

BOTANICAL DESCRIPTION ALONG WITH AN EXTENSIVE RESEARCH ARTICLE ON A MEDICINAL PLANT OF ARGEMONE MEXICANA AND THEIR MEDICINAL IMPORTANCE WITH PHYTOCHEMICAL POTENTIAL.

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ABSTRACT

Argemone Mexicana is commonly known as 'Mexican prickly poppy' and 'Satyanashi' is a common name. Its potential as a medicinal plant has been practiced traditionally and been prescribed as medicines by Ayurvedic, Unani, Siddha and Homeopathic practices since several years. It is a well-known weed in the agricultural and waste lands. It is a widely distributed plant throughout the subtropical and tropical regions of the world. *Argemone Mexicana Linn* has been reported that Each part of these plant posses bio active compounds that help in curing ailments like Anti-malarial, Antibacterial, ring worm infections, fungal infections, cancer, Wound healing, Hepato protective, Anti-HIV, Vaso relaxant activities etc. The present article show the pharmacological and phytochemical work done on the plant and determines a scientific base for novel study for future research to establish toxin free response of plant or its phytoconstituents. Therefore the present study is aimed to highlight the botanical characters, its Phytochemical and pharmacological activities in various diseases.

KEYWORDS: Phytochemical screening, Prickly poppy, Medicinal plant, Traditional, *Argemone Mexicana*, Papaveraceae.

INTRODUCTION

Argemone Mexicana Linn (Papaveracea) is commonly known as 'Mexican prickly poppy' and 'Satyanashi'. It occurs as wasteland weed in almost every part of India. In many parts it is reported as crop weed also. The genus *Argemone* includes 12 species. According to Ayurveda the plant is used as diuretic, purgative and destroys worms. In Homoeopathic system of medicine, the drug prepared from this herb is used to treat the problem caused by tape- worm. The plant contains alkaloids as berberine, protopine, sarguinarine, optisine, chelerytherine etc.^[1]

Medicinal plants are of noble worthiness to mankind. They are nature's offering human beings to regulate a sickness free healthful life. This performance is a necessary role in preserving our health.^[2] Medicinal plants are considerably serviceable and economically needed. The receive dynamic phytoconstituents that are used in the treatment of various human ailments.^[3]

Argemone Mexicana L. (Papaveraceae), commonly known as Prickly Poppy in English and Premathandu in Tamil found in Mexico and now has widely naturalized

in the United States, India, Bangladesh and Ethiopia. It occurs as wasteland weed in almost every part of India.^[4]

The plant prefers light sandy soils, requires well-drained soil and can grow in nutritionally poor soil and also prefers acid, neutral and basic (alkaline) soils.^[5]

Medicinal plants can be used dated back to ancient times when these were the only reliable source of treatment of any disease.

Use of plants as medicine has been taken into practice since ages in literatures like Ayurveda, Siddha and Unani. Each and every part of a plant has some curative property for any particular disease that could be thought of. According to WHO more than 60% of population still depends on plants as their primary source of treatment specially the tribal population, people living in villages or rural areas or other enthusiasts who found this dependence on natural sources much beneficial in terms of side-effects.

It is a prickly, glabrous, branching herb with yellow juice and showy yellow flowers. The Sanskrit name

Svarnakshiri is given because of the yellow juice.

The height of the plant varies between 60-90 cm, Leaves are thistle like. Stem clasping; Oblong, sinuately spinous and veins are white.

Argemone Mexicana is considered as an important medicinal plant in India; the yellow juice, which exudes when the plant is injured, has long been used in India as traditional medicine for dropsy, jaundice, ophthalmia, scabies and cutaneous affections.^[6,7] Further with improvement in technology and introduction of *in vitro* and *in vivo* experimentations certain activities have also been studied exhibited by the plant parts like anti-HIV, anti-malarial, anti-cancerous, cytotoxicity etc. Active Phytochemicals have been reported from different parts of plants that are responsible for the curative responses. They include alkaloids like berberine, chlerytherine, sargurinanrine, fatty acids like palmitic acid, oleic acid, etc.

Leaves and seeds are also reported to find application in maintaining normal blood circulation and cholesterol level in human body. Although it is poisonous in nature

and seeds were been used with mustard seeds as an adulterant as observed cases of food adulteration. Traditionally the plant has been taken in use to cure fungal infections, skin disease, ringworm jaundice, etc by the folks.

Morphological Description: *Argemone Mexicana* belonging to family Papavercaea is commonly called as Mexican poppy; it is prickly, dicot plant. Its height vary from 0.3 m to 1.2 m. Stem is green in color and oblong. Leaves are green with white veins and yellow flower which is terminal.

A fruit is in oval capsule covered with prickles all over. Whole plant is covered in prickles and hence it got it name 'prickly poppy'. This is a wild plant that grows a weed near road side, wells, abandoned lands, near fields, agricultural waste lands etc. It prefers little alkaline medium for growth and light sandy soil.

It is widely distributed in tropical and sub-tropical countries like United States, Ethopia, Africa, Mexico and Bangladesh and could be found widely in every part of India.

(Plant of *Argemone Mexicana* Linn)



Classification

Taxonomy

Kingdom : Plantae
 Super division : Spermatophyta
 Division : Magnoliophyta
 Class : Magnoliopsida
 Subclass : Magnoliidae
 Order : Papaverales
 Family : Papaveraceae
 Genus : Argemone
 Species : Argemone Mexicana

Konkani - Phirangi-dhuro
 Malayalam- Ponnummattu
 Marathi -Phirangi-dhotra
 Tamil - Kudiyotti
 Telugu-Brahmadandi

MATERIAL AND METHODS

Plant Selection

The selection of plant species for our study was based on their traditional use for diabetes treatment, the information being gathered from published sources and traditional healers. The plants aerial parts of *Argemone Mexicana* Linn were selected for the present studies.

Collection and identification

Fresh and mature plant of *A. Mexicana* L was, collected from the road side area from pali, Rajasthan, India, during summer (June, 2019) and was authenticated.

Vernacular names

Its vernacular names are as follows:

Hindi- Satyanashi
 Sanskrit- Kankkshiri
 Bengali-Barashit-kantal
 Kannada- Datturigidda

After due authentication, fresh matured leaf parts *A. Mexicana* L was collected in bulk, initially rinsed thoroughly with distilled water, shade dried for 15 days.

The shade dried materials were coarsely powder by a mechanical grinder and preserved in a nylon bag in a deep freezer, till further use.

Preparation of Extraction of *A. Mexicana* leaf part

The extraction yield of the extracts from plant species is vastly depends on the solvent polarity, which find out both qualitatively and quantitatively the extracted compounds.

Ethanol and water are the commonly used solvent for the extraction because of their low toxicity and high extraction yield with the advantage of modulating the polarity of the solvent by using mixtures at different ratios.

The plant materials (1 kg) were initially defatted with petroleum ether and then extracted with alcohol and water using a Soxhlet apparatus.

The yield of the plant extracts ethanol (95%) and aqueous measured about 20 g each after evaporating the solvent using water bath. The standard extracts obtained from *A. Mexicana* were then stored in a refrigerator.

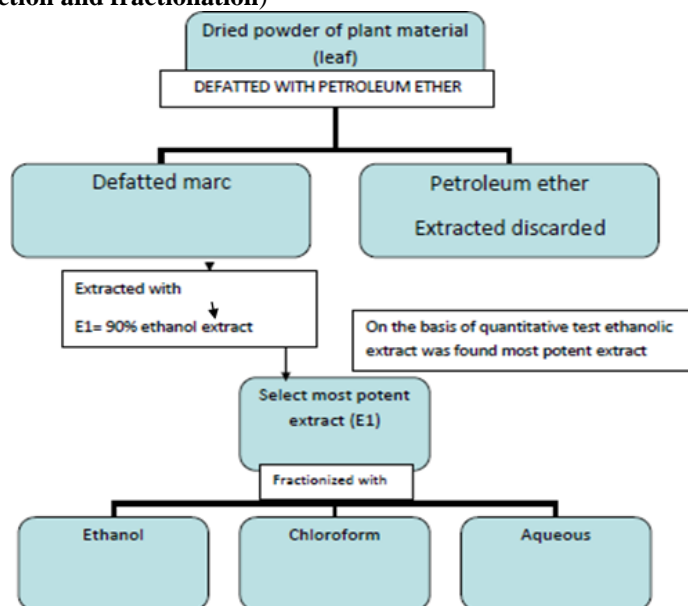
Phytochemical testing of powdered extract in different solvents

1 kilogram of powdered drug was packed in Soxhlet apparatus and continuously extracted with petroleum ether (60-80°C) to defeat the drug. Petroleum ether was removed from the powdered defatted drug, which was then extracted with ethanol (95%).

The alcoholic extract thus obtained was further fractionated with hexane and ethanol. The solvents were removed from each extract and fraction by distillation and the last traces of solvent being removed under reduced pressure.

The extracts and fractions were weighed and their % value was recorded and also the physical appearance, color and odor was evaluated and recorded and thereafter, were stored in refrigerator for further experimental work.

(General scheme of extraction and fractionation)



Physical parameters of powder material

Determination of total ash value

Accurately weighed about 3 gms of air dried powdered drug was taken in a tared silica crucible and incinerated by gradually increasing the temperature to make it dull red hot until free from carbon. Cooled and weighed, repeated for constant value. Then the percentage of total ash was calculated with reference to the air dried drug.

Determination of Alcohol Soluble Extractive Value

10gms of the air-dried coarse powder of *Argemone Mexicana* Linn. D.C. was macerated with 100 ml of 90% ethanol in a closed flask for 24 hours, shaking frequently

during the first 6 hours and allowing standing for 18 hours.

Thereafter, it was filtered rapidly taking precautions against loss of the solvent. Out of that filtrate, 25 ml of the filtrate was evaporated to dryness in a tared flat bottomed shallow dish, dried at 105°C and weighed. The percentage of ethanol soluble extractive value was calculated with reference to the air-dried drugs.

Determination of acid insoluble ash value

The ash obtained as directed under total ash was boiled with 25 ml of 2N HCl for 5 minutes. The insoluble matter was collected on an ash less filter paper, washed

with hot water, ignited and weighed, then calculated the percentage of acid insoluble ash with reference to the air dried drug.

Loss on drying

About 1.5 gm. of powdered drug was weighed accurately in a tared porcelain dish which was previously dried at 105 °C in hot air oven to constant weight and then weighed. From the difference in weight, the percentage loss of drying with reference to the air dried substance was calculated and listed in result.

Determination of water soluble extractive value

Weigh accurately the 10 gm of coarsely powdered drug and macerate it with 100 ml of chloroform water in a closed flask for 24 hours, shaking frequently during the first 6 hours and allowing standing for 18 hours. Thereafter, it was filtered rapidly taking precautions against loss of the solvent. Then 25 ml of the filtrate was evaporated to dryness in a tared flat-bottomed shallow dish, dried at 105°C and weighed. The percentage of water soluble extractive was calculated with reference to the air dried drug. The percentage of water soluble extractive and alcohol soluble extractive was calculated with reference to the air dried drug.

Phytochemicals constituents

The whole plant of *A. Mexicana* was reported to possess isoquinoline alkaloids such as berberine, cheilanthifoline, coptisine, muramine, scoulerine, stylophine, cryptopine, thalifone, sanguinarine, protopine, optisine, chelerytherine and benzyloisoquinoline alkaloids.^[8,9,10,11,12] Various isoquinoline alkaloids viz. berberine, cryptopine, coptisine, muramine, scoulerine, stylophine, cheilanthifoline, sanguinarine, sarguinarine, chelerytherine, sanguinarine, thalifoline and protopine have been reported from the plant.^[13] Seed oil otherwise called as Argemone oil reported to contain sanguinarine and dihydrosanguinarine. It also contains palmitic, myristic, oleic and linoleic acids.

Pharmacological activity

Antidiabetic activity: Aqueous extract of aerial parts of *Argemone Mexicana* at a dose of 200 and 400 mg/kg body weight was reported to have hypoglycemic efficacy in alloxan-induced diabetic rats; significant reduction in blood glucose levels, plasma urea, creatinine, triacylglyceride, cholesterol values and recovery in body weight compared to diabetic control rats and the standard drug treated rats are found when treated with the aqueous extract at a dose of 400 mg/kg body weight.^[14]

Antibacterial activity: Many reports have been carried out to investigate the antibacterial determinants of *Argemone Mexicana* extracts.^[15] *Argemone Mexicana* leaves and seeds extracts showed considerable antibacterial activity.^[16,17]

Wound healing activity: Wound healing activity using excision, incision and dead space wound models in Wistar albino rats with different extracts of *Argemone Mexicana* leaves. The results revealed that the treatment with methanol extract of leaves of *Argemone Mexicana* accelerated wound healing agent in rats. Significant wound healing activity of petroleum ether and butanol fractions of ethanol extract of *Argemone Mexicana*, containing some sterols, alkaloids, proteins and carbohydrates, was also reported in albino rat model by Patil and his group.^[18]

Antimicrobial activity: Stem and essential oil of *Argemone Mexicana* was found to be good antimicrobial activity. The inhibition activity of plants extracts against the growth of microorganisms was attributed to the presence of antioxidants.^[19]

Antipyretic activity: The antipyretic potential showed by the two doses of drug extract might be attributed to the phytochemical constituents such as alkaloids, glycosides, flavonoids, phenolic compounds as tannins, saponins found in the water aqueous extract of *Argemone Mexicana* leaves.^[21,22,23]

These components exert their biological action according to a mechanism of cyclooxygenase enzymes I and II inhibition (COX-1 and COX-2) which are implicated in the production of inflammation mediating agent prostaglandin (PGE) from arachidonic acid.^[24]

Lousicidal activity: Lousicidal efficacy of aqueous leaf extract of *Argemone Mexicana* by conducting mortality and repellency tests on tropicalis peters and found lousicidal activity with 73% mortality.^[25]

Antiplasmodial activity

By the research 20 species, with low IC50 values of 9–43 mg dry extract / ml have been shown to possess antiplasmodial activity in all of them, *Argemone Mexicana* L. (Papaveraceae) also shown the same activity which is vary by varying extract dose per kg/ body wt. concentration: *In vitro* inhibition (%) of plant extracts against chloroquine susceptible strain of *P. falciparum*. The result shows: Mg dry extract / 80 mg part dry plant material 2.50, % Inhibition (mg: ml) according to dose i.e. 100 µg/ml; 50 µg/ml; 25 µg /ml; 12.5 µg/ml; and IC50 µg /m(21).

Antiasthmatic activity

The research title i.e. Medicinal plants used to treat asthma in Andhra Pradesh, India proved that *Argemone Mexicana* L. (Papaveraceae) (common or local name: Brahmadand) Seed powder, 100–200 mg taken twice a day, for 2 weeks shows significant effect on asthma as antiasthmatic activity 24. Anti-Stress and Antiallergic Effect of *Argemone Mexicana* Stems in Asthma shows: Petroleum ether, acetone and methanol and aqueous extracts of *Argemone Mexicana* stem (50 mg/kg, i.p.).

RESULT AND DISCUSSION

Physical properties of *Argemone Mexicana*.

S.no.	Parameters	Observation %w/w
1	Loss on drying	7.55%
2	Total ash value	8.5%
3	Water soluble ash value	3.55%
4	Alcohol extractive value	4.78%
5	Water extractive value	6.77%

Qualitative examination of phytoconstituents

Chemical constituents	Chemical Test	Extracts/Fractions			
		Ethanol extract	Ethanol fraction	Chloroform fraction	Aqueous fraction
Alkaloids	Mayer's	+	+	+	+
	Wagner's	-	-	-	-
	Dragendorff's	+	+	+	+
	Hager's	+	+	+	+
Saponin	Ferric Chloride	+	+	+	+
	Haemolytic	-	-	-	-
Phenolic compounds and Tannins	Foam	-	+	-	-
	Gelatin	-	-	-	-
	Million's	+	-	+	-
Proteins	Lead acetate test	+	+	+	+
	Biuret	+	+	+	-
	Xanthoprotein	-	-	-	-
Flavonoids	Ferric Chloride	+	+	-	+
	Lead Acetate	+	+	+	+
	Shinoda	-	-	-	-
Glycoside	Baljet's	-	-	-	-
	Legal's	-	-	-	-
	Borntrager's	-	-	-	-
	Killer killani	-	-	-	-
Fixed oil	Spot	-	-	-	-
Carbohydrate	Molisch's	-	-	-	-
	Fehling's	+	+	+	+
	Benedict's	+	+	+	+
	Barford	-	-	-	-
	Cobalt-chloride	-	-	-	-
Gums and mucilage	Swelling Index	-	-	-	-
Amino Acids	Ninhydrin	-	-	-	-
	Salkowski's	+	-	+	-
	Liebermann-Burchard's	+	+	+	-
Sterols and triterpenes	Tryptophan	-	-	-	-
	Tyrosin	-	-	-	-

CONCLUSION

Medicinal plant is the most exclusive source of life saving drugs for majority of the world's population. They continue to be an important therapeutic aid for alleviating the ailments of human kinds. *Argemone Mexicana* is an important source of various types of compounds with diverse chemical structures as well as many pharmacological activities. Till date no more pharmacological work is done on this plant. The plant is in need to a greater research emphasis for better utilization of this plant for humankind. This review will be helpful in serve the purpose of aiding in future

Research work on this plant. *Argemone Mexicana* has been identified as a plant with wide spectrum use and most important use as an indigenous medicine. Several applications have been discussed in the review that favors the medical application of the plant. Being a wild plant it is easily procurable and available in abundance in the season. Belonging to the Papavercaea family or the poppy family, it is commonly known as Mexican poppy and has been taken into use as a traditional medicine to cure skin infections, tumors, malaria, warts. Rheumatoid pain and the list continues, the plant is found to be efficient in pharmaceutical aspects too and hence

several more researches were and are been carried out to unveil many more uses of the plant which was supported by experimentation including activities like Anti- HIV, Anti-fertility, Anti-cancerous, etc and the concluding results were found to be positive. The plant is rich in alkaloids and also contains many kinds of phenols, flavonoids, carboxylic acid, amino acids etc. All are distributed over the, plant parts but some have exclusive existence amongst the parts of the plant. A part from the uses *Argemone*. Mexicana has also been identified as a toxic plant; its safety evaluation is also a point to be considered the plant *Argemone Mexicana* Linn. Have been found to be source of medicinal agents based on their use in traditional medicines in present work the taxonomic identification of collected plant. In brief preparation of plant material by different techniques such as drying, grinding, sieving. Extraction of plant material by using different solvents ethanol and water and phytochemical screening has been done. This chapter deals with description, review of literature and finding of Phytochemicals and pharmacological studies of *Argemone Mexicana* Linn.

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