Tropical Forages

Hymenachne amplexicaulis

Scientific name
Hymenachne amplexicaulis (Rudge) Nees

Synonyms
Basionym Panicum amplexicaule Rudge

Family/tribe
Family: Poaceae (alt. Gramineae) subfamily: Panicoideae
tribe: Paspaleae subtribe: Otachyriinae

Common names
Note: Asian common names probably more likely refer to Hymenachne acutigluma (Steud.) Gilliland.

Chinese: 莎草, 莎草科 mo fu cao

English: hymenachne, west indian marsh grass, water straw grass, trumpet grass, wick grass; dal (dhal) grass, bamboo grass (India).

India: bhat dal, dhamsiria, dhop dal, karanga dal, pokalia, taboo, tattu

Indonesian: rumput kumpai

Khmer: ក្រដាស្រី, ក្រដាស្រី mo cao

Philippines: lagtom

Portuguese: canarana de folha, capim-capivara

Spanish: camalote, canutillo, capí, capii camalote, carrizo, carrizo chico (Argentina); carrizo chico, cañuela blanca (Bolivia); canutillo, trompetilla (Colombia); azuche, corcho, corcho bância, zacatal (Mexico); gamalote, gramalote (Nicaragua); chingolo (Paraguay); canela blanca, cañuela morada, canutillo, carrizo chico, hierba lancha, lengua de vaca, miuda, paja de agua, pasto paja de agua, rabo de zorro, trompetillo, yerbelancha

Suriname: bamboegras

Thai: หญ้าไส้ตะเกียง, หญ้าปล้อง ya plong, yaa plong

Vietnam: bấc gián đoạn

Morphological description
A perennial, stoloniferous grass, with robust, erect or ascending culms 1-2.5 m high and to >12 mm thick, and prostrate stems that run on wet ground, or float on water.
Grazed and ungrazed in drying ponded pasture area Queensland Australia

Developing adventitious roots. Stems glabrous, pithy. Leaves glossy green in colour, largely glabrous; sheaths often spongy; blades mostly linear-lanceolate, 10-45 cm long and to >3 cm wide, cordate, auriculate and clasping (amplexicaul) at base; ligule an eciliate membrane, 1–2.5 mm long. Panicle narrow, spikelike, cylindrical, 20-50 cm long. 1-2 cm across, sometimes with 2 to a few long, upright branches. Spikelets lanceolate, dorsi-ventrally compressed, upright, 3-4 (-5) mm long and 1 mm diameter; c. 2.3 million seeds/kg. Caryopsis ellipsoid, easily detached, 1-2 mm long and 0.6 mm diameter.

_H. amplexicaulis_ is morphologically similar to _H. acutigluma_ (Steud.) Gilliland (syn. _Hymenachne pseudointerrupta_ Müll. Hal) but can be distinguished by virtue of its cordate, stem-clasping leaf base.

**Distribution**

Native:

**Northern America:** Mexico (Campeche, Chiapas, Colima, Guerrero, Jalisco, Michoacan, Nayarit, Oaxaca, Sinaloa, Tabasco, Tamaulipas, Veracruz)

**Caribbean:** Barbados; Cuba; Dominica; Dominican Republic; Guadeloupe; Haiti; Jamaica; Martinique; Puerto Rico; St. Lucia

**Central America:** Belize; Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama

**South America:** Bolivia; Brazil; Colombia; Ecuador; French Guiana; Guyana; Paraguay; Peru; Suriname; Uruguay; Venezuela

**Note:** Morphologically similar to, but distinct from _Hymenachne acutigluma_ (Steud.) Gilliland, which is native to Continental Asia, Malesia and Australasia

Naturalized:

**Australasia:** Australia (New South Wales, Northern Territory, Queensland, Western Australia)

**Northern America:** USA (Florida, Louisiana)

Cultivated:

**Australasia:** Australia (no longer recommended due to "Declared" status

**Ecology**

Soil requirements

Grows well on fertile, seasonally inundated clays, although distribution is determined more by availability of water than by soil texture.

Moisture

_H. amplexicaulis_ is a wetland species, inhabiting margins of swamps, river floodplains, and drainage canals, mostly in water to about 2 m deep, occasionally extending into water 3-4 m deep. It can be grown for pasture in natural or artificially inundated pondage areas. On seasonally flooded floodplains, it needs over 1 m of water during the wet season to persist. It has low drought tolerance, not spreading beyond the wet zone, and low salt tolerance, not surviving even occasional tidal impact.

Temperature

Occurs from about 29ºN in Florida and 19ºS in Mexico to about 28ºS in Argentina, mostly at low altitudes (<850 m asl, but reportedly to 1,500 m asl). This is equivalent to a range in average annual temperatures of 21-26°C, with some frost incidence at the extremes. _H. amplexicaulis_ appears better adapted to slightly lower temperatures than is _H. acutigluma_.

Light

Tolerant of only light shade.

Reproductive development

Appears to be primarily a short day plant with a critical daylength of about 12 hours. Flowering also appears to be stimulated in response to an extended, more intense wet season. Although plants can largely flower throughout the growing season, there is a peak flowering from March/April to late June in the southern hemisphere or September/October to late December in the northern hemisphere.

Defoliation
H. amplexicaulis is a valuable fodder resource for the dry season. It is normally not grazed at other times of the year due to the harmful effects of trampling and uprooting of plants from wet soil. However, once the soil has dried out sufficiently to carry stock, H. amplexicaulis can tolerate heavy grazing. Stands are normally stocked at one beast per 1.5-2 ha.

Fire

By virtue of its habitat, fire is uncommon. However, fire following herbicide application can stimulate seedling growth if mature seed has fallen before herbicide treatment.

Uses/applications

Forage

H. amplexicaulis has value as a cool or dry season forage in seasonally inundated land, and can also be cut for silage. Stems are too thick for effective hay-making, although it can be used in cut-and-carry systems as green feed.

Environment

It has been proposed as a nutrient sink and sediment trap in ponded/floodplain environments which have become polluted by high nutrient and/or sediment loads. It has also been proposed as a suppressant for the serious weed of tropical wetlands, Mimosa pigra L. However, both species are now on the list of Weeds of National Significance in Australia because of their invasiveness in environmentally important wetlands and any proposal towards similar usage in other parts of the world should be carefully and cautiously considered.

Other

The plant is sometimes harvested from the wild for local use as a wick.

Agronomy

Guidelines for the establishment and management of sown pastures.

Establishment

H. amplexicaulis can be established vegetatively or from seed. Stem cuttings (2-3 nodes) can be dropped into water over 10 cm deep, or runners planted in rows 5 m apart. Seed can be broadcast onto wet soil, or onto shallow water, with seedlings emerging as the pond dries out. Sowing rates of 1-2 kg seed/ha are usually adequate. Seed viability declines fairly quickly under ambient storage conditions in the tropics (20-30°C), from an initial 98% to 10% over a period of 16 months.

Fertilizer

25-50 kg/ha N can be applied to sparse or newly established stands to promote tiller development. Plants appear to obtain nitrogen from a non-symbiotic association with nitrogen-fixing bacteria or cyanobacteria around the roots and submerged stems, reducing the reliance on fertilizers. Nitrogen fixation rates are believed to be higher in newly established stands compared with mature stands, which draw nutrient from litter decomposition and mineralisation, and eutrophication. N and P fertilizers applied at the beginning of the wet season have little effect on dry matter yield, or CP or P levels in the plant in the long term.

Compatibility (with other species)

Tends to suppress companion species.

Companion species

Grasses: Echinochloa polystachya, Urochloa arrecta (syn. Urochloa radicans), U. mutica.

Legumes: Not usually planted with legumes.

Pests and diseases

H. amplexicaulis is susceptible to fungal diseases, a leaf spot caused by Curvularia lunata and a tar spot caused by Phyllachora sp. Neither fungus is sufficiently aggressive to be a useful biocontrol agent. In Australia, rice leaffolder (Marasmi sp.) larvae attack H. amplexicaulis and H. acutigluma, causing leaf tip necrosis, much more severe in the former. Larvae of the Ocola skipper (Panoquina ocola) also feed on hymenachne. A lygaeid bug (Ischnodemus variegatus) can kill stands in localised areas, but infestations do not spread sufficiently to kill whole stands. The paddy bug (Oebalus poecilus and O. ysipholongriseus), also known as “ghundi” or “bush bug”, a serious pest of rice in the Caribbean, feeds on H. amplexicaulis, migrating to rice crops during early flowering.

Ability to spread

Seed is dispersed by floodwater and by water birds. Pieces of plants can be carried to new locations on hooves of grazing animals, or in moving water. Rafts of plant material are moved by water flow, until lodging against a bank and taking root. It has also been moved by man for use in pasture development. Surface seed has survived for 1-2 years, and buried seed for >3 years. In Australia, cv. Olive has spread, intentionally by man, and naturally by fauna, from where it was first introduced at about 23ºS in Queensland to 30ºS in coastal NSW, and about 12º 30’S in the Northern Territory, over a period of about 40 years.

Weed potential
H. amplexicaulis has displaced native wetland vegetation, and blocks drainage canals. It has been declared an environmental weed in Florida, USA, and its planting and use is now restricted in Australia, where it has been declared a Weed of National Significance (WONS).

Feeding value

Nutritive value
Unlike most tropical grasses, hymenachne employs the C3 photosynthetic pathway, which usually results in lower lignin content of the herbage. Crude protein levels in whole tops varies from 9-21% at different times of year, with leaf levels up to 25% and stem 9%. CP digestibility mostly ranges from 66-80%, being higher in stems than in leaves. TDN values range from 54-76%. P levels mostly vary from 0.16% or over during the dry season to 0.20% or over during the wet season. Sodium levels are low (0.02%) compared with levels in Echinochloa polystachya (0.10%) and Urochloa mutica (0.33%). Digestibility varies from highly digestible to non-digestible among Mexican ecotypes.

Palatability/acceptability
While generally readily eaten by cattle and buffaloes, even when mature, it is not as palatable as Urochloa mutica or Echinochloa polystachya. Important feed component for the giant rodent, capybara or carpincho (Hydrochaeris hydrochaeris), found in its native habitat.

Toxicity
None reported.

Feedipedia link
https://www.feedipedia.org/node/431

Production potential

Dry matter
Herbage contains high levels of moisture. DM yields are commonly of the order of 5-10 t/ha/yr, although >18 t/ha/yr DM has been recorded.

Animal production
Estimated carrying capacity of 1 beast/ha, with an average liveweight gain of 180 kg per beast per annum.

Genetics/breeding
$2n = 2 \times 24$. Natural hybrids between the introduced H. amplexicaulis and the native H. acutigluma ($2n = 20$) have been identified in northern Australia and given the name Hymenachne x calamitosa J.R. Clarkson.

Seed production
Seed has been produced commercially in large artificial ponds, from which the water can be pumped out prior to harvest by adapted machinery.

Herbicide effects
Haloxyfop-R methyl has proven the most effective control agent, giving 100% kill. Imazapyr and fluazifop-butyl can give 90% kill, and the isopropylamine salt of glyphosate, a 50% kill. Repeated applications of high volume foliar spray may be necessary to control dense infestations, since, although tops might be killed by a single application, stands recover from stolons and seed within 3 months. Imazapyr and glyphosate are broad-spectrum herbicides, and should be used with care. Care should also be taken that herbicides used pose no environmental threat, and are registered for use in the intended manner. Application of glyphosate, followed by burning of dead tops can give significant control, providing mature seed has not dropped prior to treatment. Care should also be taken that large quantities of dead plant material from sprayed hymenachne do not contaminate bodies of water.

Strengths
- Palatable, high quality feed
- Maintains quality
- Dry season feed
- Can be planted vegetatively or from seed
- Acts as nutrient sink and sediment trap

Limitations
- Invasive (environmental threat)
- Readily spread by animals and water movement
- Not compatible with other species (forms monocultures)

Selected references
Cultivars

'Olive' Released in Australia (1987) Origin uncertain. Released as a source of dry season feed for sub-humid tropics. No longer recommended due to adverse environmental impact in wetlands.

Promising accessions

None reported.

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