Crop Protection Compendium - *Argemone mexicana* L. (1753)

Updated by **Pierre Binggeli 2005**

NAMES AND TAXONOMY

Preferred scientific name

Argemone mexicana L. (1753)

Taxonomic position
Domain: Eukaryota
Kingdom: Viridiplantae
Phylum: Spermatophyta
Subphylum: Angiospermae
Class: Dicotyledonae
Order: Papaverales
Family: Papaveraceae

BAYER code
ARGME (*Argemone mexicana*)

Common names

English:
Mexican poppy
Mexican thistle
prickly poppy
yellow thistle
Mexican pricklypoppy
Mexican pricklepoppy
Spanish:
cardo blanco
adormidera espinosa
chicalote
French:
argemone mexicaine
pavot epineux
argémone du Mexique

Argentina:
cardo amarillo
Bangladesh:
Shialkata
Brazil:
cardo-amarelo
cardo-santa-maria
cardo-santa
figo-do-inferno
papoula-de-espinho
papoula-espinhosa
Germany:
Mexikanischer Stachelmohn
Haiti:
Chardon béni
India:
Brahamadandi
agara
bharband
bharbhar
bramandandu
kantakusama
katelisatyanasi
satyonasi
Indonesia:
droedjoe
tjelangkringan
Italy:
papavero messicano
Japan:
Azami-Geshi
Kenya:
ekijembajembe
mkumajalaga
Mauritius:
chardon du pays
Mexico:
chicalote
Myanmar:
kye-ja
Netherlands:
stekelpapaver
Niger:
Boginahi
Dàyí gííwáá
Hákóórín kádà
Karanko
Kwarakko
Kwaranko
Kàankámárkà tà bíí kà
Kánkàámáá
Káákí rúwàn Allàh
Kùùrár fataakee
Wagiri
Wasiri
Nigeria:
Boginahi
Dàyí gííwáá
Hákóórín kádà
Karanko
Kwarakko
Kwaranko
Kàankámárkà tà bíí kà
Kánkàámáá
Káákí rúwàn Allàh
Kùùrár fataakee
Wagiri
Wasiri

kamukamu
Niger:
kamukamu
Pakistan:
kanderi
kundiari
sialkanta
Paraguay:
Cardo santo
Portugal:
papoula-do-Mexico
Puerto Rico:
cardosanto
South Africa:
yellow-flowered Mexican poppy
Zimbabwe:
umjelemani

Notes on taxonomy and nomenclature

In

HOST RANGE

Notes on host range

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; *mexicana* combines Mexico with the Latin suffix ana, belonging to, suggesting the country of origin (Parsons and Cuthbertson, 1992).

List of hosts plants

Major hosts

Gossypium (cotton), *Phaseolus vulgaris* (common bean), *Sorghum bicolor* (sorghum), *Triticum aestivum* (wheat), *Zea mays* (maize)

Minor hosts

Agave sisalana (sisal hemp), *Arachis hypogaea* (groundnut), *Coffea* (coffee), *Medicago sativa* (lucerne), *Nicotiana tabacum* (tobacco), *Saccharum officinarum* (sugarcane), *Solanum tuberosum* (potato)

HABITAT

A. mexicana is a weed of most cropping systems, including large- and small-grain cereals, legumes, vegetables, fibre crops (cotton, sisal) and perennial crops (coffee, sugarcane). It appears that any crop has the potential to be infested with *A. mexicana* if grown within the habitat range of this weed.

GEOGRAPHIC DISTRIBUTION

Notes on distribution

A. mexicana is native to tropical America but its native range is a matter of debate. It is thought that its natural distribution in Northern America included Mexico and southern Florida (Ownbey, 1997). It is probably native to much of South America but Mayworm et al. (1998) have stated that *A. mexicana* is an introduced and naturalized species in Brazil. Its distribution and status in tropical and warm regions of the world are likely to be seriously under-reported. As the species has probably often been confused with *A. ochroleuca* and even *A. subfusiformis*, its world distribution and abundance must be viewed with some

caution. In Europe it was reported as being present in Bulgaria and Spain by Mowat (1964) but Greuter et al. (1989) stated that it was absent and reported in error.

Distribution List

Europe				
Austria	present	introduced		Mowat, 1964
Czech Republic	absent, formerly present	introduced	not invasive	Pysek et al., 1989
France	present, few occurrences	introduced	not invasive	Greuter et al., 1989
Germany	present	introduced		Mowat, 1964
Italy	present, few occurrences	introduced	not invasive	Greuter et al., 1989
Portugal	present	introduced		Holm et al., 1979
Spain	present	introduced		de Lorenzo Caceres, unda
Balearic Islands	present	introduced		de Lorenzo Caceres, unda
Canary Islands	present	introduced		de Lorenzo Caceres, unda
Switzerland	present	introduced		Mowat, 1964
Asia				
Bahrain	present	introduced		Miller and Cope, 1996
Bangladesh	widespread	introduced	invasive	Holm et al., 1979; Islam et al., 2003
Bhutan	present	introduced		Parker, 1992
[China]				
Hong Kong	present	introduced		Holm et al., 1979
Christmas Island (Indian Ocean)	widespread	introduced	invasive	DEH, 2002
[India]				
Andhra Pradesh	present	introduced		Chitra et al., 1997
Bihar	widespread	introduced	invasive	Singh et al., 1999
Chandigarh	widespread	introduced	invasive	Ramakrishnan and Gupta, 1972
Delhi	widespread	introduced	invasive	Inderjit, 2002
Gujarat	present	introduced		Patel et al., 1993
Karnataka	present	introduced	invasive	von Weizsõckerl, 1995
Madhya Pradesh	present	introduced		Paradkar et al., 1989
Maharashtra	present	introduced		Katole & Mundiwale, 1995
Tamil Nadu	present	introduced		Shanmughave, 1995
Uttar Pradesh	present	introduced		Shah et al., 1992
Indonesia	present	introduced		Moody, 1989; Holm et al., 1992
Israel	present, few occurrences	introduced	not invasive	Greuter et al., 1989
Japan	present	introduced		Wu et al., 2004
Ryukyu Archipelago	indigenous, localized	introduced	not invasive	Walker, 1976
Nepal	present	introduced		Ranjit & Bhattarai, 1988

Oman	present	introduced		Miller and Cope, 1996
Pakistan	present	introduced		Holm et al., 1979; Mahmood, 1987
Saudi Arabia	present	introduced		Abdel Hafez, 1985
Syria	widespread	introduced	invasive	Greuter et al., 1989
Yemen	widespread	introduced	invasive	Miller and Cope, 1996
Africa				
Botswana	widespread	introduced	invasive	Phillips, 1991; Karikari et al., 2000
Egypt	widespread	introduced	invasive	Boulos & El-Hadidi, 1984; Greuter et al., 1989
Ethiopia	present	introduced		Stroud & Parker, 1989; Karlsson et al., 2003
Ghana	present	introduced		Holm et al., 1989
Kenya	present	introduced		Terry & Michieka, 1987
Madagascar	present	introduced		Holm et al., 1979
Malawi	present	introduced		Banda & Morris, 1986
Mauritania	present			McIntyre, 1991
Mauritius	widespread	introduced	invasive	Vaughan and Wiehe, 1937; Parsons & Cuthbertson, 1992
Mozambique	present	introduced		Exell, 1960
Niger	present	introduced		Blench, 2003
Nigeria	present	introduced		Blench, 2003
Saint Helena	widespread	introduced	invasive	Ashmole and Ashmole, 2000
Sao Tome and Principe	present	introduced	invasive	Exell, 1944
Senegal	present	introduced		Berhaut, 1967
Seychelles	present	introduced		Robertson, 1989
South Africa	present	introduced		Henderson & Anderson, 1966
Swaziland	present	introduced		Wells et al., 1986
Tanzania	widespread	introduced	invasive	Terry & Michieka, 1987; Katagira, 2002
Uganda	present			Terry & Michieka, 1987
Zambia	present	introduced		Terry & Michieka, 1987
Zimbabwe	widespread	introduced	invasive	Exell, 1960; Hyde and Wursten, 2002
Central America & Caribbean				
Belize	present			Holm et al., 1979
Cuba	widespread	native		Seifriz, 1943; Holm et al., 1979
Dominica	present			Holm et al., 1979
Haiti	present	native		Anon, 2002
Jamaica	present			Holm et al., 1979
Nicaragua	widespread	native		Holm et al., 1979; Alemán, 2001
Puerto Rico	widespread	native		Barnés, 1946; Holm et al., 1979
North America				
[Canada]				

Ontario	present	introduced		Ownbey, 1997
Mexico	present	native		Holm et al., 1979
USA	present			Holm et al., 1979
Alabama	present	introduced		Ownbey, 1997
Connecticut	present	introduced		Ownbey, 1997
Florida	present	native		Ownbey, 1997
Georgia (USA)	present	introduced		Ownbey, 1997
Hawaii	present	introduced		Wester, 1992
Illinois	present	introduced		Ownbey, 1997
Indiana	present	introduced		Ownbey, 1997
Kansas	widespread	introduced	invasive	Hitchcock and Clothier, 1898; Ownbey, unda
Louisiana	present			Ownbey, unda; Pammel, 1913; Brown, 1972
Maryland	present	introduced		Ownbey, 1997
Massachusetts	present	introduced		Ownbey, 1997
Michigan	present	introduced		Ownbey, 1997
Missouri	present	introduced		Ownbey, 1997
Nebraska	present	introduced		Ownbey, 1997
New Jersey	present	introduced		Ownbey, 1997
New York	present	introduced		Ownbey, 1997
North Carolina	present	introduced		Ownbey, 1997
Pennsylvania	present	introduced		Ownbey, 1997
South Carolina	present	introduced		Ownbey, 1997
Tennessee	present	introduced		Ownbey, 1997
Texas	present	introduced		Ownbey, 1997
Virginia	present	introduced		Ownbey, 1997
South America				
Argentina	present			Holm et al., 1979
[Brazil]				
Alagoas	present			Lorenzi, 1982
Amazonas	present			Lorenzi, 1982
Bahia	present			Lorenzi, 1982
Ceara	present			Lorenzi, 1982
Goias	present			Lorenzi, 1982
Maranhao	present			Lorenzi, 1982
Matto Grosso	present			Lorenzi, 1982
Minas Gerais	present			Lorenzi, 1982
Paraiba	present			Lorenzi, 1982
Parana	present			Lorenzi, 1982
Pernambuco	present			Lorenzi, 1982
Piauí	present			Lorenzi, 1982
Rio Grande do Norte	present			Lorenzi, 1982
Sao Paulo	present			Lorenzi, 1982

Sergipe	present		Lorenzi, 1982
Chile	present		Holm et al., 1979
Ecuador	indigenous, localized	introduced	Tye, 1999
French Guiana	present	native	DeFilipps et al., 2004
Paraguay	present	native	Schvartzman and Santander, 1996
Peru	present		Holm et al., 1979
Uruguay	present		Holm et al., 1979
Venezuela	present		Holm et al., 1979
Oceania			
[Australia]			
Australian Northern Territory	present	introduced	Parsons & Cuthbertson, 1992
New South Wales	present	introduced	Parsons & Cuthbertson, 1992
Queensland	present	introduced	Parsons & Cuthbertson, 1992
South Australia	present	introduced	Parsons & Cuthbertson, 1992
Victoria	present	introduced	Parsons & Cuthbertson, 1992
Western Australia	present	introduced	Parsons & Cuthbertson, 1992
Fiji	present	introduced	Holm et al., 1979
New Caledonia	present	introduced	Waterhouse, 1997
New Zealand	present	introduced	Holm et al., 1979
Niue	present	introduced	Space and Flynn, 2000
Samoa	present	introduced	Space and Flynn, 2002
Vanuatu	present	introduced	Waterhouse, 1997

HISTORY OF INTRODUCTION AND SPREAD

A. mexicana has been introduced accidentally (seed contaminant) or as an ornamental. Little is known about the history of its introduction and spread around the world. By 1814 it was the commonest weed of St Helena and was first recorded on Ascension in 1828 (Ashmole and Ashmole, 2000). In New Zealand, it was accidentally introduced with imported wheat in the 1890s (Healy, 1961). The plant was introduced to Hawaii as an ornamental and was first recorded in 1934 (Wester, 1992). Tye (1999) reported that the plant was still relatively uncommon and suspected that it may become problematic in the future. In the Czech Republic, it was first reported occurrence in the wild in 1965 but appears to have become extinct (Pysek et al., 2002).

BIOLOGY AND ECOLOGY

Genetics

A. mexicana is a diploid species, 2n=28. *A. ochroleuca* is a tetraploid (2n=56). The occurrence of 5% of triploids (2n=42) in a population of *A. ochroleuca* suggest the possibility of a natural hybridization between these genetically close species (Chaturvedi et al., 1999).

Physiology and Phenology

A. mexicana is a long-blooming plant. In the Temperate Zone flowering occurs in summer-autumn. In southern India (Western Ghats) the plant flowers and fruits through the year (Matthew, 1999).

Reproductive Biology

The physiology of seed production and germination varies throughout the world. Mauritius reports the greatest seed production with an average of 60 to 90 capsules per plant with 300 to 400 seeds in each capsule (Holm et al., 1977). Seeds are dormant when shed and have an after-ripening period of several weeks or months. In eastern Africa and Australia, seeds germinate at any time of year if moisture is available but, in Mauritius, germination only occurs in the cooler months (Parsons and Cuthbertson, 1992). In India also, it has been noted that germination occurs late in the season, with low night temperatures (Ambasht, 1992). Most seeds fall around the base of the parent plant where they form a carpet of seedlings. Dispersal occurs in surface water and in mud adhering to farm machinery and the feet of man and livestock. Seeds are readily eaten by a number of bird species in Puerto Rico as indicated by the presence of many seeds of the species in birds' stomachs (Barnés, 1946). In Ethiopia, most seeds do not normally germinate the year after shedding. Instead they enter the seed bank and seedlings establish, even in well-maintained field, probably for many years (Karlsson et al., 2003).

Environmental Requirements

It tends to grow best in soils of low fertility and, in Australia, is peculiarly adapted to colonise derelict areas low in phosphorus (Parsons and Cuthbertson, 1992). *A. mexicana* is better suited to grow at sites deficient in nitrogen whereas the closely related *A. ochroleuca* does better where phosphorus is limiting (Ramakrishnan and Gupta, 1972). However, neither species appear to have obvious restriction to particular agronomic or environmental situations (Karlsson et al., 2003). In southern India it occurs up to an altitude of 800 m a.s.l. (Matthew, 1999). When growing in undisturbed land, it can produce fresh weights of 6-9 t/ha but, in cultivated land, it is generally not an aggressive competitor (Holm et al., 1977).

Associations

In India grazing effects forest vegetation structure. It reduces grass cover and leads to the appearance of unpalatable species, including *A. mexicana* (Shanmughave, 1995).

MEANS OF MOVEMENT AND DISPERSAL

Transport pathways for long distance movement

- Non-host Plant Material: Seed Contaminant (Healy 1961)

NATURAL ENEMIES

A bacterial wilt, *Xanthomonas papavericola* [*X. campestris* pv. *papavericola*], periodically checks the growth of *A. mexicana*, in some areas (Holm et al., 1977) but there is a dearth of information on natural enemies of this weed.

IMPACT

Economic impact

A. mexicana is a principal weed of beans and maize in Tanzania, cereals in Australia and India, cotton in Nicaragua, potatoes in India, tobacco in Argentina and Puerto Rico, and wheat in Pakistan (Holm et al., 1977). In Bangladesh, it grows in wheat, sugarcane, potato, pulses and tea fields (Islam et al., 2003). In Florida, USA, it is reported as a weed in tomato crops (Johnson, 1997) and Vaughan and Wiehe (1937) stated that it was frequent in cane fields in Mauritius. *A. mexicana* is one of the main weeds associated with common bean (*Phaseolus vulgaris*) in Nicaragua (Alemán, 2001). In the late 19th century the plant was not be considered as a bad weed in Kansas, USA (Hitchcock and Clothier, 1898). *A. mexicana* has an inhibitory effect on germination and seedling growth of vegetables (Hazarika and Sannigrahi, 2001) and weed residues may affect Bambara groundnut (*Vigna subterranea*) and sorghum (*Sorghum bicolor*) growth and development because of the inhibitory effects of allelochemicals present (Karikari et al. 2000).

In poultry, one ounce of seed causes symptoms (e.g. decreased egg production), and 2 ounces usually cause death (Everest et al., unda). Grazing animals generally avoid this weed but can be poisoned if it is consumed in hay or chaff. The value of wool is decreased when contaminated by the prickly fruits of *A. mexicana* (Parsons and Cuthbertson, 1992). Harvesting by hand of low-growing field crops can be a painful experience in the presence *A. mexicana* and hired labour may expect to be paid a premium in these conditions.

Social impact

A. mexicana has had a major impact on human health in the Indian subcontinent. Edible vegetable oil either accidentally contaminated with *A. mexicana* or intentionally adulterated by unscrupulous traders has resulted in epidemic dropsy. Such an epidemic occurred in 1998 in Delhi (India) and epidemic dropsy has also been reported from Nepal (Jha et al., 2001; Sharma et al., 2002). Sharma et al. (1999) have provided an review of the clinical effects of adulterated oil and suggested preventive measures. An epidemic occurred in South Africa following the contamination of wheat flour (Sharma et al., 1999). In northern and central India, *A. mexicana* has been identified as an important allergen (Singh and Kumar, 2004). Subsistence farmers in the Ethiopian Highlands find this prickly plant difficult to manage in cereal fields.

Extracts of *A. mexicana* readily kill the snail *Biomphalaria glabrata* and thus have potential as a molluscide for the relatively cheap control of human schistosomiasis (Melendez and Capriles, 2002).

Impact on biodiversity

To-date little is known about the impact of *A. mexicana* on biodiversity. Islam et al. (2003) has ascertained that the species reduces plant diversity, and Kumar and Rohatgi (1999) postulated that it decreases biodiversity in India. In Tanzania the plant is commonly found in the Lake Manyara National Park (Lyons, 2000).

Summary of impact

Negative impact on: crop production; human health; animal and plant products

PHYTOSANITARY SIGNIFICANCE

Seeds of *A. mexicana* and closely related species can be readily dispersed via contaminated seeds and soil. Being still considered as a desirable ornamental in parts of the world it is likely to be further introduced within regions where its distribution is still restricted. In South Africa the seeds of *A. mexicana* have been declared as 'noxious' as its seeds or bits of seeds may represent a hazard to human or animal health when consumed (NDA, 2001).

SUMMARY OF INVASIVENESS

A. mexicana is a widespread annual weed primarily associated with agricultural crops and wastelands. It is a major weed of a number of crops in the tropics and warm temperate regions and is persistent as it produces a seed bank. In India in particular, the species is a health hazard and because of its prickliness, is a nuisance to subsistence farmers.

Risk and Impact Factors

- invasive in its native range: no
- proved to be invasive outside its native range: yes
- highly adaptable to different environments: no
- high reproductive potential: yes
- highly mobile locally: yes
- its propagules remain viable for more than one year: yes
- tolerates cultivation, browsing pressure, mutilation, fire etc.: yes
- competitive in crops or pasture: yes
- affects ecosystem: unknown
- adversely affects natural communities: unknown
- adversely affects community structure: unknown
- adversely affect human health: yes
- has sociological impacts on recreational patterns, aesthetics, property values: unknown
- harmful to animals: yes
- produces spines, thorns or burrs: yes
- host or vector of pests or diseases: no
- likely to be accidentally transported internationally: yes
- likely to be deliberately transported internationally: yes
- difficult to identify or detect as a commodity contaminant: yes
- difficult to identify or detect in the field: yes
- difficult or costly to control: yes

MORPHOLOGY

Plant type: annual; herbaceous; seed propagated.

A. mexicana is an annual herb, up to 150 cm tall with a slightly branched tap root. The stem is erect, branched, usually prickly, pale bluish-green and exudes an unpleasant-smelling yellow sap when cut. Leaves are alternate, without petioles, more or less sheathing the stem, up to 15 cm long, deeply lobed with irregularly toothed, spiny margins; greyish-white veins are conspicuous on the bluish-green upper surface of the leaves. Flowers are solitary, 2.5-4.5 cm in diameter, subtended by 1-2 leafy bracts; sepals 3, prickly; petals 4-6, yellow to pale orange, glabrous; stamens numerous. Fruit is a capsule, spiny, 2.5-5 cm long and 2 cm wide, with 4-6 valves opening at the tip to release

numerous seeds. Seeds are brownish-black, nearly spherical, about 1 mm in diameter, covered in a fine network of veins, oily.

A. mexicana forma l*eiocarpa* is a form found in West Africa which has few or no prickles on the stem, leaves and capsule (Lucas, 1962).

SIMILARITIES TO OTHER SPECIES

A. albiflora has white flowers, 10-15 cm in diameter. A weed of Arkansas, Louisiana, Mississippi and Texas, USA (Brown, 1972).

A. corymbosa is a weed native to California, USA (Goeden and Ricker, 1985).

A. intermedia has white or pinkish flowers, 5-8 cm in diameter. Plant densely covered with short yellowish hairs. Arizona, USA (Parker, 1972).

A. ochroleuca ssp. *ochroleuca* is a weed of Australia. It has a basal rosette of leaves which are light green and mottled white (Auld and Medd, 1987).

A. ochroleuca (*A. mexicana* forma *ochroleuca*) has creamy white to yellow petals, an ellipsoid capsule narrowed at both ends, seeds approximately 1.5 mm in diameter. Ownbey (1997) differentiates it from *A. mexicana* on the basis of differences in flower bud shape and petal colour. *A. ochroleuca* is recorded as a weed from Australia (Parsons and Cuthbertson, 1992), Ethiopia (Karlsson et al., 2003), India (Ramakrishnan and Gupta, 1972) and South Africa (Milton and Dean, 1998). Chaturvedi et al. (1999) have suggested that it can naturally hybridize with *A. mexicana*. In Zimbabwe, these two species are viewed as colour forms of one species *A. mexicana* (Hyde and Wursten, 2002).

A. polyanthemos has white or lavender flowers and prickles on the lower surface of the leaves. It is a weed of pastures in the Great Plains of the USA (Davis, 1993).

A. squarrosa is a perennial with prickles on both sides of the leaves. It is a weed of pastures and rangeland in the Great Plains of the USA (Davis, 1993).

A. subfusiformis is closely related to A. ochroleuca and is found in Australia (New South Wales and South Australia) (Parsons and Cuthbertson, 1992). It has cream to pale yellow petals, capsule slenderly spindle-shaped and seed approximately 2 mm in diameter. A subspecies, *A. subfusiformis* ssp. *subfusiformis*, with deep yellow flowers also occurs as a weed in Australia (Auld and Medd, 1987).

Other *Argemone* species occurring in California, USA include *A. minuta* (Goeden and Ricker, 1985) and *A. platyceras* (Robbins et al., 1951).

Hosking et al. (2000) have pointed out that *A. mexicana*, *A. ochroleuca*, and *A. subfusiformis* have been confused in the past and at present, and are often incorrectly identified.

CONTROL

Chemical Control

Plants of *A. mexicana* should be destroyed or removed before they produce seeds.

Seedlings are readily controlled by light tillage. Long cultivated fallow or vigorous perennial pastures will control large infestations (Parsons and Cuthbertson, 1992). Herbicides which control *A. mexicana* include 2,4-D, 2,4-DB, dicamba, diuron, fluroxypyr, hexazinone, isoproturon, karbutilate, MCPA, metribuzin, oxadiazon, picloram and terbutryn.

Biological Control

A biological control programme of *A. mexicana* and of the closely related *A. ochroleuca* has been initiated in Australia. This native of Mexico is naturalized in most warm countries of the world in sub-humid as well as semiarid regions. This project sought natural enemies in Mexico and identified several predatory insects including an extremely damaging species of root-breeding and leaf-feeding weevil (CSIRO, 1999; Julien, 2002).

USES

Extracts of the leaves, flowers and seeds of *A. mexicana* have been tested, mostly under laboratory conditions in India, against insect pests (Chitra et al., 1997), crop pathogens (Singh et al., 1993) and nematodes (Das and Sukul, 1988; Saxena and Tabassum, 2000; Shaukat et al., 2002). Aqueous extracts have been tested with success against tropical hen louse, Lipeurus lawrensis tropicalis (Kumar et al. 2002). Although control or suppression of these pests has been found, there is little evidence for the widespread practical exploitation of these findings. Von Weizsäckerl (1995) reported that it is used in parts of India to prepare antifeedant sprays in the same way as is done with leaves of Azadirachta indica.

Medicinal properties have been attributed to the sap and oil from the seed (Holm et al., 1977). In the Guianas the whole plant is used as an infusion against asthma. The root is taken in rum and cognac for stomach pain. Sap from the cut end of the stem is applied to cavities as a treatment for toothache. Children having difficulty with urination are given infusions of petals (DeFilipps et al., 2004). In India (Madhya Pradesh) it is reported to be a homeopathic drug (Oudhia et al., 1998). In West Africa it is used as a cosmetic, i.e. a washing milk (Rukangira, 2001).

In East Africa, the seeds are ground and put into beer or tea to increase their potency and cause drunkenness (Verdcourt and Trump, 1969).

In India, *A. mexicana* seeds are added to mustard oil in very small quantities, to increase its pungency. However, recently in New Delhi, over 60 deaths have been attributed to adulteration of mustard oil with larger quantities of *A. mexicana*, as a means of reducing costs (The Indian Society of Weed Science, 1998).

PESTS

Pests listed in the database

Major host of:
Aspergillus niger (collar rot), *Rotylenchulus reniformis* (reniform nematode)

Host of (source - data mining):

Helicoverpa assulta (cape gooseberry budworm)

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