

Exploring the Health Benefits of *Euphorbia milii* *Des Moul*: A Comprehensive Literature Review

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Abstract: *The increasing interest in herbal medicine stems from its perceived efficacy as an alternative treatment for various illnesses, particularly chronic conditions often managed with pharmaceuticals. Traditional medical practitioners advocate for herbal remedies, citing better compatibility between phytoconstituents in herbs and the human body. Researchers are actively investigating the therapeutic potential of phytochemical found in herbs, both as standalone treatments and as starting points for developing new drugs. With technological advancements facilitating research, there is a renewed global interest in herbal medicine for discovering novel drugs. Euphorbia milii Des Moul, commonly known as the Crown-of-thorns plant, is recognised for its diverse medicinal properties. This evergreen shrub, native to Madagascar, possesses a rich array of chemical compounds with various therapeutic effects. Recent studies have highlighted its antioxidant, antitumor, antimicrobial, antibacterial, diuretic, cytotoxic, antiviral, and mild diuretic properties, attributed to the presence of natural products such as euphol, triterpenes, flavonoids, saponins, sugars, tannins, alkaloids, β -amyryn acetate, β -sitosterol, cycloartenol, lupeol, proteins, glycosides, and phenolics. Euphorbia milii Des Moul shows promise in treating pharmaceutical disorders. One intriguing hypothesis suggests that Euphorbia milii may exhibit therapeutic efficacy in managing inflammatory diseases, both in acute and chronic phases, owing to its antioxidant properties. However, further investigation is warranted to elucidate the underlying mechanisms and explore its potential applications in treating such inflammatory conditions.*

Keywords: Euphorbia millii Des Moul , Plant profile , Traditional and pharmacological approach , Hypothesis of Inflammatory disease

I. INTRODUCTION

Current Fascination with Herbal Medicine:

Many individuals see herbal medicine as a viable alternative for treating various illnesses, especially chronic conditions often managed with pharmaceuticals, which can raise safety concerns over long-term use. Traditional medical practitioners often advocate for herbal remedies, citing better compatibility between phytoconstituents in herbs and the human body. Researchers are actively exploring the therapeutic potential of phytochemical found in herbs, both as standalone treatments and as starting points for developing new drugs. With advancements in technology like high-throughput screening, extensive libraries of pure phytochemical, sophisticated laboratory models mimicking human diseases, toxicity profiling kits, and bioinformatics databases for safety predictions, there's been a resurgence in global research interest in herbal medicine for discovering novel drugs.^[1]

Rising Trend in Herbal Medicine Usage: Growing Popularity and Adoption:

The popularity of herbal medicine continues to surge in many developing nations, and its adoption is rapidly spreading in industrialised countries as well. It has been reported that a significant portion of medical doctors in France and Germany—estimated at 70%—regularly prescribe herbal remedies. Furthermore, there is a substantial increase in the number of patients seeking herbal therapies, with estimates indicating exponential growth globally. In China, traditional herbal medicine comprises 30% to 50% of total drug consumption, while in several African countries such as Ghana, Mali, Nigeria, and Zambia, herbal medicines constitute 60% of the primary treatment at home. In Europe, North America, and other developed regions, over 50% of the population has utilized herbal medicinal approaches at least

once in their lifetime. The use of herbal formulations among HIV/AIDS-affected patients is prevalent in cities like San Francisco, London, and South Africa, where 75% of such individuals rely on herbal remedies. In Canada and Germany, approximately 70% to 90% of the population have experimented with herbal medicines. In the United States, an estimated 158 million adults use herbal medicines, with the trend continuously rising. The global market for herbal medicines currently exceeds US\$60 billion annually and is steadily expanding. Notably, the adult population tends to equally embrace both conventional and herbal medicines, particularly due to the higher incidence of chronic diseases that often deter long-term use of complex conventional drug therapies due to their lasting side effects. In contrast, herbal medicines are perceived to offer long-term therapeutic benefits without adverse effects, contributing to their widespread acceptance worldwide.^[2]

Plant description :

Euphorbia milii Des Moul, commonly known as the Crown-of-thorns plant, is an evergreen shrub native to the Inselberg region of Madagascar's Central Plateau in Africa. It typically grows as a scrambling, many-branched shrub reaching heights of 60-90 cm. This resilient plant thrives in dry to moderately moist conditions and prefers full sun on well-drained soil, though it appreciates some afternoon shade in hot summer regions. While it can tolerate poor soils, including rocky-sandy soils, and drought conditions, regular moderate hydration may enhance blooming and reduce leaf drop. However, excessive moisture, especially during winter, can be fatal. Adequate air movement is essential for optimal growth. Propagation is commonly done through tip cuttings, and indoor plants require intense light and a coarse soil-based potting mix. The plant has gained popularity as an ornamental in tropical and subtropical regions worldwide, and it is cultivated and naturalised in various continents including Europe, Asia, Africa, South America, North America, and the Caribbean. The plant's morphological characteristics include densely spiky stems with cylindrical or irregularly angled branches adorned with hard, thin, and diverse spines. The pale green leaves are oblong-ovate or short acuminate, growing up to 5 cm in length, and are not replaced once shed. The inflorescences, emerging from upper leaf axils, feature peduncles with two to four involucre, each sporting two spreading red kidney-shaped lobes. The small, unisexual flowers are surrounded by noticeable petal-like bracts, ranging in colour from red to pink to white, with a maximum width of 12 mm. These blossoms are aggregated into clusters called "cyathia," a distinctive feature of the *Euphorbia* genus. Synonyms for *Euphorbia milii* include *Euphorbia splendens* var. *bojeri*, *Euphorbia bojeri*, and *Euphorbia breonii* var. *mucronulata*. The plant is known by various vernacular names globally, such as Siamese Lucky Plant, Christ's plant, and Christ's thorn. In India, it is referred to as Ainkona kalli in Tamil and Kanta Mukut in Bangla, among others. In Chinese, it is known as Wàn nián cì and Tiě hǎi táng, while in Italian, it is called Corona di spine or Spina di Cristo. Spanish names include Corona de Cristo and Gracia de Dios, while in Swedish, it is known as Kristi tornekrone, and in Indonesia, it is called Mahkota duri.^[3]

II. METHOD

Sources and search strategy of literature:

We conducted our literature search using databases like Scopes, PubMed, and Google Scholar. In PubMed, we used the search term "*Euphorbia milli* Des Moul" in the title or abstract. Similar search strategies were employed for Scopes and Google Scholar, with the first hundred relevant results retrieved. We didn't limit the search by year or language. Additionally, we screened the reference lists of included papers to find more relevant studies.

Eligibility criteria of literature:

For inclusion in our study selection, we established specific eligibility criteria:

Study Types: We considered all pre-clinical experimental studies. This includes studies conducted in laboratory settings using animal models or in vitro experiments.

Predictive pharmacological activity from *Euphorbia milli* Des Moul against inflammatory related disease

III. RESULT

Phytochemical and Nutrient Study:

Phytochemical, or plant secondary metabolites, while not essential for sustaining life, play crucial roles in preventing or fighting common diseases. Among these, alkaloids, flavonoids, tannins, carotenoids, and phenolic compounds are particularly beneficial to humans. In the Philippines, there is a rich diversity of plant species known for their medicinal or herbal properties, with traditional knowledge passed down through generations. One such example is the *Euphorbia* genus from the Euphorbiaceae family, with species like *Euphorbia antiquorum* L. being used in folkloric medicine to treat various ailments. Various studies have extensively investigated the chemical composition of *Euphorbia* species, revealing the presence of numerous chemical compounds. In *Euphorbia milii* Des Moul, commonly encountered phytochemical include β -amyryn acetate, β -sitosterol, cycloartenol, lupeol, euphol, alkaloids, phenolic compounds, carbohydrates, anthocyanin, β -cyanin, proteins, amino acids, cardiac glycosides, steroids, anthraquinone, tannins, phlobatannins, reducing sugar, saponins, coumarin, triterpenes, and flavonoids. Qualitative phytochemical analyses have confirmed the presence of alkaloids in the ethanolic extract of *Euphorbia milii* Des Moul thorn part, while amino acids, proteins, and cardiac glycosides were identified in the ethanolic extract of its stem part. Additionally, studies conducted by Hye Sook Yum-Choi et al. identified 1-octacosanol, 1-triacontanol, and β -sitosterol in the methanolic extract, while Shao-Nan Liu et al. isolated three new ent-rosane diterpenoids. Eumilii, a monomeric protein, was isolated from *Euphorbia milii* Des Moul latex, and benzodioxole and barbital compounds were found in its chloroform fraction. Kamurthy H. et al. reported the presence of triterpenoids, flavones, and phenolic compounds in *Euphorbia milii* Des Moul flowers. compared the chemical compositions of dichloromethane and methanol extracts from different parts of the plant, identifying various secondary metabolites. Subhash C. Yadav et al. isolated a new serine protease named 'milin' from the latex of *Euphorbia milii* Des Moul. Furthermore, Salvador Pancorbo et al. extracted cycloartenol and β -amyryn acetate from the petroleum ether preparation of the plant. Overall, these studies highlight the diverse array of chemical constituents present in *Euphorbia milii* Des Moul, underscoring its potential medicinal significance and providing valuable insights for further research and application.^[5-25]

Traditional use :

Recent studies have indicated that over 5% of *Euphorbia* species are utilized for medicinal purposes. *Euphorbia milii* Des Moul, in particular, is commonly employed in folk medicine for various ailments. In southern Brazil, it is used to treat warts, while in China, it is utilized for conditions such as cancer, hepatitis, and trichiasis. The plant's whole paste is applied to dislocated animal bones, its leaves are utilized for snake bites and ringworm treatment, and its seeds serve as a laxative for children. Furthermore, *Euphorbia milii* Des Moul flower powder and whole plant ash are administered orally to alleviate asthma symptoms, with doses ranging from 250-500 mg twice a day to 500 mg three times a day, respectively. Additionally, *Euphorbia* species are employed in the treatment of various other medical conditions, including digestive problems, blood syndromes, genitourinary syndromes, microbial infections, scorpion stings, and issues related to pregnancies/puerperium, as well as sensory difficulties. These plants are also used topically as skin remedies to alleviate conditions such as warts, itching, hair loss, dermatitis, acne, sunburn, boils, rashes, and irritation. They are valued for their disinfecting, antiseptic, and emollient properties. It's worth noting that undiluted latex from *Euphorbia milii* Des Moul has been found to irritate the eyes and skin of mammals. However, while certain determine esters of ingenol present in the plant are potent skin irritants, they lack tumour-promoting potential compared to other closely related ingenol and phorbol derivatives. Additionally, milli amines derived from *Euphorbia milii* Des Moul latex have demonstrated high molluscicidal activity.^[26,27]

Pharmacological activity :

Anti-oxidant activity : This research focused on analysing the methanolic flower extract of *Euphorbia milii* using a combination of phytopharmacological and advanced computational techniques. The aim was to characterise the chemical components, evaluate the in vitro antioxidant capacity, and assess the metal binding capacity of the flower extracts. The study revealed that the scavenging activity, particularly against DPPH, was notably higher ($19.65 \pm 0.545 \mu\text{g/ml}$) compared to the H₂O₂ assay ($14.66 \pm 0.185 \mu\text{g/ml}$), suggesting that *E. milii* flower extracts possess significant antioxidant potential. These findings suggest that the phytoconstituents present in the flower extracts of *E. milii* may contribute to their antioxidant properties and metal binding ability.^[28]

Anthelmintic: A preliminary screening of *Euphorbia milii* revealed the presence of various phytoconstituents such as triterpenes, steroids, tannins, alkaloids, phenols, flavonoids, saponins, and glycosides, which may contribute to its potent anthelmintic effects. The methanolic extract of *E. milii* leaves demonstrated significant anthelmintic activity comparable to the standard drug albendazole. Aqueous extracts of *E. milii* exhibited paralysis and death of worms at concentrations of 100 mg/ml, with results similar to those of albendazole. Further research using in vivo models is warranted to validate the efficacy and pharmacological basis of *E. milii* as an anthelmintic medication. Investigation into the specific active ingredients responsible for its anthelmintic action is recommended for future studies. Overall, the study confirms the anthelmintic activity of the methanolic extract of *E. milii* leaves and highlights the need for further exploration of its pharmacological properties.^[29]

Antinociceptive, muscle-relaxant & sedative activities : In this study, gold nanoparticles of *Euphorbia milii* methanolic extract (Au-EM) were synthesised and characterised. Au-EM demonstrated remarkable stability in varying pH and NaCl solutions and exhibited significant sensitivity to heavy metals. When tested in BALB/c mice, Au-EM showed potent antinociceptive effects at doses of 10 and 20 mg/kg compared to crude *E. milii* methanolic extract. Additionally, Au-EM displayed significant muscle relaxant and sedative effects in rotarod and open field tests, respectively, at both dosage levels. These findings suggest that gold nanoparticles enhance the therapeutic properties of *E. milii*, offering potential for effective and safe nano-herbal therapy.^[30]

Anti-gout : Gout, an ancient disease dating back to the 5th Century BC, persists to this day, characterised by the excessive production of uric acid leading to crystal formation around joints and potential tissue damage. While advanced treatments exist, they often come with a high cost. Allopurinol, a synthetic drug, is a cheaper alternative, albeit with long-term negative side effects. *Euphorbia milii* (Euphorbiaceae) was selected for study due to its reported secondary metabolites, potentially beneficial for gout treatment. The study involved quantitative analysis of total phenolic content and xanthine oxidase inhibitory assays on crude extracts of Malaysian *E. milii*. The methanol leaves extract exhibited the highest total phenolic content (0.77 ± 0.02 mg QAE/g of sample) and demonstrated potent uric acid inhibitory properties (IC₅₀ = 0.0864 mM), reducing uric acid production by 65.6%. GC-MS analysis revealed hexadecanoic acid in the methanolic leaves extract, suggesting anti-gout properties. In conclusion, Malaysian *E. milii* shows promise as a potential new drug candidate for gout treatment.^[31]

Antimicrobial and antioxidant : In this study, we investigated the phytochemical composition, antibacterial activity, and antioxidant potential of different extracts and fractions of *Euphorbia milii*, a Pakistani herb used traditionally for treating various infectious diseases. Phytochemical analysis revealed the presence of cardiac glycosides, steroids/phytosterols, anthocyanin, proteins, terpenoids, flavonoids, and tannins. Antibacterial susceptibility testing using the well diffusion assay showed that chloroform and methanol fractions exhibited significant antimicrobial activity against *Klebsiella pneumonia* and *Staphylococcus epidermis*. Additionally, the ethyl acetate fraction of roots displayed considerable antimicrobial activity against several tested pathogens. Evaluation of antioxidant potential using the DPPH radical scavenging assay revealed that the chloroform fraction exhibited notable scavenging activity. Furthermore, infrared spectroscopy of the various extracts/fractions indicated the presence of specific functional groups. These findings support the traditional medicinal use of *E. milii* and provide valuable insights into its potential therapeutic applications.^[32]

Antiviral: *Euphorbia milii* is renowned for its medicinal properties, including its effectiveness against skin infections, warts, cancer cells, hepatic disorders, fungal infections, pain conditions, and viral infections. The plant contains various secondary metabolites such as alkaloids, anthraquinone, anthocyanin, glycosides, flavonoids, tannins, and terpenoids. Ethanol was found to be the most effective solvent for extracting these phytoconstituents. The hot water extract exhibited strong free radical scavenging activity and antiviral strength against tested viruses. Cyclobarbitol was identified as a major bioactive constituent of *E. milii*, showing acceptable druggability in computational analyses. Further research is needed to explore the molecular characterisation and antiviral action of *E. milii* extracts, considering the challenge of viral mutations and the need for ongoing drug development to address these concerns.^[33]

Cytotoxic and antiviral : A study was conducted to assess the cytotoxic and antiviral properties of *Euphorbia milii* var. splendens leaf against Peste des petits ruminants virus (PPRV). Different extracts and fractions of *E. milii* leaves were evaluated using the Vero cell line and MTT assay. The methanol extract and various fractions demonstrated significant effects against PPRV at all tested concentrations, with cytotoxic concentrations calculated to be ≤ 25 µg/mL.

However, while ethyl acetate, n-hexane, and n-butanol fractions showed no antiviral activity even at non-cytotoxic concentrations, the methanol extract and its chloroform fractions exhibited significant veridical potential. These findings suggest the need for further exploration and isolation of antiviral constituents from the fractions, which could lead to the development of novel antiviral agents.^[34]

Anti-cancer :*Euphorbia milii* has a long history of use in folk medicine, where it has been employed for its anti-inflammatory, antioxidant, antispasmodic, and anti-parasitic properties, as well as for treating warts. In this study, hot methanol extraction was utilized to obtain a methanolic extract, which tested positive for glycosides, steroids, flavonoids, alkaloids, and phenols. The anticancer activity of the extract was evaluated across various concentrations. Chloroform fractions exhibited notable anti-DPPH radical activity. The study employed a combination of traditional phytopharmacological methods and advanced computational tools to investigate the anticancer potential of *Euphorbia milii*. Results from antioxidant assays consistently showed superior antioxidant activity in the methanol extract compared to the water extract. Both toxicity tests yielded significant toxicity results. The proposed *Euphorbia triaculeata* extract demonstrated genotoxic effects on PC 3 and MCF-7 DNA cell lines, but not on HEPG2 cell lines, as evidenced by increased DNA damage in the comet assay.^[35]

Anti-oxidant and anti-tumour : The aim of this study was to assess the antioxidant and antitumor properties of the ethyl acetate extract of *Euphorbia milii* flower (EAEEMF) against breast cancer induced by MCF-7 cell lines and colon cancer induced by CACO-2 cell lines in mice. Female mice were treated orally with doses of 200mg/kg and 400mg/kg of the extract for 30 days, and various parameters were evaluated. The extract reduced body weight and circumference, normalised hematological parameters, decreased lipid peroxidation, and increased levels of antioxidant enzymes. Serum biochemical parameters associated with cancer were also normalised in the extract-treated groups. Additionally, cancer-specific markers such as ferritin and carcinoembryonic antigen (CEA) were significantly reduced in the extract-treated groups. Histopathological analysis supported these findings, suggesting that the ethyl acetate extract of *Euphorbia milii* flower possesses antioxidant and chemopreventive properties.^[36]

Anti-diabetic:The ornamental shrub *Euphorbia milii* Des Moul, native to Madagascar and the Philippines, is commonly found in India. It has been traditionally used in folk medicine for treating conditions such as warts in South Brazil, and cancer and hepatitis in China. This study aimed to assess the anti-diabetic effects of the methanolic aerial extract of *Euphorbia milii* Des Moul (MAEEM) using a streptozotocin–nicotinamide induced type 2 diabetic rat model. Various tests including oral glucose tolerance test, phytochemical screening, and acute toxicity study were conducted. Diabetic rats were administered graded doses of MAEEM (100mg/kg, 200mg/kg, and 400mg/kg) for 21 days, and their blood glucose levels, serum lipid profiles, liver profile markers (AST, ALP, ALT), and renal profile markers (serum creatinine, blood urea) were assessed. Type-2 diabetes significantly impacted these parameters, but oral administration of MAEEM effectively mitigated these effects.^[37]

Burn :Burns are a prevalent form of trauma in society, with approximately 1.2 million people experiencing them annually, leading to about 100,000 hospitalisations. The giwang fern cactus leaf extract (*Euphorbia milii*) is rich in antimicrobial compounds found throughout the plant. This study aimed to investigate the impact of giwang fern cactus leaf extract on fibroblast count in rats with *Pseudomonas aeruginosa*-infected burns. The research employed a randomised post-test design with three rat groups, including a control group. Statistical analysis was conducted using One Way Anova in SPSS version 20.0 for Windows. Results indicated that the 50% giwang fern cactus leaf extract yielded the highest average fibroblast count (38.3±8.77), surpassing both the control (23.3±1.86) and the 25% extract group (27.6±6.65). Statistical analysis revealed a significant difference between the groups (p<0.05). In conclusion, the study demonstrated a notable variance in fibroblast count among groups following treatment with giwang fern cactus leaf extract (*Euphorbia milii*).^[38]

Potential Larvicide of the Aedes Aegypti Mosquito : During the rainy season in the Philippines, diseases transmitted by the *Aedes aegypti* mosquito, such as dengue, malaria, chikungunya, and Zika fever, pose significant health risks. Conventional methods like fogging, insecticides, and repellents often fall short in preventing these illnesses. To address this, researchers developed organic alternatives using extracts from the crown-of-thorns plant (*Euphorbia milii*) to target mosquito larvae. Two formulations were tested: one involved pounding the plant stem and soaking it in water, while the other simply soaked the stem. These were applied to containers with mosquito larvae, with varying concentrations and compared to control groups treated with cooking oil and acetone. Results indicated low mortality

rates (0-50%) for the experimental groups, mainly affecting *Culex quinquefasciatus* larvae, while control groups showed 100% mortality. Statistical analysis confirmed a significant difference between control and experimental groups ($P = .0008$). Thus, the stem extracts of *Euphorbia milii* were found to be ineffective against mosquito larvae.^[39]

Insecticidal / Leaf Essential Oil: Study evaluated the insecticidal efficacy of oils from leaves of *Euphorbia milii* and *C. occidentalis* on selected insect pests. Results showed contact insecticidal activity of *E. milii* oil at LD50 and LD90 (mg/kg) of 0.583 and 1.108 for *Periplaneta americana*, 0.681 and 1.215 for *Tettigonia viridissima*, 0.488 and 0.893 for *Anopheles gambiae*. Results showed the oils possess bioactive metabolites with commendable degree of insecticidal activity. (see constituents above)^[40]

Diuretic : R.Haleshappa and colleagues identified phlobatannins in the ethanolic extracts derived from both the thorn and stem components of *Euphorbia milii Des Moul*. This finding suggests that the plant exhibits diuretic properties, implying its potential to increase urine production and promote fluid elimination from the body.^[41]

Anti-hypertensive : In their research, R. Haleshappa and colleagues identified flavonoids in the ethanolic extract obtained from *Euphorbia milii Des Moul*. Flavonoids are known for their antioxidant properties, being water-soluble compounds that safeguard cells against oxidative stress. This discovery suggests that the plant extract may possess various health benefits, including antimicrobial, anticancer, anti-inflammatory, and mild hypersensitive activities, owing to the presence of flavonoids.^[41]

Predictive pharmacological activity from *Euphorbia milii Des Moul* against inflammatory related disease

Based on the potent antioxidant properties observed in *Euphorbia milii* and the presence of various phytochemical within the plant, it is hypothesised that *Euphorbia milii* may exhibit anti-inflammatory activity in both acute and chronic phases of inflammation. Despite lacking reported activity specifically in inflammatory diseases, such as rheumatoid arthritis, the combined presence of antioxidants and phytochemical suggests a potential therapeutic effect. The antioxidant activity of *Euphorbia milii* implies its ability to scavenge free radicals and reduce oxidative stress, a key contributor to inflammatory processes. Additionally, the presence of phytochemical such as flavonoids and phenolic, Saponin, Tannic acid compounds may further enhance its anti-inflammatory potential through modulation of inflammatory pathways. While direct evidence of anti-inflammatory effects in rheumatoid arthritis or other chronic inflammatory diseases is currently lacking, the hypothesis is grounded in the understanding of the biochemical properties of *Euphorbia milii* and warrants investigation to validate its therapeutic potential in mitigating inflammatory conditions.

IV. CONCLUSION

Undoubtedly, *Euphorbia milii Des Moul* stands out as a versatile plant with a plethora of medicinal properties. It serves as an unparalleled source of diverse chemical compounds, each possessing various therapeutic effects. Utilising zinc oxide nanoparticles derived from the aqueous extract of *Euphorbia milii Des Moul*, researchers have explored its sedative, muscle relaxing, and antinociceptive properties. A comprehensive review of existing literature unequivocally highlights *Euphorbia milii Des Moul* as a significant reservoir of numerous therapeutically beneficial compounds. This plant exhibits a wide range of medicinal benefits, including antioxidant, antitumor, antimicrobial, antibacterial, diuretic, cytotoxic, antiviral, and mild diuretic properties. These beneficial activities are attributed to the presence of various natural products such as euphol, triterpenes, flavonoids, saponins, sugars, tannins, alkaloids, β -amyryn acetate, β -sitosterol, cycloartenol, lupeol, proteins, glycosides, and phenolics. *Euphorbia milii Des Moul* has been traditionally employed for an extensive period to address a diverse array of health issues. current research endeavours provide compelling evidence supporting the utilisation of *Euphorbia milii Des Moul* in the treatment of various pharmaceutical disorders. Nevertheless, further investigations are warranted to isolate and identify the specific chemical constituents responsible for the therapeutic effects observed with *Euphorbia milii Des Moul*. Due to its antioxidant properties and phytochemical, it is speculated that *Euphorbia milii* may demonstrate therapeutic effectiveness in treating inflammatory diseases, whether in their acute or chronic phases. However, further investigation is needed to understand the mechanisms underlying its action and to explore its potential applications in managing such inflammatory conditions.

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