

*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 hao 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  
*Pycneus 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 CO<sub>2</sub> on purple nutsedge in controlled studies. Purple nutsedge exposed to elevated CO<sub>2</sub> 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-CO<sub>2</sub> 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 m<sup>2</sup> and produce 750 shoots within 6 months (Webster 2005, in Bangarwa *et al.* 2008).

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).

**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.

**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 nutraceutical 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).

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).

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).

**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 perennating 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).

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 management of *Cyperus rotundus* please read: [Cyperus rotundus \(Purple Nutsedge\) Management Information](#). The information in this document is summarised below. In 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).

**Preventative Measures:** A [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.

**Manual Control:** Approximately 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).

**Physical control:** Nutsedges 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).

**Chemical Control:** Glyphosate 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).

**Biological Control:** The 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).

**Use of Allelopathic Plants:** The 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).

**Integrated Management:** Methyl 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 (*Solanum 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:



# GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Cyperus rotundus*

**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

Interim 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

**Publication date:** 2009-04-27

## ALIEN RANGE

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[1] ETHIOPIA	[1] EX-YUGOSLAVIA
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[1] INDIA	[2] INDONESIA
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[1] ISRAEL	[1] ITALY
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[1] JORDAN	[1] KENYA
[7] KIRIBATI	[1] KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
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[8] PALAU	[1] PANAMA



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[1] SOUTH AFRICA	[1] SPAIN
[1] SRI LANKA	[1] SUDAN
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[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	

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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 sulfonyleurea 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.

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[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.

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FULL ACCOUNT FOR: *Cyperus rotundus*

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