nagaraju Potnuri and Ravi Kumar Pigili
- Evaluated of the antioxidant and antiinflammatory activity of the plant *Euphorbia thymifolia* Linn. The extract in the dose of 100 mg/kg body weight caused a comparable reduction in edema with that of standard drug, Indomethacin (10mg/kg) when evaluated for anti-inflammatory activity by carrageenan-induced rat paw edema method. The extract also inhibited Nitric Oxide free radical which was estimated by Griess's method which involves the use of griess reagent (1% Sulphanilamide, 2% Phosphoric acid and 0.1% Naphtyl ethylenediamine dihydrochloride).
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6.	Antihyperglycemic and Antinociceptive Activities of Methanolic Extract of <i>Euphorbia thymifolia</i> L. Whole Plant	Zhong Xi Yi Jie He Xue Bao	2012	Examined antihyperglycemic and antinociceptive activities of methanolic extract of the whole plant of <i>Euphorbia thymifolia</i> L., a plant used in folk medicine of Bangladesh for treatment of diabetes and pain. Antihyperglycemic activity studies were conducted in glucose-loaded mice by oral glucose tolerance tests.
7.	Phytochemical investigation and antitumour activity of <i>Euphorbia hirta</i> Linn	Sandeep B. Patil and Chandrakant S. Magdum	2011	Prepared ethanol, chloroform and pet ether extract of <i>Euphorbia hirta</i> L. showed the positive test for tannin, saponin, alkaloids, flavonoids. Antitumour activity of the aerial part of <i>Euphorbia hirta</i> L. has been evaluated against EL-4 cell line (S.C.) in Swiss albino mice. A significant enhancement of mean survival time and reduction of solid tumor mass of <i>Euphorbia hirta</i> L. treated tumour bearing mice was found with respect to control group due to the presence of flavonoids.
8.	Behavioral and neurotropic effect of an aqueous extract of <i>Euphorbia hirta</i> L.	Ladthers Marie-Glaire, Fleumntin Jacques, Mortier Frangoisz, Misslin, Caeml, IBN Pierre	1993	Conclude that the activity profile of <i>Euphorbia hirta</i> is different from that of benzodiazepine

Conclusion

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The current review reveals that, *Euphorbia thymifolia* was found to be having potent antihyperglycemic, antinociceptive, larvicidal, anti-HSV-2, antioxidant, anti-inflammatory, antibacterial, anthelmintic, and laxative activities. Presently few drugs that contain derivatives of *Euphorbia thymifolia* are available to cure diseases, but further research on the medicinal activity of this plant will further help in producing more useful drugs.

Reference

1. Hore SK, Ahuja V, Mehta G, Kumar P, Pandey SK and Ahmad AH. Effect of aqueous *Euphorbia hirta* leaf extract on gastrointestinal motility. *Fitoterapia*. 2006; 77: 35-38.
2. Mangathayaru K, Sravan K, Reddy PK, Kumar M and Sweta B, Reddy UC. In vitro antioxidant studies on the aerial parts of *Origanum majoram* Linn. *Artemesia sieversiana* earh, *Pharmacognosy Magazine*. 2007; 3(10): 90-94.
3. Nadkarni KM and Nadkarni AK. *Indian Materia Medica*. 2007; 1: 529.
4. Khare CP. *Indian medicinal plants*. 2007; 254.
5. Prabha T and Singh SK. Antioxidant activity of ethanolic extract of *Euphorbia thymifolia* Linn. *Indian J Pharm Sci* 2005; 67: 736-8.
6. Anonymous. *The Wealth of India (Raw Materials)*. New Delhi: CSIR; 2003; 3: 224-7.
7. Mali PY and Panchal SS. A review on phyto-pharmacological potentials of *Euphorbia thymifolia* L. *Ancient Science of Life*. 2013; 32(3): 165-172.
8. Ghani A. *Medicinal Plants of Bangladesh with chemical constituents and uses*. 2nd edition, Asiatic Society of Bangladesh, 5 old Secretariate roads, Nimtali, Dhaka, Banglades, 2002.
9. Warriar PK, Nambiar VP and Ramankutty C. *Indian Medicinal Plants: A Compendium of 500 Species*. Hyderabad: Orient Longman; 1995; 3: 6.
10. Sikdar M and Dutta U. Traditional phytotherapy among the Nath people of Assam. *Ethnomedizin* 2008; (2): 39-45.
11. Khare CP. *Indian Herbal Remedies: Rational Western Therapy, Ayurvedic and Other Traditional Usage*. Berlin: Springer Verlag; 2004; 210-1
12. Syed A, Thippeswamy BS, Kulkarni VH and Hegde K. Hepatoprotective effect of *Euphorbia thymifolia* whole plant extract on CCl₄ induced hepatic damage in rats. *International Journal of Research in Ayurveda & Pharmacy*. 2011; 2(2): 681-6.

13. Nagaraju G, Chinnalalaiah R, Nagaraju P and Kumar PA. Anti-inflammatory and antioxidant activities of ethanolic extract of *Euphorbia thymifolia* Linn, whole plant. Int J Pharm Pharm Sci. 2012; 4(3): 516-9.
14. Durai MG, Vijay AA and Manikandan R. Anti-oxidant, anti-helminthic and anti-microbial activity of *Euphorbia thymifolia* Linn whole plant. Int J Curr Microbiol App Sci. 2013; 2(1): 66-79.
15. Gudipudi S, Puranik DS, Ajarapu U and Kistammagari TR. Anti-stress activity of *Euphorbia thymifolia* L. aqueous root extract in female rats. International Journal of Pharma Sciences and Research.2015; 6(4): 640-644.
16. Kainsa S and Singh R. Flavan-3-ol Isomers Isolated from *Euphorbia Thymifolia* Linn. Pharmacogn. Commn. 2016; 6(1): 28-33.
17. Rajeh AB, Zuraini Z, Sasidharan S, Lachimanan YL and Santhanam A. Assessment of *Euphorbia hirta* L. Leaf, Flower, Stem and Root Extracts for Their Antibacterial and Antifungal Activity and Brine Shrimp Lethality. Molecules 2010; 15:6008-6018.
18. Lin CC, Cheng HY, Yang CM and Lin TC. Antioxidant and Antiviral Activities of *Euphorbia thymifolia* L. J Biomed Sci. 2002; 9:656–664.
19. Garipelli N, Runja C, Potnuri N and Pigili RK. Anti-inflammatory and anti-oxidant activities of ethanolic extract of *Euphorbia thymifolia* Linn whole plant. Int J Pharm Pharm Sci. 2012; 4(3):516-519.
20. Zhong X, Jie H and Xue B. Antihyperglycemic and Antinociceptive Activities of Methanolic Extract of *Euphorbia thymifolia* L. Whole Plants. 2012; 10(2):228-32.
21. Patil SB and Magdum CS. Phytochemical investigation and antitumour activity of *Euphorbia hirta* L. European Journal of Experimental Biology. 2011; 1(1): 51-56.
22. Marie-Glaire L, Jacques F, Frangoisz M and Caem M. IBN Pierre Behavioral and neurotropic effect of an aqueous extract of *Euphorbia hirta* L. Medicaments et Aliments. 1993; 298-302.