

Mini data sheet on *Verbesina encelioides* (Asteraceae)

Added in 2008 - Deleted in 2012

Reasons for deletion:

Verbesina encelioides was added to the EPPO Alert List in 2008 but as no immediate risk was perceived, it was transferred to the Observation List in 2012.

Why

Verbesina encelioides (Asteraceae - common name is 'golden crownbeard') is an erect annual native to North and South America. The pathways of introduction of this species remain uncertain but are generally considered to be unintentional (e.g. as a contaminant of soil or of wool). 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 as a potential emerging invader in Europe.

Geographical distribution

EPPO region: Denmark (not invasive), Israel, Morocco (region of Agadir), Spain (O Mayoral García-Berlanga & M Angel Gómez-Serrano, pers. com.), UK.

Asia: India, Saudi Arabia.

North America: USA (Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, Nevada, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Wyoming).

Central America: Mexico, Puerto Rico.

South America: Argentina.

Africa: Botswana, Namibia, South Africa.

Oceania: Australia (New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia).

Note: Tutin *et al.* (1964-1980) report doubtful records in Germany, Sweden and Switzerland. The species has been reported as casual in Vienna (AT), and no impacts are reported. The species might also have a wider distribution in South America.

Morphology

V. encelioides is an erect annual reaching 30 cm and up to 160 cm and grows from a taproot system. Leaves are toothed or lobed and have two growth patterns: lower leaves are opposite and triangular, while the upper leaves are alternate and lance shaped. Fine white hairs are present on the underside of leaves and on the stem. Flower heads are bright yellow and found on elongated stalks and resemble small sunflowers, and are 2.5 to 5 cm in diameter. Seeds are grayish-brown achenes, flat and winged along the margins, they measure 5.4 mm to 6.7 mm long by 3.1 mm to 3.6 mm large.

Biology and ecology

Seeds of *V. encelioides* germinate in autumn or early spring. Seeds can survive drought and high temperatures; long periods of seed dormancy and high germination rates are reported. Highest germination levels were observed with seeds at the surface of soil, but seeds were still able to germinate when placed in soil up to 5 cm deep (Sade *et al.*, 2007). Once in the soil, the seeds typically take 14-30 days to germinate. The plant does not require large amounts of water and is considered drought tolerant. It is not tolerant to salinity or to shade and requires exposure to light to establish. It grows best in the 800-900 mm annual rainfall zone and is adapted to fine or medium textured soil. Sade *et al.* (2007) showed that the species prefers sandy soils. It can tolerate alkaline soils. It generally flowers during late summer, in the warmer months after significant rain (in particular in tropical areas), but the flowering period depends on locations: in North-Western Hawaiian islands, it flowers throughout the year, while in North Dakota, flowering is observed from July through to September. The plant is self- and cross-pollinated and reproduces by seeds. A single flower head produces 300 to 350 seeds and each plant can produce 2 to 6 flowers leading to the production of 600 to 2100 seeds per plant. Seeds are dispersed under or nearby the parent plant, or by light winds.

Additionally, seeds can travel long distances by adhering to wool, fur, clothing, sacks and other fibrous material.

Habitats

V. encelioides' range can encompass a variety of habitats, temperatures, and elevations. In its native range, considered to be throughout Mexico, Arizona and North Dakota although there is some disagreement on this point, the plant is found from 0 to 2700 m above sea level. Open areas and disturbed habitats appear to be ideal habitats for the plant. According to the Corine Land Cover nomenclature, the following habitats are invaded: arable land (fields of peanut, millet, maize, rice, barley, vegetables, orchards), pasture, road and rail networks and associated land, other artificial surfaces (wastelands, i.e. field headlands, vicinity of water courses). It might also occur in woodlands and valley grasslands, but these natural ecosystems are almost unaffected by the species.

Pathways

Though not widely used for ornamental purposes, a few companies in the South-Western United States (specifically in New Mexico and Texas where the species is native) promote the planting of *V. encelioides* for its fast-growing abilities and its drought resistance qualities. Arizona Department of Water Resources even recommends the plants for landscaping usage due to its low water requirements. In the Midway Atoll (Hawaii), the plant is suspected to have arrived as seeds contaminating the 9000 tonnes of soil imported to improve the quality of life on the island when it was a military base. It might also have been contaminating equipment or been intentionally introduced as an ornamental plant. Seeds may also be spread as contaminants in pasture hay and cereal grain, and they are reported as being introduced with wool from Australia in the British Isles.

Impacts

V. encelioides is one of the most common weeds in Northern India, germinating after the rainy season and invading maize, barley, rice, peanut and millet fields (Taleb, 2006). It is also a weed of peanut in Texas (where it is native) and in Israel. The plant contains a toxic component called galegine which poisons livestock (sheep). The plant is not a preferred source of feed for the livestock, but it will be eaten when feed is limited. Studies made in Argentina showed that animals ingesting 5 g of *V. encelioides* per kg of body weight might show lethargy and anorexia. Ingestion of 6.3 g/kg of body weight might result in death due to severe lesions on the internal organs and internal haemorrhaging. In Morocco, the plant is also reported to be a host of whiteflies such as *Bemisia tabaci* (EPPO A2 List) and *Trialeurodes vaporariorum* (Taleb, 2006).

V. encelioides displays allelopathic effects inhibiting native plants growth. Its aggressive and dominant growth abilities outcompete native plants.

In the North-Western Hawaiian Islands, the plant also presents a significant problem due to habitat degradation for seabirds nesting directly on the ground. Where growth of *V. encelioides* is particularly thick, some bird species can even become entangled amongst the weed.

Control

Mechanical control methods such as removal of flower heads or of the entire plant with taproot, mowing, etc. are suggested.

In natural areas, a combination of glyphosate and triclopyr has been applied where *V. encelioides* occurred in monospecific stands, and glyphosate alone where *V. encelioides* was found mixed with native vegetation. These methods killed the weed. Regardless of the method used, it was emphasised that one control attempt is not sufficient and that a combination and repetition of efforts is needed. Due to its negative effects on peanuts, the species has been the object of research on herbicidal control in Texas. In Israel, Sade *et al.* (2007) showed that pre-emergence herbicides such as linuron, metribuzin, oxyfluorfen and terbutryne effectively controlled the weed. Post-emergence herbicides such as oxyfluorfen, glufosinate ammonium and oxadiazon controlled the weed only when applied at the 2 to 4 leaf stage, but older plants recovered from the initial injury and resumed growth. Auxin-type herbicides such as fluroxypyr and 2,4-D with or without glyphosate controlled the weed at all growth stages. Sade *et al.* (2007) tested soil fumigation with metham-sodium in 2 soil types: sandy light and heavy clay soil. The treatment was highly effective in the sandy soil but showed almost no effect in the heavy clay soil.

Considering the invasive behaviour of *V. encelioides* in Morocco and Israel as well as its resistance to drought, the Mediterranean region is considered to be the area at risk. Additionally, this plant is reported as a weed in many crops (maize, peanut, orchards, vegetables, etc.) which are cultivated in some parts of the southern EPPO area.

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