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Medicinal Plants of West Godavari

Sudhakar Pola and Venkata Narasimha Kadali

Additional information is available at the end of the chapter

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Abstract

Medicinal plants are one of the nature's greatest gifts to the mankind. Each plant will have an exquisite deal of character, which can act as an antidote to various of diseases. Traditional medicine has become a vital alternative source of medicine all over the world today with some approximation of about 80% of the primary health care system in some developing countries. Medicinal plants are known to comprise of hundreds of active constituents that may be potentially useful for the development of therapeutic agents. The development of therapeutic agents involves the isolation and identification of bioactive compounds from plant materials which is crucial for drug discovery. Researchers from all around the globe have focused on drug discovery from the natures' wonder medicinal plants, forming an important group of complementary and alternative medicine (CAM) therapy. West Godavari is a part of Andhra Pradesh, India, which hosts several plants that have high therapeutic significance. Each of the plants has a unique feature which can be employed for healing of various lethal diseases. The present examination intends to review the therapeutic plant assets of West Godavari area Andhra Pradesh. This evaluation also offers the critical elements which include medicinal properties of various medicinal plants found in West Godavari district of Andhra Pradesh, India.

Keywords: drug discovery, traditional medicine, West Godavari district, nature, antidote

1. Introduction

The great thing that nature has given us is the medicinal plants. Each plant will have a great deal of character, which can act as an antidote against different types of diseases.

Traditional medicine has become a vital alternative source of medicine all over the world today with some approximation of about 80% of the primary health care system in some developing countries (e.g., Nigeria, Ghana, China, and India [1, 2]).

India has a recognized traditional system of medicine, that is, Ayurveda, Siddha, Unani, Homeopathy, Yoga, and Naturopathy which placed India in a unique position in the world [3].

As the growth of knowledge has increased, the number of new plant-derived drugs grow at an accelerated pace. India has an enormous wealth of medicinal plants, and often it has been referred to as the Medicinal Garden of the world [4].

Medicinal plants are known to comprise hundreds of active constituents that may be potentially useful for the development of therapeutic agents. The development of therapeutic agents involves Identification and segregation of bioactive compounds from plant materials that are crucial for drug discovery [5].

Researchers from all around the globe have focused on drug discovery from the nature's wonder medicinal plants, an important group of complementary and alternative medicine (CAM) therapy [5].

The man has acclimated himself with plants and utilized them in an assortment of courses all through the ages. Primitive man looking for nourishment and to adapt efficiently to human sufferings started to recognize those plants appropriate for restorative reason from others with complete pharmacological activity. This connection between plants and man has developed, and many plants came to be utilized as medicines. The development of information to cure infections proceeded at a quick pace and various new plant-derived drugs expanded in this manner.

Herbs employed in ancient medicines represent a tiny, low portion of present plants solely. With the advances in informative innovation and science, many bioactive concoction substances are distinguished in plants or foodstuffs through phytochemical and pharmacological studies.

The clinical utilization of plants portrayed in Indian Vedas for curing distinctive maladies. In the present setting, the conventional arrangement of pharmaceutical is broadly acknowledged and drilled by individuals around the world.

The natural solution is drilled around the world. For a considerable length of time, individuals have swung to natural solutions for basic cure illnesses, for example, colds, sensitivity, annoy stomachs, and toothaches, and the pattern is continually expanding. In this way, there has been a move in general pattern from manufactured to homegrown solutions.

The advancement of plant-derived drugs began when improvement of science. The homegrown drug is compelling, minor symptom, and moderate than the medications purchased from an allopathic pharmaceutical. Homegrown medications incorporate herbs, homegrown materials, natural arrangements, and homegrown items that contain diverse parts of plants or other plant materials as dynamic fixings.

As the worldwide utilization of homegrown therapeutic items keeps on developing and numerous, the newest items are brought into the market, general medical problems and concerns encompassing their well-being are likewise progressively perceived. Although some homegrown herbs have promising potential and are utilized, a considerable lot of them stay untested and their utilization likewise not observed.

It has turned out to be fundamental, subsequently, to outfit the overall population incorporating human services experts with adequate data to encourage better comprehension of the dangers related to the utilization of these items and to guarantee that all solutions are protected and of reasonable quality. Discussion in this review is restricted to lethality-related issues, and significant well-being concerns are emerging from the utilization of homegrown drugs and additional factors advancing them. Some essential difficulties related to the successful checking of security of these homegrown cures are additionally featured to refocusing appropriate administrative offices on the requirement for viability and guaranteeing sufficient assurance of general well-being and advancing well-being.

The worldwide acknowledgment and utilization of natural medicines and related items keep on assuming exponential increment. Issues identifying with unfavorable responses as of late are additionally ending up more distinctive, expanding in common and no longer accessible to refute as a result of prior misguided judgment with regards to or classifying homegrown restorative items as "protected" because they are getting from "characteristic" source. In this manner, regulatory approaches on homegrown pharmaceuticals should be institutionalized and reinforced on a worldwide scale. Pertinent administrative experts in various nations of the world should be proactive and keep on putting proper set up measures to secure the general well-being by guaranteeing that every single natural prescription endorsed available to be purchased sheltered and of reasonable quality. Suppliers of pharmaceuticals, for example, doctors, attendants, and drug specialists, regularly have little preparing in and comprehension of how homegrown solutions influence the well-being of their patients. Satisfactory preparation is present extremely basic since most patients are regularly on different sorts of the solution or non-professionally prescribed drugs. Additionally, it is vital that all suppliers of natural solutions are adequately enabled to assume a part in observing well-being of homegrown prescriptions. This, be that as it may, ought to be in a joint effort with the traditional healers. For this to be successful, it is basic to make a climate of trust to encourage satisfactory sharing of information about the utilization and well-being of homegrown solutions. Truth be told to suppliers of homegrown solutions, and patients/shoppers are imperative for the version of possibly genuine dangers from misuse of natural medications. The supplier must demonstrate adequate responsibility toward understanding the utilization of homegrown drugs.

West Godavari is a part of Andhra Pradesh, India, which hosts several plants that have high medicinal importance. Each of the plants has a unique feature which can heal lethal diseases. Some researchers have drawn some plants into attention from lots of surveys. It also hosts traditional healers who can efficiently cure some of the deadly diseases.

The traditional plant healing has brought a significant breakthrough in curing diseases very efficiently. The nutraceutical companies have isolated plant compounds based on the knowledge provided by the traditional healers. An adequate amount of knowledge is still to be known from the traditional healers. There is a substantial increase in the use of Ayurvedic medicines and medicines derived from plant sources. The reason being its efficacy and lack of side effects, and there is an economic point of view as well. Based on the information given by the traditional healing system, several modern scientific studies are being conducted on the various medicinal plants.

Some of the medicinal plants have been perished because of urbanization. The ancient knowledge about medicinal plants had not been documented, and many of the valuable plants are

at the edge of extinction. The government and NGO should take necessary conservatory steps to avoid extinction of valuable medicinal plants.

Several bioactive compounds isolated from medicinal plants are in excess demand in nutraceutical companies.

The present study aims to review the medicinal plant resources of West Godavari district, Andhra Pradesh. This review also deals with the critical aspects such as medicinal properties of various medicinal plants present in West Godavari district of Andhra Pradesh, India. This article deals with the medicinal properties of plants which are implicated in various diseases such as jaundice, cardiac diseases, asthma, cancer, skin diseases, diarrhea, conjunctivitis, ulcers, diabetes, leprosy, syphilis, and neural diseases.

This article also deals with the scientific studies conducted by the researchers on numerous medicinal plants present in West Godavari.

2. Medicinal plants of West Godavari

2.1. *Annona reticulata* L.

Annona genus (Annonaceae) has about 119 species [6]. *Annona reticulata* belongs to the plant family Annonaceae and is a semi-evergreen and small deciduous tree [7]. *Annona* species are having a place in custard apple family and is cultivated everywhere in India for its fruit. All components of genus *Annona* are employed in natural medication within the tropics. It is thought to be a smart supply of natural antioxidants for various diseases.

It is being cultivated in Peru and Brazil and is grown mostly in the Bahamas and occasionally in southern Florida, Bermuda, the east coast of Malaysia, and throughout Southeast Asia and the Philippines [8, 9].



2.1.1. Scientific evidences

This plant is known to possess antioxidant activity [7], anticancer activity [10–13], anti-helminthic activity [14], anti-inflammatory activity [6], analgesic, and CNS depressant activity [15].

2.2. *Abutilon indicum*

Abutilon indicum (Linn.) belong to family Malvaceae and it is scattered throughout Andhra Pradesh, India, and it is being used for treating various diseases like diabetes, leprosy, ulcer, and jaundice [16].

In Siddha System of Medicine, it has been using as a remedy for jaundice, piles, ulcers, and leprosy [17].

2.2.1. Scientific studies on *Abutilon indicum*

This plant is proved to have diuretic activity [18], antimycotic activity [19], anti-arthritic activity [20], anti-inflammatory and anti-asthmatic activity [21], hypoglycemic activity [22], anti-convulsant activity [23], wound healing activity [24], antidiarrhoeal activity [25], antimalarial [26], and hepatoprotective activity [27].



2.3. *Abrus precatorius*

Abrus precatorius belongs to family Fabaceae. *Abrus precatorius* is a plant originating from Southeast Asia. The name *Abrus*, means beautiful or graceful, is used to describe the appearance of the seed [28]. The seeds of *Abrus precatorius* have a history in a variety of roles because they have uniform size and weight. They were once called as Rati, and utilized as weights for measuring gold and silver [28].

2.3.1. Scientific studies on *Abrus precatorius*

This plant is demonstrated to have antibacterial activity [29], diuretic activity [30], nephroprotective activity [31], neuroprotective activity [32], bronchodilator activity [33], effect on neuromuscular antioxidant activity [34], anticonvulsant activity [35], antispasmodic activity [36].



2.4. *Acacia Arabica*

Acacia is the most remarkable variety of family: Leguminosae, as a matter of first importance, portrayed by Linnaeus in 1773. It is assessed that there are approximately 1380 types of *Acacia* around the world, and two-thirds of them local in Australia and rest of spread around tropical and subtropical districts of the world [37–39].

2.4.1. *Scientific studies on Acacia Arabica*

This plant is proved to have antidiabetic activity [40], antimutagenic activity [41], antimicrobial activity [42], antifungal activity [43], antidiarrhoeal activity [44], antiviral activity [45], nematocidal activity [46], antioxidant activity [47], and abortifacient activity [48].



2.5. *Bambusa arundinacea*

Bambusa arundinacea, belong to Gramineae family, is a highly reputed Ayurvedic tree commonly known as the Bamboo [49]. Bamboos contrast from alternate individuals from the grass family

because of the nearness of branches at every node. A bamboo culm comprises of an internode (which is empty for most bamboo) and a node, which is robust and gives basic structural integrity to the plant. The buds on the node later develop into side branches [50].

2.5.1. Scientific evidences

This plant is demonstrated to have antifertility activity [51], anti-bacterial activity [52], anti-inflammatory [53], and anti-ulcer activity [54].

2.6. *Boerhavia diffusa* L.

Boerhaavia diffusa L. (Nyctaginaceae), generally known as “Punarnava” in the Indian arrangement of medicine, is a perennial creeping herb found all through the wastelands of India [55]. The roots are reputed to be diuretic and laxative and are given for the treatment of anasarca, ascites, and jaundice [56].

2.6.1. Scientific evidences

This plant is verified to have antidiabetic activity [57], antibacterial activity [58], hepatoprotective activity [56], analgesic/anti-inflammatory activity [59], antitumor activity [60], anticonvulsant activity [61], antiproliferative and antiestrogenic activity [62], cytological activity [63], bronchial asthma [64], and anti-fibrinolytic activity [65].



2.7. *Calotropis procera*

Calotropis procera belong to family Asclepiadaceae is a tropical plant growing wild in warm climate up to an altitude of about 1050 m. It is a native plant of North Africa, and it is well distributed throughout India, particularly it is abundantly found in Rajasthan. It also found in Pakistan, Africa, Mexico, Australia, Egypt, Central and South America, and Caribbean islands [66, 67].

2.7.1. Scientific evidences

This plant is verified to have hepatoprotective activity [68], antioxidant activity [69], antipyretic activity [70], anthelmintic activity [71], anti-inflammatory activity [72], antidiarrhoeal

activity [73], spasmolytic activity [74], antidiabetic activity [75], antiulcer activity [76], and wound healing activity [77].



2.8. *Momordica charantia*

Momordica charantia is a climber that has its place in the family Cucurbitaceae, is commonly known as bitter melon or bitter melon. This plant typically grows in tropical areas of Asia, Amazon, East Africa, and the Caribbean and it is being cultivated throughout the world for its use as a vegetable as well as medicine [78].

2.8.1. Scientific evidences

This plant is demonstrated to have antioxidant activity [79], antidiabetic activity [80], anticancer and antitumoral activity [81], antiviral activity [82], antifertility activity [83], and antineoplastic activity [78].



2.9. *Punica granatum*

Punica granatum is widely known as pomegranate. It belongs to the Punicaceae family, which is a large deciduous shrub or small tree native to Asia. *Punica granatum* has been used in

folk medicine for centuries in the Middle East, India, and China, and it has been used to treat disorders ranging from inflammation and rheumatism to the pain of a simple sore throat. The most famous usage worldwide has been as a vermifugal or taenicidal agent [84–87].

2.9.1. Scientific evidences

This plant is verified to have healing activity [88], anti-inflammatory activity [89], antidiabetic activity [90], and anticancer activity [91].



2.10. *Pongamia pinnata*

It is a medicinal plant native to the Western Ghats and is chiefly found in tidal forests of India. *Pongamia pinnata* also was known as *Derris indica*, is a monotypic genus and grows profusely along the coasts and riverbanks in Myanmar and it has multi-purpose benefits and as a potential source of biodiesel [92, 93].

2.10.1. Scientific evidences

This plant is proved to have antihyperglycemic and antilipidperoxidative effects [94], anti-hyperammonemic effect [95], anti-inflammatory activity [96], antiviral activity [97], antifilarial potential [98], ulceroprotective activity [99], nootropic activity [100], and antinociceptive activity [101].

2.11. *Piper longum*

Piper longum Linn. has been named under the family Piperaceae is a flowering plant in the *Piper* family. *Piper longum* commonly known as long Indian pepper, it is widely being used as a spice and flavoring agent in various foods and herbal formulations. It is widely cultivated in India, Nepal, Indonesia, Malaysia, Sri Lanka, Timor, and the Philippines. In India, it is extensively grown in the central Himalayas to Assam, Khasi and Mikir hills, lower hills of West Bengal and evergreen forests of the Western Ghats from Konkan to Kerala and also from Car Nicobar Islands because of its therapeutic potential [102–105].

2.11.1. Scientific evidences

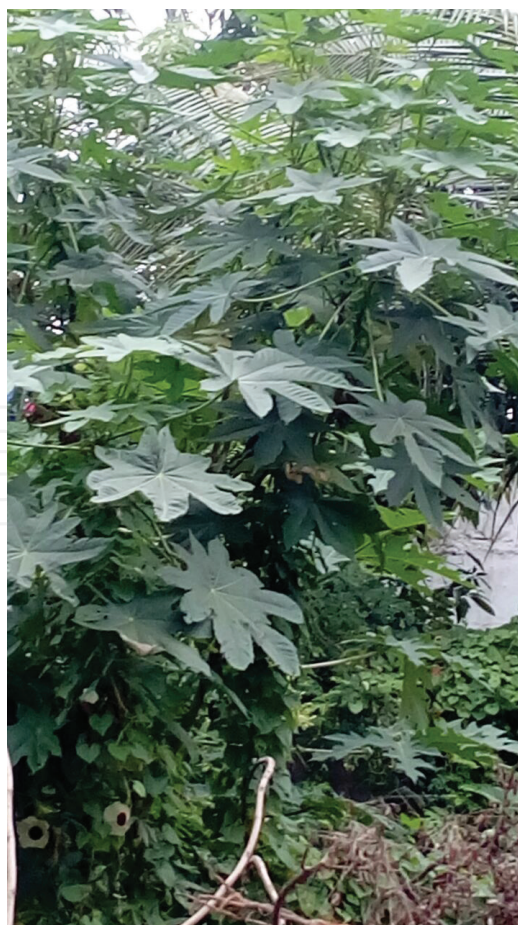
This plant is shown to have anti-apoptosis and antioxidant [106], analgesic activity [107], immunomodulatory activity [108], anticancer and antitumor activity [109], antidiabetic activity [110], antifertility activity [111], anti-snake venom activity [112], melanin-inhibiting activity [113], and antiulcer activity [114].

2.12. *Ricinus communis*

Ricinus communis, belong to a family Euphorbiaceae and it is most commonly known as castor oil plant. *Ricinus communis* as a tropical plant, known as castor bean, distributed widely across the world, and it is a local of India and developed all through the nation in greenery enclosures and fields and furthermore develops wild in squandering places [115, 116].

2.12.1. Scientific evidences

This plant is shown to have antimicrobial and antifungal [117], antioxidant activity [118], anti-implantation activity [119], anti-inflammatory and free radical scavenging activity [120], central analgesic activity [121], anti-tumor activity [122], larvicidal and adult emergence inhibition activity [123], antiulcer activity [124], molluscicidal, insecticidal and larvicidal activity [125], antidiabetic activity [126], cytotoxic activity [127], and antihistaminic activity [128].



2.13. *Syzygium cumini* (L.)

Syzygium cumini Linn. is a huge evergreen tropical tree belongs to the family Myrtaceae, and this plant is also mentioned in literature as Jamun, synonym as black plum or jambolana, since ancient age this plant is very well-known for their pharmacological properties [129, 130].

2.13.1. Scientific evidences

This plant is revealed to have antiallergic activity [131], gastroprotective activity [132], antioxidant activity [133], CNS activity [134], anti-inflammatory activity [135], antihyperlipidemic activity [136], antidiarrhoeal activity [137], antipyretic activity [138], antispasmodic activity [139], and antiviral activity [140].

2.14. *Sida cordifolia*

Sida cordifolia L. belongs to family Malvaceae and commonly called as Country Mallow and Bala (Sanskrit). This herb is extensively spread throughout the tropical and subtropical regions of India [141].

In Ayurvedic practices, *Sida cordifolia* has three basic applications: Mashabaladi Kvatha, where the plant seeds are blended with different fixings to soothe relieve muscular pain; Balataila, a procedure for the treatment of sensory system grievances and stomach issues and as a heart tonic; and the squashed leaves of the plant as an astringent for the treatment and dressing of wounds or skin wounds [142].

2.14.1. Scientific evidences

This plant is shown for its antioxidant activity [143], anti-inflammatory activity [144], anti-ulcer activity [145], antidiabetic activity [146], nephroprotective activity [147], cytotoxicity [148], anti-hypercholesterolemic activity [149], hepatoprotectivity [150], cardiovascular activity [151], and anticancer activity [152].

2.15. *Sapindus mukorossi*

Sapindus mukorossi belongs to family Sapindaceae and has some common names such as soapnut, soapberry, washnut, reetha, aritha, dodan, and doadni. It is an attractive medium-sized deciduous tree found in diverse geographical provinces like Gangetic Plains, Western Ghats, and Deccan Plateau in India [153].

2.15.1. Scientific evidences

This plant is proved to have an anti-mosquito activity or larvicidal activity [154], cytotoxic activity [155], tyrosinase inhibition and free radical scavenging [156], antigonorrhoeal activity [157], antifungal activity [158], and molluscicidal activity [159].

2.16. *Tribulus terrestris* L.

Tribulus terrestris L. is a well-known plant that belongs to genus *Tribulus*. The genus *Tribulus*, having a place with family Zygophyllaceae, involves around 20 species on the world. Among them, *T. terrestris* is a well-practiced medicinal herb by Ayurvedic practitioners as well as by modern herbalists [160].

2.16.1. Scientific evidences

This plant is demonstrated to have diuretic activity [161], aphrodisiac activity [162], anti-urolithic activity [163], immunomodulatory activity [164], antidiabetic activity [165], hypolipidemic [166], central nervous system (CNS) activity [167], anticancer activity [168], and larvicidal activity [169].

2.17. *Terminalia chebula*

Terminalia chebula is a moderate plant which is being utilized as a part of conventional solutions. It has a place in the Combretaceae family. It is typically called as Black Myrobalan, Ink tree (or) Chebulic myrobalan and furthermore known as "Ruler of the drug." It is widely utilized as a part of Unani, Ayurveda, and homeopathic prescription. *Terminalia chebula* is a well-known conventional plant utilised in the pharmaceutical industry in India as well as in different countries of Asia and Africa [170]. It stimulates the liver and ensures it is promote by removing the excretory waste items from the digestion tracts. It is shown in protracted loose bowels with hematochezia and prolapse of rectum. It is a decent nervine, utilized as a part of anxious shortcoming, apprehensive crabbiness.

2.17.1. Scientific evidences

This plant is demonstrated to have antibacterial activity [171], antiamoebic and immunomodulatory activities [172], antianaphylactic and adaptogenic activities [173], antiviral activity [174], antimutagenic and anticarcinogenic activities [175], anti-arthritic activity [176], antidiabetic and retinoprotective activities [177], and hepatoprotective activity [178].

2.18. *Tephrosia purpurea*

Tephrosia purpurea or Sharpunkha has its place in the family Leguminosae (subfamily-Papilionaceae). The genus *Tephrosia* encompasses between 300 and 400 species of annual and perennial woody herb, scattered in the tropical and subtropical local of the world. This plant has excessive economic cost due to the presence of phytochemicals like flavonoids, sugars, gums tannins and phenols, alkaloids and glue, settled oils and fats, and saponins and lipids [179, 180]. As per Ayurveda writing, this plant has additionally given the name of "Sarwa Wranvishapaka" which implies that it has the property of mending a wide range of wounds. It is an imperative part of a few arrangements, for example, Tephroli and Yakrifitused for the liver issue. In the Ayurvedic arrangement of different pharmaceutical parts of this plant, they are utilized as a solution for impotency, asthma, diarrhea, gonorrhoea, ailment, ulcer, and urinary issue.

2.18.1. *Scientific evidences*

This plant is verified to have anticarcinogenic and anti-lipid peroxidative [181], anti-inflammatory and analgesic [182], in vitro antioxidant [183], anticancer activity [184], and in vitro anthelmintic activity [185].

2.19. *Tectona grandis*

T. grandis Linn. belongs to family Verbenaceae is one of the most well-known timbers in the world and is famous for its dimensional stability, extreme durability, and hardness which also resists decay even when unprotected by paints and preservatives. This plant is commonly called as teak. It is one of the most famous heartwood of the world. Timber value of teak has been well-known for decades [186, 187].

2.19.1. *Scientific evidences*

This plant is verified to have hair growth activity [188], cytotoxic activity [189], anti-hemolytic anemia activity [190], hypoglycemic activity [191], anti-inflammatory activity [192], diuretic activity [193], and gastroprotective activity [194].

2.20. *Tamarindus indica* L.

Tamarindus indica or tamarind regarded as a tropical fruit tree native to the African savannahs and it is found in numerous tropical nations. It is arranged as a monospecific class in the group of Leguminosae. The sweet and harsh taste of its natural product mash is utilized to add flavor to neighborhood cooking styles. Other than culinary, tamarind is likewise utilized as a part of the conventional drug as purgative, diuretic, antibacterial operators and also in the treatment of fever and malarial contaminations [195, 196].

2.20.1. *Scientific evidences*

This plant is verified to have antipyretic activity [197], laxative activity [195], anticancer activity [198], antiemetic activity [199], antimicrobial [200], hepatoprotective [201], and analgesic activity [202].

2.21. *Withania somnifera*

Withania somnifera (WS) belongs to the Solanaceae family, commonly known as Ashwagandha. Traditionally this plant was named for its potential to calm the mind, the capacity to improve learning ability, memory power, and to improve poor eyesight. It is also named for anti-inflammatory potential in the treatment of joint diseases and an appropriate remedy for asthma and bronchitis [203]. Ashwagandha is one among the vast assorted variety of the restorative plant, which is exploited well for its phytopharmacological impact. The restorative properties of *Withania somnifera* are accessible both in the composed and non-composed arrangement as conventional information since time immemorial. In the conventional framework, the plant

has been utilized as a calming, antitumor, antistress, cell reinforcement, immunomodulatory, and adaptogenic medicate. It likewise applies a positive effect on the endocrine, cardiopulmonary, and focal sensory systems with next to zero-related poisonous quality. It has the ability to battle growths by lessening tumor size and ended up being a decent regular wellspring of a sturdy and moderately safe radiosensitizer/chemo-remedial specialist.

2.21.1. Scientific evidences

This plant is proved to have anti-inflammatory activity [204], antioxidant property [205], anti-cancer properties [206], immunomodulatory potential [207], neuroprotective effects [208], cardioprotective and hypocholesteremic [209], and antimalarial potential [210].

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