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Exploring The Wonders Of Mexican Prickly Poppy: A Comprehensive Review

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• ***Abstract:*** Mexican Argemone Linn, a plant widely distributed in tropical and subtropical areas globally, belongs to the Papaveraceae family. The Papaveraceae family, commonly referred to as the poppy family, includes 44 genera and approximately 760 species. This family holds significant importance from an ethnopharmacological perspective. It can be found growing in fields, alongside roads, and near water sources throughout India. The plant features leaves, roots, and flowers. Another designation for it is "Mexican Poppy." This article provides a comprehensive review of the chemistry and pharmacology of Argemone mexicana Linn. This species is recognized as one of the most crucial in traditional medical systems. Although alkaloids are the predominant compounds, the plant contains various other chemical constituents. While many plant parts have medicinal advantages, some may also present toxic effects. This article examines pharmacological, microscopical, morphological, and phytochemical research. Current findings related to the chemistry and pharmacology of this plant may serve as a valuable resource for researchers looking to pursue further studies in these domains.

• ***Keywords*** *:* Argemone mexicana, Biological activity, Papaveraceae, Pharmaceutical potential, Phytochemical constituents, Traditional uses

• INTRODUCTION

Due to their low economic worth, countless plants on our green planet are viewed as wild or unwanted. Without requiring additional care, these plants have successfully adapted to challenging conditions. Nevertheless, every organism that nature has created serves a purpose. Thus, Argemone Mexicana also contains valuable genetic resources, but continuous scientific exploration would demand diligent observation and commitment. Many plants once deemed undesirable or without use actually hold several essential components. Medicinal herbs are commonly employed to address cancer, metabolic disorders, and numerous infectious illnesses. Argemone Mexicana L. is often located in the arid and tough regions of Maharashtra. The Indian healthcare system known as Ayurveda has been practiced for over two millennia. Certain medications yield relatively weak effects against specific diseases, such as HIV and tuberculosis. The seeds and seed oil are utilized to remedy gastrointestinal ailments like asthma, ulcers, and dysentery. Furthermore, the leaves and seeds of this plant are used to promote healthy blood circulation and manage cholesterol levels. These plant parts exhibit antivenom properties. Latex is utilized for treating conjunctivitis and possesses antibacterial effects; flowers serve as expectorants to alleviate coughs; and the seeds of these plants have purgative and laxative effects.

- **Plant Description:**

Plant Parts	Description	Image
Stem	The stem has a cylindrical to rectangular shape, appearing swish and in pale colors. The entire stem is covered with very short hairs and some long yellow spines.	
Leaves	The blade is a compound structure, with a pinnately arranged form that is undivided, exhibiting a base that slightly embraces the stem, measuring between six to twenty centimeters in length and three to eight centimeters in width. The lobes are rectangular, twisted, with teeth that conclude in spines. The veins are pinnate, displaying whitish spines that are smaller and less frequent, especially on the underside. Both surfaces of the leaves are devoid of hair.	
Flowers	The flowers are giant, four to seven cm in diameter. There are six spherical petals, bright yellow.	
Fruits	Fruits looks like a ovoid capsules shape, 2cm in diameter and 5 cm in lenght. It's coated by stout, yellow spines. Once ripe it opens from the apex. It's divided into 5 chambers, contain varied seeds.	
Seeds	Seeds are created in profusion, tiny and black, 1.7-2 mm x 1.6 mm.	

- **MORPHOLOGICAL CHARACTERISTICS:**

The stem of Argemone Mexicana is a straight, herbaceous (non-woody), branched, and cylindrical structure. It has a pale greenish hue, and the entire stem is covered in very short hairs as well as some long yellowish spines. The leaves are simple, alternate, stalkless, blue-green in color, thick, and rough to the touch. The leaf base measures between 6 to 20 cm in length and from 3 to 8 cm in width. The upper surface of the leaf is smooth, while the underside features a few spines along the midrib. The edges of the leaves are adorned with numerous spines. The fruits are oval-shaped capsules that are 5 cm long and 2 cm in diameter, covered with rough, yellowish spines. When these fruits ripen, they open from the apex, dividing into five chambers that contain a multitude of seeds. The seeds are located inside spiny capsules, which are about 1.5 inches in length.

Each capsule has roughly 3 to 5 openings allowing the seeds to disperse; however, many seeds can remain within the capsule for several weeks until the wind or animals shake the plant.

- **Taxonomical classification :-**

Sr.no	Scientific Category	Classification
1.	Kingdom	Plantae
2.	Division	Magnoliophyta
3.	Class	Magnoliopsida dicotyledons
4.	Subclass	Magnoliidae
5.	Order	Papaverales
6.	Family	Papaveraceae
7.	Genus	Argemone
8.	Species	Argemone Mexican

- **TRADITIONAL USE:**

Understanding well-established medical practices is crucial for innovating new medicines. A survey indicates that the use of plants as therapeutic agents ranges from 4% to 20% across different parts of the world. Around 2,500 plant species are internationally traded, and many more have been utilized for thousands of years by local healers. The ongoing use of numerous species for medical treatments has persisted over many decades. Additionally, it is more reliable and accepted because it aligns closely with the region's culture and religious traditions. In various settings, Argemone mexicana (AM) has been employed as an effective medicinal plant. The name Argemone comes from the Greek term "argema," which translates to "cataract in one's eye," as historical users have depended on its juice for relief from vision-related issues. The juice of AM can be used to alleviate conditions such as ophthalmia and corneal opacity. Despite its seeds having both laxative and sedative qualities, they are also utilized for the treatment of constipation.

- **GEOGRAPHICAL DISTRIBUTION:**

- **Distribution in India**

In India, this species is prevalent in states like, Andhra Pradesh, Assam , Bihar, Delhi, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, Telangana, Rajasthan, Uttar Pradesh, and West Bengal

- **Distribution in rest of the World**

This plant species is usually spread in all parts of the world. AFRICA: Nigeria, Namibia, Niger, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe; ASIA: Bahrain, Bangladesh, Bhutan, Cambodia, China, Hong King, Indonesia, Java, Japan, Pakistan; MIDDLE EAST: Israel, Saudi Arabia, Turkey, Iran, Iraq.

- **SYNONYMS:**
- Argemone leiocarpa Greene
- Argemone mexicana L. var. leiocarpa Prain
- Argemone mucronata Dum.
- Argemone ochroleuca Sweet
- Argemone ochroleuca L. var. barclayana Prain
- Argemone spinosa Moench
- Argemone sulphurea Sweet ex London

- **VERNACULAR NAME:**

Argemone Mexican is identified by different common names in different areas by local people.

Sr.no	Language	Common Name
1.	English	Mexican Poppy
2.	Marathi	Phirangi dhotra
3.	Hindi	Pila dhatura
4.	Gujarati	Dhaturo
5.	Malayalam	Brahmadandi
6.	Assamese	Siyalakanta

- **PHYTOCONSTITUENTS OF PLANT:**

Plant Parts	**Active Constituents**	**Pharmacological activity**
Leaves	Berberine	Anti-fertility activity
		Effect on ileum contraction in guinea pig
		Antimalarial activity
Whole Plant	Dehydrocorydalmine	Antifungal activity
Apigeal Parts, Aerial Parts	Protopine	Anti-fertility activity
		Effect on ileum in guinea pig
		Mollucicidal activity
		Antimalarial activity
		Antimalarial activity
Whole Plant	Chelerythrine	Cytotoxic activity
Seed	Sanguinarine	Mollucicidal activity
	(+)-Higenamine	Cytotoxic activity

Whole Plant	Oxyberberine	Antifungal activity
Aerial Parts	N-Demethyloxysanguinarine	Cytotoxic activity
Aerial Parts	Pancorine	Cytotoxic activity
Whole Plant Whole Plant	(±)-6-Acetonyl Dihydrochelerythrine	Anti-HIV activity
	Angoline	Cytotoxic activity
Leaves	B-Amyrin	Anti-inflammatory & analgesic activity
	Cysteine	Anti-inflammatory & analgesic activity
Roots	β-sitosterol	Used in chronic disease and leprosy Inflammation, Antioxidant, Antifungal
Seed	Dihydropalmatine Hydroxide	Anti-fertility activity

- **PHARMACOLOGICAL ACTIVITY:**

- **ANTICANCER ACTIVITY :**

Many plants and their individual components have been found to possess noteworthy anticancer properties. A. mexicana, which contains a variety of chemical compounds—with alkaloids being the most prevalent—has been thoroughly researched for its ability to inhibit the growth of tumor cells among traditional medicinal plants. In a particular study, six alkaloids, including 13-oxoprotopin, 8-ethyl dihydro sanguinarine, dehydrocorybulbine, jatrorrhizine, and 8-Berberine, were extracted from the aerial parts of A. mexicana, and their cytotoxic effects were examined on a cell line derived from a human colon cancer patient. The cytotoxic effects of the isolated alkaloids were assessed at different doses to evaluate their impact on cell viability.

- **ANTIOXIDANT ACTIVITY :**

Antioxidants function as free radical scavengers. Reactive oxygen species (ROS) such as superoxide (O2-), hydrogen peroxide (H2O2), and hydroxyl radical (OH), along with reactive nitrogen species (RNS) including nitrous oxide (N2O), nitrosyl cation (NO+), peroxynitrite (OONO), nitrogen dioxide (NO2•), nitroxyl anion (NO), and nitrous acid (HNO2), are known to have significant roles in biological processes. These ROS and RNS can be effectively neutralized by antioxidants or polyphenolic compounds found in plants, helping to slow the progression of diseases. Moreover, synthetic antioxidants like butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), and gallic acid esters have been associated with negative health effects, making naturally occurring antioxidants a more beneficial choice.

- **ANTI-DABETIC ACTIVITY:** :

Hyperglycemia is a hallmark of diabetes mellitus, a chronic metabolic disorder. Traditional therapies suggest that A. mexicana possesses properties that are beneficial for diabetes. Several in vitro and in vivo studies have explored the effects of different extracts from various parts of A. mexicana on its strong anti-diabetic activity. In research involving rats that were made diabetic through alloxan administration, the anti-diabetic effect of the aqueous extract of A. mexicana was assessed.

- **WOUND HEALING ACTIVITY :**

Fresh leaves of Argemone mexicana were individually assessed for their potential to enhance wound healing in rats using excision, incision, and dead space wound models. When compared to the control group and reference standard, both excision and incision showed significant improvements in wound healing activity with the chloroform, methanol, and aqueous extracts of Argemone mexicana. The methanol extract demonstrated exceptional healing advantages against Staphylococcus aureus in the infected wound model.

- **ANTIBACTERIAL ACTIVITY :**

The seeds were harvested from the plants, rinsed three times with distilled water, and then dried on blotting paper in a laboratory at 37 °C for a duration of 24 hours. After drying, the seeds were ground into a powder using a grinder before being extracted with methanol, ethanol, and water. Tests evaluating the sensitivity of various bacterial strains to the extracts revealed that the chloroform seed extract had an inhibitory effect on E. coli, P. aeruginosa, Enterococcus, S. typhi, and S. aureus, as well as on resistant strains of P. aeruginosa and S. aureus. Methanol seed extracts also showed inhibitory effects on P. aeruginosa, S. typhi, and S. aureus. The chloroform extract from the seeds exhibited greater inhibitory properties compared to the methanol extracts. Conversely, the seed extracts in water and hexane showed no signs of inhibition.

- **ANTI-INFLAMMATORY ACTIVITY :**

At a dosage of 200 mg/kg in mice, the ethanolic extract from the leaves of A. mexicana is reported to have considerable anti-inflammatory and analgesic properties. Furthermore, it has been observed that the leaf extract of A. mexicana exhibits noteworthy anti-inflammatory effects in rats. Researchers suggest that the chemical constituents of the leaf extract, including isorhamnetin-3-O-glucopyranoside, amyrin, cysteine, and phenylalanine, may be responsible for these effects.

- **ANTIMICROBIAL ACTIVITY :**

Aerial and root parts of Argemone mexicana were gathered, washed with clean water, and air-dried. The antibacterial activity of Argemone mexicana was evaluated using the agar well diffusion method at different concentrations. A total of seven microorganisms were tested, which included four bacterial species and three fungal species. For the positive controls, ampicillin and ketoconazole were used, while 75% methanol served as the negative control. The findings from the agar well diffusion method and the determination of the MIC values indicated that C. albicans was the most susceptible, showing MIC values of 2.0 mg/ml when exposed to the essential oil, whereas C. torulopsis exhibited the least sensitivity to the essential oil from A. mexicana.

- **ANTIULCER ACTIVITY :**

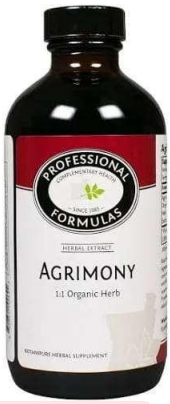
Traditional medicine utilizes the plant A. mexicana for the treatment of ulcers and associated ailments. Research indicated that both methanolic and aqueous extracts of A. mexicana were administered orally to rats to prevent duodenal ulceration induced by cysteamine hydrochloride. The findings revealed that both extracts from the plant exhibited a significant inhibitory effect on the duodenal ulcers experimentally induced in the rats. Notably, the aqueous extract demonstrated a stronger effect than the methanolic extract in a dose-dependent manner.

- **HEPATOPROTECTIVE ACTIVITY :**

The effectiveness of the bark root in treating liver damage caused by CCl4 (carbon tetrachloride) was investigated using a rat model. The hepatoprotective properties were assessed through rigorous toxicity tests, evaluation of health status, blood analysis, and biochemical tissue assays (including total protein, glucose, bilirubin, liver markers, and enzyme measurements), among other techniques. The results indicated that this herb possesses significant healing capabilities, including the regeneration of injured liver cells and the restoration of liver tissue, establishing it as a beneficial liver tonic.

- **FORMULATIONS:**

PRODUCT	COMPANY
1.MOTHER TINCTURE 	BJAIN
2)HOMOEOPATHIC DILUTION 	BAKSON'S HOMOEOPATHY

3) TABLETS 	GANESH AYURVEDIC
4)HERBAL EXTRACT 	PROFESSIONAL FORMULAS

- **CONCLUSION:**

Mexican Prickly Poppy is a significant medicinal plant widely used in various traditional medical practices across the globe. In this review, we aimed to provide morphological, phytochemical, and ethnopharmacological information on Argemone Mexicana. The properties of this plant include antimicrobial, anti-inflammatory, antidiabetic, anticonvulsant, antistress, antidiarrheal, anticancer, antiestrogenic, antifertility, antihelminthic, antiasthmatic, osteogenic effects, wound healing, hemagglutinating activity, and benefits for liver disorders.

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