GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: ***Imperata cylindrica***

Imperata cylindrica 简体中文 正體中文 **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Liliopsida	Cyperales	Poaceae

Common name Blutgras (German), gi (Fijian), cogon grass (English), ngi (Fijian), alang-alang (English), japgrass (English), speargrass (English), lalang (English), carrizo (English), kunai (English), blady grass (English), satintail (English), paille de dys (French), paillotte (French), impérata cylindrique (French)

Synonym *Imperata arundinacea* , Cirillo
Lagurus cylindricus , L.

Similar species *Imperata brasiliensis*

Summary
Native to Asia, cogon grass (Imperata cylindrica) is common in the humid tropics and has spread to the warmer temperate zones worldwide. Cogon grass is considered to be one of the top ten worst weeds in the world. Its extensive rhizome system, adaptation to poor soils, drought tolerance, genetic plasticity and fire adaptability make it a formidable invasive grass. Increases in cogon grass concern ecologists and conservationists because of the fact that this species displaces native plant and animal species and alters fire regimes.

view this species on IUCN Red List

Species Description
Although *Imperata cylindrica* can have leaf blades of up to 1.5 m tall in conditions of good soil moisture and fertility (Holm *et al*. 1977, in Daneshgar & Shibu 2009), the majority of its biomass occurs below ground comprising greater than 60% of the total biomass (Sajise 1976, in Daneshgar & Shibu 2009). Cogon grass is stemless erect perennial growing in loose to compact tufts with slender flat linear-lanceolate leaves arising from the rhizomes. The scabrous leaves are 4 to 10 mm wide with prominent white midribs that are slightly off center. The leaves may be 15 to 150 cm tall, depending on habitat, with narrow sharp points (Bryson & Carter 1993; Hubbard *et al*. 1944, in Dozier *et al*. 1998). For more information on morphology see Dozier *et al*. 1998.

Lifecycle Stages
Rhizome production from a seedling plant takes about 4 wk. Seed viability is short lived with no dormacy. As many as 4.5 million shoots have been reported more than 10 metric tons of leaf material and more than 6 metric tons of rhizomes produced from a single hectare (Bryson & Carter, 1993).

Uses

Imperata cylindrica is used as thatch, short-term forage production, soil stabilisation and paper making (Watson & Dallwitz 1992, in Dozier *et al*. 1998). In surveys conducted in the coastal/derived savanna (Benin and Nigeria) and southern Guinea savanna (Ivory Coast) in Africa some farmers indicated that *I. cylindrica* was an important source of cheap roofing material, animal fodder and medicines. Silica bodies in the leaves contribute to its unpalatability to grazers (Coile & Shilling 1993, in Dozier *et al*. 1998). *I. cylindrica* was imported and distributed by the United States Department of Agriculture for use as a forage grass and for soil erosion control. In the United States, an ornamental variety of the grass is promoted for landscape use (Johnson & Shilling 2009). Although the ornamental varieties, known as 'Rubra,' 'Red Baron,' or 'Japanese Blood Grass' are not aggressive, plants grown from callus tissue can revert to the invasive form (Greenlee 1992, in Dozier *et al*. 1998).

Habitat Description

Imperata cylindrica occurs in a wide range of habitats, including degraded forests, grasslands, arable land, and young plantations within tropical and subtropical climates with 75 to 500 cm of annual rainfall. It can be found growing in almost all eco-types from the dryest flatwoods to the margins of permanent bodies of water. Cogon grass has invaded areas from highly xeric, upland sites to fully shaded, mesic sites. It invades sandhills, flatwoods, hardwood hammocks, sand dunes, grasslands, river margins, swamps, scrub, and wet pine savanna communities. It is known to occur from latitudes 45°N (Japan) to 45°S (New Zealand) and from sea level to over 2,000 m elevation (Langeland and Burks, 1998; Chikoye, 2003; Van Loan Meeker and Minno, 2002).
Cogon grass typically does not invade closed forests unless they are degraded for agriculture or lumbering. It is very successful in areas that are frequently burnt, overgrazed, or intensively cultivated and rapidly colonizes such disturbed sites. A high root-rhizome to shoot ratio provides *I. cylindrica* a substantial source of regeneration following cutting or burning. Its rhizomes are very resistant to heat and breakage and may penetrate soil up to 1.2 m deep, but generally they only reach the top 0.15 m in heavy clay soil and the top 0.4 m in sandy soils. Its capabilies of recovery and colonization after fire allow it to take advantage of slash and burn forestry practices (Bryson & Carter, 1993, Peet *et al*, 1999; Chikoye, 2003; Van Loan Meeker and Minno, 2002).
A fast-growing species, *I. cylindrica* thrives in areas of minimal tillage, such as orchards, lawns, and roadsides. It does not generally survive regular, deep tilling. While cogon grass is tolerant of a wide variety of soil conditions, including variations in fertility, organic matter, and moisture, it grows best in relatively acidic soils (pH 4.7). Temperature markedly affects shoot and rhizome growth, with increased growth occurring at 29º/23ºC (day/night). Temperatures of -4.5°C or lower for exposure periods of 24 hours were found to be lethal to rhizomes (Wilcut *et al*., 1988). While in general rhizomes do not exhibit extreme cold hardiness, stands of cogon grass may survive temperatures as low as –14ºC (Langeland and Burks, 1998; Van Loan Meeker and Minno, 2002).

Reproduction

The ecological resiliency of *Imperata cylindrica* and its ability to regenerate from any man-made or natural disturbance, is primarily attributed to the well-protected rhizome network. The rhizome biomass can accumulate up to 1100 g m-2 in a mature sward (Soerjani 1970, in Ramsey *et al*. 2003). *I.\r\ncylindrica* can reproduce asexually from rhizome fragments as small as 0.1 g (Ayeni & Duke 1985, in Daneshgar & Shibu 2009). It is a prolific seeder, producing as many as 3 000 seeds per plant (Holm *et al*. 1977, Daneshgar & Shibu 2009). Indications are that seed viability is extremely short-lived.

Nutrition
One of the reasons for the high invasive potential of *Imperata cylindrica* is its ability to grow on a wide range of soil types with no special nutrient requirements. It has extremely efficient nutrient uptake and forms associations with mycorrhizae which enhance nutrient uptake on unfertile soils (Collins & Jose, 2009 and references therein).\r\n\r\n
I. cylindria assimilates carbon via the C4 photosynthetic pathway (Paul & Elmore, 1984) giving it a competitive advantage over C3 plants in many conditions and contributing to its invasiveness. It is a strong competitior for water, light and nutrients because it sprouts and grows more rapidly than most crops. However, like other C4 plants it is relatively intolerant of shade.

General Impacts
For a detailed account of the environmental impacts of *Imperata cylindrica* please read: *Imperata cylindrica* (cogon grass) Impacts Information. The information in this document is summarised below.
Increases in *I. cylindrica* concern ecologists because this species displaces native plant and animal species and alters fire regimes (Lippincott 1997 2000, in Brewer & Cralle 2003). Dense swards of *I. cylindrica* create an intense competitive environment for commercially important species (Bryson and Carter 1993, Kuusipalo *et al*. 1995, Premalal *et al*. 1995, Dozier *et al*. 1998).
Displacement: Invasion of longleaf pine communities by *I. cylindrica* will likely cause significant losses of short habitat-specialists and reduce the distinctiveness of the native flora of these threatened ecosystems (Brewer 2008).
Agricultural: The interference of *I. cylindrica* with the growth of tropical crop species, both herbaceous and woody, is well documented (Brook 1989, in King & Grace 2000b).
Habitat alteration: *I. cylindrica* invasion of an emerging pine forest may be an example of a grass converting a woodland with high understory diversity into a grassland with low diversity. *I. cylindrica* presents a case where its ability to deprive competitors of N may lead to the conversion of the ecosystem (Daneshgar & Shibu 2009).
Modification of nutrient regime: The changes in nutrient cycling caused by exotic grasses can endanger young tree seedlings in a regenerating forest (Daneshgar & Shibu 2009). Because *I. cylindrica* allocates significant carbon below-ground, it is able to recover quickly after fire, which is why Lippincott (2000, in Daneshgar & Shibu 2009) suggested that frequent intense fires could convert a pine savanna into an *I. cylindrica*-dominated grassland.
Ecosystem change: A study by Holly and colleagues (2008) supports the growing consensus that invasive plant species alter normal ecological processes and highlights a possible mechanism (alteration of microbial assemblages) by which *I. cylindrica* may alter an ecosystem process (decomposition).
Competition: The results of a study by Brewer and Cralle (2003) suggest that *I. cylindrica* is a better competitor for phosphorus than are native pine-savanna plants, especially legumes. The competitive effects of this species on plant diversity may be of more immediate conservation concern relative to the effects of this species on fire regimes in longleaf pine ecosystems (Brewer 2008).
Threat to endangered species: Longleaf pine savannas of the southeastern USA contain extraordinarily species-rich plant communities and are home to numerous threatened endemic plant and animal species (Walker & Peet 1983, Bridges & Orzell 1989, Brockway & Lewis 1997, in Brewer & Cralle 2003).
Inhibits other species: The extensive rhizome network of *I. cylindrica* not only allows rapid regeneration of foliage, but also produces allelopathic root exudates that can inhibit germination and growth of other plants, including some pines (Hussain *et al*., 1994, in Ramsey *et al*. 2003).
Modification to fire regime: Lippincott (2000) found that sandhill invaded by *I. cylindrica* had significantly greater fine-fuel loads that resulted in fires that had higher maximum temperatures at greater heights. Fire-induced mortality of juvenile longleaf pine was higher for pines growing in invaded sandhill.
Other: The density of the below-ground rhizome network makes *I. cylindrica* a mechanical hindrance to root growth of native species. The rhizome tips are sharp: they may even penetrate the roots of native species, leading to damage or mortality by infection (Eussen & Soerjani 1975, in Daneshgar *et al*. 2008).

Management Info
For more detailed information on management of *Imperata cylindrica* (cogon grass) please read: *Imperata cylindrica* (cogon grass) Management Information. The information in this document is summarised below.\r\n
Preventative measures: A Risk assessment of *Imperata cylindrica* for the Pacific region was prepared by Pacific Island Ecosystems at Risk (PIER) using the Australian risk assessment system (Pheloung 1995). The result is a score of 19 and a recommendation of: reject the plant for import (Australia) or species likely to be a pest (Pacific).\r\n
Results from a study by King and Grace (2000a) suggest that efforts to prevent *I. cylindrica* invasion should focus on preventing *I. cylindrica* propagules (seeds and rhizomes) from reaching sensitive communities. \r\n
Chemical control: Ramsey and colleagues (2003) report that herbicides may temporarily control *I. cylindrica* foliage up to 12 to 24 months (Willard *et al*. 1996 1997, in Ramsey *et al*. 2003). Without the re-establishment of desirable species, viable rhizomes will eventually allow cogon grass to re-infest the area (Shilling *et al*. 1995, in Ramsey *et al*. 2003). Controlling rhizomes with herbicides is a difficult task. A combination of glyphosate applied at 2.8 kg ai ha_1, followed by fertilization and reseeding with Bermuda grass (*Cynodou doctylon*) showed that rhizome reserves were sufficient for cogon grass to recover from both treatments (Johnson 1999, in Ramsey *et al*. 2003). In another study, cogon grass recovered after imazapyr was applied at 2.24 kg ai ha_1 in a 2-year-old loblolly pine plantation (Miller 2000, in Ramsey *et al*. 2003). Even these relatively high herbicide application rates there is still a remnant population of viable rhizomes that has the potential to re-infest the treated site. Further research is needed to integrate herbicide usage, which provides short-term control and a ‘‘window for re-establishment’’, with bio-control using desirable, yet highly productive plant species for long-term control (Ramsey *et al*. 2003). \r\n
Recommendations (Demers *et al*. 2008) to control cogon grass in the southeastern USA are to treat infestations in autumn (May through to October) with glyphosate and/or imazapyr herbicides. These recommendations are consistent with a wide range of studies conducted (Miller 2003, Faircloth *et al*. 2005, in Demers *et al*. 2008). Fluazifop is also an effective option (Demers *et al*. 2008). Guidelines for herbicide control are detailed by Demers and colleagues (2008).\r\n
Integrated management : Shade, repeated herbicide application, and mechanical control have all been used to control *I. cylindrica* (Macdicken *et al*. 1997, Terry *et al*. 1997, in Brewer & Cralle 2003). An integrated approach that combines burning, tillage (mechanical control) and chemical applications provide the best approach for cogon grass management (MacDonald *et al*. 2009). Cogon grass should first be burned or mowed, preferably in summer, to remove excess thatch and older leaves. Subsequent regrowth (of one to four months) will reduce rhizome biomass and allow herbicides to target actively growing leaves which maximises herbicide effectiveness. Once control of cogon grass has been achieved planting of desirable vegetation should occur as quickly as possible to prevent reinvasion (MacDonald *et al*. 2009).\r\n
Other: Brewer and Cralle (2003) found that short-lived, high-level pulses of phosphorus addition reduce the competitive advantage *I. cylindrica* has over native plants without negatively affecting native plant diversity. Additional work is needed, however, to elucidate the mechanism of inhibition of *I. cylindrica* by P addition (Brewer & Cralle 2003).

Pathway
A special concern is that several nurseries are now selling a cultivar of cogongrass. 'Japanese Blood Grass' or 'Red Baron', in the United States (Bryson & Carter 1993). If additional populations are found outside of the existing range, please contact the U.S. Department of Animal and Plant Health Inspection Service or the appropriate state agency.Cattle ranchers wanting to improve forage spread the grass throughout Florida (Dickens 1976, in Dozier *et al*. 1998). It was intentionally introduced from the Philippines into Mississippi as forage (Demers *et al*. 2008).*Imperarta cylindrica* was accidentally introduced as packing material from Japan in Mobile, Alabama in 1911 (Demers *et al*. 2008).Moved with heavy equipment from job to job.

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Dr. James Leary, Department of Natural Resources and Environmental Management, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa

Pubblication date: 2010-08-21

ALIEN RANGE

[1] AFGHANISTAN
[1] ALBANIA
[1] ALGERIA
[1] AMERICAN SAMOA
[1] ARGENTINA
[1] ARMENIA
[9] AUSTRALIA
[1] AZERBAIJAN
[1] BENIN
[1] BHUTAN
[1] BOLIVIA
[1] BURKINA FASO
[1] BURUNDI
[1] CAMBODIA
[1] CAMEROON
[1] CHILE
[1] CHRISTMAS ISLAND
[1] COLOMBIA
[1] CONGO
[1] CONGO, THE DEMOCRATIC REPUBLIC OF THE
[1] COTE D'IVOIRE
[1] CROATIA
[1] CYPRUS
[1] EGYPT
[1] ETHIOPIA
[1] FIJI
[1] FRANCE
[1] GABON
[1] GAMBIA
[1] GEORGIA
[1] GHANA
[1] GREECE
[1] GUAM
[1] GUINEA
[1] INDIA
[3] INDONESIA
[1] IRAN, ISLAMIC REPUBLIC OF
[1] IRAQ
[1] ISRAEL
[1] ITALY
[1] JORDAN
[1] KAZAKHSTAN
[1] KENYA
[1] KYRGYZSTAN
[1] LAO PEOPLE'S DEMOCRATIC REPUBLIC
[1] LEBANON
[1] LESOTHO
[1] LIBERIA
[1] LIBYAN ARAB JAMAHIRIYA
[1] MALAWI
[1] MALAYSIA
[1] MALI
[1] MAURITIUS
[1] MAYOTTE
[1] MICRONESIA, FEDERATED STATES OF
[1] MOROCCO
[1] MOZAMBIQUE
[1] MYANMAR
[1] NAMIBIA
[2] NEPAL
[2] NEW CALEDONIA
[1] NEW ZEALAND
[1] NIGERIA
[2] NORTHERN MARIANA ISLANDS
[1] OMAN
[1] PAKISTAN
[2] PALAU
[1] PERU
[1] PHILIPPINES
[1] PORTUGAL
[1] RUSSIAN FEDERATION
[1] RWANDA
[2] SAMOA
[1] SAUDI ARABIA
[1] SENEGAL
[1] SEYCHELLES
[1] SIERRA LEONE
[1] SLOVENIA
[1] SOLOMON ISLANDS
[1] SOUTH AFRICA
[1] SPAIN
[1] SRI LANKA
[1] SWAZILAND
[1] SYRIAN ARAB REPUBLIC
[1] TANZANIA, UNITED REPUBLIC OF
[1] TOGO
[2] TONGA
[1] TUNISIA
[1] TURKEY
[1] TURKMENISTAN
[1] UGANDA
[11] UNITED STATES

[1] URUGUAY
[1] UZBEKISTAN
[2] VANUATU
[1] VENEZUELA
[1] YEMEN
[1] ZAMBIA
[1] ZIMBABWE

Red List assessed species 2: VU = 1; NT = 1;

Fallicambarus gordoni **NT**

Gopherus polyphemus **VU**

BIBLIOGRAPHY

78 references found for **Imperata cylindrica**

Managment information

Bolfrey-Arku, G.E., Onokpise, O.U., Carson, A., Shilling, D.G., Coultas, C. Undated. The Speargrass (*Imperata cylindrica* (L) Beauv.) Menace in Ghana: Incidence, Farmer Perceptions and Control Practices in the Forest and Forest-Savanna Transition Agro-ecological Zones of Ghana.

Brewer, J. Stephen and Cralle, Sean P. 2003. Phosphorus addition reduces invasion of a longleaf pine savanna (Southeastern USA) by a non-indigenous grass (*Imperata cylindrica*). Plant Ecology. 167(2). 2003. 237-245.

Capo-Chichi, L.J.A; Faircloth, Wilson; Williamson, A; Patterson, M; Van Santen, E., 2007. Invasive Dynamics and Genotypic Diversity of Cogongrass (*Imperata cylindrica*) at the Point of Initial Introduction in the Southeastern United States. Journal of Invasive Plant Science and Management

Chikoye, David., 2003. Characteristics and management of *Imperata cylindrica* (L.) Raeuschel in smallholder farms in developing countries. In Weed Management for Developing Countries Addendum 1 (Ed) by R. Labrada. Food And Agriculture Organisation Of The United Nations (FAO) Rome

Chikoye, David, Ellis-Jones, Jim, Avav, Ter-Rumun, Kormawa, Patrick M., Udensi, E. Udensi, Tarawali, Gbassey, Nielsen, Ole K. 2007. Promoting integrated management practices for speargrass (*Imperata cylindrica* (L.) Raeusch.) in soybean, cassava and yam in Nigeria. Journal of Food Agriculture & Environment. 5(3-4). JUL-OCT 2007. 202-210.

Chikoye, David, Ellis-Jones, Jim, Kormawa, Patrick, Udensi, Udensi E., Ibana, Simon E., Avav, Ter-Rumun. 2006b. Options for cogongrass (*Imperata cylindrica*) control in white Guinea yam (*Dioscorea rotundata*) and cassava (Manihot esculenta). Weed Technology. 20(3). JUL-SEP 2006. 784-792.

Chikoye, David, Ellis-Jones, Jim, Tarawali, Gbassey, Kormawa, Patrick, Nielsen, Ole, Ibana, Simon, Avav, Ter-Rumun. 2006a. Farmers perceptions of the speargrass (*Imperata cylindrica*) problem and its control in the lowland sub-humid savannah of Nigeria. Journal of Food Agriculture & Environment. 4(3-4). JUL-OCT 2006. 118-126.

Chikoye, David, Udensi, Udensi E., Ogunyemi, Shola. 2005. Integrated management of Cogongrass [*Imperata cylindrica* (L.) Rauesch.] in corn using tillage, glyphosate, row spacing, cultivar, and cover cropping. Agronomy Journal. 97(4). JUL-AUG 2005. 1164-1171.

Chikoye, D., Manyong, V. M., Ekeleme, F. 2000. Characteristics of speargrass (*Imperata cylindrica*) dominated fields in West Africa: Crops, soil properties, farmer perceptions and management strategies. Crop Protection. 19(7). August, 2000. 481-487.

Cummings, Jason, Reid, Nick, Davies, Ian, Grant, Carl. 2005. Adaptive restoration of sand-mined areas for biological conservation. Journal of Applied Ecology. 42(1). February 2005. 160-170.

Daneshgar, Pedram; Shibu Jose, Alexandra Collins, and Craig Ramsey., 2008. Cogongrass (*Imperata cylindrica*), an Alien Invasive Grass, ReducesSurvival and Productivity of an Establishing Pine Forest. Forest Science 54(6) 2008

Demers, Chris; Alan Long and Rick Williams., 2008. Controlling Invasive Exotic Plants in North Florida Forests. University of Florida (IFAS Extension) SS-FOR19. 1. This document is SS-FOR-19, one of a series of the School of Forest Resources and Conservation, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published in June 2002, reviewed and revised June, 2008.

Summary: Available from: http://edis.ifas.ufl.edu/pdffiles/FR/FR13300.pdf [Accessed 18 August 2009]

Dozier, Hallie, Gaffney, James F., McDonald, Sandra K., Johnson, Eric R. R. L., Shilling, Donn G. 1998. Cogongrass in the United States: History, ecology, impacts, and management. Weed Technology. 12(4). Oct.-Dec., 1998. 737-743.

Early Detection and Distribution Mapping System (EDDMapS)., 2009. cogongrass *Imperata cylindrica* (L.) Beauv.

Summary: Available from: http://www.eddmaps.org/florida/distribution/viewmap.cfm?sub=2433 [Accessed 18 August 2009]

Evans, Christopher W., Moorhead, David J., Bargeron, Charles T., Douce, G. Keith. 2007. Implementation of control and prevention strategies for managing cogongrass (*Imperata cylindrica*) by the Georgia Invasive Species Task Force. Natural Areas Journal. 27(3). JUL 2007. 226-231.

Florida Exotic Pest Plant Council (FLEPPC), undated. Fact sheet *Imperata cylindrica* (L.) Raeuschel Poaceae (Gramineae)/Grass Family

Summary: Available from: http://www.fleppc.org/ID_book/Imperata%20cylindrica.pdf [Accessed 18 August 2009]

Holly, D. Christopher and Ervin, Gary N. 2006. Characterization and quantitative assessment of interspecific and intraspecific penetration of below-ground vegetation by cogongrass (*Imperata cylindrica* (L.) Beauv.) rhizomes. Weed Biology & Management. 6(2). 2006. 120-123.

Hutchinson, Jeffrey T., MacDonald, Gregory E., Langeland, Kenneth A. 2007. The potential for herbicide resistance in non-native plants in Florida s natural areas. Natural Areas Journal. 27(3). JUL 2007. 258-263.

Johnson, E. and Shilling, D. G. Weeds gone wild: Cogon grass. Weeds Gone Wild fact sheet series.

Summary: Alien Plants Working Group fact sheet series.

Jussi, K., Goran, A., Yusuf, J., Antti, O., Kari, T. and Risto, V. 1995. Restoration of Natural Vegetation in Degraded *Imperata cylindrica* Grassland: Understorey Development in Forest Plantations, *Journal of Vegetation Science 6*. [Accessed 13 March 2006, from Jstor (online database)]

Summary: Paper on the restoration of *I. cylindrica* wastelands in an Indonesian site via secondary exotics.

Kaewkrom, Puangpaka, Gajaseni, Jiragorn. 2006. Effects of two combinations of multi-purpose species plantations on *Imperata cylindrica* in restoring site, Northern Thailand. Indian Forester. 132(5). MAY 2006. 565-574.

King, Sharon E. and Grace, James B. 2000a. The effects of gap size and disturbance type on invasion of wet pine savanna by cogongrass, *Imperata cylindrica* (Poaceae). American Journal of Botany. 87(9). July, 2000. 1279-1286.

King, Sharon E. and Grace, James B. 2000b. The effects of soil flooding on the establishment of cogongrass (*Imperata cylindrica*), a nonindigenous invader of the southeastern United States. Wetlands. 20(2). June, 2000. 300-306.
Langeland, K.A. 2003. Help Protect Florida s Natural Areas from Non-Native Invasive Plants. Circular 1204 University of Florida (IFAS Extension) This document is Circular 1204, one of a series of the Agronomy Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. First published March 1998. Revised April 2003.
Lippincott, Carol L. 2000. Effects of *Imperata cylindrica* (L.) Beauv. (cogongrass) invasion on fire regime in Florida sandhill (USA). Natural Areas Journal. 20(2). April, 2000. 140-149.
Lum, A. F., Chikoye, D., Adesiyan, S. O. 2004. Evaluation of nicosulfuron for control of speargrass (*Imperata cylindrica* (L.) Raeuschel) in Nigeria. International Journal of Pest Management. 50(4). October 2004. 327-330.
MacDonald, Gregory. 2004. Cogongrass (*Imperata cylindrica*)�Biology, Ecology, and Management. Critical Reviews in Plant Sciences, 23(5):367�380 (2004).
MacDonald, G., Sellers, B., Langeland, K., Duperron, T. & Ketterer, E. 2009. Cogongrass - *Imperata cylindrica*. Center for Aquatic and Invasive Plants. University of Florida, IFAS.
McNamara, Sean, Tinh, Duong Viet, Erskine, Peter D., Lamb, David, Yates, David, Brown, Sharon. 2006. Rehabilitating degraded forest land in central Vietnam with mixed native species plantings. Forest Ecology & Management. 233(2-3). SEP 15 2006. 358-365.
Nielsen, Ole K., Chikoye, David, Streibig, Jens C. 2005. Efficacy and costs of handheld sprayers in the subhumid savanna for cogongrass control. Weed Technology. 19(3). JUL-SEP 2005. 568-574.
Peet, N.B., Watkinson, A.R., Bell, D.J. and Sharma, U.R. 1999. The Conservation Management of *Imperata cylindrica* Grassland in Nepal With Fire and Cutting: An Experimental Approach, *Journal of Applied Ecology 36*. [Accessed 13 March 2006, from Jstor (online database)]
Summary: Rationale behind cutting and fire practises in *Imperata* grasslands in Nepal.
Peet, Nicholas B., Watkinson, Andrew R., Bell, Diana J., Sharma, Uday R. 1999. The conservation management of *Imperata cylindrica* grassland in Nepal with fire and cutting: An experimental approach. Journal of Applied Ecology. 36(3). June, 1999. 374-387.
Perkins, Reed M. & Wei-Ning Xiang ., 2006. Building a geographic info-structure for sustainable development planning on a small island developing state. Landscape and Urban Planning 78 (2006) 353�361
Ramsey, Craig L.; Shibu Jose, Deborah L. Miller, Joseph Cox, Kenneth M. Portier, Donald G. Shilling and Sara Merritt., 2003. Cogongrass [*Imperata cylindrica* (L.) Beauv.] response to herbicides and disking on a cutover site and in a mid-rotation pine plantation in southern USA. Forest Ecology and Management Volume 179, Issues 1-3, 3 July 2003, Pages 195-207
Scher, Julia., undated. *Imperata cylindrica* (L.) R�usch. Federal Noxious Weed Disseminules of the US. Lucid
Summary: Available from: http://keys.lucidcentral.org/keys/FNW/FNW%20grasses/html/fact%20sheets/Imperata%20cylindrica.htm [Accessed 18 August 2009]
Space, James C and Marjorie Falanruw., 1999. Observations on invasive plant species in Micronesia. Prepared for the meeting of the Pacific Islands Committee, Council of Western State Foresters, Majuro, Republic of the Marshall Islands, February 22-26, 1999.
Summary: Available from: http://sprep.org/att/IRC/eCOPIES/INVASIVE%20SPECIES/micronesia.pdf [Accessed 18 August 2009]
Swarbrick, J. T. and Hart, R. 2001. Environmental weeds of Christmas Island (Indian Ocean) and their management. Plant Protection Quarterly. 16(2). 2001. 54-57.
Terry, P. J.; G. Adjers, I. O. Akobundu, A. U. Anoka, M. E. Drilling, S. Tjitrosemito and M. Utomo., 1996. Herbicides and mechanical control of *Imperata cylindrica* as a first step in grassland rehabilitation. Agroforestry Systems Volume 36, Numbers 1-3 / December, 1996
Texasinvasives.org., 2008. Plant Detail Page *Imperata cylindrica* (L.) Beauv
Summary: Available from: http://www.texasinvasives.org/invasives_database/detail.php?symbol=IMCY [Accessed 18 August 2009]
Udensi, Udensi E., Akobundu, I. Okezie, Ayeni, Albert O., Chikoye, David. 1999. Management of cogongrass (*Imperata cylindrica*) with velvetbean (*Mucuna pruriens* var. *utilis*) and herbicides. Weed Technology. 13(2). April-June, 1999. 201-208.
Van Loan, A.N. Meeker, J.R. and Minno, M.C. Cogon Grass In: Van Driesche, R. *et al*., 2002, Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04. [Accessed 13 March 2006, from http://www.invasive.org/eastern/biocontrol/28CogonGrass.html]
Summary: Overview of the biology and status of *I. cylindrica* in the USA.
Vissoh, Pierre V., Kuyper, Thomas W., Gbehounou, Gualbert, Hounkonnou, Dominique, Ahanchede, Adam, Roling, Niels G. 2008. Improving local technologies to manage speargrass (*Imperata cylindrica*) in southern Benin. International Journal of Pest Management. 54(1). 2008. 21-29.
Vissoh, P. V., Gbehounou, G., Ahanchede, A., Kuyper, T. W., Roling, N. G. 2004. Weeds as agricultural constraint to farmers in Benin: results of a diagnostic study. NJAS Wageningen Journal of Life Sciences. 52(3-4). DEC 04. 305-329.
Wilson, Colin, Wildlife Management Officer, Department of Infrastructure, Planning and Environment, Parks & Wildlife Service, Northern Territory, Australia.
Summary: Compilor of original GISD profile of *Chromoleana odorata*.
Yager, Lisa., 2007. OOS 50-8: Rates of spread of the invasive species, cogongrass: Implications for restoration of gopher tortoise habitat. ESA/SER Joint Meeting Sunday August 5- Friday, August 10, 2007. San Jose McEnery Convention Centre San Jose California
Summary: Available from: http://eco.confex.com/eco/2007/techprogram/P1554.HTM [Accessed 18 August 2009]
Yager, Lisa Y.and Matt Smith., 2009. Case Study: Use of GIS to Prioritize Cogongrass (*Imperata cylindrica*) Control on Camp Shelby Joint Forces Training Center, Mississippi. Invasive Plant Science and Management 2009 2:74�82
Yandoc, C.B. R. Charudattan and D.G. Shilling. 2004. Suppression of cogongrass (*Imperata cylindrica*) by a herbicidal fungus and plant competition. Weed Science 52: 649-653.

General information

Barthelat, F. 2005. Note sur les esp�ces exotiques envahissantes � Mayotte. Direction de l�Agriculture et de la For�t. 30p
Summary: Tableau synth�tique des plantes exotiques de Mayotte class�es en fonction de leur niveau d envahissement.
Brewer, Stephen. 2008. Declines in plant species richness and endemic plant species in longleaf pine savannas invaded by *Imperata cylindrica*. Biological Invasions. 10(8). DEC 2008. 1257-1264.

Bryson, C. and Carter, R. 1993. Cogongrass, *Imperata cylindrica*, in the United States. Weed Technology, Vol. 7, No. 4 (Oct. - Dec., 1993), pp. 1005-1009.
Chikoye, D. and Ekeleme, F. 2001. Weed flora and soil seedbanks in fields dominated by *Imperata cylindrica* in the moist savannah of West Africa. Weed Research (2001) 41, 475-490.
Collins, A.R. & Jose, S. 2009. Chapter 14. Imperata cylindrica, an Exotic Invasive Grass, Changes Soil Chemical Properties of Forest Ecosystems in the Southeastern United States. In R. Kumar Kohli, J. Shibu, Pal Singh, H. & Rani Batish, D. Invasive Plants and Forest Ecosystems (pp. 237-247). CRC Press.
CONABIO. 2008. Sistema de informaci�n sobre especies invasoras en M�xico. Especies invasoras - Plantas. Comisi�n Nacional para el Conocimiento y Uso de la Biodiversidad. Fecha de acceso.
Summary: English:
The species list sheet for the Mexican information system on invasive species currently provides information related to Scientific names, family, group and common names, as well as habitat, status of invasion in Mexico, pathways of introduction and links to other specialised websites. Some of the higher risk species already have a direct link to the alert page. It is important to notice that these lists are constantly being updated, please refer to the main page (http://www.conabio.gob.mx/invasoras/index.php/Portada), under the section Novedades for information on updates.
Invasive species - Plants is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas [Accessed 30 July 2008]
Spanish:
La lista de especies del Sistema de informaci�n sobre especies invasoras de m�xico cuenta actualmente con informaci�n aceca de nombre cient�fico, familia, grupo y nombre com�n, as� como h�bitat, estado de la invasi�n en M�xico, rutas de introducci�n y ligas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p�gina de alertas. Es importante resaltar que estas listas se encuentran en constante proceso de actualizaci�n, por favor consulte la portada (http://www.conabio.gob.mx/invasoras/index.php/Portada), en la secci�n novedades, para conocer los cambios.
Especies invasoras - Plantas is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas [Accessed 30 July 2008]
Daneshgar, Pedram and Jose, Shibu. 2009. *Imperata cylindrica*, an alien invasive grass, maintains control over nitrogen availability in an establishing pine forest. Plant & Soil. 320(1-2). JUL 2009. 209-218.
Falvey, J.L. and Hengmichai, P. 1979. Invasion of *Imperata cylindrica* (L.) Beauv. by Eupatorium Species in Northern Thailand. Journal of Range Management, Vol. 32, No. 5 (Sep., 1979), pp. 340-344.
Global Compendium of Weeds (GCW)., 2009. *Imperata cylindrica* (Poaceae)
Summary: Available from: http://www.hear.org/gcw/species/imperata_cylindrica/ [Accessed 18 August 2009]
Holly, D. Christopher and Gary, N Ervin., 2006. Characterization and quantitative assessment of interspecific and intraspecific penetration of below-ground vegetation by cogongrass (*Imperata cylindrica* (L.) Beauv.) rhizomes. Weed Biology and Management 6, 120�123 (2006)
Summary: Available from: http://www.cavs.msstate.edu/publications/docs/2006/06/3981Holly&Ervin_WeedBiolMgmt_2006.pdf [Accessed 18 August 2009]
Holly, D. Christopher Gary N. Ervin, Colin R. Jackson, Susan V. Diehl and Grant T. Kirker., 2008. Effect of an invasive grass on ambient rates of decomposition and microbial community structure: a search for causality. Biological Invasions DOI 10.1007/s10530-008-9364-5
ITIS (Integrated Taxonomic Information System), 2005. Online Database *Imperata cylindrica*
Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from:
http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Imperata+cylindrica&p_format=&p_ifx=plglt&p_lang= [Accessed March 2005]
Langeland, K.A. and Burks, K. C (Eds) 1998. Identification and Biology of Non-Native Plants in Florida s Natural Areas, University of Florida. *Imperata cylindrica*
Summary: Information on plants that pose threats to natural resource areas in Florida.
Available from: http://www.fleppc.org/ID_book/Imperata%20cylindrica.pdf [Accessed 30 December 2004]
MacKee, H.S. 1994. Catalogue des plantes introduites et cultiv�es en Nouvelle-Cal�donie, 2nd edn. MNHN, Paris.
Summary: Cet ouvrage liste 1412 taxons (esp�ces, sous esp�ces et vari�t�s) introduits en Nouvelle-Cal�donie. L auteur pr�cise dans la majorit� des cas si l esp�ce est cultiv�e ou naturalis�e.
Meyer, Jean-Yves & Loope, Lloyd & Sheppard, A. & Munzinger, Jérôme & Jaffré, Tanguy. (2006). Les plantes envahissantes et potentiellement envahissantes dans l'archipel néo-calédonien : première évaluation et recommandantions de gestion.
NatureServe. 2009. *Imperata cylindrica* - (L.) Palisot Cogon Satin-tail. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: August 19, 2009).
Summary: Available from: http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Imperata%20cylindrica [Accessed 18 August 2009]
Pacific Islands Ecosystems at Risk (PIER)., 2009. *Imperata cylindrica* (L.) Beauv., Poaceae
Summary: Available from: http://www.hear.org/Pier/species/imperata_cylindrica.htm [Accessed 18 August 2009]
Paul, R. & Elmore, C. D. 1984. Weeds and the C4 syndrome. Weeds Today 15: 3-4.
Platt, William J. and Robert M. Gottschalk., 2001. Effects of exotic grasses on potential fine fuel loads in the groundcover of south Florida slash pine savannas. International Journal of Wildland Fire Volume 10 (Issue 2) Pages 155-159x
Space, James C and Tim Flynn., 2000. Report to the Government of Niue on Invasive Plant Species of Environmental Concern. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai i, USA 24 October 2000
Summary: Available from: http://hear.org/alienspeciesinhawaii/articles/pier/pier_niue_report.pdf [Accessed 18 August 2009]

Space, James C. and Tim Flynn., 2001. Report to the Kingdom of Tonga on Invasive Plant Species of Environmental Concern. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai�i, USA 18 October 2001
Summary: Available from: http://202.4.49.29/att/IRC/eCOPIES/INVASIVE%20SPECIES/Invasive_species_tonga_report.pdf [Accessed 18 August 2009]
Space, James C. and Tim Flynn., 2002a. Report to the Government of the Cook Islands on Invasive Plant Species of Environmental Concern. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai�i, USA 8 November 2002
Summary: Available from: http://www.hear.org/pier/pdf/palau_report.pdf [Accessed 18 August 2009]
Space, James C. and Tim Flynn., 2002b. Report to the Government of Samoa on Invasive Plant Species of Environmental Concern. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai�i, USA 26 November 2002
Summary: Available from: http://www.sprep.org/att/IRC/eCOPIES/Countries/Samoa/27.pdf [Accessed 18 August 2009]
Space, James C and Tim Flynn., undated. Observations on invasive plant species in American Samoa. Report: survey of islands in Micronesia and American Samoa for invasive plant species requested by the Pacific Islands Committee, Council of Western State Foresters.
Summary: Available from: http://www.hear.org/AlienSpeciesInHawaii/articles/pier/pier_samoa_report.pdf [Accessed 18 August 2009]
Space, James C.; Barbara M. Waterhouse, Joel E. Miles, Joseph Tiobech and Kashgar Rengulbai., 2003. Report to the Republic of Palau on Invasive Plant Species of Environmental Concern U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai�i, USA 5 May 2003
Summary: Available from: http://www.hear.org/pier/pdf/palau_report.pdf [Accessed 18 August 2009]
Space, James C., Barbara Waterhouse, Julie S. Denslow and Duane Nelson., 2000. Invasive Plant Species on Rota, Commonwealth of the Northern Mariana Islands. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai i, USA 25 October 2000
Summary: Available from: http://www.hear.org/AlienSpeciesInHawaii/articles/pier/pier_samoa_report.pdf [Accessed 18 August 2009]
Space, James C; Barbara Waterhouse, Julie S. Denslow, Duane Nelson and Erick E. Waguk. 2000b. Invasive plant species on Kosrae, Federated States of Micronesia. U.S.D.A. Forest Service Pacific Southwest Research Station Institute of Pacific Islands Forestry Honolulu, Hawai i, USA 22 December 2000
Summary: Available from: http://www.sprep.org/att/IRC/eCOPIES/INVASIVE%20SPECIES/FSM_kosrae.pdf [Accessed 18 August 2009]
USDA, ARS, 2009. Taxon: *Imperata cylindrica* (L.) P. Beauv. National Genetic Resources Program. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland
Summary: Available from: http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?19864 [Accessed 18 August 2009]
USDA, NRCS. 2009. *Imperata cylindrica* (L.) P. Beauv. Cogongrass The PLANTS Database (http://plants.usda.gov, 19 August 2009). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
Summary: Available from: http://www.plants.usda.gov/java/profile?symbol=IMCY [Accessed 18 August 2009]
Vergara, Rodrigo, Minno, Marc C., Minno, Maria, Soltis, Douglas E., Soltis, Pamela S. 2008. Preliminary study using ISSRs to differentiate *Imperata* taxa (Poaceae : Andropogoneae) growing in the US. Southeastern Naturalist. 7(2). 2008. 267-276.
Wilcut, J.W., Truelove, B., Davis, D.E. & Williams, J.C. 1988. Temperature factors limiting the spread of cogongrass (*Imperata cylindrical*) and torpedograss (*Panicum repens*). Weed Science, 36(1): 49-55.