Aeschynomene villosa

Scientific name

Aeschynomene villosa Poir.

Subordinate taxa:

Aeschynomene villosa Poir. var. *longifolia* (Micheli) Rudd

Aeschynomene villosa Poir. var. *mexicana* (Hemsl. & Rose) Rudd

Aeschynomene villosa Poir. var. *villosa*

Note: The genus, *Aeschynomene,* is separated into two sections: Aeschynomene and Ochopodium. The former encompasses predominantly species from humid environments, such as *A. americana*, *A. indica* and *A. villosa*, while the latter includes a number of dryland species, such as *A. brasilianas*, *A. falcata* and *A. histrix*.

Synonyms

***Aeschynomene villosa*:** *Aeschynomene javanica* Miq.

var. *longifolia*: Basionym: *Aeschynomene americana* var. *longifolia* Micheli

var. *mexicana*: Basionym: *Climacorachis mexicana* Hemsl. & Rose

Family/tribe

Family: *Fabaceae* (alt. *Leguminosae*) subfamily: *Faboideae* tribe: *Dalbergieae.*

Morphological description

Annual or weakly perennial herb to sub-shrub with stems to about 1 m long, prostrate to weakly erect, glabrous to hispid. Leaves pinnate, about 2–7 cm long, 20–50-foliolate; leaflets 3–15 mm long, 1–4 mm wide. Inflorescences 3–10 (–15-flowered in var. *longifolia*), with hispid peduncles and pedicels; flowers usually yellow, 3–9 mm long; calyx 2–4 mm long, hispid; standard commonly 5–7 mm long. Pods 3–7 (commonly 4–6) seeded, the articles 2.5–3.0 (–4) mm in diameter, villous-hispid, the tuberculate bases of the hairs often dark, in contrast with the otherwise straw-coloured or light brown fruits, usually dehiscing along the lower arcuate suture but sometimes along the transverse suture (cf. *A. americana*) with seed retained in the article; seeds 2–2.5 mm long, 1.5–2 mm wide, dark brown to black. Mostly about 400,000 seeds/kg, but ranging from 190,000 to 1,000,000 seeds/kg.

Inflorescences 3–10 (–15) flowered (CPI 93616)

Annual or weakly perennial, prostrate to decumbent, herb to sub-shrub

Leaves about 2–7 cm long, 20–50 foliolate (CPI 37198)

Pods villous-hispid, commonly 4–6 seeded. Plant susceptible to powdery mildew

Seeds

Stem nodules

Seed crop of cv. Kretschmer

Seed production for cultivar mixture, "Villomix"

Similar species

***A. villosa*:** flowers 3–6 (–8) mm long; leaflets less than 8 mm long; mature fruit-centre non-muricate.

***A. americana*:** flowers >6 mm long; leaflets more than 4–15 mm long; mature fruit-centre muricate

Common names

English: villose jointvetch, hairy jointvetch, hairy joint-vetch, sensitive jointvetch

Latin America: angiquinho, pinheirinho (Brazil); amor seco; uekaku k'arhiri (Purépecha) (Mexico)

Distribution

Native:

Northern America: Mexico (Aguascalientes, Chiapas, Chihuahua, Colima, Durango, Guanajuato, Guerrero, Jalisco, Mexico, Michoacán, Morelos, Nayarit, Nuevo León, Oaxaca, Puebla, Sinaloa, Sonora, Tabasco, Tamaulipas, Veracruz, Zacatecas); USA (Arizona (s.))

Caribbean: Cuba, Dominican Republic, Guadeloupe, Haiti, Jamaica, Martinique, Montserrat, Puerto Rico, St. Kitts and Nevis (St. Kitts)

Central America: Costa Rica, El Salvador, Guatemala, Honduras, Panama

South America: Colombia, Ecuador, Venezuela

Cultivated:

Australasia: Australia (NSW, Queensland)

Uses/applications

Forage

Primarily used as a semi-permanent or regenerating component of pasture in grazed and cut-and-carry or green chop systems. Value for standover (foggage) or hay is limited by the tendency for leaves to abscise on drying.

Environment

Showing potential as ground cover in orchard and intercrop systems, and should have application for soil improvement as a N-fixing pioneer or green manure/fallow species.

Ecology

Soil requirements

Occurs on sometimes poorly drained soils of clay (including cracking clay), clay loam, loam, and sandy loam texture, with pH from 4.5 to 8.5 (mostly 6–6.5).

Moisture

Usually found in dryer areas than *A. americana*, in pine and oak forests, and pastures. Rainfall at collection sites ranges from 460 to 2,400 mm/yr, but mostly 800–1,500 mm/yr. Tolerates waterlogging, but not to the same extent as does *A. americana*. Both have the capacity to form nodules on the lower stem to offset the effect waterlogging might have on root nodulation. Drought tolerance varies according to the degree of defoliation. If heavily grazed adopting a rosette growth habit; can tolerate dry conditions. Conversely, plants entering a dry period with a bulk of foliage rapidly exhaust available moisture and show stress. Cultivars are normally only recommended in areas receiving >1,000 mm annual rainfall, and where moisture is retained.

Temperature

Occurs from about 31.5º N in Arizona, USA to 13.6º S in Bolivia, and from near sea level to 2,250 m asl. This equates to a range in average annual temperature of about 17–25 ºC.

Light

Grows in full sunlight and light shade.

Reproductive development

Appears to be a short day species in relation to flowering response, the critical photoperiod varying with ecotype. Early flowering types commence flowering in late February/early March at 21º S, while late flowering types may not commence flowering until May, posing a threat to seed set with early frost.

Defoliation

A. villosa is tolerant of heavy grazing, adjusting growth habit according to grazing pressure. Under very light grazing, plants are sprawling sub-shrubs, and under heavy grazing or regular mowing, flat rosettes.

Fire

No information available, but plants are likely to be susceptible. Stand should recover by virtue of prolific seedling recruitment.

Agronomy

Guidelines for establishment and management of sown forages.

Establishment

As with most legumes, hard-seed levels of manually harvested seed are often high. Germination is usually improved following mechanical harvesting. *A._villosa* is somewhat promiscuous, but nodulates most effectively if seed is inoculated with *Bradyrhizobium* strain CB 2312 or its equivalent. Best sown into a well-prepared seedbed, but reasonable establishment can be achieved with minimum cultivation. Seed is normally sown less than 1–2 cm deep, immediately prior to the onset of the wet season, to achieve best establishment and maximum

production in the first year. Sowing rates of 2–3 kg/ha of seed are usually adequate. Early seedling growth is slow. In subsequent years, regeneration occurs without further soil disturbance. Hard seed from previous seasons becomes germinable through weathering and soil temperature effects. The large seedling populations that develop reach an equilibrium level through natural competition and selection.

Fertilizer

Tolerates low fertility but is less productive. Applications of 20 kg P/ha on phosphate deficient soils can produce large increases in DM yield.

Compatibility (with other species)

Once established, *A._villosa* is compatible with tussock and stoloniferous species. Appears to benefit from more intensive management to minimise light competition from taller grasses.

Companion species

Grasses: *Axonopus fissifolius*, *Setaria sphacelata*, *Urochloa decumbens*, *U. humidicola*.
Legumes: *Aeschynomene americana*, *Arachis glabrata*, *A. pintoi*, *Centrosema molle*, *Vigna parkeri*.

Pests and diseases

Powdery mildew, caused by *Oidium* sp., is common on undefoliated stands such as seed crops. It forms a white mycelium on leaf surface, but, unless severe, seems to have little effect on production, quality or acceptability to animals. In seed crops the *Sclerotinia-Botrytis* pathogen complex sometimes causes death of stems necessitating spraying with fungicides. Flowers and developing pods are often attacked by heliothis (*Helicoverpa armigera*) larvae.

Ability to spread

A. villosa spreads by seed, either by water movement or through ingestion by livestock. Appears to be less likely to spread than *A. americana* or *A. falcata*.

Weed potential

Has shown no real indication of weediness.

Feeding value

Nutritive value

Analysis of tip samples (terminal 15 cm) yielded the following:
leaf: stem ratio c. 3:1. Leaf 23–27% CP, 0.24–0.26% P, 18.3–20.7% ADF.
Stem 9–14% CP, 0.23–0.27% P, 40.1–47.6% ADF.

Palatability/acceptability

Well eaten by livestock.

Toxicity

No record of toxicity.

Production potential

Dry matter

Capable of yields of 5–10 t DM/ha under good conditions.

Animal production

No information available.

Genetics/breeding

2*n* = 20. Off-types are rare in progeny from nursery-produced seed, where large numbers of accessions are growing in close proximity, suggesting a high degree of self-pollination.

Seed production

A. villosa exhibits 2 types of pod dehiscence - one where the arcuate suture separates at maturity, dropping the seed, and the other similar to that of *A. americana* where the pod breaks into segments, the seed being retained within the segment. The latter is more easily commercially harvested. 'Reid' and 'Kretschmer' exhibit first type, but a combination of direct and suction harvesting can produce seed yields of the order of 1 t/ha.

Herbicide effects

A. villosa is relatively tolerant of 2,4-D but not as tolerant as *A. americana* cvv. Glenn and Lee. Also tolerant of 2,4-DB and MCPA. 'Reid' and 'Kretschmer' seedlings are susceptible to acifluorfen, dicamba, fluoroxypyr and metsulfuron.

Strengths

- High quality, palatable feed.
- Tolerant of heavy grazing.
- Compatible with a range of grasses.
- Good seed yields.

Limitations

- Not very drought hardy.
- Susceptible to powdery mildew.
- Has not persisted well in some sown pastures.

Selected references

Bielig, L.M. (1997) Chromosome numbers in the forage legume genus, *Aeschynomene* L. Sabrao Journal of Breeding and Genetics **29:**33–39.

Bishop, H.G. and Cook, B.G. (2001) Register of Australian herbage plant cultivars: *Aeschynomene villosa* Poir. cvv. Reid and Kretschmer. Australian Journal of Experimental Agriculture **41(4)**:579–580. doi.org/10.1071/EA01006_CU

Kretschmer Jr., A.E. and Bullock, R.C. (1980) *Aeschynomene* spp.: Distribution and potential use. Proceedings of the Soil and Crop Science Society of Florida **39:**145–152. ufdc.ufl.edu/AA00067243/00024/153j

Rudd, V.E. (1955) The American species of *Aeschynomene*. Contributions from the United States National Herbarium **32**:1–172. hdl.handle.net/10088/27083

Cultivars

'Kretschmer' (CPI 93621) Released in Australia (1995) Origin Veracruz, Mexico (19.5º N, 1,420 m asl, 1,100 mm/yr). Perennial (to 3 or more years) to 60 cm high and 230 cm diameter. Mature plants commence flowering 3–4 weeks later than 'Reid' at 26º S. 'Reid' is more prostrate and has darker seeds than 'Kretschmer'. Some propensity to form adventitious roots and plantlets on prostrate stems. Mixed with 'Reid' and marketed as 'Villomix'. Moderate cold tolerance.

'Reid' (CPI 91209) Released in Australia (1995) Origin San Luis Potosí, Mexico (22.5° N, 1,250 m asl, 650 mm/yr). Perennial (to 3 or more years) to 30 cm high and 230 cm diameter, with darker seeds than 'Kretschmer'. Mature plants commence flowering mid-March at 26º S. Some propensity to form adventitious roots and plantlets on prostrate stems. Mixed with 'Kretschmer' and marketed as 'Villomix'. Moderate cold tolerance.

Promising accessions

CPI 37235 Evaluated in Australia Origin Jalisco, Mexico (21.1º N, 1,060 m asl, c. 1,000 mm/yr). Low growing, early flowering, widely adapted annual.

CPI 87491 Evaluated in Australia Origin Oaxaca, Mexico (16.3º N, 2,000 m asl, 800 mm/yr). Vigorous, mid-flowering, widely adapted annual.

CPI 91219 Evaluated in Australia Origin Morelos, Mexico (19º N, 2,100 m asl, 1,500 mm/yr). Vigorous, mid-flowering, widely adapted annual.