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Exploring Traditional Uses, Phytochemical Composition, and Antimicrobial Potential of Latex-Producing Plants in the *Euphorbia* Genus: A Comprehensive Review

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Abstract

The *Euphorbia* genus, ranking as the third largest among angiosperm plants, encompasses nearly 2026 species. The latex derived from these plants contains irritants to the skin and finds application in wart removal. Additionally, it serves as a source for crafting fish and arrow poisons. Literature substantiates the utilization of these plants in the treatment of diverse ailments including menstrual issues, diarrhea, colds, fevers, as well as an array of skin conditions such as warts, sores, boils, dermatitis, psoriasis, eczema, and sunburn. Moreover, they contribute to wound healing. Certain species within the *Euphorbia* genus, classified under Euphorbiaceae, exhibit properties as anti-herpetic and antitumor agents against polio, rhinoviruses, and coxsackievirus. In the realm of Ayurveda, specific plant latex from select species is employed in the preparation of surgical threads for Kshara sutra therapy. This Ayurvedic approach serves as a minimally invasive para-surgical procedure in the management of anorectal piles or fistula. Remarkably, various di- and tri-terpenes obtained from the latex exhibit robust antimicrobial activity against both bacterial and fungal strains. Moreover, the di-terpenoids sourced from *Euphorbia* species display anti-inflammatory properties along with noteworthy cytotoxic and anticancer activities. The focal objective of this review is to present a contemporary overview encompassing traditional applications, phytochemical constituents, and the antimicrobial potential of ten latex-producing plants within the *Euphorbia* genus.

Keywords

Antimicrobial activity; *Euphorbia* sp.; herbal drugs; latex; medicinal values; phytochemical composition; traditional use

Introduction

Plants fulfill fundamental human requirements encompassing shelter, sustenance, attire, and therapeutics. Advanced traditional medical systems, such as Ayurveda, Unani, Siddha, and Homeopathy, find their foundation in plant-based remedies. India stands as a reservoir of genetic resources for herbal plants, a fact underscored by its prominent role in preserving and utilizing botanical diversity (1). The quest for novel molecules from diverse origins remains an essential pursuit in contemporary research. Floral diversity and various plant sources emerge as pivotal reservoirs of new leads. Among these, plants yielding latex assume a significant role, displaying a plethora of biological activities. The realm of latex-bearing plants

encompasses over 20,000 species across 40 Angiospermic families. Plant latex, a milky sap, presents a complex emulsion housing diverse chemical constituents including alkaloids, proteins, tannins, sugars, and gums (2). Within this expansive spectrum, the *Euphorbia* genus commands attention as the third-largest genus among angiosperms, boasting approximately 2026 species (3). These plants manifest as woody shrubs, annual or perennial herbs, characterized by their toxic milky latex—a substance employed in the treatment of skin disorders, digestive ailments, wounds, and hemorrhages (4). Notable species within this genus include *Euphorbia milli* Des. Moul., *Euphorbia tirucalli* L., and *Euphorbia lacteal* Roxb., valued for ornamental purposes, while the wax of *Euphorbia antisyphilitica* Zucc., known as candelilla, finds application for its medicinal properties (4). In vitro investigations have illuminated the antiviral and antitumor potential of several *Euphorbia* species (Euphorbiaceae), demonstrating efficacy against pathogens such as poliovirus, rhinoviruses, and coxsackievirus (5).

The coexistence of diverse compounds offers boundless prospects for the discovery of novel therapeutics targeting re-emerging infectious diseases (6). Diterpenoids sourced from Euphorbia species exhibit efficacy in mitigating inflammatory disorders, concurrently demonstrating cytotoxic and anticancer properties (7). Numerous species find utilization in the management of cutaneous ailments encompassing warts, sores, boils, dermatitis, psoriasis, eczema, and sunburn, and are additionally harnessed for addressing hair loss concerns (8). The latex-derived milky sap serves as a remedial agent for wound healing (9). This comprehensive review endeavors to chronicle the vernacular nomenclature, traditional applications, chemical constituents, and biological activities inherent to ten specifically chosen *Euphorbia* species.

Methods

A comprehensive literature review was undertaken to explore the ethnobotanical applications and phytochemical constituents of species within the *Euphorbia* genus. The acquisition of pertinent information involved systematic searches across esteemed scientific databases, including Google Scholar, Web of Science, Scopus, Science Direct, PubMed, and Wiley Online Library. The search strategy encompassed employing distinct keywords, such as "Euphorbia," "latex yielding plants," and "phytochemical compounds," individually across these aforementioned databases. To ensure taxonomic accuracy, the Plant List database, specifically the e-flora of India, was consulted for confirming the correct binomial nomenclature of the ten target species. The scope of the search was confined to publications available in the English language. The depiction of phytochemical structures was sourced from the PubChem database.

Results

Many valuable plant based drugs have been discovered by the local healers for some kind of treatment. These results were systematically summarized and common names, traditional uses, phytochemical constituents and their biological activities are organized.

Common names of *Euphorbia* species

One of the intriguing facets inherent to perusing and investigating drug plant literature lies in the manifold nomenclature associated with the plants. This phenomenon manifests in the form of diverse vernacular appellations, which can diverge across languages and even within regions sharing the same linguistic origins. This proliferation of names can contribute to perplexity and skepticism, thereby impeding the systematic inquiry into the scientific facets of medicinal plants. In a proactive endeavor to navigate the intricacies posed by this nomenclatural diversity, a comprehensive index of common names, as well as cross-referenced names, has been compiled for a selection of ten *Euphorbia* species. This index serves as a valuable tool aimed at facilitating the elucidation of the expansive medical botany literature. Importantly, it is crucial to underscore that this index does not profess to wield authoritative taxonomic foundations. The tabulated representation of common names corresponding to distinct *Euphorbia* species is documented in Table 1.

Table 1. Common names of *Euphorbia spp.*

Euphorbia spp.	**Common names**		
	English	**Hindi**	**Odia**
E. antiquorum L.	Triangular spurge	Tridhara	Dokanasiju
E. characias L.	Mediterranian spurge	--	Siju
E. heterophylla L.	Lesser green Poinsettia	--	Dudhipatra/ Patrasiju
E. hirta L.	Garden spurge/Asthma weed/Common spurge	BadaDudhi	Chitakutei
E. nerifolia L.	Indian spurge tree	Dandathor	Thor
E. nivulia L.	Leafy milk hedge/Dog's tongue	Katathohar/Sij/ Sehund	Svarasana
E. pulcherrima Willd. Ex Klotzsch	Easter flower/Christmas flower	Lalpata	Lalpatrasiju
E. thymifolia L.	Thyme leaves spurge/Chickenweed	Chhotadudhi	Chhotapatrasiju/ Laghududhika
E. tirucalli L.	Pencil tree/Indian tree spurge/Pencil cactus	Anglithor	Lanka siju
E. trigona Mill.	African milk tree/Cathedral cactus/	--	Trikonasiju

Ethnomedicinal use of selected *Euphorbia* species

Medicinal plants have held a significant role in traditional healthcare systems for millennia. Within this context, species within the *Euphorbia* genus have garnered extensive utilization within traditional Ayurvedic medicine. These plants have been harnessed to address a diverse array of ailments, including body pain, wound healing, snake and scorpion bites, and respiratory disorders. This employment is attributed to the presence of a varied spectrum of phyto-compounds, endowed with distinct pharmacological properties. Among these species, *Euphorbia thymifolia* L., commonly referred to as *Dugdhika*, has garnered attention. It finds mention in the therapeutic repertoire prescribed by Charaka for the management of painful bleeding piles. Additionally, it is incorporated as a component in vegetable soup formulations aimed at mitigating diarrhea. Notably, its latex has also been applied topically to address conditions such as ringworm infections and boils (10). The ethnopharmacological applications of these select species from the *Euphorbia* genus have been cataloged and are presented in Table 2.

Table 2. Traditional use of selected *Euphorbia spp.*

Euphorbia spp.	**Region/Place in which it is used ethno-medicinally**	**Plant Parts used**	**Mode of preparation**	**Ethno-medicinal use**	**References**
E. antiquorum L.	Shervarayan and Lalrayan hills, Tamilnadu	Latex	----	Rheumatism, purgative, swelling on breast	(11)
	Ben En National Park, Vietnam	Stem	----	Reduce tooth ache	(12)
	Shervarayan and Lalrayan hills, Tamilnadu		----	Nervous diseases, dropsy, palsy, deafness, earache, amaurosis	(11, 13)
	Chadragiri and Gopalapuram village, Chittoor, Andhra Pradesh, India	Latex	External application of latex mixed with turmeric powder two times daily for one to two weeks for removal of warts by Yanadi tribe	Used for removal of warts	(14)
	Andhra Pradesh, India	Latex	Latex is applied on the paralysed part by Sugalis tribe in paralysis treatment. Along with this topical application, half teaspoonful of *Acorus calamus* rhizome powder is mixed with honey and administered to cure paralysis	Used in the treatment of paralysis	(15)
E. characias L.	Arribes del Duero, Spain	Latex	External application of fresh latex	used to remove warts	(16)
	--	Latex	External application of fresh latex	Treatment of wounds, warts	(17)
*E. heterophylla*L.	Anyigba, Nigeria	Leaves	Leaf decoction is used by Igbo community	Used in treatment of respiratory tract infection; also used in management of asthma, constipation	(18)
			-----	Used as laxative, ; in management of migraine and wart cures	(19)
		Latex	-----	Used to make fish poison and arrow poison	(19, 20)
E. hirta L.	Kancheepuram, Tamil Nadu	Whole plant	Paste externally applied	Treatment of wounds and lip cracks	(21, 22, 23)
	Manavalakurichi village, Kanyakumari, Tamil Nadu	Whole plant	--	Used for blood purification, treatment of skin diseases, cough and asthma	(24)
	Udhampur, J&K state	Whole plant	Whole plant and black pepper paste is consumed orally	To treat piles	(25)
	Ben En National Park, Vietnam	Whole plant	----	Used in treatment of malaria	(12)
	Pachalur hills, Dindigul, Tamil Nadu	Root	Root extract is orally consumed	Used to cure blood dysentery	(26)
	Kashipur , Uttarakhand	Latex	Externally applied three times daily up to 15 days	Used by Vangujjars to remove warts on anybody parts	(27)
	China and Nigeria		----	Used in managing diarrhoea	(28, 29)
	Vidarbha region, Maharashtra, India	Latex	--	Used by the tribes of Nagpur, and Gadchiroli districts to remove warts	(1)
		Leaf	--	Used to cure from urinary disorders, itches, gonorrhoea	
		Whole plant	--	Cures scabies, burns, used in managing diarrhoea	

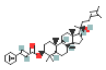
			External application of turmeric powder mixed with latex	For management of piles	(30,31)
			Latex is boiled in castor oil and salt is added and applied externally on cracked heels	To manage deep cracks in heels	(32)
	Chattishgarh Gujrat		External application of lukewarm leaves reduces itching pain in piles	Reduces swelling and itching pain in piles	(32)
		Latex	Latex is boiled in neem oil and applied externally on affected parts	Used in rheumatism	(33)
		Wood	Black pepper seeds are burned with the wood and the collected ash is given with sugar to patients of chronic respiratory trouble	Used in management of respiratory trouble	(32)
E. nerifolia L.		Stem and Leaf juice	Stem and Leaf juice is mixed with honey and administered three times a day	Management of cough, cold and asthma	(32)
		Stem	Stem juice is applied over warts	Used to remove skin warts and also in the management of earache	(32)
		Leaf	Luke warm leaf extract is mixed with honey and common salt	Applied externally and adminstered internally in case of respiratory trouble in children	(32)
	Gujrat	Root	External application of root powder mixed with black pepper	Scorpion bite, snake bite, reduces swelling and pain	(34,46)
	Mahendergarh, Haryana	Whole plant	Fresh juice is used	To relieve toothache and skin boils	(35)
	Tripura, India	Leaf	Leaves heated and juice is extracted and applied to the ear (used by Mnaipuri tribes)	Used to relive from ear infection & fever	(36)
		Latex	---	Broncho dilating activity	(37)
			Leaf juice applied externally by Boro community	For reducing pains and boils	(38)
	Assam		Juice is applied to relieve pains and boils by Boro community	Used in treatment of jaundice, enlarged liver, pains and boils	(38, 39)
		Leaf	Juice is used as diuretic and purgative		(40)
			Leaf paste is mixed with neem oil and applied externally	Used to treat rheumatism	(40)
	Vidarbha region, Maharashtra, India	Latex	--	Antiseptic	
		Stem	--	Used in bone fracture management	
E. nivulia L.	Khandesh region, Maharashtra	Stem	Fleshy stem is roasted for 20-30 minute in hot ash. Juice is extracted and 1-2 tablespoonful juice is administered per day for 7 -10 days to children of 3-7years	Cures cough	(41)
	Vidarbha region, Maharashtra, India	Stem	--	Bone fracture	
	Khandesh region, Maharashtra	Fleshy stem	Juice is extracted from roasted fleshy stem in extreme hot ash after 20-30 minutes and 1-2 table spoon is adminstered to children	Reliving from cough	(41)
	Manavalakurichi village, Kanyakumari, Tamil Nadu	Leaf, latex, root	--	Skin infection, ear disorders, urine retention, worm infestation	(24)

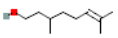
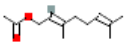
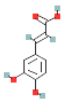
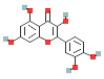
	--	Whole plant	--	Bronchial asthma and paronychia	(42)
E. pulcherrima Willd. Ex Klotzsch	--	Latex	Latex is spread over the warts; and applied as hair remover	Removing warts, skin wounds, and skin ulcers, herpes infection; used as hair remover	(43)
	--	Latex	--	Used to manage fever and to stimulate breast milk production in nursing mother	(5, 44)
	Vidarbha region, Maharashtra, India	Seeds	Acne vulgaris, ring worm and eruptive boils, cough, promotes conception, skin disease, parasitic infection, a tonic for menorrhagia	Laxative for children	(45, 46)
	Vidarbha region, Maharashtra, India	Whole plant	--	Used as anti-inflammatory agent, bone dislocation of animals, relieves from joint pains	
E. thymifolia L.	Manavalakurichi village, Kanyakumari, Tamil Nadu	Whole plant	---	Ring worm, wounds, asthma, skin infection	(24)
	India	Latex	Arrow poison is made by dipping the weapon in the milky juice	Used in making Arrow poison, Possess Anthelmentic activity	(47)
	India	Whole plant	Plant is crushed and rubbed on the head to promote hair growth	Treatment of alopecia, shows anti-leprotic activity	(45, 47);
	India	Whole plant	Whole plant paste is used as plaster preparation	Used for plaster preparation	(13,48)
	India	Leaves	Dried leaves and seeds are mixed with butter-milk and given to children	Used in reducing bowel complaints	(45)
	Konkan, India	Leaves	juice is used to cure ringworm	Cure ring worm infection	(47)
	India	Root	Root powder infusion is used by Santals as a remedy for amenorrhoea	Cures amenorrhoea, enteritis, diarrhoea and venereal diseases	(13, 47, 48)
	India	Whole Plant	Powered plant is consumed with wine in management of snake-bite, also externally applied to the bitten part	Used to cure from snake-bite	(30)
	Rajshahi, Bangladesh	Whole Plant	Juice is mixed with fresh milk of goat and administered to cure blood dysentery	Used to cure blood dysentery	(49)
		Whole Plant	Juice is applied on the affected skin	Used in treatment of ring worm	(50)
	Koraput district, Odisha, India	Leaf	Leaf is heated and placed after karanja oil application on the waist	To reduce waist pain	(51)
	Rajshahi, Bangladesh	Latex	Latex is applied in the treatment of warts, rheumatism, toothache	Used in management of rheumatism, warts, toothaches	(49)
E. tirucalli L.		Whole plant	Juice is administered	Used to treat asthma, whooping cough, bladder stone, jaundice, spleen enlargement	(50)
	Jaipur, Rajasthan	Latex	Diluted latex (5ml) administered twice a day	Asthma	(52)
	Chittoor, Andhra Pradesh	Stem	Stem is used by Nakkala tribes	Used to treat cough and cold	(53)
E. trigona Mill.	East Godavari district, Andhra Pradesh	Latex	Equal parts of latex, oil and cow milk is boiled till complete evaporation of latex and milk. This oil is massaged twice a day on paralytic hand	Effective against paralysis	(54)
			Fresh latex is applied on cuts	Used for blood clotting	(54)
	Bangladesh	Stem	elephantiasis	Used to treat elephantiasis	(50)

Phytochemical Constituents

Plant latex contains a diverse array of phytochemical compounds, encompassing alkaloids, phenols, tannins, terpenoids, flavonoids, steroids, and glycosides. Notably, phytochemical constituents implicated in plant defense mechanisms exhibit pronounced efficacy in treating skin disorders, owing to their antimicrobial activity against pathogens associated with skin ailments (8). Within this genus, distinct species have garnered substantial employment in traditional medicinal systems, primarily due to the abundance of phytochemical compounds, including polycyclic and macrocyclic di-terpenes (55). These compounds confer an array of pharmacological properties, and the presence of *Euphorbia* di-terpenes stimulates the interest of biochemists seeking novel drug molecules from natural origins. Table 3 delineates the diverse phytochemical compounds identified within the latex of the selected *Euphorbia* species. Furthermore, Table 4 provides an exposition of the biological activities exhibited by various extracts sourced from different plant components, such as stems, stem bark, latex, leaves, roots, aerial parts, essential oils, and whole plants, utilizing distinct solvent systems.

Table 3. Plant parts, chemical constituents in the extracts of selected *Euphorbia spp.*

Sl. No.	Name of the species	Plant part	Type of compound (polyphenols/ flavonoids/ coumarins/ terpenes/ alkaloids etc)	*Isolated/detected chemical compound	Method of isolation/detection	References
1.	*E. antiquorum* L	Latex	Triterpenes	 Antiquol A  Cycloeucalenol	The latex was diluted with H_2O and extracted with ethyl acetate. This fraction was chromatographed on silica gel with hexane, hexane-EtOAc . nine compounds were isolated and identified	(11)
2.	*E. characias* L.	Leaf	Phenols	 Catechin	Extracted with ethanol	(56)
		Leaf and flower	Flavonoids	 Quercetin-3-arabinofuranoside  Quercetin-3-O-rhamnoside		(17, 56)
3.	*E. heterophylla* L.	Leaf	Pentacyclic triterpenes	 Lupeol acetate  α-amyrin acetate  β-amyrin acetate	Hexane extracts eluted with hexane -ethyl acetate 95:5 (v/v) fractioned by column chromatography was subjected to GC-MS analysis	(57)

			Acyclic monoterpenoid	 Citronellol		
4.	*E. hirta* L.	Leaf	Monoterpene	 Geranyl acetate	Methanolic extract was subjected to GC-MS analysis	(58)
			Monoterpenoid	 Geraniol		
5.	*E. nerifolia* L.	Latex	Triterpene alcohol	 Euphol	Petroleum ether 80/20	(32)
6.	*E. nivulia* Buch. Ham.	Whole plant	Polyphenols	 Caffeic acid  Quercetin	Leaf was extracted with methanol and extract was fractioned with aqueous alcohol	(23)
			Terpenoids	 3-Fluorophenyl 2-fluoro-6-(trifluoromethyl) benzoate		
7.	*E. pulcherrima*Willd. Ex Klotzsch	Whole plant	Quinone	 2,6-Di-tert-butylcyclohexa-2,5-diene-1,4-dione	Ethyl acetate fraction of methanol extract	(59)
			Phenol	 2,4-Di-tert-butylphenol		

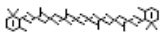
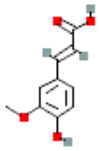
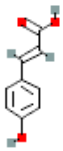
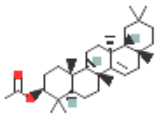
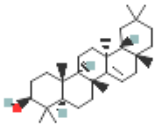
8.	*E. thymifolia* L.	Aerial parts	Isoprenoids	 β-carotene	Fresh material was subjected to steam distillation for 6 hrs to obtain essential oil in a cleavenger apparatus	(60)
9.	*E. tirucalli* L.	Aerial parts	Phenolic compounds	 Ferulic acid  Hydroxycinnamic acid	Dried sample was extracted with 80: 20 Methanol and water	(44)
10.	*E. trigona* Mill.	Latex	Methanol	 Taraxeryl acetate	Latex was extracted with methanol	(61)
		Aerial parts	Methanol	 Taraxerol	Shade dried aerial parts was extracted with methanol	(62)

Table 4. List of different plant parts used to extract bioactive compounds from *Euphorbia spp.* and their biological activities

Euphorbia spp.	Plant parts/ Solvents	Solvents used	Biological activities	References
E. antiquorum L.	Stem	Methanol	Anti-inflammatory effects	(63)
	Latex	Methanol	*Candida albicans*, *Aspergillus flavus*, *A. fumigatus*	(76)
	Leaf	Ethanol	Anti-melanogenic activity,	(64)
			Antimicrobial activity against *Bacillus cereus* ATCC 1177	(56)
E. characias L.	Aerial parts	Methanol	Wound-healing activity	(17)
	Latex	Hexane	Antibacterial activity against *Staphylococcus aureus*	(65)
			Antibacterial activity against *Moraxella catarrhalis*	(65)
			Showed up- regulated expression of metalloproteinase responsible for wound healing	(66,67)
*E. heterophylla*L.	Dried leaves	Aqueous	Antibacterial activity against *Klebsiella pneumoniae, Streptococcus aureus, Escherichia coli, Pseudomonas aeruginosa*	(68)
		Hexane	Antibacterial activity against *Enterococcus faecal* ATCC 4083(70 mg mL per lit), *S. aureus* 2927(80 mg mL per lit)	(57)
	Leaf	Ethanol	*S. aureus* and *E. coli* but not against *E. faecalis* and *P. aeruginosa*	(69)
	Root	Methanol	Allelopathic effect on *Sorghum bicolor* and *Lactuca sativa*	(70)
	Essential oils from aerial parts	By hydrodistillation	Significant antioxidant activity	(71)
E. hirta L.	Whole plant	Methanol and Hexane	Antibacterial activity against *Microsporum canis, Klebsiella pneumoneae, S. aureus*	(72)
			Antibacterial activity against *S. pyogenes*	(22)
		Ethanol	Wound healing of burnt wounds	(73)
	Leaf	Ethanol	Antibacterial activity against *E. coli*, *B. subtilis, S. aureus*, *P. aeruginosa*,	(6)
	Leaf	Ethanol	Plant pathogens like *Colletotricum capsici*, *Fusarium pallidoroseum*, *Botryodiplodia theobromae*, *Aspergillus niger*	(6)
	Aerial part	methanol	Free radical scavenging activity	(74)
	Latex	Petroleum ether 80/20	Antimicrobial activity	(32, 75)
	Stem bark	Petroleum ether	Antibacterial activity against *P. aeruginosa*	(32, 76)
	Root	Petroleum ether	Antibacterial against *E. coli, K. pneumoniae*	(32)
E. nerifolia L.	Leaf	Ethanol	Anti-inflammatory, analgesic and antibacterial activity against *E. coli, K. pneumoniae*	(77)
		Chloroform	Antibacterial activity against *Proteus vulgaris*	(72)
		Chloroform	Showed activity against *P. vulgaris* with 8mm inhibition zone followed by *K. pneumonia* with 5 mm inhibition zone	(78)
E. nivulia Buch. Ham.	Leaves	Aqueous alcohol fraction of methanolic extraction of leaves	Antibacterial activity against*E.coli, K. aerogenes, P. aeruginosa, Salmonella typhimurium, C. albicans, Saccharomyces cerevisiae,*	(75)
E. pulcherrima Willd. Ex Klotzsch	Aerial parts	Ethanol	Insecticidal activity against dusky cotton bugs	(23)
	Leaf	n-hexane fraction of ethyl acetate extract	Antioxidant effect	(59, 79)
	Whole plant	Ethyl acetate fraction of methanol extract	Antibacterial activity against *K. pneumoniae, S. epidermidis, B. stearothermophihus, S. typhi, E. coli, S. aureus, P. aeruginosa*	(42, 59)
		Fixed oil	Antifungal activity against *Aspergillus flavus* showing 60% growth inhibition and *Penicillium notatum* by 25% growth inhibition	(80)
E. thymifolia L.	Whole plant	Ethyl acetate fraction of ethanol extract	Antibacterial activity against *E. coli, Shigella flexner*	(47, 81)
	Aerial part	Methanol	Antioxidant activity	(60)
	Latex	Methanol	Showed 20.65 mm zone of inhibition against *E. coli*, as compared with standard drug Ceftriaxone (24.55 mm), with relative percentages of inhibition of 70.7,	(82)
		Ethanol	Showed the zone of inhibition of 19.23 mm against *E. coli*, as compared with standard drug Ceftriaxone (24.55 mm), with relative percentages of inhibition 61.40	(82)
*E. tirucalli*L.	Whole plant	Methanol	Antibacterial activity against *P. aeruginosa*	(83)
	Aerial parts	Ethyl acetate	Gram-positive bacteria such as *S. aureus* ATCC 29213,and *S. epidermidis* ATCC 12228 were reported to be susceptible with 12.8 to 16.0 mm and 13.2 to 13.7 mm zone of inhibition	(84)
	Stem	Chloroform/ethanol/ methanol	Showed activity against test microbes like *E. coli*, *C. albicans*, *A. niger*, *A. fumigatus*, *S. aureus*, *P. vulgaris*, *B. subtilis*	(85)
E. trigona Mill.	Latex		Antisyphilitic, co carcinogenic	(86)
	Aerial parts	Methanol	Antiproliferative effect against keratinocytes	(62)
	Latex	Methanol	Antiproliferative activity to human cancer cell lines	(61)
			Germination of conidiospore of *A. niger* and *F. graminearum* is inhibited by lectin present in the latex	(13)
	Stem	Methanol	Antiradical activity, antioxidant	(87, 88)

Conclusion

Euphorbia plants constitute a noteworthy reservoir of bioactive compounds, harboring potential for the advancement of novel pharmaceutical agents. The latex derived from various *Euphorbia* species has entrenched its role in traditional medicinal practices. Notably, the chemical composition of these plants exhibits substantial variability dictated by species distinctions, alongside influences of diverse habitats, seasonal dynamics, and collection timings. The pivotal role of diverse chemical constituents in conferring pharmacological attributes to species is a well-established phenomenon. Numerous investigations have validated the biological efficacy of extracts procured from diverse *Euphorbia* species, suggesting their viability for therapeutic applications across various diseases. Consequently, the meticulous examination of plant materials for both pharmacological activities and preliminary chemical profiling emerges as a fundamental endeavor. The data presented in this study substantiates that the chosen *Euphorbia* species stand as rich repositories of diverse chemical entities encompassing alkaloids, steroids, saponins, glycosides, terpenoids, reducing sugars, and amino acids. This compositional richness holds promising potential for the development of antimicrobial agents, bearing significant prospects for mitigating infectious diseases in the foreseeable future.

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Authors' contributions

SP conceived, designed and wrote the paper and AM collected and contributed the data. Both the authors read and approved the final manuscript.

Compliance with ethical standards

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