

Paspalum vaginatum 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Liliopsida	Cyperales	Poaceae

Common name Seashore paspalum (English), Biscuit grass (English)

Synonym

Paspalum gayanum, E. Desv.
Digitaria vaginata, (Sw.) Magnier
Panicum vaginatum, (Sw.) Gren. & Godr.
Paspalum boryanum, C. Presl
Paspalum distichum, L.var. *nanum*(Döll) Stapf
Rottboellia uniflora, A. Cunn.
Paspalum distichum, L.var. *tristachyum*(Leconte) A.W.Wood
Paspalum distichum, L. subsp. *vaginatum* (Sw.) Maire
Paspalum distichum, L.var. *littorale*(R.Br.) F.M.Bailey
Paspalum foliosum, (Lag.) Kunth
Paspalum gayanum, E.Desv.
Paspalum inflatum, A. Rich.
Paspalum jaguaense, León
Paspalum kleineanum, J.Presl
Paspalum littorale, R. Br.
Paspalum reimarioides, Chapm.
Paspalum squamatum, Steud.
Paspalum tristachyum, Leconte
Paspalum vaginatum, Sw.var. *littorale*(R.Br.) Trin. ex Büse
Paspalum vaginatum, Sw.var. *nanum*Döll
Paspalum vaginatum, Sw.var. *reimarioides*Chapm.
Paspalum vaginatum, Sw.subsp. *nanum* (Döll) Loxton
Sanguinaria vaginata, (Sw.) Bubani
Digitaria foliosa, Lag.
Digitaria tristachya, (Leconte) Schult.
Panicum littorale, (R.Br.) Kuntze
Paspalum distichum, L.var. *vaginatum*(Sw.) Griseb.

Similar species

Summary

Paspalum vaginatum (seashore paspalum) is a North American grass which now has a pantropical distribution. It has been widely used for landscaping and revegetation and is a common turf grass on golf courses. *Paspalum vaginatum* has naturalised in coastal salt marshes where it changes the composition of vegetation and in some cases dominates, impacting on fauna communities and estuarine hydrology.



[view this species on IUCN Red List](#)

Species Description

Seashore paspalum (*Paspalum vaginatum*) is a perennial stoloniferous grass. Its stolons range from slender and wiry to stout and somewhat fleshy. Its culms are slightly compressed, between 2.5 and 5 (-10) dm long. The sheaths of *P. vaginatum* are often keeled, and have small auricles. Wagner *et al.* (1999; in PIER, 2007) describes the grass as follows:

"Sheaths often keeled, with small auricles; ligule membranous, ca. 0.5 mm long, with a ring of soft white hairs behind it, the hairs sometimes up to 5 mm long; blades usually stiff, ascending at an uniform angle, 2.5-15cm long, 3-8 mm wide at base, narrower than summit of sheath, apex attenuate, involute, base abruptly contracted. Racemes 2 (-5), opposite or closely approximate, at first erect and appressed together, usually spreading or reflexed at maturity, often subfalcate, 1.5-7.5cm long, rachis naked at base, 1-2 (-2.5) mm wide, triangular, flexuous, margins minutely scabrous; spikelets pale, solitary, imbricate, oblong, 3-4.5 mm long, 1.2-1.5 mm wide; first glume rarely developed, second glume and first lemma equal, thin, 3-7-nerved, the midnerve of both usually obscure, glabrous; first lemma usually transversely undulate, sometimes conspicuously so; second lemma convex, usually 3-5-nerved, apex with a few short, stiff cilia, otherwise glabrous; palea flat, 0-2-nerved, similar to lemma. Caryopsis narrowly obovate, slightly concavo-convex, 2.5-3 mm long, subacute"

Uses

Haynes *et al.* undated state that seashore paspalum (*Paspalum vaginatum*) makes a high-quality turfgrass because of its minimal fertility and pesticide requirements. Furthermore, its tolerance of a wide range of conditions such as drought, saline or recycled water, varying soil pH, extended periods of low light intensity, flooding or extended wet periods as well as its resistance to insects, disease and wear mean it can be planted and grow where other species would not survive. It is frequently used in landscaping and as a turf grass in golf courses.

P. vaginatum has historically been used for erosion control, as forage food for cattle and horses, by wild geese for feed. It is also used for wetland restoration and site reclamation on oil and gas well sites (Gates, 2003). Loch *et al.* 2003 suggest that *P. vaginatum* is suitable for use as a part of the management of salt-affected lands in Australia. Again, its saline-tolerant and overall survivability traits make it stand out from other turfgrasses.

Habitat Description

Seashore paspalum (*Paspalum vaginatum*) can be found in the coastal salt marshes of the tropics and subtropics (USDA-GRIN 2007). In various islands in the Pacific region, *P. vaginatum* is found in coastal sunny areas, near beaches and sometimes on the beach, in brackish marshy areas and mangrove swamps (PIER, 2007). It is best suited to compacted inorganic marsh soils of moderate salinity (USDA-NRCS, 2007), and is tolerant of drought, salt, a wide range of soil pH, extended periods of low light intensity, and flooding or extended wet periods (Haynes *et al.* undated).

Reproduction

seashore paspalum (*Paspalum vaginatum*) propagates asexually using its stolons and rhizomes. It more often propagates through sprigs, plugs and sod than through seeds. (USDA-NRCS, 2007)

General Impacts

Seashore paspalum (*Paspalum vaginatum*) can alter ecosystems in a number of ways. It can form dense monospecific groundcover in brackish marshes and estuaries, and alter the composition of native species. This can lead to changes in invertebrate communities - in the Galapagos it is associated with a move from aquatic to more terrestrial communities (Siemens, 2005), and this in turn can impact on foraging habitat and food resources for waterbirds. In addition, invasion of *P. vaginatum* is associated with an increase in sediment accumulation, changing hydrology in New Zealand estuaries (Shaw and Allen, 2003; Graeme, 2005a, b).

Management Info

Preventative measures: A [Risk Assessment of *Paspalum vaginatum*](#) for Hawaii and other Pacific islands was prepared by Dr. Curtis Daehler (UH Botany) with funding from the Kaulunani Urban Forestry Program and US Forest Service. The alien plant screening system is derived from Pheloung *et al.* (1999) with minor modifications for use in Pacific islands (Daehler *et al.* 2004). The result is a score of 7 and a recommendation of: \"Likely to cause significant ecological or economic harm in Hawaii and on other Pacific Islands as determined by a high WRA score, which is based on published sources describing species biology and behavior in Hawaii and/or other parts of the world.\"\"

Mechanical control and grazing is not an option, as plants will resprout from fragments. Shaw and Allen (2003) recommend that vegetation development be monitored with permanent plots before control is considered. The information available for control of cord grass (*Spartina* spp.) in New Zealand is probably also applicable to *P. vaginatum*. Please follow these links to view complete profiles of [Spartina alterniflora](#) and [Spartina anglica](#), including management information.

Principal source:

Compiler: IUCN/SSC Invasive Species Specialist Group (ISSG) with support from ASB Community Trust, New Zealand

Review:

Publication date: 2008-04-17

ALIEN RANGE

[1] ARGENTINA	[3] AUSTRALIA
[3] BERMUDA	[1] BRITISH INDIAN OCEAN TERRITORY
[1] CHILE	[1] CHINA
[4] COOK ISLANDS	[1] ECUADOR
[1] FIJI	[1] GUAM
[1] INDIA	[1] INDONESIA
[1] MALAYSIA	[4] MARSHALL ISLANDS
[1] MAURITIUS	[1] MEXICO
[13] NEW ZEALAND	[1] NIUE
[1] PHILIPPINES	[1] PORTUGAL
[1] SENEGAL	[1] SOUTH AFRICA
[4] SPAIN	[1] SRI LANKA
[1] TAIWAN	[1] TANZANIA, UNITED REPUBLIC OF
[1] TUVALU	[20] UNITED STATES
[1] VIET NAM	

Red List assessed species 1: VU = 1;

[Sterna nereis](#) VU

BIBLIOGRAPHY

48 references found for ***Paspalum vaginatum***

Management information

Boudouresque, C. F., Meinesz, A. and Gravez, V. 1994. First International Workshop on *Caulerpa taxifolia*, Nice, France, 17-18 janvier 1994. GIS Posidone, Marseille, France. 392pp.

Summary: This book includes a synthese of results of the CE- LIFE Program Spreading of the tropical seaweed *Caulerpa taxifolia* in the Mediterranean and the 46 lectures presented on the First International Workhop on *Caulerpa taxifolia*.

Boudouresque, C. F., Meinesz, A. and Gravez, V. 1998. Scientific papers and documents dealing with the alga *Caulerpa taxifolia* introduced to the Mediterranean, Ninth edition. GIS Posidonie publishers, Marseille, France: 1-60.

Summary: This publication contains the bibliographic references of 358 documents and scientific papers about *Caulerpa taxifolia* invasion in the Mediterranean Sea.

City of Cape Town. 2002. Two Rivers Urban Park spatial development framework and phase 1 management plan. Final Draft. Cape Town Administration, Environmental Branch.

Summary: This management plan details the restoration aims for Two Rivers Urban Park in Cape Town, South Africa.

Gacia, E., Rodríguez-Prieto, C., Delgado, O. and Ballesteros, E. 1996. Seasonal light and temperature responses of *Caulerpa taxifolia* from the northwestern Mediterranean. Aquatic Botany: 215-225.

Summary: Seasonal light requirements and temperature tolerance of the Mediterranean *C. taxifolia* were examined by means of photosynthetic assays. These results indicate that this species is well adapted to light and temperature typical of the infralittoral and upper circalittoral zone in the Mediterranean. Its annual productivity pattern seems less affected by seasonal fluctuations than has been reported for endemic seaweeds; this response may explain its potentially high invasive capacity.

Guezou, A., Pozo, P. and Buddenhagen, C. 2007. Preventing establishment: an inventory of introduced plants in Puerto Villamil, Isabela Island, Galapagos. *PLoS*. 2 (10): e1042.

Summary: This paper discusses invasive plant species on Isabela Island (Galapagos) and makes recommendations for control and eradication.

[IUCN/SSC Invasive Species Specialist Group \(ISSG\), 2010. A Compilation of Information Sources for Conservation Managers.](#)

Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.

Meinesz A., Cottalorda J. M., Chiaverni D., Cassar N and De Vaugelas J. (1998) Suivi de l'invasion de l'algue tropicale de l'algue tropicale *Caulerpa taxifolia* en Méditerranée: situation au 31 décembre 1997. Lab. Environnement Marin Litoral, Université de Nice-Sophia Antipolis publications: 1-238.

Summary: Report on the expansion of *Caulerpa taxifolia* in the Mediterranean coasts at end of 1997: 5 countries affected, 99 stations cited, 4630 ha concerned, 81 km of coast affected. The report included the cartography of the *C. taxifolia* populations in each station.

Ribera, M. A., Ballesteros, E., Boudouresque, C. F., Gómez, A. and Gravez, V. 1996. Second International Workshop on *Caulerpa taxifolia*. Barcelona, Spain, 15-17 December 1994. Publicacions Universitat de Barcelona: 1-457.

Summary: This book includes a synthesis of results of the CE-LIFE Program Spreading of the tropical seaweed *Caulerpa taxifolia* in the Mediterranean and the 54 lectures presented on the Second International Workshop on *Caulerpa taxifolia*.

Shaw, W.B. and Allen, R.B. 2003. Ecological impacts of sea couch and saltwater paspalum in Bay of Plenty estuaries. Department of Conservation Science Internal Series, No. 112-118, p. 18. May-June 2003.

Summary: This report describes the ecological impact of *P. vaginatum* and makes control recommendations.

[Siemans, T. J., 2005. Impacts of The Invasive Grass Saltwater Paspalum \(*Paspalum vaginatum*\) on Aquatic Communities of Coastal Wetlands on The Galapagos Islands, Ecuador. Thesis.](#)

Summary: Available from: <http://ecommons.library.cornell.edu/handle/1813/2556> [Accessed 20 March 2008]

[Timmins, S. M. and H. Braithwaite, 2002. Early detection of invasive weeds on islands. In *Turning the tide: the eradication of invasive species*: 311-318. Veitch, C.R. and Clout, M.N.\(eds\). IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.](#)

Summary: Eradication case study in Turning the tide: the eradication of invasive species.

[Varnham, K. 2006. Non-native species in UK Overseas Territories: a review. JNCC Report 372. Peterborough: United Kingdom.](#)

Summary: This database compiles information on alien species from British Overseas Territories.

Available from: <http://www.jncc.gov.uk/page-3660> [Accessed 10 November 2009]

General information

Allen, M., Walker, C. and Pen, L. 2000. Water notes for wetlands management: Advisory notes for land managers on river and wetland restoration. Water and Rivers Commission, Western Australia.

Summary: This information sheet provides information about restoration of wetlands in Western Australia.

Bakar, B.H. 2004. Invasive weed species in Malaysian agro-ecosystems: species, impacts and management. *Malaysian Journal of Science*. 23: 1-42.

Summary: This paper discusses the invasive plant species that occur in Malaysian agro-ecosystems.

Bambaradeniya, C.N.B., Ekanayake, S.P., Kekulandala, L.D.C.B., Samarakkrama, V.A.P., Ratnayake, N.D. and Fernando, R.H.S.S. 2002. An Assessment of the Status of Biodiversity in the Muthurajawela Wetland Sanctuary. Occasional Papers of IUCN Sri Lanka No. 3:iv-48pp.

Summary: This paper provides an assessment of the biodiversity of the Muthurajawela Wetland Sanctuary in Sri Lanka.

[BirdLife International 2007. BirdLife IPA Factsheet: SN001, Djoudj wetlands. BirdLife's online World Bird Database: the site for bird conservation. Version 2.1. Cambridge, UK: BirdLife International.](#)

Summary: This page outlines the conservation values and problems faced at the Djoudj wetlands in Senegal.

Available from: <http://www.birdlife.org/datazone/sites/index.html?action=SiteHTMDetails.asp&sid=6840&m=0> [Accessed 24 April 2008]

[Bjornsson, K.T. 2006. Narrung wetland management plan. Coorong District Local Action Plan Committee, Tintinara.](#)

Summary: Available from:

http://www.rivermurray.sa.gov.au/work/pdfs/management_plans/Narrung%20Wetland%20Management%20Plan.pdf [Accessed 24 April 2008]

Boudouresque, C. F., Meinesz, A., Ribera, M. A. and Ballesteros, E. 1995. Spread of the green alga *Caulerpa taxifolia* (Caulerpales, Chlorophyta) in the Mediterranean: possible consequences of a major ecological event. *Scientia Marina* 59 (supl.1): 21-29.

Summary: This is a synthesis of the knowledge on the ecology, biology, toxicity, impacts and management of the Mediterranean populations of *Caulerpa taxifolia*. And it concludes that if *Caulerpa taxifolia* continues to spread at present rates we will witness a major ecological event, with a strong decrease of eco-diversity, in the Mediterranean coastal waters.

[Bradley, K.A., Woodmansee, S.W. and Gann, G.D. 2004. Inventory of vascular plants of Biscayne National Park. National Park Service Inventory and Monitoring Program. South Florida/Caribbean Network of Parks Inventory of Vertebrates and Vascular Plants.](#)

Summary: This document outlines the vascular plants found at Biscayne National Park in Florida, USA.

Available from: http://science.nature.nps.gov/im/units/sfcn/docs/BISC_Vascular_Plant_Final_Report.pdf [Accessed 23 April 2008]

Campos, J.A., Herrera, M., Biurrun, I. and Loidi, J. 2004. The role of alien plants in the natural coastal vegetation in central-northern Spain. *Biodiversity and Conservation*. 13: 2275-2293.

Summary: This paper provides basic information about invasive plants in central-northern Spain.

Department of Environmental Protection. 1999. Honeymoon Island State Recreation Area, Unit Management Plan. Division of Recreation and Parks, Florida.

[Department of Environmental Protection. 1999. Lovers Key State Recreation Area, Unit Management Plan. Division of Recreation and Parks, State of Florida.](#)

Summary: Available from: <http://www.dep.state.fl.us/parks/planning/parkplans/LoversKeyStatePark.pdf> [Accessed 23 April 2008]

Domingues de Almeida, J. and Freitas, H. 2006. Exotic naturalized flora of continental Portugal - a reassessment. *Botanica Complutensis*. 30: 117-130.

Summary: This paper lists the alien plants present in Portugal.

[Englund, R.A., Imada, C., Preston, D.J., Evenhuis, N.L., Cowie, R.H., Puttock, C., Arakaki, K. and Dockall, J. 2001. Native and exotic organism study Lower Waioa River, Waipio Valley, County of Hawaii. Contribution No. 2001-014 to the Hawaii Biological Survey.](#)

Summary: This report presents the results of a detailed biological survey of the Waipio Valley on Hawaii Is.

Available from: <http://hbs.bishopmuseum.org/pdf/waipio.pdf> [Accessed 24 April 2008]

[Gates, M. 2003. Seashore paspalum. USDA Natural Resources Conservation Service Plant Guide.](#)

Summary: This information sheet provides basic ecological and distribution information about *P. vaginatum*.

Available from: http://plants.usda.gov/plantguide/pdf/pg_pava.pdf [Accessed 22 April 2008]

Ghosh, A.K., Pattnaik, A.K. and Ballatore, T.J. 2006. Chilika Lagoon: Restoring ecological balance and livelihoods through re-salinization.

Lakes and Reservoirs: Research and Management. 11: 239-255.

Summary: This paper discusses the ecological problems facing Chilika Lagoon in India s Orissa state.

[Graeme, M. 2005. Estuarine vegetation survey - Kawhia Harbour. Environment Waikato Technical Report 2005/42.](#)

Summary: This report describes the vegetation at Kawhia Harbour, Waikato, New Zealand.

Available from: <http://www.ew.govt.nz/publications/technicalreports/documents/tr05-42.pdf> [Accessed 24 April 2008]

[Graeme, M. 2005. Estuarine vegetation survey - Port Waikato. Environment Waikato Technical Report 2005/41.](#)

Summary: This report describes the vegetation at Port Waikato, New Zealand.

Available from: <http://www.ew.govt.nz/publications/technicalreports/documents/tr05-41.pdf> [Accessed 23 April 2008]

[Hauraki Gulf Forum. 2004. Biological diversity of the gulf. Chapter 6 in Hauraki Gulf State of the Environment Report.](#)

Summary: Available from:

<http://www.arc.govt.nz/albany/fms/main/Documents/Environment/Coastal%20and%20marine/Hauraki%20Gulf%20State%20of%20the%20Environment%20Report%20-20%20Biological%20Diversity%20of%20the%20Gulf.pdf> [Accessed 23 April 2008]

[Institute of Systemic Botany. Atlas of Florida Vascular Plants, 2007. *Paspalum vaginatum*](#)

Summary: Available from: <http://www.plantatlas.usf.edu/synonyms.asp?plantID=2780> [Accessed 20 March 2008]

Laegdsgaard, P. 2006. Ecology, disturbance and restoration of coastal saltmarsh in Australia: a review. *Wetlands Ecology and Management*. 14: 379-399.

Summary: This paper talks about the ecological changes taking place in Australian coastal saltmarsh habitat.

[Nahonyo, C.L., Mwasumbi, L.B., Eliapenda, S., Msuya, C., Mwansasu, C., Suya, T.M., Mponda, B.O. and Kihale, P. 2002. Jozani-Chwaka Bay proposed national park biodiversity inventory report. Department of Zoology and Marine Biology, University of Dar es Salaam, Tanzania.](#)

Summary: This reports on a biological inventory of the proposed Jozani-Chwaka Bay National Park.

Available from: <http://cf.tfcg.org/pubs/Jozani%20biodiversity%20inventory%20report%202002.pdf> [Accessed 24 April 2008]

[Pacific Island Ecosystems at Risk. 2007. *Paspalum vaginatum*.](#)

Summary: The PIER website provides an overview of invasive weeds such as *P. vaginatum* in the Pacific region.

Available from: http://www.hear.org/pier/species/paspalum_vaginatum.htm [Accessed 22 April 2008]

Robertson, A.I., Bunn, S.E., Boon, P.I. and Walker, K.F. 1999. Sources, sinks and transformations of organic carbon in Australian floodplain rivers. *Marine Freshwater Research*. 50: 813-829.

Summary: This paper discusses the ecology of Australian floodplain rivers, including the vegetation composition.

Santiago Caamano, J., Duran Neira, C. and Acuna Castroviejo, R. 1990. Aparicion de *Undaria pinnatifida* en las costas de Galicia (Espana). Un nuevo caso en la problematica de introducción de especies foraneas. CIS Santiago de Compostela, Informes Tecnicos 3.

Sanz-Elorza, M., Dana, E. and Sobrino, E. 2001. Aproximacion al listado de plantas aloctonas invasoras reales y potenciales en Espana (Checklist of invasive alien plants in Spain (Iberian Peninsula and Balearic Islands)). *Lazaroa*. 22: 121-131.

Summary: This paper lists the invasive and potentially invasive plant species present in Spain.

Sanz-Elorza, M., Dana, E.D. and Sobrino, E. 2005. Aproximacion al listado de plantas vasculares aloctonas invasoras reales y potenciales en las islas Canarias (Contribution to a checklist of invasive alien vascular plants in Canary Islands). *Lazaroa*. 26: 55-66.

Summary: This paper presents a list of the alien vascular plants of the Canary Islands.

[Serviss, G.M. and Sauers, S. 2003. Sarasota Bay juvenile fisheries habitat assessment. Submitted to Sarasota Bay National Estuary Program, Sarasota, Florida, USA.](#)

Summary: Available from: <http://www.artificialreefs.org/ScientificReports/Habitat%20Assessment%20Project.pdf> [Accessed 23 April 2008]

[Siemens, T.J. 2005. Impacts of the invasive grass saltwater paspalum \(*Paspalum vaginatum*\) on aquatic communities of coastal wetlands on the Galapagos Islands, Ecuador.](#)

Summary: This thesis examined the impacts of *P. vaginatum* on Galapagos ecosystems.

Available from: <http://ecommons.library.cornell.edu/handle/1813/2556> [Accessed 24 April 2008]

[Starr, F. and Starr, K. 2006. Oahu offshore islets botanical survey. Prepared for: Hawaii State Department of Land and Natural Resources and Offshore Islet Restoration Committee.](#)

Summary: This paper presents the results of a botanical survey of the offshore Oahu islets.

[Starr, F., Starr, K. and Wood, K. 2006. Maui offshore islets botanical survey. Prepared for Department of Land and Natural Resources, Division of Forestry and Wildlife and Offshore Islet Restoration Committee.](#)

Summary: This report presents the findings of a botanical survey of the offshore islets of Maui, Hawaii.

Available from: http://www.hear.org/starr/publications/2006_maui_islets_botanical_survey.pdf [Accessed 23 April 2008]

[Swihart, T.I. 2005. Floristic study of the Upper Frio River, Texas. Unpublished MS thesis, Texas A and M University.](#)

[UK Overseas Territories Conservation Forum. 2004. Review of existing and potential Ramsar sites in UK Overseas Territories and Crown Dependencies. Final report.](#)

Summary: This paper provides information on Ramsar sites in the UK Overseas Territories.

Available from: http://www.jncc.gov.uk/PDF/ramsar_ukOT_Crowndep_reportfinal_0205.pdf [Accessed 23 April 2008]

[United States Department of Agriculture. 2007. Natural Resources Conservation Service, Plants Database. Profile: *Paspalum vaginatum*.](#)

Summary: The USDA Plants Database provides information about the distribution of *P. vaginatum* in the USA.

Available from: <http://plants.usda.gov/java/profile?symbol=PAVA> [Accessed 22 April 2008]

[USDA, ARS. 2007. *Paspalum vaginatum* National Genetic Resources Program. Germplasm Resources Information Network - \(GRIN\) \[Online Database\]. National Germplasm Resources Laboratory, Beltsville, Maryland](#)

Summary: The GRIN database provides basic taxonomic and distribution data for a range of species.

Available from: <http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?26933> [Accessed 22 April 2008]

[USDA, NRCS. 2008. *Paspalum vaginatum* Sw. The PLANTS Database \(<http://plants.usda.gov>, 31 March 2008\). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.](#)

Summary: Available from: <http://plants.usda.gov/java/profile?symbol=PAVA> [Accessed 25 April 2008]

[Vander Velde, N. 2003. The vascular plants of Majuro Atoll, Republic of the Marshall Islands. Atoll Research Bulletin, No. 503.](#)

Summary: Available from: <http://www.botany.hawaii.edu/faculty/duffy/arb/497-508/503.pdf> [Accessed 23 April 2008]

[Waller, D. and Barrett, L.C. 2000. Ossabaw Island Comprehensive Management Plan. Department of Natural Resources, Wildlife Resources Division.](#)

Summary: Available from: <http://www.gofishgeorgia.com/assets/documents/CMP.pdf> [Accessed 23 April 2008]