

Hyparrhenia rufa

Thatching grass

Moraceae

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OVERVIEW

Hyparrhenia rufa is a large thatching grass which is commonly cultivated throughout the tropics for cattle fodder. *H. rufa* has naturalized in many places where it is cultivated. In Hawai'i, *H. rufa* spreads from pastures, along roadsides and in disturbed areas. After fires, *H. rufa* and other fire adapted non-native grasses, dominate the understory, which in turn adds to the fuel load, frequency, and size of future fires. Most native plants are not well suited to fire and eventually few remain. The island of Maui has relatively few known locations of *H. rufa*. The Kaupo Gap and W. Maui locations are near vulnerable native habitat and should be contained before they become widespread. Given the current known distribution on the entire island, it may be feasible to control all locations. However, it is likely that there are more existing locations that have not yet been detected. Detailed distribution maps for all islands would help guide management decisions.

TAXONOMY

Family: Poaceae (grass family) (Wagner et al. 1999).

Latin name: *Hyparrhenia rufa* (Nees) Stapf (Wagner et al. 1999).

Synonyms: *Trachypogon rufus* Nees; *Andropogon rufus* (Nees) Kunth (Wagner et al. 1999). Wunderlin and Hansen (2000) lists 19 known synonyms including: *Andropogon altissimus* A Braun; *A. bouangensis* Franch.; *A. fulvicomus* Hochst.; *A. fulvicomus* Hochst. var. *approximatus* Hochst.; *A. rufus* (Nees) Kunth var. *glabrescens* Chiov.; *A. rufus* (Nees) Kunth.; *A. rufus* (Nees) Kunth var. *fulvicomus* (Hochst.) Hack; *A. xanthoblepharis* Trin.; *Cymbopogon rufus* (Nees) Rendle var. *major* Rendle; *C. rufus* (Nees) Rendle var. *fulvicomus* (Hochst.) Rendle; *C. rufus* (Nees) Rendle; *Hyparrhenia altissima* Stapf; *H. fulvicoma* (Hochst.) Andersson ex Asch.; *H. hirta* (L.) Stapf var. *brachypoda* Chiov.; *H. parvispiculata* Bamps; *H. rufa* (Nees) Stapf var. *fulvicoma* (Hochst.) Chiov.; *H. rufa* (Nees) Stapf var. *major* (Rendle) Stapf; *Sorghum rufum* (Nees) Kuntze; and *Trachypogon rufus* Nees.

Common names: Thatching grass, jaragua (Wagner et al. 1999).

Taxonomic notes: The genus, *Hyparrhenia*, is made up of about 50 species mostly of African origin, with some species widely distributed throughout the tropics (Wagner et al. 1999).

Nomenclature: The name is derived from the Greek word, *hupo*, meaning under, and *arrhen*, meaning male, in reference to the presence of pairs of staminate spikelets at the base of the raceme in species of this genus (Wagner et al. 1999).

Related species in Hawai'i: According to Wagner et al. (1999), *H. hirta* (L.) Stapf is adventive on Moloka'i and Lana'i.

DESCRIPTION

"Perennials or sometimes annuals; culms densely tufted, forming large clumps 3-25 dm tall, nodes long-pilose. Sheaths sparsely long-pilose, the hairs white, appressed at base, upper sheaths glabrous but with margins ciliate and hairs readily deciduous; ligule a firm, brownish membrane, 1-2.5 mm long; blades flat, glabrous or upper surface hirsute, 30-60 cm long, 2-8 mm wide, narrowed at base. Inflorescences large, paniculate, with numerous branches, the branches lax or contracted, fasciculate, 5-80 cm long, spathes linear-lanceolate, becoming reddish and rolled around the peduncle, 3-5 cm long, sparsely to densely red-tinged, (1.5-)2-2.5 cm long, with (7-)9-14 awns per raceme pair, the awns rarely reflexed, with 1 homogamous pair of spikelets at the base of the lowest or of both racemes, raceme-bases unequal, sometimes connate, the upper one 2-3.5(-4) mm long, glabrous, rarely with a few long hairs, the articulation with the peduncle apex glabrous; sessile spikelet (3-)3.5-4.5(-5) mm long, glabrous to pubescent, but usually sparsely covered with stiff red hairs, usually glossy; pedicellate spikelet acute or rarely mucronate, callus 0.2-0.8 mm long, short and rounded to cuneate, narrowly truncate; lemma slender, filiform, ca. 2 mm long, membranous, awn arising from bifid apex, 2-2.5 cm long, golden to copper brown, strongly twisted, geniculate, pubescent; palea lanceolate, ca. 3 mm long. Caryopsis ellipsoid to ovoid, ca. 3 mm long." (Wagner et al. 1999).

Stone and Pratt (1994) describe *H. rufa* as a large grass, 3-6 ft tall, with leaf blades often hued with red to purple, with a similar appearance as that of pili grass (*Heteropogon contortus*), with prominent twisted bristles, and inflorescences that are large, open clusters with wide spreading branches.

BIOLOGY & ECOLOGY

Cultivation: *H. rufa* is widely cultivated throughout the tropics as a pasture grass. It is valued as a pasture grass for its ability to persist, and to produce high live-weight gains under intense grazing regimes (Skerman and Riveros 1990). It was first recorded in Hawai'i in 1939 (Wagner et al. 1999).

Invasiveness: Some of the attributes that make *H. rufa* a desired pasture grass are also attributes which make it an aggressive invader. *H. rufa* is a persistent plant that produces abundant seeds and easily establishes in tropical areas where it is planted, such as Florida, Central America and Hawai'i (Wagner et al. 1999, PIER 2000). *H. rufa* is listed as a weed in Western Australia's global compendium of weeds (Randall 2002). Skerman and Riveros (1990) report that this species competes successfully with and smothers other weeds. Another attribute that makes *H. rufa* an invasive plant in Hawai'i is that it is fire adapted, whereas most native Hawaiian plants are not. *H. rufa* and other non-native fire adapted grasses typically carry fires and replace native plants after fires. Fires have a destructive cycle by increasing fuel loads of flammable alien grasses, which in turn contributes to future fire frequency and size (Smith and Tunison 1992).

Pollination: Unknown.

Propagation: *H. rufa* can be propagated from seeds. A fully prepared seed bed will give the best results, but it will establish in a rough seed bed or after burns (Skerman and Riveros 1990). Root stocks can also be planted (Skerman and Riveros 1990).

Dispersal: Seeds with long bristles are capable of catching on people or animals that walk past the plant. The seeds are able to disperse on the wind after fires and germinate well in these conditions.

Pests and Diseases: Skerman and Riveros (1990) report that *H. rufa* has good disease resistance and no insect problems.

DISTRIBUTION

Native range: *H. rufa* is native to tropical and South Africa (Wagner et al. 1999). GRIN (2002) reports the native range as the following African districts: Benin; Botswana; Burkina Faso; Cameroon; Cote D'Ivoire; Eritrea; Ethiopia; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Madagascar; Mali; Mauritania; Namibia; Nigeria; Senegal; Sierra Leone; South Africa – Transvaal; Sudan; Swaziland; Tanzania, including Zanzibar and Pemba; Togo; Uganda; and Zaire. Skerman and Riveros (1990) report that the natural habitat is seasonally flooded grassland and open woodland.

Global distribution: *H. rufa* is cultivated and naturalized throughout the tropics. It is a reported weed in at least Florida, Hawai'i, and Costa Rica (Wagner et al. 1999, PIER 2001). In Florida, it is known from several counties from north, central, and southern Florida. The altitude range is reported as up to 2,000 m (6,562 ft) in Colombia (Skerman and Riveros 1990). Minimum rainfall requirements are reported as 600-1,400 mm (24-55 in) annually and it is said to be rather drought tolerant (Skerman and Riveros 1990). Additional locations from herbarium collections are listed below.

The Missouri Botanical Garden (2002) specimen database includes the following locations:

North America: USA, Florida, 27.22.32N-27.41.15N and 080.27.30W-080.35.00W.

Mesoamerica: Belize, 100-250 m (328-820 ft), 17.49N 88.42 W-17.05N and 088.58.28W; Costa Rica, 10-1,150 m (33-3,773 ft), 8.36.40N-10.23.38N and 83.22.50W-85.19.05W; El Salvador, 1,050-1,800 m (3,445-5,906 ft), 13.28.13N-13.58N and 088.08.46W-089.05.48W; Guatemala, 200-850 m (656-2,789 ft), 14.52N-17.01N and 89.53W-90.37W; Honduras, 100-1,380 m (328-4,528 ft), 14.34N-15.25N and 87.10W-88.38W; Mexico, 220-2,103 m (722-6,900 ft), 16.30N-18.31N and 089.26.20W-92.30W; Nicaragua, 25-1,600 m (82-5,249 ft), 10.57N-13.13.08N and 84.39W-86.31W; and Panama, 2-45 m (7-148 ft), 8.10N-9.10N and 77.54W-81.15W.

South America: Bolivia, 135-1,400 m (443-4,593 ft), 11.18S-17.39S and 63.13W-67.44W; Brazil, 730 m (2,395 ft); Colombia, 2,000 m (6,562 ft); Ecuador, 550-1,300

m (1,804-4,265 ft); French Guiana, 04.48N 052.22W; Paraguay, 22.32S 056.52.44W; Peru, 200-780 m (656-2,559 ft), 08.40S-12.05S and 69.03W-75.19W; and Venezuela, 100-1,410 m (328-4,626 ft), 7.56N-10.25N and 62.38W-69.48.38W.

Africa and Madagascar: Burundi, 800 m (2,625 ft); Central African Republic, 415-610 m (1,362-2,001 ft), 8.29N-9.13N and 21.09E-21.22E; Madagascar, 1,000-1,300 m (3,280-4,265 ft), 18.55S-25.01S and 46.57E-47.32E; Seychelles, 15 m (49 ft); Tanzania, 150-1,800 m (492-5,906 ft), 06.19S-09.55S and 33.20E-038.58E; Uganda, 1,200-1,800 m (3,937-5,906 ft), .22S-.23N and 30.29E-32.38E; and Zambia, 1,200 m (3,937 ft).

The New York Botanical Garden (2002) specimen database reported the following locations and habitat descriptions: Brazil, Puerto Rico, 45 m (148 ft), 18.17N 67.03W, "dominating the roadside", Bolivia, 370-500 m (1,214-1,640 ft), 17.23S-18.01S and 63.13W-67.03W, "the surrounding area mostly cleared of forest and in crops and pastures. Roadside with *Panicum maximum*, *H. rufa* and some shrubs", "invading grassland in places", "along new highway", "abundant in places as a weed along edge of sugarcane field", "brushy areas along railroad".

State of Hawai'i distribution: In Hawai'i, *H. rufa* has spread from initial plantings and is now naturalized in disturbed areas and along roadsides at an elevation of 10-660 m (33-2,165 ft) on Kaua'i, O'ahu, Moloka'i, Maui and Hawai'i (Wagner et al. 1999). It has recently been reported from roadsides up to 1,219 m (4,000 ft) elevation within the Hawai'i Volcanoes National Park (HAVO) (Stone and Pratt 1994). Fire frequency has increased dramatically at HAVO since the 1970's after goats were removed and non-native grasses, such as *H. rufa*, *Andropogon virginicus*, *Melinis minutiflora*, and others, proliferated, adding to the fuel load (Smith and Tunison 1992). Areas that are vulnerable to wildland fires in Hawai'i include mostly mesic and dry habitats, though it is predicted that as human activity and non-native fire carrying grasses invade further into moist habitats, fires will be more frequent in these areas as well (Mueller-Dombois 1973).

Island of Maui distribution, population structure: There are only a few known locations of *H. rufa* currently known from Maui. On West Maui, it has been reported from only one location, the Kapunakea Preserve, in Wahikuli gulch (Pat Bily pers comm.). No other sites on West Maui are currently known. On East Maui, there are a few sites along the Hana Hwy. at Huelo and near Keanae. A few locations are known from Kaupo, one at the entrance to Kaupo Ranch where about 20 plants are located (Steve Anderson pers comm.). There is also a location reported from Kalepa, between Kipahulu and Kaupo (Bill Haus pers comm.).

CONTROL METHODS

Physical control: Small plants can probably be dug out by hand, though seeds persist in the ground and follow up control will be necessary.

Chemical control: *H. rufa* can be controlled with a foliar application of 2% Roundup.

Biological control: No biological controls are known.

Cultural control: Stopping or slowing the fire regime would help control *H. rufa*. Establishing fire breaks helps to break up fire fuel loads.

Noxious weed acts: None.

MANAGEMENT RECOMMENDATIONS

H. rufa is an aggressive fire adapted grass. As non-native fire adapted grasses increase in an area, fire loading, frequency, and fire size is increased. Native plants, not well adapted to fire tend to decrease. *H. rufa* is common in Hawai'i Volcanoes National Park and contributes to the fire regime there. On Maui, there are only a few locations known. These should be controlled as soon as possible in order to prevent an infestation in the future, especially in areas that are prone to fire or are near natural areas. This species should be included in future monitoring to help find new locations that have not been recorded yet on Maui and the rest of the State of Hawai'i.

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