CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Cyperus esculentus, yellow nutsedge

Family: Cyperaceae

Pest Rating: C

Seed Rating: Restricted

Comment Period: 08/01/2024 through 09/15/2024

Initiating Event:
Cyperus esculentus has been assigned a Q-rating by the California Department of Food and Agriculture (CDFA), Plant Health and Pest Prevention Services. *Cyperus esculentus* is designated as a noxious weed as defined by the California Food and Agricultural Code (FAC) Section 5004 and is listed in Title 3, California Code of Regulations (CCR), Section 4500. As it has been assigned a Q rating, a pest evaluation is advisable.

History & Status

General Description
Cyperus esculentus is a perennial, herbaceous sedge that grows from tubers on horizontal, underground, creeping rhizomes. The tubers of *Cyperus esculentus* are hard, grayish orange to dark brown, and may be up to 3 cm long (Defelice, 2002). *Cyperus esculentus* has fibrous roots and erect stems. The stems of *Cyperus esculentus* can grow to approximately 90 cm. tall and are V-shaped in cross section (UC/IPM, 2016). Grass-like leaves arise from the base of the stem. Leaves of *Cyperus esculentus* are stiffer and thicker than grass leaves, light green, also V-shaped in cross section, and have pointed tips (UC/IPM, 2016). The leaves of *Cyperus esculentus* may be up to 85 cm long, and in some plants, may be longer than the stem (Defelice, 2002). The inflorescence of *Cyperus esculentus* is a spikelet with many goldish brown flowers (UC/IPM, 2016). *Cyperus esculentus* has tiny [1-1.6 mm], single-seeded, brown, football shaped fruits (achenes) (UC/IPM, 2016). Per the Jepson Flora Project (2024), the seeds of *Cyperus esculentus* seldomly mature.

Cyperus esculentus and a related species, *Cyperus rotundus* (purple nutsedge) can be distinguished from each other by the number and color of the flowers (many and gold-brown versus fewer and dark reddish to purplish brown, respectively), and by the number of tubers per rhizome (single versus numerous in chains, respectively) (UC/IPM, 2016).

Worldwide Distribution
Cyperus esculentus is native to the eastern Mediterranean region where it was originally cultivated in ancient Egypt for its edible, oil-rich tubers (Defelice, 2002). *Cyperus esculentus* has spread to all

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continents of the world (Defelice, 2002). In North America, *Cyperus esculentus* occurs in all states (including Alaska and Hawaii) except Montana and Wyoming (FNA, 2019). Per the Jepson Flora Project, *Cyperus esculentus* is native in California.

Official Control:
Cyperus esculentus is listed on CCR Section 4500 as a noxious weed defined by California FAC Section 5004. The Department is mandated by California FAC, Division 1, Chapter 3, Section 403 to prevent the introduction and spread of noxious weeds. *Cyperus esculentus* is listed as a prohibited noxious weed seed in California defined by California FAC Section 52258 for which there is no tolerance in agricultural seed shipments into and within California.

Cyperus esculentus is listed as a prohibited noxious weed seed for shipments into the states of Arizona, Colorado, Connecticut, Georgia, Hawaii, Louisiana, Maine, Michigan, Mississippi, New Mexico, Oklahoma, Tennessee, Texas, and a restricted noxious weed seed subject to established tolerances for shipments into the states of New Hampshire and North Carolina. *Cyperus spp.* are listed as prohibited weed seeds for shipments into Rhode Island (USDA/AMS, 2023).

California Distribution:
Cyperus esculentus has been collected and recorded in the CDFA Pest and Damage Record (PDR) database 26 times in California between 2004-2020 from the counties of Contra Costa (3), Fresno (4), Kings (2), Sacramento (4), Solano (2), Yolo (2), and one time in each of the counties of Alameda, Glenn, Imperial, Kern, Madera, Orange, Placer, San Bernadino, San Mateo, and Sutter. The collections were from situations such as orchards, fields, residential gardens, streams, and public ornamental plantings (CDFA PDR database, 2024).

The CalFlora Database contains additional records of *Cyperus esculentus* collections in the California counties of Amador, Butte, El Dorado, Humboldt, Inyo, Marin, Mariposa, Mendocino, Merced, Monterey, Riverside, San Benito, San Francisco, San Joaquin, San Luis Obispo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sonoma, Stanislaus, Tulare, Ventura, and Yuba. The earliest recorded collections of *Cyperus esculentus* in the CalFlora database are from 1902 from Los Angeles and Orange counties.

California Interceptions:
Cyperus esculentus has been intercepted a total of 108 times during regulatory nursery inspections or in general inspections of field and container grown nursery stock between 2002-2023 in Los Angeles (35 times), Placer (two times), Plumas (three times), San Diego (43 times), Sutter (eight times), and one time each in the counties of Contra Costa, San Benito, San Luis Obispo, San Mateo, Shasta, Solano, and Sonoma (CDFA PDR database, 2024). *Cyperus esculentus* has been intercepted in incoming truck or parcel shipments a total of seven times between 2003-2021; once at the Needles Border Protection Station and six times in the counties of Los Angeles, Sacramento, San Mateo, and Sutter counties (CDFA PDR database, 2024).

Consequences of Introduction

1) **Climate/Host Interaction:** Score is **High (3)**

Cyperus esculentus occurs in wet fields, in heavily irrigated crops, along river banks and roadsides, in ditches, in sandy or loamy soils, and in disturbed wetlands (CABI, 2014; University of Georgia, Center for Invasive Species and Ecosystem Health, 2018; USGS/WARC, undated). In California, *Cyperus esculentus* occurs in summer-irrigated annual and perennial crops (UC/IPM, 2016). *Cyperus esculentus* grows throughout California to an altitude of approximately 1,000 m (about 3,300 ft) above sea level (UC/IPM, 2016) and tolerates temperatures ranging from -4 to 36° Celsius (C) [(approximately 24-97° Fahrenheit (F)] (CalFlora, 2014). Per CABI, *Cyperus esculentus* bud sprouting can occur at temperatures ranging from 10-42°C (50-107.6°F), with most growth occuring at temperatures between 12-38°C (53.6-100°F). *Cyperus esculentus* grows in sandy fields, roadsides, and waste places, moist disturbed or unstable sandy or loamy soil, margins of lakes, streams and ditches, and wet prairies (CABI, 2014).

-Low (1) Not likely to establish in California; or likely to establish in very limited areas
- Medium (2) may be able to establish in a larger but limited part of California
- High (3) likely to establish a widespread distribution in California

2) **Known Pest Host Range:** Score is **High (3)**
Cyperus esculentus can occur wherever general ecological conditions exist that are conducive to its survival.
- Low (1) has a very limited host range
- Medium (2) has a moderate host range
- High (3) has a wide host range

3) **Pest Dispersal Potential:** Score is **High (3)**
Cyperus esculentus reproduces by tubers that are attached to the rhizomes. Tubers can persist in the soil and continue reproducing even when the plant is pulled up by the roots (University of Georgia, Center for Invasive Species and Ecosystem Health, 2018). *Cyperus esculentus* can quickly regenerate from a single tuber (CABI, 2014). Long-distance dispersal of *Cyperus esulentus* occurs through the movement of tubers in contaminated crop seed or rootstocks, bulbs, ships ballast, and tillage or harvesting equipment (Defelice, 2002).

The seeds of *Cyperus esculentus* have "low viability" in California (UC/IPM, 2016). Seeds are not considered a source of reproduction and spread of *Cyperus esculentus* in California (UC/IPM, 2016).

- Low (1) does not have high reproductive or dispersal potential
- Medium (2) has either high reproductive or dispersal potential
- High (3) has both high reproduction and dispersal potential

4) **Economic Impact:** Score is **High (3)**
Cyperus esculentus "behaves as a weed in almost all temperate, tropical and subtropical regions of the world" and can greatly reduce crop yields (UC/IPM, 2016). Morales-Payan et al. (2005) summarize the results of several studies detailing the reduced yields of various crops including asparagus, eggplant, onion, tomato, and bell pepper by 16-89% when grown in association with *Cyperus esculentus*. For watermelon grown in association with *Cyperus esculentus*, Morales-Payan et al. (2005) cite research showing an almost complete yield loss.

In 2021, the total value of tomato production in California was approximately $1.2 billion. In 2021, the approximate production value for asparagus was $21 million, for onion was $297 million, for bell pepper was $184 million, and for watermelon was $70 million (CDFA Crop Report, 2021-22).

Cyperus esculentus is difficult to control (UC/IPM, 2016). Per CABI (2014), once established, *Cyperus esculentus* it is extremely difficult to eradicate because of its "stratified and layered root system, with tubers and roots being interconnected." Managing nutsedges in general can include labor-intensive and time-consuming methods such as repeated mulching, hoeing, shoot removal, and herbicide applications (Morales-Payan et al., 2005).

Per CABI (2014), *Cyperus esculentus* may be associated with harboring and/or transmission of pests and diseases including *Agrotis segetum* (turnip moth), *Elasmopalpus lignosellus* (lesser corn stalk borer), *Haplaxius crudus* (American palm cixiid), *Chaetocnema pulicaria* (corn flea beetle), *Rosellinia necatrix* (dematophora root rot), *Rotylenchulus reniformis* (reniform nematode), Impatiens necrotic spot virus (TSWV-I), *Meloidogyne arenaria* (peanut root-knot nematode), and Rice yellow mottle virus.

Cyperus esculentus is listed as a Harmful Organism for the countries of New Zealand, Niue, and Taiwan (USDA/PExD, 2024). Shipments, including agricultural seed, destined to these countries are subject to phytosanitary restrictions pertaining to C*yperus esculentus.* Shipments that do not meet the specified requirements may be subject to rejection, treatment, reconditioning, or destruction, typically at the owner's expense.

A. The pest could lower crop yield.
B. The pest could lower crop value (includes increasing crop production costs).
C. The pest could trigger the loss of markets (includes quarantines).
D. The pest could negatively change normal cultural practices.
E. The pest can vector, or is vectored, by another pestiferous organism.
F. The organism is injurious or poisonous to agriculturally important animals**.**
G. The organism can interfere with the delivery or supply of water for agricultural uses.

Economic Impact:
- Low (1) causes 0 or 1 of these impacts
- Medium (2) causes 2 of these impacts
- High (3) causes 3 or more of these impacts

5) Environmental Impact: Score is **High (3)**

Cyperus esculentus can form dense stands, especially in disturbed wetlands (University of Georgia, Center for Invasive Species and Ecosystem Health, 2018). Per CABI, *Cyperus esculentus* colonies can increase by more than one meter per year. *Cyperus esculentus* can outcompete native plant species for water, light, and nutrients (CABI, 2014).

A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
B. The pest could directly affect threatened or endangered species.

C. **The pest could impact threatened or endangered species by disrupting critical habitats.**
D. **The pest could trigger additional official or private treatment programs.**
E. **The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.**

Environmental Impact:
- Low (1) causes none of the above to occur
- Medium (2) causes one of the above to occur
- High (3) causes two or more of the above to occur

Consequences of further spread in California for *Cyperus esculentus* **High (15)**

Low = 5-8 points
Medium = 9-12 points
High = 13-15 points

1) **Post Entry Distribution and Survey Information**: Score is **High (-3)**

-Not established (0) Pest never detected in California or known only from incursions.
-Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).
-Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.
-High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.

7) **Final Score: Medium (15-3=12)**

Conclusion and Rating Justification:
Despite the economic impacts of *Cyperus esculentus* on California's agricultural industry, including reduced yield of important fruit and vegetable crops and the rejection of agricultural seed shipments infested with *Cyperus esculentus*, the weed is so widespread in California that a C-rating is recommended. Because it is a Section 4500 Noxious Weed, seed of *Cyperus esculentus* is Restricted by reference. As a Noxious Weed, it is not legal to propagate or sell this species in California.

Uncertainty
Because of its long history and wide range in California, there is little uncertainty about the behavior and impacts of this weed.

References

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Responsible Party: California Department of Food and Agriculture; Seed Laboratory and Herbarium; 3294 Meadowview Road, Sacramento, CA 95832; (916) 738-6700; permits@cdfa.ca.gov.

***Comment Period: 08/01/2024 through 09/15/2024**

***NOTE:**

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at permits[@]cdfa.ca.gov.

Comment Format:

- Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

  Example Comment:

  Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to "Climate/Host Interaction" here.]

- Posted comments will not be able to be viewed immediately.

- Comments may not be posted if they:

Contain inappropriate language which is not germane to the pest rating proposal;

Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

Violates agency regulations prohibiting workplace violence, including threats.

- Comments may be edited prior to posting to ensure they are entirely germane.
- Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

Pest Rating: C