



A Review on *Datura Stramonium* (Solanaceae): Traditional uses, Pharmacological and Toxicological Properties

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ABSTRACT

Datura stramonium, known by the common names thorn apple, jimson weed (jimson weed), devil's snare, or devil's trumpet, family Solanaceae. *D. stramonium* has frequently been employed in traditional medicine to treat a variety of ailments. It has also been used as a hallucinogen (of the anticholinergic/ antimuscarinic, deliriant type). Today, it grows wild in all the world's warm and temperate regions, where it is found along roadsides and at dung-rich livestock enclosures. *D. stramonium* can be grown from seed, which is sown with several feet between plants. It is sensitive to frost, so should be sheltered during cold weather. One of the primary active agents in *Datura* is atropine which has been used in traditional medicine for psychoactive effects and recreationally over centuries. The leaves are generally smoked either in a cigarette or a pipe. The Chinese also used it as a form of anesthesia during surgery. The plant has many traditional uses in intermittent fever, wound healing, anti-inflammatory, anti-oxidant, anti-microbial and anti-asthmatic.

Keywords: *Datura Stramonium*, Solanaceae, Antimuscarinic, Atropine, Anesthesia,

Introduction

Peganum harmala

Datura stramonium, known by the common names thorn apple, jimsonweed (jimson weed), devil's snare, or devil's trumpet, is a species of flowering plant in the nightshade family Solanaceae. Its likely origin will be in Central America, and it has been introduced in many world regions. It is an aggressive invasive weed in temperate climates across the world. *D. stramonium* has frequently been employed in traditional medicine to treat a variety of ailments. It has also been used as a hallucinogen (of

the anticholinergic/antimuscarinic, deliriant type), taken entheogenically to cause intense, sacred or occult visions. It is unlikely ever to become a major drug of abuse owing to effects upon both mind and body frequently perceived subjectively as being highly unpleasant, giving rise to a state of profound and long-lasting disorientation or delirium (anticholinergic syndrome) with a potentially fatal outcome. It contains tropane alkaloids which are responsible for the psychoactive effects, and may be severely toxic.



Datura wrightii

Scientific classification

Kingdom	:	<u>Plantae</u>
Clade	:	<u>Tracheophytes</u>
Clade	:	<u>Angiosperms</u>
Clade	:	<u>Eudicots</u>
Clade	:	<u>Asterids</u>
Order	:	<u>Solanales</u>
Family	:	<u>Solanaceae</u>
Subfamily	:	<u>Solanoideae</u>
Tribe	:	<u>Datureae</u>
Genus	:	<u>Datura L.</u>



Common names for *Datura stramonium* vary by region and include thornapple, moon flower, hell's bells, devils's trumpet, devil's weed, *tolguacha*, Jamestownweed, stinkweed, locoweed, pricklyburr, false castor oil plant, and devil's cucumber.

Habitat

Today, it grows wild in all the world's warm and temperate regions, where it is found along roadsides and at dung-rich livestock enclosures. In Europe, it is found as a weed in garbage dumps and will betelands, and is toxic to animals consuming it. In South Africa, it is

colloquially known by the Afrikaans name *malpitte* ("evil seeds"). Through observation, the seed is thought to be carried by birds and spread in their droppings. Its seeds can lie dormant underground for years and germinate when the soil is disturbed. The Royal Horticultural Society has advised worried gardeners to dig it up or have it otherwise removed, while wearing gloves to handle it¹.

Cultivation

Datura stramonium prefers rich, calcareous soil. Adding nitrogen fertilizer to the soil increases the concentration

of alkaloids present in the plant. *D. stramonium* can be grown from seed, which is sown with several feet between plants. It is sensitive to frost, so should be sheltered during cold weather. The plant is harvested when the fruits are ripe, but still green. To harvest, the entire plant is cut down, the leaves are stripped from the plant, and everything is left to dry. When the fruits begin to burst open, the seeds are harvested. For intensive plantations, leaf yields of 1,100 to 1,700 kilograms per hectare (1,000 to 1,500 lb/acre) and seed yields of 780 kg/ha (700 lb/acre) are possible².

Toxicity

All parts of *Datura* plants contain dangerous levels of the tropane alkaloids atropine, hyoscyamine, and scopolamine, which are classified as deliriants, or anticholinergics. The risk of fatal overdose is high among uninformed users, and many hospitalizations occur among recreational users who ingest the plant for its psychoactive effects. Deliberate or inadvertent poisoning resulting from smoking jimsonweed and other related species has been reported.

Datura intoxication produces delirium, hallucination, hyperthermia, tachycardia, bizarre behavior, urinary retention, and severe mydriasis with resultant painful photophobia that can last several days. Pronounced amnesia is another commonly reported effect. As with other cases of anticholinergic poisoning, intravenous physostigmine can be administered in severe cases as an antidote³.

Uses

Traditional medicine

One of the primary active agents in *Datura* is atropine which has been used in traditional medicine and recreationally over centuries. The leaves are generally smoked either in a cigarette or a pipe. During the late 18th century, James Anderson, the English Physician General of the East India Company, learned of the practice and popularized it in Europe. The Chinese also used it as a form of anesthesia during surgery⁴.

Literature Review

Neurological Activity

- Devi MR, *et al.* (2011) investigated Neurotoxic and medicinal properties of *Datura stramonium* L⁵.

Antimicrobial Activity

- Gachande BD, *et al.* (2013) investigated *In-vitro* evaluation of *Datura* species for potential antimicrobial activity⁶.
- Gul H, *et al.* (2012) investigated Antibacterial and antifungal activity of different extract of *Datura stramonium* (branches and leaves sample)⁷.
- Shagal MH, *et al.* (2012) investigated Pharmacological justification for the ethnomedical use of *Datura Stramonium* stem-bark extract in treatment of diseases caused by some pathogenic bacteri⁸.
- Gupta S, *et al.* (2010) investigated Comparative studies on anti-inflammatory activity of *Coriandrum Sativum*, *Datura stramonium* and *Azadirachta Indica*⁹.
- Reddy BU (2009) investigated Antimicrobial activity of *Datura stramonium* L¹⁰.
- Banso A, *et al.* (2006) investigated Phytochemical screening and antimicrobial assessment of *Abutilon mauritianum*, *Bacopa monnifera* and *Datura stramonium*¹¹.
- Usha K, *et al.* (2006) investigated Antifungal activity of *Datura stramonium*, *Calotropis gigantea* and *Azadirachta indica* against *Fusarium mangiferae* and floral malformation in mango¹².
- Guarrera PM. *et al.* (1999) investigated Traditional antihelmintic, antiparasitic and repellent uses of plants in Central Italy¹³.

Antiasthmatic Activity

- Pretorius E, *et al.* (2006) investigated *Datura stramonium* in asthma treatment and possible effects on prenatal development¹⁴.

Toxicity Study

- Gaire BP, *et al.* (2013) showed a review on the pharmacological and toxicological aspects of *Datura stramonium* L¹⁵.
- Bouzidi A, *et al.* (2011) investigated Toxicity studies of alkaloids of seeds of

Datura stramonium and synthesis alkaloids in male rats¹⁶.

- Giadado A, et al. (2007) investigated Toxicity studies of ethanol extract of the leaves of *Datura stramonium* in rats¹⁷.
- Boumba A, et al. (2005) investigated Fatal poisoning from ingestion of *Datura stramonium* seeds¹⁸.
- Chang SS, et al. (1999) investigated Poisoning by *Datura* leaves used as edible wild vegetables¹⁹.

Acaricidal and Repellent Activity

- Kurnal NA, et al. (2009) investigated Acaricidal, repellent and oviposition deterrent activities of *Datura stramonium* L²⁰.
- Swathi S, et al. (2009) investigated Larvicidal and repellent activities of ethanolic extract of *Datura stramonium* leaves against mosquitoes²¹.

Antioxidant Activity

- Akharaiyi FC (2011) investigated Antibacterial, Phytochemical and Antioxidant activities of *Datura metel*²².

Phytochemical Screening

- Nain J, et al. (2013) investigated Phytochemical screening of secondary metabolites of *Datura stramonium*²³.
- Oseni OA, et al. (2011) investigated Studies on chemical compositions and functional properties of thorn apple (*Datura stramonium* L) Solanaceae²⁴.

Conclusion

It is seen from the literature that *Datura stramonium* is a very important plant for its large number of medicinal properties as well as for important chemicals like tropane, alkaloids atropine, hyoscyamine, and scopolamine etc. The plant have many traditional uses in intermittent fever, wound healing, anti-inflammatory, anti-oxidant, anti-microbial and anti-asthmatic, which is being studied till today. Thus, as folk medicine *Datura stramonium* has pharmacological and toxicological aspects so further clinical trials should be performed to prove its efficacy.

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