

A REVIEW OF THE ETHNOMEDICAL USES PHYTOCHEMISTRY AND PHARMACOLOGY OF THEEUPHORBIA MACULATA

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ABSTRACT

A review of the ethnomedical uses phytochem is try and pharmacology of the euphorbia maculate spotted spurge, prostrate spurge, milk purslane or spotted stammat is fast – growing annual plant these species was distributed throughout the world uses of the plants to treat diseases vary according To the population is found in poorly maintainel thinning turf and in newly established turf seeded in latespring or summer spurge plants are frequently found near ornamental beds or along side walk and are most noticeable during summer months.

KEYWORDS: Euphorbia maculate.

INTRODUCTION

Medicinal herbs are the local heritage with global importance they are used to treat several diseases of humans and animal. Branching stream of spotted spurge are pink or red and generally do not rise more than a few inches above the soil surface stems exude amilky whilky white sticky liquid. Leaves of spotted spurge showing opposite arrangement on pink stem milky while latex liquid oozing from recently severed spurge stems seeds are produced in small capsules and have sticky surfaces which can adhere toshoes and animal fur since then we note a large use of several species of spurge or namental and household plants and latex contributedto the economical importance of some species such as euphorbiaantisiphiliticazuce.^[1]

SYNONYMS

List

Anisophyllum maculatum (L.) Haw.
Chamaesyce jovetii (Huguet) Holub
Chamaesyce maculata (L.) Small
Chamaesyce pseudonutans Thell.
Chamaesyce supina (Raf.) H.Hara
Chamaesyce tracyi Small
Euphorbia depressa Torr. Ex Spreng.
Euphorbia jovetii Huguet
Euphorbia maculata var. detonsa Engelm. Ex Boiss.
Euphorbia maculata var. parvula Riddell
Euphorbia reichenbachiana Lojac.
Euphorbia supina Raf.

Tithymalus maculatus (L.) Moench
Xamesike depressa (Torr. Ex Spreng.) Raf.
Xamesike littoralis Raf.
Xamesike maculata (L.) Raf.
Xamesike supina (Raf.) Raf.^[2]

Kingdom: Plantae
Clade: Tracheophytes
Clade: Angiosperms
Clade: Eudicots
Clade: Rosids
Order: Malpighiales
Family: Euphorbiaceae
Genus: Euphorbia
Species: E. maculata
Binomial name
Euphorbia maculata
L.

TOXONOMY

Spotted spurge is amember of the
Family – Euphorbiaceae
Species – A very large and diverse group of plant
Kingdom – Plantae
Clade – Tracheophytes, Angiosperms, Eudicots, Rosids.
Order – malpighiales
Genes- Euphorbia
Species –Euphorbia maculate high as 30 centimetres 12 in



It likes warm consistent air temperature above 75°F genus Euphorbia. Which contained triterpenoids to study their chemical constituents and pharmacological activity.

Herein we describe the structural elucidation of the new Triterpenoids and the anti-inflammatory activity of the tetracyclic isolated triterpenoids.

LIFE CYCLE

It sounds like you're describing *Euphorbia maculata*, commonly known as spotted spurge. This plant is indeed a summer annual that thrives in warm weather. Its lateral growth and taproot make it resilient, while the sticky seeds allow for widespread distribution. Since the seeds remain dormant over the winter, the plant's life cycle

ensures it reemerges each summer. Spotted spurge can be a common weed in lawns and gardens, often hard to control due to its quick spreading.^[3]

IDENTIFICATION

Branching stems of spotted spurge are pink or red and covered with fine hairs. Stems grow close to the ground, and generally do not rise more than a few inches above the soil surface. When broken or punctured, stems exude a milky-white, sticky liquid. Leaves are small (about ½ to ¾ inches long and ¼ to ½ inch wide), oblong, dark green, often with a purple blotch in the center. Leaf margins are smooth or slightly serrated, and mostly rounded at tips. Leaves have short petioles and are arranged opposite one another on stems.^[3]



Figure 2. Leaves of spotted spurge showing opposite arrangement on pink stem. Note the purple blotch in the center of older leaves. Photo: Peter Landschoot, Penn State

Tiny pink and white flower clusters are formed in leaf axils on the upper portion of spotted spurge stems during mid to late summer. Clusters are made up of male and female flowers that are enveloped in a cup-like structure

called an involucre. Seeds are produced in small capsules and have sticky surfaces which can adhere to shoes and animal fur.



Figure 3. Milky-white latex liquid oozing from recently severed spurge stems. Photo: Peter Landschoot, Penn State



Figure 4. Flower clusters, seed pods, and involucres in leaf axils of spotted spurge. Photo: Peter Landschoot, Penn State

MICROSCOPY STUDY EUPHORBIA MACULATA L.

Sp. Pl. 455. 1753. *Thymuses maculatus* (L.) Moench, *Methodus*: 666. 1794. — *Anisophyllum maculatum* (L.) Haw., *Syn. Pl. Succ.*: 162. 1812. — *Xamesike maculata* (L.) Raf., *Autik. Bot.*: 97. 1840. — *Chamaesyce maculata* (L.) Small. *Fl. Southeast. U.S.* 713. 1903. *Euphorbia supina* Raf., *Amer. Monthly Mag. & Crit. Rev.* 2(1): 119. 1817. — *Chamaesyce supina* (Raf.) H. Hara, *J. Jap. Bot.* 16: 119. 1940. *Euphorbia depressa* Torr. *Ex Spreng., Syst. Veg.* 3: 794. 1826. *jovetii* Huguët, *Botaniste* 54: 153. 1971. — *Chamaesyce jovetii* (Huguët) Holub, *Folia Geobot. Phytotax.* 8: 176. 1973.

Prostrate pubescent annuals, usually much branched from the base; branches 10–45 cm long. Leaves subfalcately elliptic-oblong to linear-oblong, 4–15 × 1.5–5 mm, obtuse, asymmetrical at the base, serrulate; stipules

linear-lanceolate to linear or filiform, sometimes 2-3-partite, lacinate or fimbriate, 1.5 mm long. Glands transversely ovate, reddish-brown, with small, white or pinkish petaloid appendages. Capsules 1.5 mm diameter, sparingly adpressed-pubescent. Seeds 0.8–0.9 mm long, ovoid-quadrangular, transversely grooved, brown, ecarunculate.

Habitat: Naturalized as a weed in lawns, ornamental gardens, forests and roadsides.

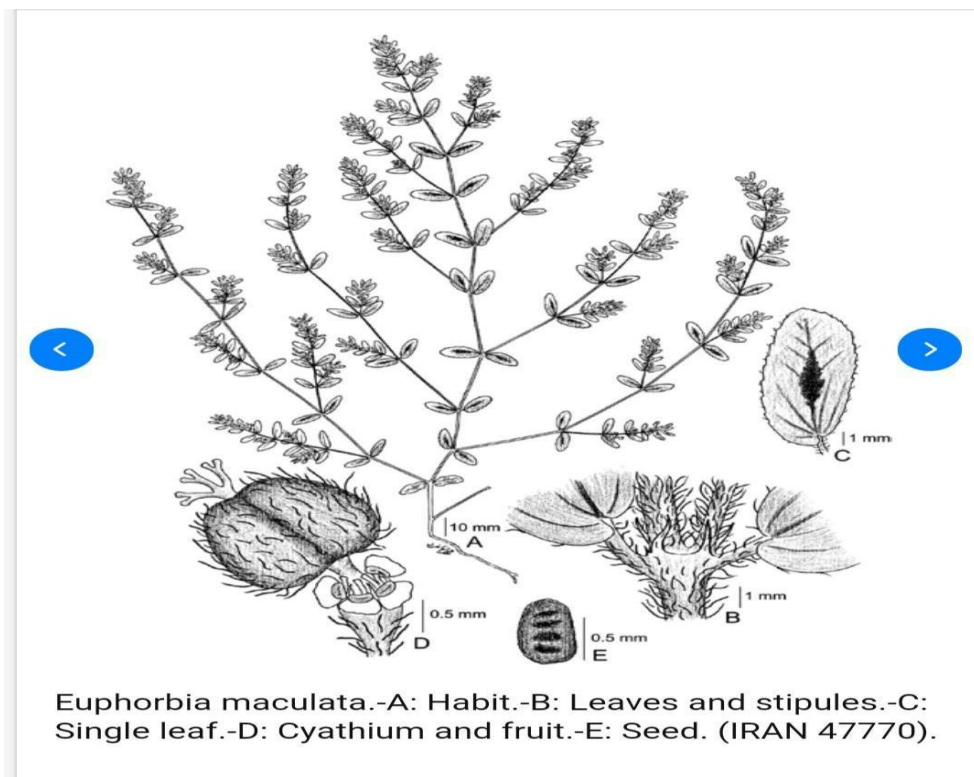
Geographical distribution: Americas (USA, SE Canada to Belize, Cuba, Bahamas) and introduced to many parts of the Old World such as

Europe (Austria, Azores, Bulgaria, France, Germany, Switzerland, Spain, Hungary, Italy) and Asia (Iran, Caucasus, China, Taiwan).

Origin: North America. Chromosome number $2n = 42$ (Queiros 1975, Benedi & Orell 1992).

Flowering and fruiting time: July–September. The species was recorded for flora of Iran From the Mazandaran Province (Nasseh *et al.* 2006); however, the species had already been Introduced to Iran about 35 years ago, but was Mistakenly identified as *E. turcomanica*.

Selected specimens examined. — Iran. Prov. Gilan, Talesh, Gisoum forest, Pahlevani & Amini Rad (IRAN 47770); Bandar-e Anzali, Mozaffarian (TARI 65236); Prov. Tehran, Karaj, Kalak, Pahlevani (IRAN 43577); Park-e Niavaran, Kiabi (IRAN 29515); Pasdaran street (Saltanat-abad), Termeh (IRAN 18187); Prov. Mazandaran, Ramsar, Chaboksar, Sabeti (TARI 7815); Prov. Golestan, W of Tanagerah, Akhani (Hb. Akhani 12237 (4)



ANTI INFLAMMATORY

The n-hexane extract of the whole plant of *E. maculata* inhibited the inflammatory ear oedema induced by tpa with the ID50 (50% inhibitory dose) value of 0.8MM.

All the tetracyclic triterpenoids were evaluated with respect to their anti inflammatory acitivity against TPA-induced inflammation in mice and the spotted spurge *emaculata* represents a group used by eclectics and homoeopaths with claims for properties more or less special. It has been used in cholera, diarrhcea and dysentery hematuris, in the form of an infusion of the leaves.

Then are ayurvedic treatment cough coryza bronchitis and asthma), pimles gonorrhoea digestive problems and tumors. Extracts of this plant has an antiplatelet B2 formation. Previous phytochemical investigations of *e. maculata* a yielded tanins flavonol glycoside and triterpenoids naturally occurring anti-inflammatory and anti HIV activities. Thus we chose the medicinal plants of and the inhibitory effects weve compared with indomethacin a commercially avialble anti-inflammatory drug

CHEMICAL CONSTITUENTS

maculata is a medicinal plant of the Euphorbiaceae family, which can produce anti-inflammatory and cancer chemopreventive agents of triterpenoids. The present study reports on the bioactive triterpenoids of this plant. Two new lanostane-type triterpenoids, named (3S,4S,7S,9R)-4-methyl-3,7-dihydroxy-7(8→9)abeo-lanost-24(28)-en-8-one (1) and 24-hydroperoxy-lanost-7,25-dien-3β-ol (2), together with 15 known triterpene derivatives, were isolated from *Euphorbia maculata*. The structures of the new compounds were determined on the basis of extensive spectroscopic data (UV, MS, 1H and 13C-NMR, and 2D NMR) analysis. All tetracyclic triterpenoids (1–11) were evaluated for their anti-inflammatory effects in the test of TPA-induced inflammation (1 μg/ear) in mice. The triterpenes exhibited significant anti-inflammatory activities.

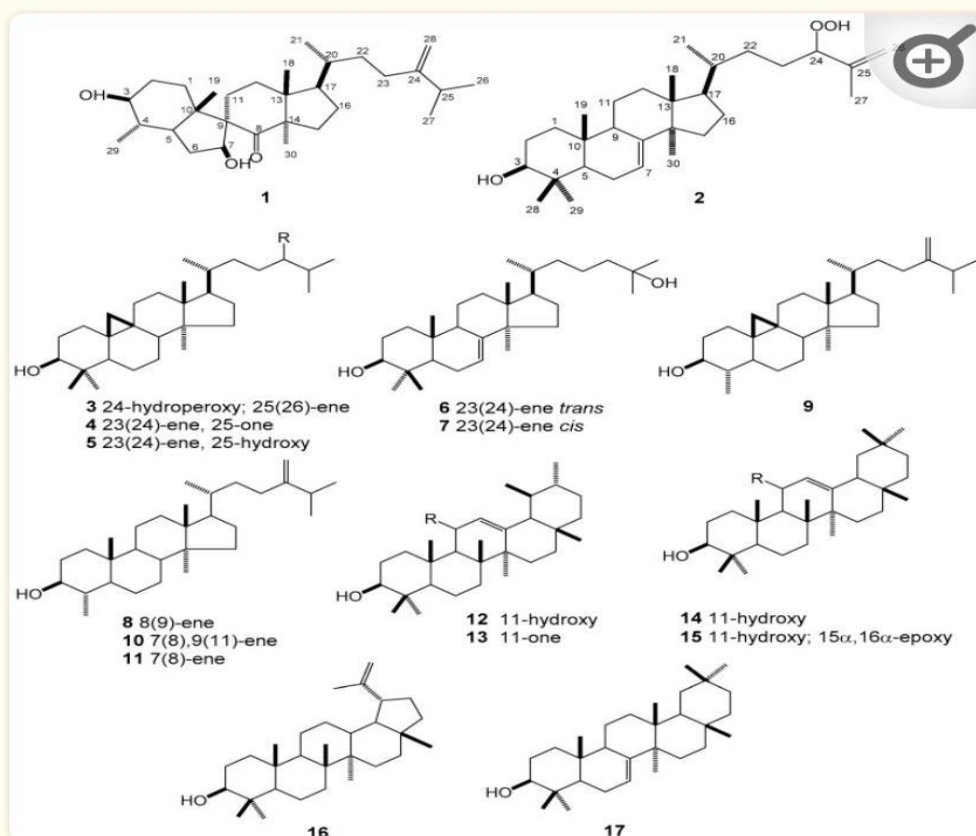


Figure 1

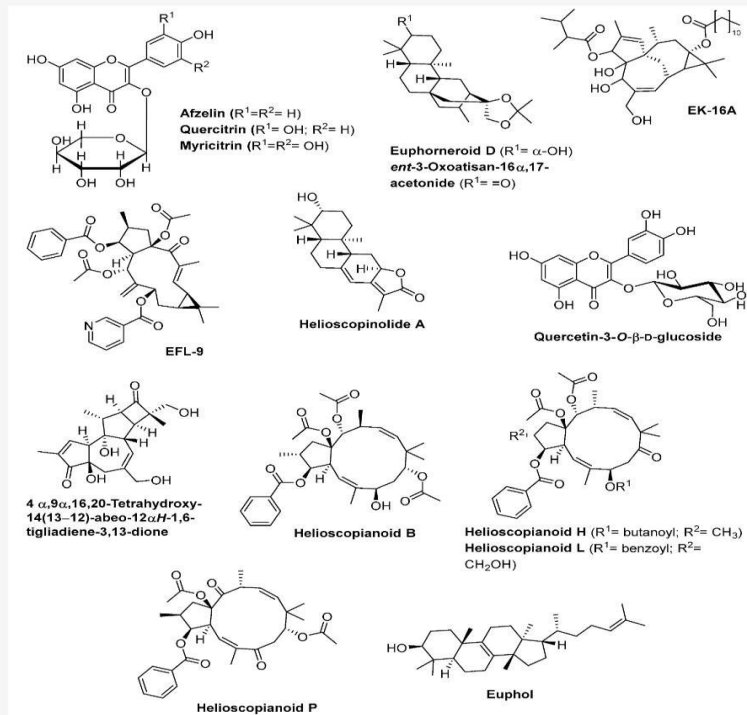
The chemical structures of compounds **1–17** isolated from *Euphorbia maculata*.

We investigated the n-hexane extract of *E. maculata* by the bioassay-guided fractionation method.

Seventeen triterpene derivatives (1–17) (Figure 1), including a new spiro-triterpenoid (1) and a new lanostane triterpenoid (2), were isolated. Compounds 3–17 were identified to be 3-hydroxycycloart-25-ene-24-hydroperoxide (3), 3 β -hydroxy-26-nor-9,19-cyclolanost-23-en-25-one (4), cycloart-23en-3 β ,25-diol (5), (23E)-3 β ,25-dihydroxytirucalla-7,23-diene (6), (23Z)-3 β ,25-dihydroxy-tirucalla-7,23-diene (7), Obtusifoliol (8), cycloeucaenol (9), 4 α ,14 α -dimethyl-5 α -ergosta-7,9(11),24(28)-trien-3 β -ol (10), gramisterol (11), urs-12-ene-3 β ,11 α -diol (12) [, Neoilexonol (13), 12-Oleanene-3 β ,11 β -diol (14), (3 β ,15 α ,16 α)-15,16-epoxy-Olean-12-en-3-ol (15), lupeol (16), multiflorenol (17) by compared spectroscopic data and physicochemical properties with those reported in the literatures. The new compounds

were determined by means of mass spectrometry and extensive 1D and 2D NMR (5, 6,7,8,9,10,11,12,13,14,15,16,17,18,19)

Figure 2. Chemical structures of *in vitro* bioactive *Euphorbia* compounds.

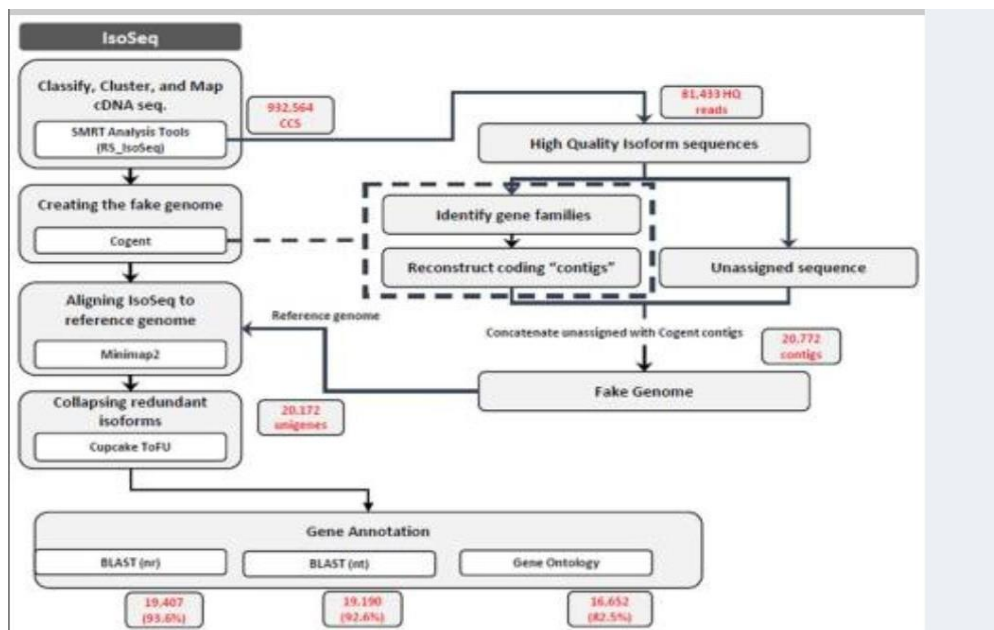


FUNCTIONAL ANNOTATIONS

were obtained by mapping sequences into several databases. Non-redundant protein sequences (Nr) and non-redundant nucleotide sequences (Nt) were compared against the NCBI database by BLAST v2.10.1 with an E-value cut-off of 1×10^{-5} . Gene Ontology (GO) analyses were carried out by BLAST2GO v5.2.5 (bioinformatics

software) with an E-value cut-off of 1×10^{-5} . Figure 1 shows the genomics and bioinformatics pipeline used in this study.

Schematic representation of full-length cDNA analysis in *E. maculata*(20, 21,22)



MATERIALS AND METHODS**TLC –THIN LAYER CHROMATOGRAPHY**

As an internal standard silica gel and silica gel plates are used for CC AND TLC respectively sephadex IH20 was purchased from Pharmacia ODS –EP column (250*10MM) INERTSIL; GL sciences inc. Tokyo. Japan was used for preparative HPLC.

EXTRACTION AND ISOLATION

The dried whole plant of *E. maculata* was ground and extracted with MeOH at room temperature.

The n-hexane extract was subjected to a silica gel column, eluting with a gradient of n-hexane / EtOAc and then monitored on TLC to obtain five major fractions.

ETHNOMEDICAL USE

Some species of *Euphorbia* have been used in traditional medicine since many decades in the worldwide to treat a variety of human and animal diseases. Recent studies have shown that more than 5% of species of *Euphorbia* are used in medicine. They are most often used to treat digestive disorders, skin diseases, inflammation and disorders of the respiratory system. Numerous studies referred to the purgative and emetic effect of *Euphorbia* species.^[18] Uses of *E. hirta* were very diverse from all over the world, as well as from different plant parts used (latex, entire plant, leaves, stems, roots). Uses were recorded from all continents, except Australasia. In India for example, it is used to treat worm infestations in children and for dysentery, gonorrhea, jaundice, pimples, digestive problems and tumours. A decoction of leafy stems of *E. hirta* is given as anti-diarrheal in Burundi; China; Nigeria and also used for the same purpose in the Philippines. Many species of *Euphorbia* are also used to treat skin or subcutaneous cellular tissue disorders. The most frequently treated disorders in the category skin diseases were warts, sores, carbuncles, boils, dermatitis, calluses, hair loss, irritation, psoriasis, pustules, sunburn, eczema and the use of *Euphorbia* spp. as astringents. The milky sap or latex of spurge is used to have a protective and defensive role in helping heal wounds. Numerous scientific records bring up to the use of *Euphorbia* to treat wounds and hemorrhages. The treatment of abscesses, blisters, burns and injuries were also recorded. In China, both *E. thymifolia* and *E. maculata* are used for the treatment of hemoptysis, hematuria, hemafecia, hematemesis, epistaxis and vaginal bleeding and for the treatment of wounds and carbuncles. In the category of respiratory system disorders, *Euphorbia* was described to treat asthma and coughs, but also included descriptions of treatments for bronchial complaints, breathlessness, pneumonia and use as an expectorant and originator. The most cited species was *E. hirta*. *Euphorbia* is reportedly used for a multitude of purposes besides medicine and poisons. *Euphorbia* uses described included environmental and ornamental uses (e.g. the well-known house plants poinsettia, *E. pulcherrima* and crown of thorns, *E. milii*) or the usage

of *E. tirucalli* and other species, mainly in Africa, to build natural fences.

INDUSTRIES USE

Euphorbia maculata, also known as spotted spurge, is used in traditional medicine and may be used in the pharmacy and food industries:

Traditional medicine: *Euphorbia maculata* is used as an anti-diarrheal, antibacterial, antifungal, and antioxidant agent.

Pharmacy and food industry: *Euphorbia* plants may be a source of phytochemicals used in the pharmacy and food industries. For example, candelilla wax, which comes from the leaves of some *Euphorbia* species, is used as a food additive and glazing agent.

MEDICAL USE

Euphorbia maculata is a plant that has been used in folk medicine for a variety of purposes, including:

Antidiarrheal: Used to treat diarrhea

Antibacterial: Used to treat infections

Antifungal: Used to treat infections

Antioxidant: Used as an antioxidant agent

Anti-inflammatory: Used to treat inflammation

Euphorbia maculata is an annual herb that is native to the temperate biome of SE. Canada to Belize, Cuba, and the Bahamas. It is a member of the Euphorbiaceae family, and many species of this genus have a variety of uses in traditional Chinese medicine.

Other uses of Euphorbia species include

Treating digestive system disorders
Treating skin ailments

Treating respiratory complaints
Treating inflammation and injuries

Treating microbial infections, including malaria, cancer, ringworms, tuberculosis, and sexually transmitted diseases

Treating respiratory illness such as asthma, coughs, bronchial complaints, and pneumonia

CONCLUSIONS

In this study, we isolated two new lanostane type triterpenes together with 15 known triterpenoids we evaluated the anti-inflammatory activities of all the tetracyclic triterpenoids.

Many triterpenes with different skeletons such as oleanane ursane lupirane lanostane and multiflorane types, inhibited the tumor promoting activity TPA.

Therefore, these triterpenes might be the candidates for anti-inflammation or for cancer chemopreventive agents.

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