

Pest plant risk assessment

Hairy sicklepod

Senna hirsuta

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Identity and taxonomy

- Names:** *Senna hirsuta* (L.) Irwin and Barneby, *Phytologia* 44(7):499 (1979); *Mem. New York Bot. Gard.* 35: 425 (1982).
- Common names:** Hairy senna; wooly wild sensitive plant (US)
- Synonyms:** *Cassia hirsuta*, *C. leptocarpa*, *C. pubescens*, *C. longisiliqua*, *C. neglecta*, *C. gooddingii*, *C. pubigera*, *C. venenifera*, *C. caracasana*, *C. tomentosa* and *Ditremexa hirsuta*.

Description, biology, ecology and overseas distribution

The *Senna hirsuta* complex comprises seven varieties. All varieties are annual or short-lived perennial herbs that become softly woody with age (generally 0.3–2.4 m tall). Depending on variety, the species may be erect or diffuse, simple or multiple-stemmed. Pubescence and pod features vary considerably and these attributes are used as a key to differentiate varieties (see key by Irwin & Barneby 1982, p. 428). The inflorescence is a 2–8 flowered axillary raceme up to 40 mm long, including the 10–15 mm peduncle (Hacker 1990). Petals are yellow. The pods of Queensland specimens are erect, curved, 100–140 mm long, 4–6 mm wide, slightly flattened, densely covered with coarse hairs and can contain 50–90 seeds per pod (Randell 1988). Seeds are rounded and 2.5 mm in diameter (Hacker 1990). Reproduction occurs from seeds (Wells et al. 1986). The plant is similar in appearance to *S. occidentalis* (sicklepod).

S. hirsuta occurs naturally in North, Central and South America and it is generally conceded that the species is American in origin (Irwin & Barneby 1982). According to Irwin and Barneby (1982) 'the varieties with more numerous derived features are dispersed correspondingly further north or northwest from the presumed focus of speciation for the section in southern Brazil.' *S. hirsuta* var. *streptocarpa* occurs along roads and in pastures at altitudes between 70–350 m. It is locally plentiful in the extreme north-east of Argentina and adjoining Brazil. Var. *puberula* inhabits disturbed, semi-deciduous woodland, fields and waste places (mostly 200–550 m) in Bolivia, Argentina and Paraguay. Var. *acuminata* is apparently rare and has a restricted distribution in the upper Rio Velhas Valley in central Minas Gerais. Var. *leptocarpa* inhabits disturbed woodlands (100–660 m) near Rio de Janeiro, Guanabara and southern Minas Gerais, Brazil. Var. *glaberrima* inhabits riverbeds, mesquite thickets, secondary brush woodland, arid grassland, degraded or ruderal habitats, mostly between 700 and 2100 m, in the interior of Mexico, Arizona and New Mexico. Var. *hirta* inhabits openings in tropical brush woodland and along stream banks and beaches, being commonest in ruderal habitats. It can be abundant in overgrazed pastures, along roads and fences, in fallow fields and about towns, ascending from tropical lowlands to 1600 m in Mexico, Central America, Ecuador and Bolivia. Var. *hirta* is the most widely dispersed form in the Americas (Irwin & Barneby 1982). Var. *hirsuta* inhabits forest margins, disturbed or regenerating scrub woodlands and becomes vigorously aggressive along roads, in pastures, orchards and in rural and urban waste places (Irwin and Barneby 1982). Over most of its range it is generally confined to the lowlands, not only in South America but elsewhere in the Neotropics.

The United States Department of Agriculture (Natural Resources Conservation Service) National Plant Data Centre lists *S. hirsuta* as native to North America with specimens being recorded from Arizona, California, New Mexico, Puerto Rico and the Virgin Islands (USDA 1995). Specimens of an unspecified variety were recorded from three locations in eastern Costa Rica. Hacker (1990) states that *S. hirsuta* is 'now pan-tropical'. *S. hirsuta* has naturalised in India (Holm et al. 1979), South Africa (Wells et al. 1986), New Caledonia, Sri Lanka and South-East Asia (Irwin & Barneby 1982; Randell 1988).

A full treatment of synonymy, typification and bibliography is given by Irwin and Barneby (1982).

Distribution and history in Australia

There is some confusion regarding the identity of varieties of *S. hirsuta* in Australia and in Queensland. Randell (1988) commented that 'the Australian collections are variable and apparently include several of the varieties recognised by Irwin and Barneby.' Irwin and Barneby (1982) list *S. hirsuta* var. *hirsuta* as being naturalised in Queensland. The Queensland herbarium HERBRECS database notes three varieties (vars. *glaberrima*, *hirta* and *puberula*).

S. hirsuta was first recorded in Queensland at Roma in 1959 (Queensland Herbarium records). It was reported to be 'growing profusely' on cleared grazing land near Seaforth in 1963 and had invaded improved pasture near Innisfail in 1970. Other herbarium (BRI) specimens have been collected from Danbulla (1960), Murray Upper (1961), Atherton (1971), King Ranch near South Johnstone (1978), O'Reilly's Creek Road, Lowood (1981), East Funnel Creek, Sarina (1984) and Andromache, near Proserpine (1987). Dense infestations exist along roadsides and on cleared grazing land near the O'Connell River (some 80 km from Mackay) (Warren pers. comm.). These records are within the Cook, North Kennedy, South Kennedy, Maranoa, Moreton pastoral districts (Hnatiuk 1990; Queensland Herbarium 1994). *S. hirsuta* also occurs within the Central and South coast regions of New South Wales (Hnatiuk 1990).

Status as a weed overseas

S. hirsuta has naturalised throughout the Neotropics and is listed as a weed in India (Holm et al. 1979), South Africa (Wells et al. 1986) and South-east Asia (Randell 1988). In South Africa, *S. hirsuta* is cultivated as a garden ornamental and has become a competitive weed in subtropical (summer rainfall) areas (Wells et al. 1986). Irwin and Barneby (1982) comment that 'the species as a whole is, like *C. occidentalis*, prevailing weedy even where native', and that 'extensions of range are (probably) due to human interference.'

Status as a weed in Australia

The only report of *S. hirsuta* behaving as a weed in Australia is provided by Symon (1966) and Irwin and Barneby (1982). It has not been declared anywhere in Australia. Hacker (1990) states that the plant is 'occasionally encountered as a weed of disturbed land' in Queensland.

Potential distribution and impact in Queensland

There appears to be very little published information on the impact of *S. hirsuta*. Irwin and Barneby (1982) list the types of areas inhabited by the seven varieties of the plant and these generally include ruderal habitats such as roadsides, fence lines, creek banks, waste places and overgrazed pastures.

Based on the limited information available, the plant appears to favour disturbed areas in subtropical and tropical climates. Some varieties appear restricted to high rainfall, coastal areas (e.g. areas in Costa Rica that receive 2000–3000 mm rainfall per annum), whereas other varieties inhabit arid grassland, woodland and even mesquite thickets in areas such as Arizona and New Mexico. As such, the complex as a whole tolerates a very broad range of climates, generally in tropical and subtropical regions.

The leaves of *S. hirsuta* are reported to be toxic to rats (in laboratory tests) and the plant is unlikely to be palatable to stock (Hacker 1990). This attribute may confer weediness, particularly in grazed environments where *S. hirsuta* could colonise gaps created when stock remove more palatable species from pasture communities. *S. hirsuta* shares several important attributes with two weedy congeners (Table 1). A more detailed assessment of the weedy attributes of *S. hirsuta* is presented in the appendix.

Table 1. Selected attributes common to *Senna obtusifolia* (sicklepod), *S. tora* and *S. hirsuta*.

| Attributes | <i>S. obtusifolia</i> | <i>S. tora</i> | <i>S. hirsuta</i> |
|-------------------------------|-----------------------|----------------|-------------------|
| Reproduces from seeds | yes | yes | yes |
| History as a weed elsewhere | yes | yes | yes |
| Unpalatable or toxic to stock | yes | yes | probably |

Discussion and conclusions

Based on the results of a weed risk assessment (see appendix) and a review of available literature, *S. hirsuta* has the potential to become a weed of disturbed areas, roadsides, fence lines, waste places and overgrazed land throughout a range of climatic zones, including areas of tropical savanna, the coastal Wet Tropics and perhaps subtropics of Queensland. Although the plant has been listed as a weed in India, South Africa, South America and South-East Asia, there is very little published information on its impacts as a weed elsewhere. By comparison, two congeners, *S. obtusifolia* and *S. tora*, are serious weeds in Queensland and elsewhere in the world, with well-documented impacts. The latter species possess biological attributes comparable to *S. hirsuta* (Table 1); however, it is difficult to predict whether *S. hirsuta* will be as aggressive as these species. Attributes that confer weediness have been considered in the appendix.

S. hirsuta has been present in Queensland since 1959. Judging by records held at the Queensland Herbarium, the plant seems to have formed small, scattered populations over a broad area of eastern Queensland. Due to a lack of detailed information on the plant's distribution, it is not possible to make firm conclusions regarding the feasibility of eradication or containment. Containment or strategic control of nascent populations may still be feasible, provided adequate control funding is available. Any decision to allocate resources to its control should consider other priority species (i.e. the existing list of more than 100 declared weeds).

Appendix

Weed Risk Assessment *(modified from Western Australian process)*

Species: *Senna hirsuta*
Family: Leguminosae (subfamily: Caesalpinioideae)
Assessor: SM Csurhes (October 1997)

Biogeography/historical

| | | |
|-------------------------------------|--|-----|
| 1. Domestication/cultivation | | |
| 1.1 | Has the species naturalised where grown? | Y* |
| 1.2 | Does the species have weedy races/forms? | Y* |
| 2. Climate and distribution | | |
| 2.1 | Species suited to Australian climates | Y*@ |
| 2.1.1 | Quality of climate match (0–low; 1–intermediate; 2–high) | 1 |
| 2.2 | Broad climate suitability | Y* |
| 2.3 | Native or naturalised in regions with extended dry periods | Y* |
| 2.4 | History of repeated introductions outside native range | Y* |
| 3. Weed elsewhere | | |
| 3.1 | Naturalised beyond native range | Y*@ |
| 3.2 | Garden ornamental/disturbance weed | Y* |
| 3.3 | Weed of agriculture | Y*@ |
| 3.4 | Weed of environment | N |
| 3.5 | Congeneric weed | Y*@ |

Biology/ecology

4. Plant type

| | | |
|-----|-----------------------------|----|
| 4.1 | Submerged aquatic | N |
| 4.2 | Free-floating aquatic | N |
| 4.3 | Grass | N |
| 4.4 | Nitrogen fixing woody plant | N? |
| 4.5 | Geophyte | N |

5. Undesirable traits

| | | |
|------|--|-----|
| 5.1 | Produces spines, thorns or burrs | N |
| 5.2 | Parasitic | N |
| 5.3 | Unpalatable to grazing animals | Y*@ |
| 5.4 | Toxic to animals | Y* |
| 5.5 | Host for recognised pests or parasites | — |
| 5.6 | Causes allergies or is otherwise harmful to people | N |
| 5.7 | Creates a fire hazard in natural ecosystems | — |
| 5.8 | Shade tolerant at some stage of life cycle | — |
| 5.9 | Grows on infertile soils | — |
| 5.10 | Climbing or smothering growth habit | N |
| 5.11 | Forms dense thickets | Y*@ |

6. Reproduction

| | | |
|-----|---|----|
| 6.1 | Evidence of substantial reproductive failure in native habitats | N |
| 6.2 | Produces viable seeds | Y* |
| 6.3 | Hybridises naturally | ? |
| 6.4 | Self-compatible or apomictic | — |
| 6.5 | Requires specialist pollinators | — |
| 6.6 | Reproduces by vegetative fragmentation | N |
| 6.7 | Short generative time (<5 years) | Y* |

7. Dispersal

| | | |
|-----|--|----|
| 7.1 | Propagules likely to be dispersed unintentionally (e.g. in soil) | Y* |
| 7.2 | Propagules dispersed intentionally by people | Y* |

| | | |
|----------------------------------|--|----|
| 7.3 | Propagules likely to contaminate produce | Y* |
| 7.4 | Propagules adapted to wind dispersal | N |
| 7.5 | Propagules bird dispersed | N |
| 7.6 | Propagules dispersed by other animals (externally) | N |
| 7.7 | Propagules survive passage through the gut | ? |
| 8. Persistence attributes | | |
| 8.1 | Prolific seed production (>2000/square metre) | ? |
| 8.2 | Evidence that a persistent propagule is formed | N |
| 8.3 | Readily controlled by herbicides | ? |
| 8.4 | Tolerates or benefits from disturbance | Y* |
| 8.5 | Effective natural enemies present in Australia | ? |

Summary of scoring

| | |
|---|----|
| Number of undesirable attributes (as indicated by *) | 18 |
| Number of key indicators of potential weediness (as indicated by @) | 6 |

Weed risk rating system

| | |
|----------|---|
| High | >3 key indicators of potential weediness |
| Moderate | 1–3 key indicators of potential weediness |
| Low | 0 key indicators of potential weediness |

References

- Hacker, JB (1990), *A Guide to the Herbaceous and shrub legumes of Queensland*, University of Queensland Press, St. Lucia, Queensland, Australia.
- Holm, LG, Pancho, JV, Herberger, JP & Plucknett, DL (1979), *A geographical atlas of world weeds*, Krieger Publishing Company, Florida.
- Hnatiuk, RJ (1990), *Census of Australian vascular plants, Australian flora and fauna series no. 11*, Bureau of Flora and Fauna, Australian Government Publishing Service, Canberra, Australia.
- Irwin, HS & Barneby, RC (1982), 'The American *Cassiinae*, A synoptical revision of Leguminosae tribe *Cassieae* subtribe *Cassiinae* in the New World', *Memoirs of the New York Botanical Gardens* 35: pp. 425–35.
- Queensland Herbarium (1994), *Queensland vascular plants; names and distribution*, Queensland Herbarium, Queensland Government.
- Randell, BR (1988), 'Revision of the *Cassiinae* in Australia. 1. *Senna* Miller Sect. *Chamaefistula* (Colladon) Irwin and Barneby', *J. Adelaide Bot. Gard.* 11(1): 19–49.

Symon, DE (1966), 'A revision of the genus *Cassia* in Australia', *Trans. Roy. Soc. S. Australia* 90: 73–146.

USDA (1995), United States Department of Agriculture Natural Resources Conservation Service, National Plant Data Centre, 'Plant report' for *Senna hirsuta*.
http://plants.usda.gov/plants/fr_querymen.cgi

Wells, MJ, Balsinhas, AA, Joffe, H, Engelbrecht, VM, Harding, G & Stirton, CH (1986), 'A catalogue of problem plants in southern Africa incorporating the national weed list of South Africa', *Memoirs of the Botanical Survey of South Africa*, Botanical Research Institute, Republic of South Africa.

