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Phytochemical Profiling and their Pharmacological Activities of Traditional Plants of Euphorbiaceae Family: A Review

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Abstract **Review Article**

The Euphorbiaceae family has long been recognized for its diverse array of medicinal plants, containing bioactive compounds with significant pharmacological properties. This review aims to provide a comprehensive overview of the pharmacological potential of the Euphorbiaceae family. Through an extensive literature search, we identify and analyze studies highlighting the various pharmacological activities exhibited by members of this botanical family. These activities include antimicrobial, anti-inflammatory, anti-cancer, anti-diabetic, analgesic, and anti-oxidant effects, among others. Furthermore, we delve into the underlying mechanisms of action of these bioactive compounds, shedding light on their therapeutic relevance. Additionally, we discuss the traditional uses of Euphorbiaceae plants in indigenous systems of medicine, as well as their integration into modern pharmaceutical practices. Overall, this review underscores the significance of the Euphorbiaceae family in drug discovery and development, emphasizing the need for further research to fully harness its potential for the benefit of global health.

Keywords: Euphorbiaceae Family, Medicinal Plants, Bioactive Compounds with Significant Pharmacological Properties.

INTRODUCTION

A enormous family of blooming plants is the spurge family, Euphorbiaceae. They are commonly referred to as euphorbias in common English, which is also the name of a genus within the family. With over 300 genera and 7,500 species, the Euphorbiaceae are one of the largest families of plants. They are primarily monoecious herbs, shrubs, and trees, although they can sometimes occasionally be succulent and cactus-like. The primary goals of this review study were to uncover the mystery surrounding the Euphorbiaceae family of plants' therapeutic properties, identify potential further uses for the plant, and compile scientific evidence supporting the plant's therapeutic worth [1]. Numerous members serve as vital food sources. Others are harmful because of their toxic fruits, leaves, or sap; helpful because of their waxes and oils and as a source of therapeutic medications; or beautiful because of their unique forms or colorful bracts, which are leaf-like structures that are found directly below flower clusters. The majority of the family's species are located in temperate or tropical regions, yet they do flourish around the world with the exception of frigid arctic or alpine environments. The family includes woody shrubs and trees, as well as a few climbers, as well as annual and perennial herbs [2].

A highly specialized kind of pseudodanthium, known as a cyathium (a "false flower" composed of many actual blossoms), is found in the species belonging to the family Euphorbieae, subtribe Euphorbiinae (Euphorbia and related allies). Usually encircling a ring of male flowers, each with a single stamen, is a tiny, cup-shaped involucre made of peripheral nectary glands and joined bracts. A solitary pistil with branched stigmas represents the female flower situated in the center of the cyathium. This arrangement looks like one single flower. Usually a schizocarp, the fruit can sometimes occasionally be a drupe. The regma is a classic example of a schizocarp. It is a capsular fruit with three or more cells that splits apart into different sections at maturity and then bursts away explosively, dispersing the tiny seeds. A wide range of phytotoxins, or poisons made by plants, are included in this family; the most common ones are glycosides, alkaloids, diterpene esters, and ricin-type toxins [3].

Distribution: The Euphorbia family comprises 283 genera and 7,300 species, found globally but not in arctic

regions. In India, it includes genera like Euphorbia, Ricinus, Phyllanthus, Croton, and Pedilanthus.

Habit: Plants can be herbs, shrubs, or trees, including annual or prennial herbs like Euphorbia hirta, E. thymifolia, E. helioscopica, E. peplus, Phyllanthus niruri, Croton sp., Acalypha indica [4].

Euphorbiaceae are a group of plants, including herbs, shrubs, vines, and trees, which can be monoecious or dioecious and contain latex in some major groups.

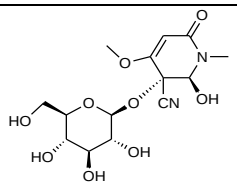
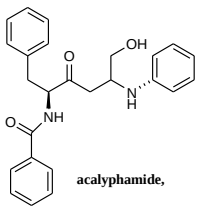
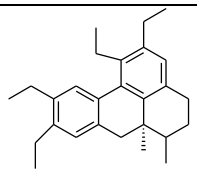
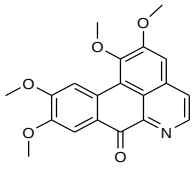
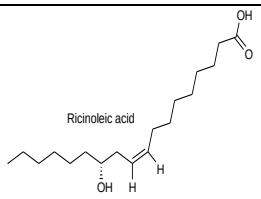
Stems in certain plants, such as Euphorbias, can be characterized as succulent and cactus-like.

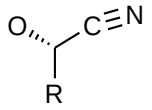
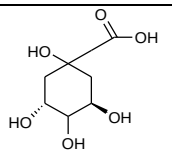
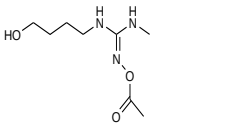
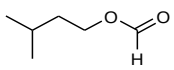
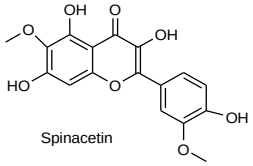
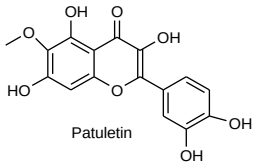
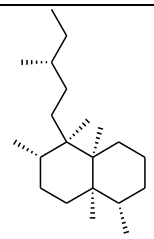
Leaves are simple, spiral, opposite, or whorled, with stipules, glands, or spines, and inflorescence is a cyme or cyathium in some Euphorbioideae.

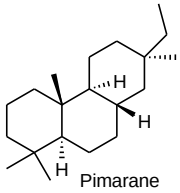
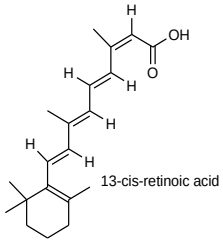
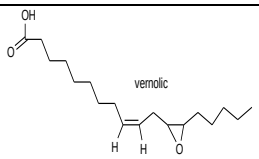
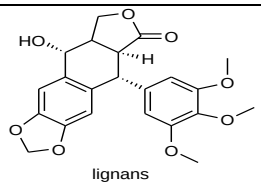
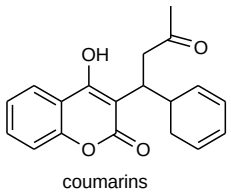
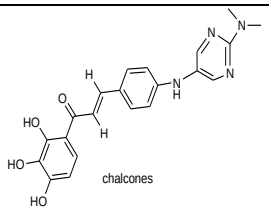
The flowers are unisexual, actinomorphic, and bracteate. The perianth is biseriate, uniseriate, or absent, and the calyx is aposepalous. The corolla is apopetalous, and the stamens are distinct. The gynoecium is syncarpous, with a superior ovary, carpels, and locules.

A fruit can be classified as a schizocarp, drupe, berry, or samara [5, 6].

Table 1: Phytochemical & pharmacological activities details of Euphorbiaceae family

S. No	Common name	Scientific name	Active Ingredients	Chemical structure	Pharmacological action
1	Herbe chatte	Acalypha indica leaf	Acalyphin, Acalyphamide, Aurantiamide, Succinimide, pyranoquinolinone alkaloid, flindersin	 acalyphin  acalyphamide,	antihelmintic, anti-inflammation, anti-bacterial, anti-cancer, anti-diabetes, anti-hyperlipidemic, anti-obesity anti-venom, hepatoprotective, hypoxia, and wound healing medicine.
2	Croton	Codiaeum variegatum leaf	Glaucine, Oxoglaucine and Hemiargyrine	 Glaucine  Oxoglaucine	antiamoebic antigiardial antimicrobialantioxidant, anticonvulsant, and antiviral activities, anti-inflammatory activity
3	Castor oil	Ricinus communis seed	Ricinoleic acid	 Ricinoleic acid	anticonceptive, antidiabetic antifertility anti-inflammatory, antimicrobial, antioxidant, hepatoprotective, insecticidal and wound-healing activities

S. No	Common name	Scientific name	Active Ingredients	Chemical structure	Pharmacological action
4	Hevea	Hevea brasiliensis. Wood	Cyanogenic glycosides, Linamarase,α-hydroxynitriles,β-glycosidase	 α-hydroxynitriles	analgesic and antidiarrheal activity analgesic and antidiarrheal activity analgesic and antidiarrheal activity antimicrobial activity, antifungal, and antioxidant, analgesic and antidiarrheal
5	Smoketree	Euphorbia cotinifolia leaf	3-methylbutyl formate, quinic acid, N1- (4-hydroxybutyl)-N3-methylguanidine acetate, and 2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one	 quinic acid  N1- (4-hydroxybutyl)-N3-methylguanidine acetate  3-methylbutyl formate  2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one	antibacterial activity, antimicrobial agents, emetic and cathartic
6	Poinsettia	Euphorbia pulcherrima flower	Spinacetin, Patuletin	 Spinacetin  Patuletin	hypermenorrhea, bruises, traumatic hemorrhage, and fracture
7	Acidocroton	Acidocrotonacurane	Clerodanediterpenoid,Cembrane diterpenoid, Labdane diterpenoid, Casbane, Halimane, Pimarane&13-cis-retinoic acid	 Clerodane diterpenoid	

S. No	Common name	Scientific name	Active Ingredients	Chemical structure	Pharmacological action
				 Pimarane  13-cis-retinoic acid	
8	Cephalocroton	Cephalocrotoncordofanus flower	Fatty acids of *C. cordofanus* were 8.60 % oleic, 17.2% linoleic, 64.2% vernolic, and 2.0% coronaric acids.	 vernolic	
9	Nettlespurge	Jatropha cuneata stem	phenolic acids, lignans, flavonoids, coumarins, alkaloids, and terpenes,	 lignans  coumarins	antimicrobial, anti-inflammatory, antidiarrheal, antihypertensive, and anticancer agents,
10	Wood spurge	*Euphorbia amygdaloides* Wood	isoflavonoids (3-phenylbenzopyrans), neoflavonoids (4-phenylbenzopyrans), chalcones	 chalcones	cytotoxic, antibacterial and antitumor diseases.

CONCLUSION

The Euphorbiaceae family encompasses a rich array of medicinal plants, offering a diverse range of pharmacological benefits. Through the ages, these plants have been valued for their natural compounds, including diterpenoids, triterpenoids, and alkaloids. Pharmacologically, they exhibit anti-inflammatory, anti-cancer, and anti-diabetic properties. Their significance spans traditions systems like Ayurvedic and Unani, as well as modern medicine, showcasing their board spectrum of therapeutic potential.

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