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Review Article

Comprehensive Review on Medicinal Value of Poisonous Plants

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Abstract

Poisonous plants, despite their toxic nature, have played a crucial role in medicine for centuries. If used properly, these deadly plants are incredibly beneficial. Many of these plants contain potent bioactive compounds that, when used in controlled doses, serve as the foundation for various pharmaceutical drugs. This article explores the dual nature of poisonous plants, examining their medicinal applications, pharmacological significance, and the scientific advancements that have transformed toxic botanicals into therapeutic agents. By understanding the balance between toxicity and healing, researchers continue to uncover new medical breakthroughs from nature's most dangerous flora. The knowledge of toxicity and usefulness of the poisonous plants are the main concern in present day scenario.

Keywords Poisonous plants, Castor bean, deadly nightshade, water hemlock, oleander.

INTRODUCTION

Plants have been a cornerstone of medicine for centuries, providing essential compounds for healing and disease management. Interestingly, many plants that are classified as poisonous also hold significant medicinal value. Poisonous plants are a group of plants that yield phytoconstituents, which exert harmful causes or effect death either presently or by purpose of cumulative activity of the toxic activity due to presence of known or unknown phytochemical principles in it and not by mechanical activity. These plants contain bioactive compounds that, when used in controlled doses, serve as the foundation for various pharmaceutical drugs. Most of the plants are capable of producing different kind of chemicals when they come in contact with other beings, especially humans and animals. The poisonous quality of complete plant or any plant part may be due to production of phytotoxic substances namely, glycosides, phenolic toxicants, resins, tannins, saponins, proteins, amino acids, amines, mycotoxins, alkaloids, carbohydrates, chelating poisons, metals, ketones, essential oil, picrotoxins toxalbumins, etc. Several of which are detrimental to man and animal life, at least under certain conditions and each group of poison acts differently. Literally thousands of plants contain various quantities of poisonous chemicals. While their toxic properties can pose risks, proper extraction and refinement have led to life-saving treatments. Despite their dangers, poisonous plants continue to be a valuable resource for pharmaceutical research. Advances in pharmacognosy and biotechnology have enabled scientists to isolate and modify toxic plant compounds for medical use. This review article explores the medicinal potential of various poisonous plants, discussing their biochemical properties, therapeutic applications, and ongoing research. Understanding the balance between toxicity and healing is crucial for developing new treatments and harnessing the full potential of nature's most dangerous flora[1].

BELLADONA

Atropa belladonna, widely recognized as belladonna or deadly nightshade, is a toxic perennial herbaceous plant. It is also referred to by several other names, including divale, dwale, banewort, devil's berries, death cherries, beautiful death, devil's herb, great morel, and dwayberry. This species is indigenous to Europe, North Africa, and Western Asia, with its range extending from Great Britain in the west to western Ukraine and the Iranian province

of Gilan in the east. Additionally, it has become naturalized or introduced in certain regions of Canada and the United States. *Atropa belladonna* is characterized as a branching herbaceous perennial with a rhizomatous structure, often developing as a subshrub from a fleshy rootstock. The plants can reach heights of up to 2.0 meters and feature ovate leaves measuring 18 cm in length. The bell-shaped flowers are a dull purple with green undertones and emit a faint fragrance. The fruits are berries that start off green and mature to a glossy black, measuring approximately 1.5 cm in diameter. These sweet berries are consumed by animals, which help in seed dispersal through their droppings, although they contain toxic alkaloids[2].

Figure 1: *Atropa belladonna*

Etymology

The name *Atropa belladonna* was published by Carolus Linnaeus in Species Plantarum in 1753. The term Atropa is derived from the name of the Greek goddess Atropos, who is known as 'she who may not be turned aside,' signifying 'the inflexible' or 'the implacable.' Atropos is one of the three Fates in Greek mythology, responsible for determining an individual's life path by weaving threads that represent their birth, life events, and ultimately, their death, with Atropos severing these threads to signify the end. The term belladonna comes from Italian, translating to 'beautiful lady.' This name likely refers to its historical use as a cosmetic to enhance the appearance of pale skin or, more plausibly, its application in dilating women's pupils[3].

Toxicity

Belladonna is recognized as one of the most poisonous plants, and its oral consumption heightens the risk of various medical conditions, including pregnancy complications, cardiovascular issues, gastrointestinal disorders, and psychiatric illnesses, among others. Every part of the plant contains tropane alkaloids. The leaves have the highest concentration of alkaloids during the budding and flowering stages, while the roots are most toxic at the end of the plant's growth cycle[4].

Symptoms

The active compounds found in belladonna, namely atropine, hyoscine (scopolamine), and hyoscyamine, exhibit anticholinergic effects. Symptoms associated with belladonna poisoning encompass dilated pupils, photophobia, blurred vision, rapid heartbeat, loss of coordination, staggering, headaches, skin rashes, flushing, extreme dryness of the mouth and throat, slurred speech, urinary retention, constipation, confusion, hallucinations, delirium, and seizures. An adult woman mistakenly identified *A. belladonna* berries as blueberries and consumed six of them, leading to a severe case of anticholinergic syndrome. The lethal effects of the plant are attributed to atropine's interference with the parasympathetic nervous system, which impairs its ability to control involuntary functions such as sweating, respiration, and heart rate. The treatment for belladonna poisoning involves the use of an anticholinesterase agent, such as physostigmine or pilocarpine, which is also effective against atropine poisoning[5].

Medicinal properties

Although it is commonly considered unsafe, belladonna is orally administered as a sedative, to alleviate bronchial spasms associated with asthma and whooping cough, and as a treatment for colds and hay fever. Additionally, it is utilized for conditions such as Parkinson's disease, colic, inflammatory bowel disease, motion sickness, and as an analgesic. The purified form of l-atropine, extracted from belladonna in the 1830s, has recognized medical applications. Furthermore, belladonna is incorporated into ointments for topical application to relieve joint pain, pain along the sciatic nerve, and general nerve discomfort. It is also used in plasters, which are medicated gauze applied to the skin[6,7].

CASTOR BEAN

The castor bean plant, scientifically referred to as *Ricinus communis,* is a perennial flowering species native to Africa and Asia, celebrated for its seeds that are rich in oil. Belonging to the Euphorbiaceae family, this plant can grow between 3 to 12 meters in height and is distinguished by its palmate leaves, which feature 5 to 12 lobes, as well as small greenish-yellow flowers.

Figure 2: *Ricinus communis*

The seeds are oval and brown, containing ricin, a highly toxic protein, while also serving as a major source of castor oil. This oil is employed in a variety of medicinal uses, including the treatment of digestive issues, skin

disorders, and inflammatory conditions, in addition to its applications in industrial products like lubricants, soaps, cosmetics, and biofuels. Moreover, castor bean plants act as natural pest deterrents and fertilizers in agricultural settings. They flourish in warm climates with well-drained soil and require full sun to partial shade, making them a valuable crop, although care must be taken when handling them due to the presence of ricin[8].

Etymology

The history of the castor bean is fascinating, with its etymology revealing a deep and varied background. The word "castor" originates from the Greek term "Kastor," meaning "beaver," which refers to the similarity between the seeds of the plant and beaver musk. This term evolved into the Latin "Castoreum," which refers to a substance derived from the seeds. The scientific name, Ricinus communis, also has Latin roots; "Ricinus" means "tick," indicating the resemblance of the seeds to the insect, while "communis" means "common," emphasizing the widespread nature of the plant. The castor bean has played a significant role in various cultures and mythologies, particularly in ancient Egyptian medicine and Greek mythology, where it was associated with the twin brothers Castor and Pollux. Throughout history, the castor bean has been utilized for a range of purposes, including medicinal, cosmetic, and industrial uses, highlighting its versatility and significance[9].

Toxicity

The castor bean, or *Ricinus communis*, contains ricin, a highly toxic protein that presents a serious risk of death if ingested, inhaled, or injected. Ricin interferes with protein synthesis, which can lead to cell death and possible organ failure. Even a small amount, such as 4 to 8 seeds, can cause toxicity, resulting in symptoms like nausea, vomiting, diarrhea, abdominal pain, fever, headache, respiratory failure, and cardiac arrest. Severe poisoning may occur within 2 to 5 days, and there is currently no known antidote. Consequently, it is essential to handle castor beans with caution, and any ingestion should be treated as a medical emergency[10].

Medicinal properties

The castor bean (*Ricinus communis)* is known for its diverse medicinal benefits, primarily due to the presence of ricinoleic acid and ricin. Historically, castor oil has been used to treat a variety of health issues, including digestive disorders like constipation and diarrhea, skin ailments such as acne and dermatitis, pain relief for conditions like arthritis and menstrual cramps, as well as respiratory issues including bronchitis and asthma. In modern usage, castor oil is also applied in wound care, incorporated into cosmetics for hydration and hair growth stimulation, and utilized in pharmaceuticals for cancer therapy and pain relief[11].

ROSARY PEA

Abrus precatorius, commonly referred to as crab's eye, Indian bead, jequirity, gunji, rosary pea, precatory pea, or Indian licorice, is a leguminous plant found in tropical and subtropical areas. This deciduous climbing vine is indigenous to tropical regions of Asia and Australia and thrives in warm, humid climates worldwide, including the Caribbean Islands and Florida. It is a perennial climbing shrub that wraps around trees, shrubs, and hedges. The plant features stipulate leaves with 12 to 16 pairs of leaflets, and its racemes are shorter than the leaves. The flowers are few and fascicled, with a sparsely pubescent calyx and a corolla that is whitish-pink. The pods are thick, hard, and wrinkled, with seeds that adhere to them, displaying a brilliant red color with a black base and a white basal hilum, lacking fracture lines. Historically, the seeds of *Abrus precatorius* have served various purposes. Known as ratti due to their consistent size and weight, they were traditionally utilized as weights for measuring gold and silver[12].

Figure 3: *Abrus precatorius*

Etymology

The Latin genus name Abrus translates to 'graceful,' highlighting the beauty of its flowers. The species name precatorius conveys the idea of 'entreaty' or supplication, evoking a sense of prayerfulness. Historically, these seeds were brought from India to Europe for the purpose of crafting rosaries[13].

Toxicity

The plant is considered toxic because it contains abrin, a dimer composed of two protein subunits, A and B. Protein B aids in the entry of abrin into cells by attaching to specific transport proteins located on cell membranes. Meanwhile, Protein A disrupts protein synthesis by inactivating the 26S subunit of the ribosome. A single molecule of abrin can inactivate 1,500 ribosomes every second[14].

Symptoms

Symptoms may manifest rapidly or be delayed by 1 to 2 days. The consumption of a single well-chewed seed can be lethal for both adults and children, as the toxin is only released upon the seeds' rupture. Extracts from the seeds can lead to ocular damage, conjunctivitis, and potentially blindness upon contact. The primary symptoms of poisoning include acute gastroenteritis characterized by nausea, vomiting, and diarrhea, which can result in dehydration, convulsions, and shock. Dehydration, along with direct toxicity to the kidneys, may lead to oliguria and could ultimately progress to death due to uremia. If

the de-hulled seed comes into contact with blood or nerves, it can cause immediate death. Inhalation of the substance may result in symptoms such as difficulty breathing, fever, cough, nausea, and chest tightness. Additionally, heavy sweating followed by fluid accumulation in the lungs (pulmonary edema) may occur, exacerbating breathing difficulties and potentially causing cyanosis. When ingested, symptoms can include vomiting, diarrhea, severe dehydration, low blood pressure, hematuria, seizures, and hallucinations[15].

Medicinal properties

The Rosary Pea (*Abrus precatorius*), known for its toxicity, has been employed in traditional medicine for centuries, particularly in Ayurvedic and Unani practices. Different parts of the plant, such as the seeds, leaves, and roots, are believed to provide various health benefits. These benefits include anti-inflammatory and analgesic properties useful for treating conditions like arthritis, fever, and pain relief. Furthermore, the plant demonstrates antimicrobial effects that help fight bacterial and fungal infections, as well as antioxidant and anticancer properties that may inhibit tumor development. Additionally, it has anthelmintic effects that aid in the expulsion of parasites, cardiovascular advantages that contribute to lowering blood pressure and cholesterol levels, and immunomodulatory effects that strengthen the immune system[16].

YELLOW OLEANDER

Cascabela thevetia is a small toxic tree indigenous to Mexico and Central America. Commonly referred to as yellow oleander, bestill tree, lucky nut (in the West Indies), Kaneru (in Sinhala), and Manjal arali (in Tamil), this tree produces flowers in shades of yellow, orange, and white. It is often cultivated in gardens and temples, and can also be found in open forests. The tree occasionally thrives on plains up to an elevation of 1400 meters and is commonly used as a live fence. *Cascabela thevetia* is classified as an evergreen tropical shrub or small tree, characterized by its willow-like, linear-lanceolate leaves that are glossy green and coated in a waxy layer to minimize water loss, a feature typical of oleanders. The stem starts off green and gradually turns silver or gray with age. The flowers are long, funnel-shaped, fragrant, and appear in terminal clusters, while the fruit is a deep red-black color containing a large seed[17].

Figure 4: *Cascabela thevetia*

Etymology

The terms ‘Cascabel’, ‘cascavel’, or ‘cascabela’ in Spanish refer to a small bell, the rattle of a snake, or the rattlesnake itself. This reference may also pertain to the plant's toxicity, which is similar to that of a rattlesnake's venom. The specific name ‘thevetia’ honors André de Thevet (1516-1590), a French Franciscan priest and explorer known for his explorations in Brazil[18].

Toxicity

The primary toxins present are cardenolides known as thevetin A and thevetin B, along with other compounds such as peruvoside, neriifolin, thevitoxin, and ruvoside glycosides. These cardenolides remain stable and are not degraded by drying or heating, exhibiting a close resemblance to the digoxin compound. They can lead to both gastric and cardiotoxic effects. Antidotes for managing these effects include atropine and digoxin immune fab fragments (antibodies), and treatment may also involve the oral administration of activated charcoal. The ovine polyclonal anti-digitoxin Fab fragment antibody (DigiTAb; Therapeutic Antibodies Inc.) is available for treating Cascabela thevetia poisoning; however, its cost is prohibitive in many countries[19,20].

Symptoms

The seed is fractured, and the cotyledons are ingested as a means of self-harm. Ingesting the seed leads to gastric and cardiotoxic effects, which manifest as nausea, vomiting, increased heart rate, convulsions, and ultimately, death. The consumption of a single seed can be fatal for an adult. In rural areas, numerous individuals resort to eating it to end their lives. Those who survive often endure significant health complications[21].

Medicinal properties

The flowers of the *Cascabela thevetia* plant have been recognized for their significant medicinal properties within traditional medicine. A phytochemical analysis of the powdered form of the plant has identified the presence of alkaloids, glycosides, tannins, phenolic compounds, proteins, essential oils, gums, mucilage, and fixed oils. The toxins derived from this plant have been tested for their potential applications in biological pest control. Additionally, oil extracted from *Cascabela thevetia* seeds has been formulated into a 'paint' that exhibits antifungal, antibacterial, and anti-termite characteristics. Traditionally, this substance has been employed to treat various cardiac conditions, including atrial fibrillation and congestive heart failure, as well as to alleviate fever, rheumatism, and inflammation. It is also used for treating several skin disorders, such as eczema and dermatitis, and demonstrates antimicrobial properties that are effective against bacterial and fungal infections. From a pharmacological standpoint, it shows cardiotonic and anti-arrhythmic effects, along with anti-inflammatory and antioxidant benefits. Furthermore, it has been recognized for its anticancer potential by inhibiting tumor growth, as well as its insecticidal and larvicidal properties[22].

WATER HEMLOCK

Cicuta virosa, commonly known as cowbane or northern water hemlock, is one of the most toxic plant species globally. This plant is indigenous to northern and central Europe, northern Asia, and the northwestern regions of North America. It thrives in wet meadows, along the banks of streams, and in other marshy environments. Due to its extreme toxicity to horses, livestock, and humans, the U.S. Department of Agriculture (USDA) has classified it as the most dangerously toxic plant found in North America. This perennial herbaceous plant can reach heights of 1 to 2 meters and features small, umbrella-like clusters of green or white flowers. Its stems are smooth, branched, swollen at the base, marked with purple stripes, and hollow, except for partitions located at the points where the leaves meet the stem[23].

Figure 5: *Cicuta virosa*

Etymology

The genus name Cicuta is originated from Latin cicūta meaning 'hemlock; pipe' and the species name virosa also originate from Latin vīrōsus meaning 'poisonous'[24].

Toxicity

The plant is known to contain cicutoxin, a substance that interferes with the central nervous system's functions. In humans, symptoms such as nausea, vomiting, and abdominal pain typically manifest within an hour after ingestion of cicutoxin. Severe poisoning can result in tremors and seizures. Even a single bite of the root, which has the highest concentration of cicutoxin, can be fatal. In animals, the toxic and lethal doses are almost identical; for instance, one gram of water hemlock per kilogram of body weight is lethal to a sheep, while 230 grams can be fatal to a horse. Given the swift onset of symptoms, treatment is often ineffective[25].

Symptoms

Poisoning from this plant could result in seizures with intermittent relaxation, rolling of eyes and other behavioural abnormalities, turning in circles, twisting of the neck, opening and shutting of mouth, falling down, nausea, vomiting, diarrhoea, hypertension and also coma[26].

Medicinal properties

The root possesses various properties, including analgesic, anticonvulsant, anti-inflammatory, antispasmodic, emetic, and sedative effects. The analgesic and anti-inflammatory qualities are crucial for alleviating pain and discomfort. Certain substances with sedative effects can effectively manage anxiety and insomnia. Moreover, their anticonvulsant properties are advantageous in the treatment of muscle spasms and epilepsy. Additionally, these compounds' anti-inflammatory effects are beneficial for relieving rheumatism. However, the entire plant is highly toxic and is not utilized in herbal medicine. Historically, a homeopathic remedy has been derived from this plant[27].

DATURA

Datura stramonium, widely recognized as jimsonweed, thorn apple, moon flower, hell's bells, devil's trumpet, devil's weed, devil's snare, tolguacha, Jamestown weed, stinkweed, locoweed, prickly burr, false castor oil plant, and devil's cucumber, is found globally. This plant is often seen in neglected areas and can reach heights of 3 to 5 feet, with leaves measuring between 5 to 8 inches. *D. stramonium* is characterized as a foul-smelling, upright, annual herb that branches freely, growing into a bush that can attain heights of 60 to 150 cm. Its root is long, thick, fibrous, and white in color. The stem is robust, upright, leafy, smooth, and varies in color from pale yellow-green to reddish purple. The leaves, measuring 8 to 20 cm in length, are smooth, toothed, soft, and exhibit irregular undulations. The upper side of the leaves is a darker green, while the underside is lighter. The trumpet-shaped flowers, which are fragrant, range in color from white to creamy or violet and measure 6 to 9 cm in length. The calyx is elongated and tubular, swollen at the base, sharply angled, and features five prominent teeth at the top[28].

Figure 6: *Datura stramonium*

Etymology

The genus name Datura is derived from Sanskrit language. The origin of Neo-Latin species name stramonium is unknown, but the name stramonia was used in the 17th century for various Datura species by Carolus Linnaeus[29].

Toxicity

Jimsonweed is a toxic plant, with its most concentrated poisons found in the leaves and seeds. All parts of Datura species contain harmful levels of tropane alkaloids, including atropine, hyoscyamine, and scopolamine, which are categorized as deliriants or anticholinergics. *D. stramonium* has been commonly utilized in traditional medicine for various health issues. However, it is also misused as a recreational drug, leading to hallucinations and a feeling of euphoria. Consequently, it has been employed as a hallucinogen of the anticholinergic and deliriant type, often taken for spiritual experiences that induce vivid visions. Despite its hallucinogenic properties, it is unlikely to become a widely abused substance due to the unpleasant effects it has on both the mind and body, which can result in severe disorientation and potentially fatal consequences. The tropane alkaloids present are responsible for these deliriant effects and can be highly toxic. Additionally, it is used in the formulation of medications that treat asthma, cough, influenza, nerve disorders, and swine flu[30].

Symptoms

Common signs of *Datura stramonium* poisoning include dry skin and mucous membranes, facial flushing, dilated pupils, rapid heartbeat, elevated body temperature, reduced bowel movements, urinary retention, and various neurological symptoms such as ataxia, short-term memory impairment, disorientation, confusion, hallucinations (both visual and auditory), psychosis, agitated delirium, seizures, and coma. These manifestations are similar to those seen in atropine poisoning. The effects of the toxins may also encompass dry mouth, intense thirst, seizures, nausea and vomiting, increased heart rate, loss of consciousness, respiratory difficulties, and in severe cases, may result in death[31].

Medicinal properties

Datura (*Datura stramonium)* is known for its medicinal benefits, despite its toxic nature. Historically, it has been employed for a range of applications, particularly for pain relief due to its analgesic and anti-inflammatory properties. Moreover, it functions as a sedative, assisting in the treatment of anxiety and insomnia. The plant is also acknowledged for its antispasmodic effects, which can aid in managing conditions like asthma and bronchitis, as well as gastrointestinal disorders by alleviating spasms and diarrhea. Additionally, Datura serves as an anticholinergic agent, inhibiting acetylcholine receptors and promoting muscle relaxation. Its anti-inflammatory and antioxidant characteristics help in reducing inflammation and neutralizing free radicals, respectively. The seeds of Datura stramonium exhibit analgesic, anthelmintic, and anti-inflammatory properties, making them useful in treating abdominal and intestinal pain caused by parasitic infections, toothaches, and fever associated with inflammation. Furthermore, the juice extracted from its fruit is applied to the scalp to address dandruff and hair loss[32,33].

ACONITE

Aconitum napellus, commonly referred to as monk's-hood, garden monkshood, aconite, or wolfsbane, is a highly toxic flowering plant that belongs to the Ranunculaceae family. This species is native to and endemic in western and central Europe. It is a perennial herbaceous plant with tuberous roots, reaching heights of up to one meter, characterized by its hairless stems and leaves. The flowers, which appear in terminal racemes, are hooded and range in color from dark purple to bluish-purple, with a narrow oblong, helmet-like shape measuring 1–2 cm in length. The plant's stalks are adorned with these purple flowers, each resembling the hood of a medieval monk, which makes them easily recognizable. Previously, plants from Asia and North America that were classified as *A. napellus* are now considered distinct species. This plant is highly poisonous, posing risks through both ingestion and skin contact[34].

Figure 7: *Aconitum napellus*

Etymology

Ancient popular etymology connected the name in part to the adjective akonitós, which means 'invincible' and in part to the name of the hill Akonitos in Pontus. The Latin species name napellus is derived from nápus, which means 'tuber' and refers to the shape of the roots[35].

Toxicity

The plants contain aconitine and other alkaloids which are highly toxic and are classified as neurotoxins and cardiotoxins. Aconitine is a potent neurotoxin that opens tetrodotoxin sensitive sodium channels. It increases influx of sodium through these channels and delays repolarization, thus increasing excitability and

promoting ventricular dysrhythmias. During the ancient Roman period of European history, the plant was often used to eliminate criminals and enemies, and by the end of the period it was banned and anyone growing A. napellus could have been legally sentenced to death[36].

Symptoms

The ingestion of this plant may result in severe complications such as burning sensations, diarrhea, and vomiting. Additionally, it can cause fluctuations in blood pressure, irregular heart rhythms, and even coma. Prominent symptoms typically manifest almost immediately, generally within one hour, and "in cases of large doses, death can occur almost instantaneously." In instances of fatal poisoning, death usually transpires within two to six hours, with doses of 20 to 40 mL of tincture potentially being lethal. The initial symptoms are gastrointestinal, including nausea, vomiting, and diarrhea, followed by sensations of burning, tingling, and numbness in the mouth and face, as well as abdominal burning[37].

Medicinal properties

Despite its toxicity, several Native American tribes found medicinal uses for white snakeroot, often using the root, but other plant parts as well. Some sources say that a poultice to treat snakebites was made from the root, resulting in the common name, white snakeroot. Root tea has been used to treat diarrhea, kidney stones, and fever[38].

MEXICAN POPPY

Argemone mexicana, commonly referred to as Mexican poppy, Mexican prickly poppy, flowering thistle, cardo, or cardosanto, is a species of poppy native to Mexico and has since become widely naturalized in various regions around the globe. This plant typically thrives along roadsides and in areas of waste. It is an annual herb that can reach heights of up to 150 cm and features a slightly branched taproot. The stem is branched and often covered in sharp spines. The leaves resemble those of thistles, are arranged alternately, lack petioles, have serrated edges, and possess spiny margins. The grey-white veins are prominently visible against the bluish-green surface of the upper leaves[39].

Figure 8: *Argemone mexicana*

Etymology

Argemone is from the Greek argena, meaning 'cataract of the eye', and was the name used in the first century AD by the classical authors Dioscorides (AD 40-90) and Pliny (AD 23-79) for some spiny poppies, the juice of which was supposedly a cure for cataract. The species epithet mexicana combines Mexico with the Latin suffix ana, belonging to, suggesting the country of origin[40].

Toxicity

The entire plant, particularly its seeds, is toxic. Argemone oil contains two alkaloids: sanguinarine and dihydrosanguinarine. Additionally, four quaternary isoquinoline alkaloidS dehydrocorydalmine, jatrorrhizine, columbamine, and oxyberberin have been extracted from the complete plant of Argemone mexicana (Singh et al., 2010). The seeds of this plant closely resemble those of mustard, which can lead to the adulteration of mustard with argemone seeds, making it hazardous. Numerous notable cases of katkar poisoning have been documented in India, Fiji, South Africa, and other nations[41].

Symptoms

The entire *Argemone mexicana* plant, especially its seeds, is highly toxic. Argemone oil is composed of two primary alkaloids: sanguinarine and dihydrosanguinarine. Furthermore, four quaternary isoquinoline alkaloidS namely dehydrocorydalmine, jatrorrhizine, columbamine, and oxyberberine have been isolated from the whole plant. The seeds of this plant bear a striking resemblance to mustard seeds, which raises the risk of mustard being contaminated with argemone seeds, posing a significant health threat. Numerous significant instances of katkar poisoning have been reported in India, Fiji, South Africa, and various other countries[42].

Medicinal Properties

The Seri people of Sonora, Mexico utilize the entire plant in both its fresh and dried forms. An infusion is prepared to alleviate kidney pain, assist in the expulsion of a retained placenta, and generally aid in cleansing the body after childbirth. Upon the arrival of the Spanish in Sonora, they incorporated this plant into their medicinal repertoire, naming it cardosanto, which should not be confused with blessed thistle (*Cnicus benedictus*). The seeds serve as a laxative. In Mali, traditional healers prepare a tea from *Argemone mexicana* to combat malaria, highlighting its numerous medicinal properties. Traditionally, the flowers are soaked in water overnight, and using this water to cleanse the eyes is believed to enhance vision. The juice extracted from the leaves is effective in treating various skin ailments and is also employed for the treatment of scorpion and snake bites. When the dried plant powder is brewed as tea or mixed with honey, it aids in alleviating coughs, asthma, and promotes overall respiratory health. The roots are cleaned, soaked, ground, and ingested to eliminate intestinal worms. Additionally, the dry powder can be used for brushing teeth to prevent gum issues. In traditional Indian medicine, the yellow sap of *A. mexicana* and the entire plant are utilized in the treatment of

jaundice[43].

CALOTROPIS

The scientific designation for calotropis is *Calotropis gigantea*, which is part of the Apocynaceae family. It falls under the subfamily Asclepiadoideae and is classified within the genus Calotropis. The species is identified as C. gigantea and is categorized in the kingdom Plantae. The bark of the calotropis plant is thick, corky, and exhibits a yellow-brown hue, while the twigs are vibrant green and may be covered with white, hair-like fibers. The leaves are simple and range from ovate to obovate, featuring six pairs of prominent nerves on the surface, an acute apex, a pale green color, and can grow quite large, reaching approximately 30 cm in length[44].

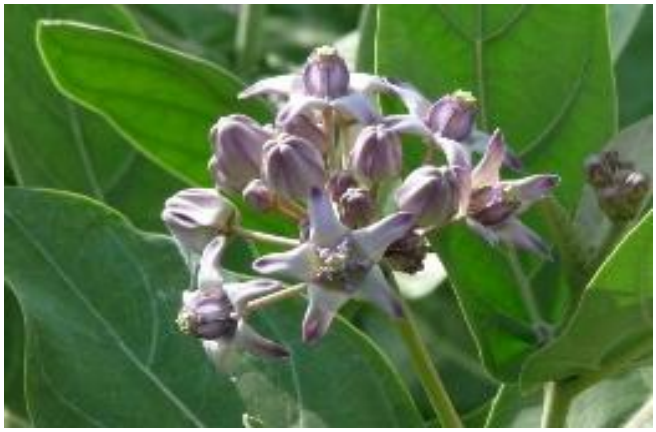

Figure 9: *Calotropis gigantea*

Etymology

The word "*Calotropis*" is derived from Greek, meaning "beautiful," which refers to its flowers; whereas "*procera*" is a Latin word referring to the cuticular wax present on its leaves and stem[45].

Toxicity

The latex comprises a potent enzyme, a highly toxic glycoside known as calactin, and a non-toxic enzyme called calotropin. This enzyme exhibits greater proteolytic activity compared to papain. The entire calotropis plant includes compounds such as gigantin, giganteol, and wax. Additionally, the plants contain proceragenin, while the bark is rich in benzoylinesolone. The stalk and leaves are sources of calotropin, whereas the flowers contain calotropenyl acetate, and the latex is characterized by the presence of terpenol ester[46].

Symptoms

The adverse effect of Calotropis consumption is reported to cause lesion, eruption and blisters were taken by patients for treatment of joint pain. If ingested by mistakenly acrid, bitter taste, and burning pain in the throat and stomach, salivation, stomatitis, vomiting, diarrhoea, dilated pupils, tetanic convulsions, collapse and death[47].

Medicinal properties

Calotropis displays a variety of advantageous characteristics, such as hepatoprotective, anticancer, analgesic, antifertility, antimicrobial, antifungal, and antidiarrheal effects. It also exhibits antioxidant and anti-asthmatic properties, as well as effects against syphilis, purgative actions, anti-worm capabilities, insecticidal properties, and antipyretic effects. In addition, it shows contraceptive, antioxidant, anticoccidial, anti-diarrheal, analgesic, and anti-tumor activities[48].

Table 1: Poisonous plants, toxic parts, chemical constituents and medicinal properties[49-56]

S.N.	Plant name	Toxic parts	Chemical constituents	Medicinal property
1	*Abrus precatorius*	Seeds, Leaves, Aerial parts	Abrin, Abrine and Abrasine	Anticancer, Antibacterial, Antifungal Antimigraine, Bronchodilator Antioxidative activity
2	*Aconitum napellus*	All parts especially dried tuberous root	Aconitine, Pseudo Aconite, Indaconitine Bhikhaconitine, Picraconitine, and Aconine	Analgesic, Antiarrhythmic
3	*Argemone mexicana*	All parts especially seeds	Berberine, Protopine, Sanguinarine and Dihydro-Sangunarine	Jaundice therapy Laxative
4	*Atropa belladonna*	All parts	Scopolamine, Hyoscyamine, and Belladonnine	Sedative for bronchial spasms, Belladonna plasters and ointments for nerve pains
5	*Datura stramonium*	All parts especially seeds and fruit	Atropine, Hyoscyamine, Hyscine and Dutarin	Analgesic, Anthelmintic, Anti-inflammatory. The juice of its fruit is applied to the scalp, to treat dandruff and falling hair
6	*Cicuta virosa*	All parts	Cicutoxin and Oenanthotoxin	Analgesic, Antispasmodic, Emetic, sedative
7	*Dioscorea communis*	All parts especially fruits and rhizomes	Phenanthrenes, Raphides and Histamines	Anti-inflammatory
8	*Cascabela thevetia*	All parts especially leaves and fruits	Cerberin, Cerberoside, Odollin, Odolotoxin, Thevetin and Cerapain	Antifungal, Antibacterial and Antitermite

CONCLUSION

The article on the medicinal value of poisonous plants highlights the fascinating dual nature of certain plants, where their toxic properties, when properly managed, can be harnessed for therapeutic purposes. It emphasizes the importance of scientific research in identifying and isolating active compounds from these plants that have the potential to treat various ailments, from pain relief to cancer treatment. However, it also underscores the risks involved, as improper use of these plants can be dangerous or even fatal. In conclusion, while poisonous plants offer significant medicinal potential, careful handling, and comprehensive understanding of their pharmacological properties are crucial for their safe and effective use in medicine.

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