Cyperus rotundus 简体中文 正體中文

System: Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Liliopsida	Cyperales	Cyperaceae

Common name boto-botonis (English), tiririca-vermelha (Portuguese, Brazil), oniani lau (Maori, Cook Islands), vuthesa (Fijian), souchet à tubercules (French), zigolo infestante (Italian), oniani (Maori, Cook Islands), soro ni kabani (Fijian), pakopako (Tongan, Tonga), coco grass (English), mauku'oniani (Maori, Cook Islands), mothe (English, Nepal), chufa (Spanish), mumuta (Samoan), oniani tita (Maori, Cook Islands), ya khon mu (Thai), vucesa (Fijian), juncia (Spanish), oniani rau (Maori, Cook Islands), tiririca (Portuguese, Brazil), sur-sur (Pampangan), capim-alho (Portuguese, Brazil), tuteoneon (Marshallese), mala-apulid (Pampangan), alho-bravo (Portuguese, Brazil), castanuela (Spanish), brown nut sedge (English), almendra de tierra (Spanish), Rundes Zypergras (German), xiang fu zi (Chinese), mutha (Tagalog), coquito (Spanish), coquillo purpura (Spanish), ya haeo mu (Thai, Central Thailand), coquillo (Spanish), tamanengi (Palauan), coco (Spanish), purple nut sedge (English), pakopako (Tagalog), herbe à oignons (French), juncia real (Spanish), cortadera (Spanish), suo cao (Chinese), soronakambani (Fijian), nut grass (English), matie'oniani (Maori, Cook Islands), hamasuge (Japanese), chaguan humatag (Chamorro), balisanga (Ilocano), mot ha (Fijian), malanga (Fijian), purple nutsedge (English), nut sedge (English), nutgrass (English), te mumute (English), souchet rond (French), souchet en forme d'olive (French), souchet d'Asie (French), ivako (Fijian), red nut sedge (English), capim-dandá (Portuguese, Brazil), castañuela (Spanish), cebollín (Spanish), kili'o'opu (Hawaiian), juna (Portuguese), mau'u mokae (Hawaiian)

Synonym
Chlorocyperus rotundus , (L.) Palla
Cyperus purpuro-variegatus , Boeckeler
Cyperus stoloniferum pallidus , Boeckeler
Cyperus tetrastachyos , Desf.
Cyperus tuberosus , Roxb
Cyperus olivaris , Targioni-Tozzetti
Pycreus rotundus , (L.) Hayek

Similar species *Cyperus esculentus*

Summary *Cyperus rotundus (purple nutsedge) is a weed in over 90 countries and the world's worst invasive weed based on its distribution and effect on crops. Its complex underground network of tubers, basal bulbs, roots and rhizomes ensure its ability to survive and reproduce during adverse conditions. Further biological features, such as its adaptation to high temperatures, solar radiation and humidity, have turned this weed into a serious problem in subtropical and even arid regions.*

[view this species on IUCN Red List]

Species Description
Cyperus rotundus (purple nutsedge) is a smooth, erect and perennial weed with an extensive subterranean tuber system (Hauser 1962, in Quayyum *et al*. 2000; Singh Pandey & Singh 2009). It usually attains a height of about 30 cm (Quayyum *et al*. 2000). Purple nutsedge appears grass like, but its stems are triangular in cross-section. It has fibrous roots that branch prolifically, rhizomes, tubers, bulbs, and inflorescences that consist of irregular compound umbels. Its leaves are mostly basal and linear in shape with a prominent mid-rib (Ministry of Agriculture and Lands of British Columbia 2007, in Rogers *et al*. 2008).

Notes
The impact of climate change on invasive species is a fascinating aspect of invasion biology. Rogers and colleagues (2008) tested the effects of a rise in atmospheric CO2 on purple nutsedge in controlled studies. Purple nutsedge exposed to elevated CO2 had greater total dry weight, leaf area, root length and numbers of tubers and tended to increase allocation belowground, which led to greater root-to-shoot ratio (R:S). These findings suggest that purple nutsedge may be more invasive in a future high-CO2 world (Rogers *et al*. 2008), however, the experiment did not account for the competitive impact of other biota.

Lifecycle Stages
Tuber Sprouting (Stoller & Sweet 1987): In purple nutsedge, tuberization can begin within 17 days after shoot emergence (Hammerton 1974, in Stoller & Sweet 1987), but dormant tubers are not found until 6 to 8 weeks after sprouting (Hauser 1962, in Stoller & Sweet 1987); this is followed by chain formation 10 weeks after shoot emergence (Hauser 1962b, in Bangarwa *et al*. 2008). Tuberization in purple nutsedge may be a response to excess carbohydrate, regulated by growth substances, photoperiod and temperature (Garg Bendixen & Anderson 1967, Hammerton 1975, in Stoller & Sweet 1987). A single purple nutsedge tuber can produce 100 tubers when allowed to grow for 12 weeks (Rao 1968, in Bangarwa *et al*. 2008). A patch originating from a single tuber can expand up to 5.5 m2 and produce 750 shoots within 6 months (Webster 2005, in Bangarwa *et al*. 2008). \n\n
Tubers lie dormant in the soil until stimulated to sprout. When a tuber sprouts, one or more rhizomes elongate vertically from tuber buds. Roots radiate horizontally from the rhizome as it grows toward the soil surface. The rhizome tip at the soil surface is exposed to sunlight and diurnal temperature fluctuations which are the principal factors that stimulate the basal bulb to form on the rhizome under the soil surface (Stoller & Woolley 1983, in Stoller & Sweet 1987). These rhizome tips are strong and sharp and can penetrate hard substrates, so mulching is an ineffective control. The rhizome extends mostly by internode elongation until the basal bulb is initiated. Basal bulbs consist of a section of stem (rhizome) with compacted internodes containing meristems for roots, secondary rhizomes, leaves, and the flower stalk. Parent tubers remain attached to the plant throughout the season, and the plant may derive food from tubers in times of stress (Hammerton, 1974, Stoller, Nema & Bhan 1972, in Stoller & Sweet 1987).\n\n
Vegetative Development: Several weeks after the primary shoot emerges, secondary rhizomes radiate horizontally from the basal bulb. In the early growth stages, the rhizome tips turn upward, differentiating into secondary basal bulbs similar to the primary basal bulb. Secondary bulbs produce shoots, rhizomes, and flower stalks as described for primary bulbs; and subsequent development of tertiary and higher order bulbs forms the complex system of subterranean, vegetative growth.\n\n
Flowering: Flowering is erratic among yellow and purple nutsedge populations. Many populations of yellow and purple nutsedge do not flower after growth for a cropping season, but tubers always are produced when these weeds grow for that length of time.

Uses

Several chemical compounds have been isolated from world's worst weed *Cyperus rotundus* (Jeong *et al*. 2000, Sonwa & Konig 2001) and some of these chemicals possess medicinal properties and are used in Latin America, China and elsewhere (Ellison & Barreto 2004; Singh *et al*. 1970, Gupta *et al*. 1971, Weenen *et al*. 1990, Hamada 1993, Thebtaranonth *et al*. 1995, Makino *et al*. 2003, in Sharma & Gupta 2007). For example, decoctions of the plant in Brazil are used for their anti-infective and anti-inflammatory properties (Cristina *et al*. 2005). Various preparations of *C. rotundus* have been used for centuries in perfumes, spices and traditional medicines in India, China, Arab and Africa (Sharma & Gupta 2007). *C. rotundus* is also an important ingredient of anti-aging Ayurvedic neutraceutical Chyavanprash (Sharma & Gupta 2007). Pigs eat its tubers; however it makes a poor fodder species; it is also reportedly used as a soil stabilizer (Ellison & Barreto 2004).

Habitat Description

Cyperus rotundus is found in cultivated fields, farmlands, neglected areas, wastelands, grasslands, at the edges of forests, and on roadsides, sandy or gravelly shores, riverbanks and irrigation canal banks (Holm *et al*. 1977, Wiggins & Porter 1971, in PIER 1999). It is prevalent in disturbed areas and lawns/turf. It is a major agricultural and garden weed but only a minor weed in other respects (Swarbrick 1997, in PIER 1999). \n
Purple nutsedge grows well in almost every soil type, over a wide range of soil moisture, pH and elevation. It is encouraged by frequent cultivation and grows best in moist fertile soils (Swarbrick 1997, in PIER 1999). In cool or waterlogged soils it grows slower, flowers little and produces fewer tubers (Holm *et al*. 1977, in PIER 1999). It is less tolerant of low temperatures and shaded areas than yellow nutsedge (Santos *et al*. 1997, in Rogers *et al*. 2008). Purple nutsedge is relatively sensitive to cold and is restricted to latitudes where the average minimum air temperature for January is higher than -1°C (Bendixen & Nandihalli 1987).\n
Bendixen & Nandihalli (1987) reported that purple nutsedge grows best where soil moisture is high, such as in upland rice and sugarcane culture and consequently is not an important weed of arid regions, except on irrigated land (Bendixen & Nandihalli 1987). Travlos and colleagues (2009), however, claim that purple nutsedge is one of the most serious weed problems of the arid and semiarid environments. Moreover, *C. rotundus* is one of the most common weeds of the secondary succession occurring in abandoned and dry fields of arid environments (El-Sheikh 2005, in Travlos *et al*. 2009). Greece is among the countries with the highest percent winter survival of purple nutsedge (Wills, 1998, in Travlos *et al*. 2009) making it even more difficult to control.

Reproduction

Seed Biology: Purple nutsedge is a perennial which rarely reproduces by seed (Thullen & Keeley 1979, in Wills 1987). Purple and yellow nutsedges have been documented to produce achenes (an achene is a small dry fruit with one seed) from aerial inflorescences; however, there are low rates of viability for purple nutsedge achenes (less than 5%), whereas yellow nutsedge achenes have 50 to 90% germination (Justice and Whitehead 1946, in Webster *et al*. 2008). Evidence is lacking that seeds play a significant role in propagation, especially in cultivated fields (Mulligan & Junkins 1976, Stoller 1981, in Stoller & Sweet 1987). Light does not stimulate germination of seedlings (Bell *et al*. 1962, in Stoller & Sweet 1987).\n\n
Tuber Biology: The aggressiveness of purple nutsedge is associated primarily with its asexual means of reproduction by underground tubers (Benedixen & Nandihalli 1987, Stoller & Sweet 1987, in Bangarwa *et al*. 2008). The tubers serve as perenniating organs by storing carbohydrates in a continuous reproductive cycle (Anderson 1999, Stoller & Weber 1975, in Bangarwa *et al*. 2008). Purple nutsedge produces a complex underground system of basal bulbs, rhizomes, and tubers (Stoller & Sweet 1987); rhizomes are initially white and fleshy with scale leaves, later becoming woody or wiry (Wills 1987); tubers are recognized as the primary dispersal unit for both species, so the literature abounds with reports on tuber biology (Stoller & Sweet 1987). \n\n
Tuber formation begins from 4 to 6 weeks after seedling emergence; many authors report that more than 95% of purple and yellow nutsedge tubers usually are formed in the upper 45 cm of and in most soils, more than 80% of tubers occur in the upper 15 cm (Stoller & Sweet 1987). When purple and yellow nutsedge are cultured in fields without interference from other plants, they produce an estimated 10 to 30 million tubers per ha in a season (Hauser 1962, Horowitz 1972, in Stoller & Sweet 1987). Both purple and yellow nutsedge tuber longevity is a function of tuber depth in the soil; tuber survival time increases as its depth in the soil increases (Stoller 1981, in Stoller & Sweet 1987). Yellow nutsedge tubers had a half-life of 4 and 6 months at 10 and 20 cm, respectively, in a non- crop environment in Illinois (Stoller & Wax 1973, in Stoller & Sweet 1987). Desiccation and temperature extremes can kill both yellow and purple nutsedge tubers (Stoller & Sweet 1987).

General Impacts

For a detailed account of the impacts of *Cyperus rotundus* please read: [*Cyperus rotundus* (Purple Nutsedge) Impacts Information]. The information in this document is summarised below.

Management Info
For a detailed account of the managment of *Cyperus rotundus* please read: *Cyperus rotundus* (Purple Nutsedge) Management Information. The information in this document is summarised below.\n\nIn agricultural fields, both purple and yellow nutsedge species reproduce primarily by underground tubers (Wills 1987). Management of nutsedges should focus on depleting tuber reserves and suppressing tuber multiplication (Bangarwa *et al*. 2008). \n\n\r\n
Preventative Measures: \nA Risk assessment of *Cyperus rotundus* for the Pacific region was prepared by Pacific Island Ecosystems at Risk (PIER); the result is a score of 13, meaning the species is likely to be of high risk in the Pacific.\r\n\n\n
Manual Control: \nApproximately 95% of purple nutsedge tubers are confined to the top 12 cm of soil (Siriwardana and Nishimoto 1987, in Bangarwa *et al*. 2008), making shallow tillage an effective method of reducing tuber multiplication. Tillage should be done at frequent intervals (eg: three weekly) (Benedixen and Stroube 1977, McGiffen *et al*. 1997, in Bangarwa *et al*. 2008).\r\n
\nPhysical control:\nNutsedges are capable of penetrating mulch with a thickness of four times that currently used in commercial vegetable production (Henson and Little 1969, in Webster 2005a). Plastic mulches are used in commercial vegetable gardens for suppressing weeds by providing a physical barrier (Bangarwa *et al*. 2008). Soil solarization, a method of increasing soil temperature using polyethylene mulch, has proved effective against many weeds when using clear film (Horowitz *et al*. 1983, in Bangarwa *et al*. 2008).\r\n\n\n
Chemical Control: \nGlyphosate and paraquat are commonly used nonselective herbicides for controlling weeds in vegetable rows, especially those systems with mulch-covered beds. Glyphosate is translocated through chains of purple nutsedge tubers, which reduces tuber viability and production (Doll and Piedrahita 1982; Zandstra *et al*. 1974, in Webster *et al*. 2008). \n\r\n
Biological Control: \nThe taxonomic isolation of the species from crop plants of importance makes it an ideal target for biocontrol (Ellison & Barreto 2004). Most of the biological control work undertaken so far has involved insect natural enemies with little success (Julien and Griffiths 1998, in Ellison & Barreto 2004). The mycoherbicide *Dactylaria higginsii* is a biological control fungus against purple nutsedge; repeated applications of *D. higginsii* provided 90% purple nutsedge control (Kadir *et al*. 2000, in Yandoc *et al*. 2006). \n\r\n
Use of Allelopathic Plants: \nThe use of allelopathic plants for weed management is an important tool in organic production systems and is gaining importance in the absence of synthetic fumigants. Plants belonging to the Brassicaceae family are known to exhibit allelopathic weed suppression (Boydston & Hang 1995, Krishnan *et al*. 1997, Vaughn & Boydston 1997, in Bangarwa *et al*. 2008). Turnip is a glucosinolate-producing Brassicaceae that has been used for weed suppression in bell pepper (Norsworthy *et al*. 2007). \n\n\r\n
Integrated Management:\nMethyl bromide has been a critical component nutsedge management (Julian *et al*. 1998, Ragsdale & Wheeler 1995, Schneider *et al*. 2003, in Webster 2005a). However, the use of methyl bromide as a pre-plant pest management tool was (scheduled to be) abolished in 2005 (Webster 2005b). This increases the complexity of pest management. Future pest management systems will need to incorporate a combination of tactics to manage nutsedges in crop production (Cardina *et al*. 1999, Patterson 1998, in Webster 2005a).

Pathway
Tubers are also transported intentionally by food fadists and for animal feed such as chufa (Bendixen & Nandihalli 1987).Nutsedge tubers are known to develop in potato (*Solarum tuberosum*) tubers and other commercial root crops. Nutsedge thus is distributed with these foods and seed stocks. Nutsedge tubers also may contaminate peanut (*Arachis hypogaea*) during harvest and shipment. Tubers and seeds might contaminate commercial seeds and feeds and be distributed widely (Bendixen & Nandihalli 1987).Entire plants, including rhizomes and tubers, may have been used as shipping ballast then discarded after use (Bendixen & Nandihalli 1987).

Principal source:

Compiler: IUCN SSC Invasive Species Specialist Group (ISSG) with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment \r\n
\r\nInterim profile was compiled by IUCN SSC Invasive Species Specialist Group (ISSG) with support from the EU-funded South Atlantic Invasive Species project, coordinated by the Royal Society for the Protection of Birds (RSPB)

Review: Under expert review

Pubblication date: 2009-04-27

ALIEN RANGE

[1] AFGHANISTAN
[4] AMERICAN SAMOA
[2] ANGOLA
[1] ARGENTINA
[4] AUSTRALIA
[1] BANGLADESH
[1] BERMUDA
[1] BOLIVIA
[1] BRAZIL
[2] BRITISH INDIAN OCEAN TERRITORY
[1] BRUNEI DARUSSALAM
[1] CAMBODIA
[1] CAMEROON
[1] CHAD
[1] CHILE
[1] CHINA
[1] CHRISTMAS ISLAND
[1] COLOMBIA
[7] COOK ISLANDS
[1] COSTA RICA
[1] COTE D'IVOIRE
[1] CUBA
[1] DOMINICAN REPUBLIC
[1] ECUADOR
[1] EGYPT
[1] EL SALVADOR
[1] ETHIOPIA
[1] EX-YUGOSLAVIA
[5] FIJI
[1] FRANCE
[14] FRENCH POLYNESIA
[1] GABON
[1] GHANA
[1] GREECE
[1] GUAM
[1] GUATEMALA
[1] GUINEA
[1] HONDURAS
[1] INDIA
[2] INDONESIA
[1] IRAN, ISLAMIC REPUBLIC OF
[1] IRAQ
[1] ISRAEL
[1] ITALY
[1] JAMAICA
[2] JAPAN
[1] JORDAN
[1] KENYA
[7] KIRIBATI
[1] KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
[1] KOREA, REPUBLIC OF
[1] LEBANON
[1] LESSER ANTILLES
[1] MADAGASCAR
[1] MALAYSIA
[1] MALDIVES
[1] MALI
[7] MARSHALL ISLANDS
[1] MAURITANIA
[1] MAURITIUS
[1] MELANESIA
[1] MEXICO
[1] MICRONESIA
[4] MICRONESIA, FEDERATED STATES OF
[1] MIDDLE EAST
[1] MOROCCO
[1] MOZAMBIQUE
[1] NAURU
[5] NEW CALEDONIA
[1] NEW GUINEA
[3] NEW ZEALAND
[1] NICARAGUA
[1] NIGER
[1] NIGERIA
[1] NIUE
[1] NORFOLK ISLAND
[4] NORTHERN MARIANA ISLANDS
[1] PAKISTAN
[8] PALAU
[1] PANAMA

[1] PAPUA NEW GUINEA
[1] PARAGUAY
[1] PERU
[1] PHILIPPINES
[1] POLYNESIA
[1] PORTUGAL
[1] PUERTO RICO
[1] RUSSIAN FEDERATION
[1] SAINT HELENA
[2] SAMOA
[1] SENEGAL
[2] SEYCHELLES
[1] SINGAPORE
[1] SOLOMON ISLANDS
[1] SOUTH AFRICA
[1] SPAIN
[1] SRI LANKA
[1] SUDAN
[1] SURINAME
[1] SWAZILAND
[1] TAIWAN
[1] TANZANIA, UNITED REPUBLIC OF
[1] THAILAND
[1] TOKELAU
[5] TONGA
[1] TRINIDAD AND TOBAGO
[1] TUNISIA
[2] TURKEY
[1] UGANDA
[22] UNITED STATES
[3] UNITED STATES MINOR OUTLYING ISLANDS
[1] URUGUAY
[1] VANUATU
[1] VENEZUELA
[1] VIET NAM
[1] VIRGIN ISLANDS, U.S.
[2] WALLIS AND FUTUNA
[1] ZAMBIA
[1] ZIMBABWE

BIBLIOGRAPHY

50 references found for **Cyperus rotundus**

Managment information

Bangarwa, S.K., Norsworthy, J.K. Jha, P., Malik, M. 2008. Purple nutsedge (*Cyperus rotundus*) management in an organic production system, *Weed Science 56*(4): 606-613.

Brecke, B.J., Stephenson, D.O., Unruh, J. B. 2005. Control of purple nutsedge (*Cyperus rotundus*) with herbicides and mowing, *Weed Technology 19*(4): 809-814.

Charudattan, R. & A. Dinoor. 2000. Biological control of weeds using plant pathogens: accomplishments and limitations, Crop Protection 19: 691-695.

Chase, C.A, Stall, W.M., Simonne, E.H., Hochmuth, R.C., Dukes, M.D. & Weiss, W. 2006. Nutsedge control with drip-applied 1,3-dichloropropene plus chloropicrin in a sandy soil, *HortTechnology 16*(4): 641-648.

Cullen, J.M., Briese, D.T. Kriticos, D.J., Lonsdale, W.M., Morin, L. and Scott, J.K. eds, 2004. Proceedings of the XI International Symposium on Biological Control of Weeds. CSIRO Entomology, Canberra, Australia, 648 pp.

Czarnota, Mark A. and S. Wayne Bingham. 1997. Control of yellow and purple nutsedges (*Cyperus esculentus* and *Cyperus rotundus*) in turfgrass with MON-12051, Weed Technology 11 (3): 460 - 465.

Summary: Abstract: Field studies were conducted from 1993 to 1995 to evaluate MON-12051 for turfgrass tolerance and control of yellow and purple nutsedges. The availability of herbicides for selective control of these weeds in turfgrass is limited. A sulfonylurea compound, MON-12051, has recently been developed for selective control of the nutsedges in turfgrass. When MON-12051 was applied at 0.07 to 0.14 kg ai/ha, the injury to Kentucky bluegrass, tall fescue, bermudagrass, and zoysiagrass was slight, with a maximum of 10% injury. At these rates, MON-12051 outperformed both bentazon and imazaquin in controlling yellow and purple nutsedges. Averaged over all tests 6 wk after treatment, yellow nutsedge control with MON-12051 was 83%. Control averaged 44% during the same period when treated with bentazon, whether applied once at 2.24 kg ai/ha or twice at 1.12 kg ai/ha. Purple nutsedge control averaged 96% when treated with MON-12051 in Kentucky bluegrass, while control was 42% with imazaquin applied at 0.19 and 0.43 kg ai/ha.

Ellison, C.A. & R.W. Barreto. 2004. Prospects for the management of invasive alien weeds using co-evolved fungal pathogens: a Latin American perspective *Biological Invasions 6*: 23-45.

E.N. Rosskopf, C.B. Yandoc, J.B. Kadir & R. Charudattan. 2004. Evaluation of Dactylaria higginsii as a component in an integrated approach to pest management. In: Proceedings of the XI International Symposium on Biological Control of Weeds (eds Cullen, J.M., Briese, D.T. Kriticos, D.J., Lonsdale, W.M., Morin, L. and Scott, J.K.), pp. 351�352. CSIRO Entomology, Canberra, Australia.

Fowler, S.V., S. Ganeshan, J. Mauremootoo & Y. Mungroo. 2000. Biological Control of Weeds in Mauritius: Past Successes Revisited and Present Challenges. In: Proceedings of the X International Symposium on Biological Control of Weeds 4-14 July 1999, Montana State University, Bozeman, Montana, USA. Neal R. Spencer [ed.]: 43-50.

Iqbal, J., Cheema, Z.A.& An, M. 2008. Purple Nutsedge (*Cyperus rotundus* L) management in cotton with combined application of Sorgaab and S-Metolachlor, *Pakistan Journal of Botany 40*(6): 2383-2391.

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.

Morales-Payan, J.P., R. Charudattan, W.M. Stall & J.T. DeValerio. 2004. Assessment of Dactylaria higginsii as a postemergence bioherbicide for purple nutsedge (*Cyperus rotundus*) in bell pepper (*Capsicum annuum*). In: Proceedings of the XI International Symposium on Biological Control of Weeds (eds Cullen, J.M., Briese, D.T. Kriticos, D.J., Lonsdale, W.M., Morin, L. and Scott, J.K.), pp. 351�352. CSIRO Entomology, Canberra, Australia.
Norsworthy, J.K., Malik, M.S., Jha, P. & Oliveira, M.J., 2006. Effects of isothiocyanates on purple (*Cyperus rotundus* L.) and yellow nutsedge (*Cyperus esculentus* L.), *Weed Biology & Management 6*(3): 131-138.
Ou, Z., M. Leigh, T., Stephen H., Schroeder, J. & Libbin, J. 2008. Nutsedge Counts Predict *Meloidogyne incognita* Juvenile Counts in an Integrated Management System, *Journal of Nematology* 40< JUN 2008. 99-108.
Pacific Island Ecosystems at Risk (PIER). 2001. *Cyperus rotundus* L. Risk Assessment
Summary: Available from: http://www.hear.org/pier/wra/australia/cyrot-wra.htm [Accessed 25 October 2009]
Pemberton, R.W. 2000. Predictable risk to native plants in weed biological control, *Oecologia 125*: 489-494.
Phatak, S.C., M.B. Callaway & C.S. Vavrina. 1987. Biological Control and Its Integration in Weed Management Systems for Purple and Yellow Nutsedge (*Cyperus rotundus* and *C. esculentus*), *Weed Technology 1*(1): pp. 84-91.
Ratiarson, O. & Falisse, A. 2006. New ploughing effects on *Cyperus rotundus* L. tubers in New Caledonia. I. Effects of rotary hoe and circular spike harrow, *Tropicultura 24*(3): 169-174.
Ratiarson, O. & Falisse, A. 2007. New ploughing effects on *Cyperus rotundus* l. tubers in New Caledonia. II. viability of half-tubers, *Tropicultura 25*(1): 12-15.
Rogers, H. H.; Runion, G. B.; Prior, S. A.; Price, A. J.; Torbert, H. A.; Gjerstad, D. H. 2008. Effects of elevated atmospheric CO2 on invasive plants: Comparison of purple and yellow nutsedge (*Cyperus rotundus* L. and *C. esculentus* L.). Journal of Environmental Quality. 37(2). MAR-APR 2008. 395-400.
Santos, B.M. 2009. Drip-applied metam potassium and herbicides as methyl bromide alternatives for *Cyperus* control in tomato, *Crop Protection 28*: 68-71.
Santos, B.M., J.P. Gilreath, T.N. Motis, M. von Hulten & M.N. Siham. 2006. Effects of Mulch Types and Concentrations of 1,3 Dichloropropene plus Chloropicrin on Fumigant Retention and Nutsedge Contro, *HortTechnology 16*(4).
Suwunnamek, U. & C. Parker. 1975. Control of *Cyperus rotundus* with glyphosate: the influence of ammonium sulphate and other additives, *Weed Research 15*: 13-19.
Travlos, I.S., Economou, G., Kotoulas, V.E., Kanatas, P.J., Kontogeorgos, A.N. & Karamanos, A.I. 2009. Potential effects of diurnally alternating temperatures and solarization on purple nutsedge (*Cyperus rotundus*) tuber sprouting, *Journal of Arid Environments 73*(1): 22-25.
Warren Jr. & H.D. Coble. 1999. Managing Purple Nutsedge (*Cyperus rotundus*) Populations Utilizing Herbicide Strategies and Crop Rotation Sequences L.S., *Weed Technology 13*: 494-503.
Webster, T.M. 2005a. Patch Expansion of Purple Nutsedge (*Cyperus rotundus*) and Yellow Nutsedge (*Cyperus esculentus*) with and without Polyethylene Mulch, *Weed Science 53*(6): 839-845.
Webster, T.M. 2005b. Mulch type affects growth and tuber production of yellow nutsedge (*Cyperus esculentus*) and purple nutsedge (*Cyperus rotundus*) , *Weed Science 53*(6): 834-838.
Webster, T.M., T.L. Grey, J.W. Davis & A.S. Culpepper. 2008. Glyphosate Hinders Purple Nutsedge (*Cyperus rotundus*) and Yellow Nutsedge (*Cyperus esculentus*) Tuber Production, *Weed Science 56*: 735-742.
Yandoc, C.B., Rosskopf, E.N., Pitelli, R.L.C.M, Charudattan, R. 2006. Effect of selected pesticides on conidial germination and mycelial growth of *Dactylaria higginsii*, a potential bioherbicide for purple nutsedge (*Cyperus rotundus*), *Weed Technology 20*(1): 255-260.

General information

Bendixen, L.E. & U.B. Nandihalli. 1987. Worldwide Distribution of Purple and Yellow Nutsedge (*Cyperus rotundus* and *C. esculentus*), *Weed Technology 1*(1): 61-65.
Cristina, M., T. Duarte, G.M. Figueira, A. Sartoratto, V.L.G. Rehder & C. Delarmelina. 2005. Anti-Candida activity of Brazilian medicinal plants ,*Journal of Ethnopharmacology 97*: 305�311.
Hawaiian Ecosystems at Risk project (HEAR). 2008. Plants of Hawaii: Cyperaceae > *Cyperus rotundus* Purple nut sedge
Summary: Images.
Available from: http://www.hear.org/starr/plants/images/species/?q=cyperus+rotundus [Accessed 10 December 2008]
ITIS (Integrated Taxonomic Information System), 2008. Online Database *Cyperus rotundus* L.
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.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=39900 [Accessed 10 November 2008]
Mennan, H. & Isik, D. 2003. Invasive Weed Species in Onion Production Systems During the Last 25 Years in Amasya, Turkey,*Pak. J. Bot. 35*(2): 155-160.
Morales-Payan, J.P., B.M. Santos, W.M. Stall & T.A. Bewick. 1997. Effects of Purple Nutsedge (*Cyperus rotundus*) on Tomato (*Lycopersicon esculentum*) and Bell Pepper (*Capsicum annuum*) Vegetative Growth and Fruit Yield, *Weed Technology 1*: 672-676.
Mullin, B.H., L.W.J. Anderson, J.M. DiTomaso, R.E. Eplee & K.D. Getsinger. 2000. Invasive Plant Species, *Council for Agricultural Science and Technology 13*.
Pacific Island Ecosystems at Risk (PIER). 1999. *Cyperus rotundus* L., Cyperaceae
Summary: Available from: http://www.hear.org/pier/species/cyperus_rotundus.htm [Accessed 14 August 2008]
Pena-Fronteras, J.T., Villalobos, M.C., Baltazar, A.M., Merca, F.E., Ismail, A.M. & Johnson, D.E. 2009. Adaptation to flooding in upland and lowland ecotypes of *Cyperus rotundus*, a troublesome sedge weed of rice: tuber morphology and carbohydrate metabolism, *Annals of Botany 103*(2): 295-302.
PestNet. 2009. Summaries: *Cyperus rotundus*
Summary: Available from: http://www.pestnet.org/Summaries/Pests/PestsEntities/Weeds/Cyperusrotundusnutgrass/tabid/1332/Default.aspx [Accessed 25 October 2009]

Quayyum, H.A., A.U. Mallik, D.M. Leach and C. Gottardo. 2000. Growth Inhibitory Effects of Nutgrass (*Cyperus rotundus*) on Rice (*Oryza sativa*) Seedlings, *Journal of Chemical Ecology 26*(9).
Santos, B.M., J.P. Morales-Payan, W.M. Stall & T.A. Bewick. 1998. Influence of Purple Nutsedge (Cyperus rotundus) Density and Nitrogen Rate on Radish (Raphanus sativus) Yield, *Weed Science 46*(6): 661-664.
Sharma, R. & Gupta, R. 2007. *Cyperus rotundus* extract inhibits acetylcholinesterase activity from animal and plants as well as inhibits germination and seedling growth in wheat and tomato, *Life Sciences 80*: 2389-2392.
Singh, N.B., Pandey, B.N. & Singh, A. 2009. Allelopathic effects of *Cyperus rotundus* extract in vitro and ex vitro on banana, *Acta Physiologiae Plantarum 31*(3): 633-638.
Space, J.C. and M. 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.
Space, J. C. and T Flynn. 2000. Observations on invasive plant species in American Samoa.
Space, J.C., B. Waterhouse, J.S. Denslow and D. Nelson. 2000. Invasive Plant Species on Rota, Commonwealth of the Northern Mariana Islands. USDA Forest Service.
Stoller, E.W. & R.D. Sweet. 1987. Biology and Life Cycle of Purple and Yellow Nutsedges (*Cyperus rotundus* and *C. esculentus*), *Weed Technology 1*(1): 66-73.
United States Department of Agriculture - Agricultural Research Service USDA, ARS, 2009. *Cyperus rotundus* 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?316644 [Accessed 14 August 2008]
United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS). 2008. *Cyperus rotundus* L. Nutgrass, The PLANTS Database (http://plants.usda.gov, 30 January 2009). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
Summary: Available from: http://plants.usda.gov/java/profile?symbol=CYRO [Accessed 14 August 2008]
Wills, G.D. 1987. Description of Purple and Yellow Nutsedge (*Cyperus rotundus* and *C. esculentus*), *Weed Technology 1*(1): pp. 2-9.