

Parthenium hysterophorus (Asteraceae)

Why

Parthenium hysterophorus (Asteraceae) is an annual plant (or short-lived perennial under certain conditions) native to the subtropics of North and South America. One of its English common name is “Parthenium weed”. The plant has been introduced accidentally to Australia, India, etc. Within the EPPO region, its distribution is still limited. Because this plant has shown invasive behaviour where it has been introduced elsewhere in the world and is still limited in the EPPO region, it can be considered an emerging invader in the EPPO region.



Parthenium hysterophorus
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Geographical distribution

EPPO region: Israel.

Asia: Bangladesh, India, Japan, Nepal, Pakistan, Sri Lanka, Taiwan.

Africa: Ethiopia, Eritrea, Kenya, Madagascar, Mauritius, Mayotte, Mozambique, Reunion, Seychelles, Somalia, South Africa, Swaziland, Uganda, Zimbabwe.

North America: Bermuda, Mexico, USA (Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Hawaii, Illinois, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Missouri, Mississippi, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Virginia).

Central America and Caribbean: Cuba, Dominican Republic, Guadeloupe, Guatemala, Honduras, Jamaica, Martinique, Netherlands Antilles, Puerto Rico, Saint Barthelemy, Trinidad and Tobago.

South America: Argentina, Bolivia, Brazil, Ecuador, Peru, Paraguay, Venezuela.

Oceania: Australia (Queensland, New South Wales, Northern territory), French Polynesia, New Caledonia, Papua New Guinea, Vanuatu.

Note: in Israel, the species occurs in a date palm (*Phoenix dactylifera*) plantation.

Morphology

This erect ephemeral herb can grow up to 1.5-2 m high and has a deep tap root. It is light green with branching stems, finely lobed leaves, 3-20 cm long, 2-10 cm wide.

Once stem elongation is initiated, smaller leaves are produced and the plant becomes multi-branched in its extremities. Flower heads are small (4 mm across) and numerous in open panicles. Achenes are black, obovate, 2 to 2.5 mm long and light weight.

Biology and ecology

P. hysterophorus reproduces by seeds and is known to be highly prolific, as a single plant produces 15,000 seeds on average and up to 100,000 seeds (GISD Database, 2010). Germination temperatures range from 8 to 30°C, with an optimum germination temperature of 22 to 25°C in spring and early summer. Buried seeds have been found to last longer than seeds on the soil surface, and a significant proportion can still germinate after 8 to 10 years. The seeds have the ability to undergo dormancy. In addition, the species is an opportunistic germinator and seeds can germinate at any time of the year provided moisture is available but require bare soil (Parsons & Cuthbertson, 2001 in Department of Primary Industries, Undated). The plant flowers 4 to 8 weeks after germination, and flowering continues until drought or frost kills the plant. Under favorable conditions, 4 or 5 generations per year can be completed. The species prefers neutral to alkaline pH soils, but tolerates a wide variety of soil types. *P. hysterophorus* is best suited to areas with an annual summer rainfall greater than 500 mm. Macconnachie *et al.* (2010) performed a climatic prediction with CLIMEX for *P. hysterophorus* which concluded that the Mediterranean Basin is at risk from the species (Algeria, Croatia, France, Greece, Italy, Morocco, Spain, Tunisia, Turkey, etc.).

In which habitats

P. hysterophorus is a pioneer species which can invade grazing land, summer crops, disturbed and cultivated areas, roadsides, recreation areas, as well as river banks and floodplains. According to the Corine Land Cover nomenclature, the following habitats are invaded: arable land, permanent crops (e.g. vineyards, fruit tree and berry plantations, olive), pastures, banks of continental water, riverbanks / canalsides (dry river beds), road and rail networks and associated land, other artificial surfaces (wastelands).

Pathways

P. hysterophorus is thought to have been introduced into Ethiopia and India with contaminated cereal grain, and into Australia with contaminated pasture seed from the USA. Locally, the seeds are dispersed by wind and water usually in the order of a few meters and as a contaminant of hay, seed, harvested material, soil and by vehicles, machinery or animals over longer distances.

Impacts

P. hysterophorus aggressively colonises disturbed sites and causes major negative impacts on pastures and crops. In India, it has been observed that *P. hysterophorus* can cause yield losses of up to 40% in agricultural crops. In Ethiopia, the yield in *Sorghum bicolor* grain was reduced from 40% to 97% when *P. hysterophorus* was left uncontrolled throughout the season. In Queensland (Australia), the species has invaded 170,000 km² of high quality grazing areas and losses to the cattle industry have been estimated to be 22 million AUS dollars per year in control costs and loss of pasture

Infestations of *P. hysterophorus* can also degrade natural ecosystems, and outcompete

native species. Because the plant contains sesquiterpenes and phenolics, it is toxic to cattle. In addition, meat and milk produced from livestock that has eaten the weed can be tainted. Because of these toxic substances, *P. hysterophorus* exhibits an allelopathic effect on several other plants including crops. Frequent contact with the plant or its pollen can produce serious allergic reactions such as dermatitis, hay fever and asthma in humans and livestock, especially horses.

Control

In Australia, the authorities are imposing measures on the movements of equipment and livestock to avoid any further spread into new areas. Good pasture management practices are also recommended. Several herbicides are considered to be effective against *P. hysterophorus* (e.g. 2,4-D, atrazine, hexazinone, metsulfuron, glyphosate and dicamba). Treatments have to be applied when plants are small and have not produced seeds, and when grasses are actively growing to recolonize the infested area. Ploughing the weed before plants reach flowering stage and then establishing pasture may be effective. In addition, Australian scientists are exploring possible biological control measures and several biological control agents are being studied. For example, the release of a moth, *Epiblema strenuana* (Lepidoptera: Tortricidae), is considered, as well as the use of a rust, *Puccinia abrupta* var. *partheniicola* that affects the weed in Mexico.

Source

Department of Primary Industries (Undated) Invasiveness Assessment - Parthenium Weed (*Parthenium hysterophorus*) in Victoria. Victoria resources on line.

http://www.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/invasive_parthenium_weed

Global Invasive Species Database (2010) *Parthenium hysterophorus*.

<http://www.issg.org/database/species/ecology.asp?fr=1&si=153&sts>

Khan H, Hassan G & Khan A (2011) Prevalence and distribution of Parthenium (*Parthenium hysterophorus* L.) weed in Peshawar Valley, Khyber Pakhtunkhwa-Pakistan. In: Bohren C, Bertossa M, Schönenberger N, Rossinelli M, Conedera M. (ed) 3rd International Symposium of Environmental Weeds and Invasive Plants. Abstracts. October 2 to 7 2011. Monte Verità, Ascona, Switzerland.

Available from Internet: http://www.wsl.ch/epub/ewrs/sessions/detail_EN?id=292

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Natural heritage Trust (2003) Parthenium weed (*Parthenium hysterophorus*). Weed management guide. Weeds of national significance. 6

[p.http://www.weeds.org.au/docs/parthenium_weed_mgt_guide.pdf](http://www.weeds.org.au/docs/parthenium_weed_mgt_guide.pdf)

Pacific Island Ecosystems at Risk (Undated) *Parthenium*

hysterophorus. http://www.hear.org/pier/species/parthenium_hysterophorus.htm

Source: EPPO (added to the EPPO Alert List in 2011).

