**Sorghum halepense**

**System:** Terrestrial

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
</tr>
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<tbody>
<tr>
<td>Plantae</td>
<td>Magnoliophyta</td>
<td>Liliopsida</td>
<td>Cyperales</td>
<td>Poaceae</td>
</tr>
</tbody>
</table>

**Common name**
- sorgho (French, New Caledonia), yerba Johnson (English), Johnson grass (English), Johnsongrass (English), Aleppo grass (English), Aleppo milletgrass (English), sorgho d'Aleop (French), sorgo de Alepo (French), herbe de Cuba (French), kola (Tongan), gumai (Russian), zacate Johnson (English), grama China (English), Don Carlos (English), cañuela (English)

**Synonym**
- Andropogon arundinaceus, Scop. 1772
- Andropogon halepensis, (L.) Brot. 1804
- Andropogon halepensis, (L.) Brot. var. anatherus Piper 1915
- Andropogon halepensis, (L.) Brot. var. genuinus Stapf ex Hook. f. 1896
- Andropogon halepensis, (L.) Brot. var. muticus (Hack.) Asch & Graebn. 1915
- Andropogon halepensis, (L.) Brot. var. typicus Asch & Graebn. 1898
- Andropogon sorghum, (L.) Brot. ssp. halepensis (L.) Hack 1889
- Andropogon sorghum, (L.) Brot. subvar. genuinus Hack 1889
- Andropogon sorghum, (L.) Brot. subvar. leiostachys Hack 1889
- Andropogon sorghum, (L.) Brot. subvar. muticus Hack 1889
- Blumenbachia halepensis, (L.) Koeler 1802
- Holcus halepensis, (L.) Cav. 1802
- Milium halepense, (L.) Cav. 1802
- Sorghum almum, Parodi 1943
- Sorghum almum, Parodi var. typicum Parodi 1943
- Sorghum controversum
- Sorghum halepense, (L.) Pers. var. muticum (Hack.) Grossh. 1928
- Sorghum miliaceum, (Roxb.) Snowden
- Sorghum saccharatum, (L.) Moench var. halepense (L.) Kuntze 1891

**Similar species**
- Sorghum bicolor ssp.drummondii

**Summary**
Sorghum halepense is an extremely invasive noxious weed with a worldwide distribution. High seed production and an extensive rhizomal system makes it difficult to eradicate. This species has a number of detrimental effects including: toxicity to grazing stock, fire risk during summer and competitive exclusion of other plants. It reduces soil fertility, acts as a host for crop pathogens and is a known allergen.
Species Description
Perennial grass with strong rhizomes; rhizomes fleshy, to 1cm in diameter, to 2m long, often rooting from the nodes; culms erect, to 1.5m tall; nodes with short pubescence; sheaths glabrous; ligule ciliate-membranous, 2mm long; blades elongate, usually 1-1.5cm wide, the midrib prominent; panicles 15-25cm long, branches ascending; spikelets 5mm long, acute; first glume hard; fertile lemma awned or awnless, awn if present 1cm long or less" (Stone, 1970). Grain remains enclosed by glumes, 4.0-6.6mm long, 2.0-2.6mm wide, oblong-ovate, glumes reddish brown to shiny black. The plant has both diploid and tetraploid races, with a chromosome number of either 2n = 20 or 40 (Stone, 1970; Warwick and Black 1983).

Notes
*S. halepense* is able to spread through a number of pathways. Seeds can be distributed via livestock, wind, contaminated farm machinery, hay or grain. They may also move long distances if transported by water, or in the excreta of birds or livestock (Holm et. al. 1977; Warwick and Black 1983).

A problem species in Hawaii. A Class A (eradicate) noxious weed in New Zealand. Fosberg *et al* (1987) list three varieties: *S. halepense* var. *halepense* f. *halepense*, present on Saipan and Rota; *S. halepense* var. *halepense* f. *muticum* (Hack.) Hubb., present on Saipan, Tinian, Rota, Guam, Palau, Chuuk, and Pohnpei; and *S. halepense* var. *propinquum* (Kunth) Ohwi, present on Saipan and Palau. There is some question as to whether or not the species in Western Polynesia is *S. halepense* or not. Whistler (1988) identifies it as *S. sudanense* (Piper) Stapf.

Lifecycle Stages
Plant development begins from rhizomes that have overwintered up to 120cm deep in the soil. These serve as the energy source for above and below-ground development of the plant in the spring. Flowering occurs throughout the growing season, depending on the climate, and the majority of rhizome growth occurs after flower production. Tertiary rhizomes grow deep into the soil during winter and serve as the following season's primary structure. Seeds can lie dormant for long periods of time, with 50% still able to germinate after 5 years (The Nature Conservancy Element Stewardship Abstract).

Uses
*S. halepense* is still in wide use as a forage plant, and was originally introduced to the United States as such in the early 1800s, later spreading into crops. Under optimum growing conditions it can provide nutritious fodder. Although toxicity can be high in younger plants, cured hay is considered safe for livestock (Washington State Weed Control Board). Because of the tendency of the plant to form spreading patches, it can be used to stabilise erosion-prone land (The Nature Conservancy Element Stewardship Abstract).
Habitat Description
Moist tropics, sub-tropics and Mediterranean climate zones. Adaptations depend upon whether the plants are Mediterranean or tropical ecotypes; and while most are frost-sensitive, some have been able to overwinter in warm temperate zones of Europe, the United States and Canada. Plants are generally intolerant of hot, dry conditions which can lead to dessication and rhizome death (McWhorter 1972). *S. halepense* thrives in fertile lowland areas, especially where land has been disturbed or cleared, and is particularly productive during the rainy season in tropical areas (La O et al.1993b).

Reproduction
Reproduction is by seed and by budding from rhizomes, both determined by such environmental factors as soil fertility, air temperature and moisture availability. Seeds germinate after a period of dormancy imposed by mechanical restrictions of the seed coat. Seeds can lie dormant for long periods of time, with 50% still able to germinate after 5 years (The Nature Conservancy Element Stewardship Abstract). The optimal air temperature for seed germination is within the range 25-30°C (Horowitz 1972a). The ultimate plant size and number of tillers will determine the seed production, which can vary from 540 to 1440kg/ha (McWhorter 1973, 1989). Rhizome initiation usually takes place a month or 45 days after Johnson grass emergence from seed, and coincides with tillering or the 6-7 leaf stage of shoot growth (Oyer et al. 1959; Anderson et al. 1960; Horowitz 1972a; La O et al. 1993a). This process is commonly faster with plants developing from perennial rhizomes bearing buds which germinate readily. Rhizomes are distributed mainly in the top 20cm of the soil profile. Most are located in the first 15cm, but up to 10% are found below 30cm (Horowitz 1972b; McWhorter 1972). Rhizome growth is more abundant than the shoot growth (Oyer et al. 1959; La O et al. 1993b) and in some cases rhizome fresh weight reaches 90% of the whole developed Johnson grass plant (Horowitz 1972b). Apical dominance is broken with rhizome fragmentation, which consistently stimulates lateral bud germination (Hull 1968) and each bud produces one shoot. *S. halepense* produces prodigious amounts of seed. Depending on conditions, over 1kg of seed can be produced per plant over one growing season. Rhizomes can grow 60 to 90 metres in one growing season (Warwick and Black 1983).

Nutrition
Adapted to a wide range of soil types, but prefers fertile porous soils with a pH between 5 and 7.5 (Nature Conservancy Element Stewardship Abstract)
General Impacts
Considered a serious agricultural pest. Its extensive spreading rhizome and shoot system and high rate of seed production make it extremely invasive. Its height and size further allow it to shade out surrounding plants and to decrease the availability of moisture and nutrients to them. It is also believed to produce allelopathic chemicals capable of inhibiting the germination and seedling development of a number of crop species. Numerous recent reports from around the world show that the principal crops affected by its weedy traits continue to be maize, sugarcane, grain sorghum, soybean, sunflowers, wheat, citrus crops and cotton as outlined in Holm et al. 1977. It has also been an alternate host for many insect, fungal, viral, bacterial and nematode pathogens that attack crops. Other problems can arise from gene transfer between Sorghum halepense and S. bicolor. This can result in smaller seed and reduced yield of the latter, and can complicate control of S. halepense in sorghum crops, particularly if transgenes are involved (Arriola & Ellstrand 1996). Under very hot dry conditions, dessicated plants can become a fire hazard, particularly in the tropics. It also has dangers as a forage crop. Stress (caused by drought, frost, herbicides) or mechanical damage (eg. trampling by stock) can cause the plant to produce hydrocyanic acid, particularly in the young leaves and stems of secondary growth. This can prove toxic to grazing livestock (Findlay 1975). Horses are subject to inflammation of the bladder from any Sorghum spp (Food & Agriculture Organisation of the United Nations).

Management Info
Various methods have been used to control *Sorghum halepense*. While herbicides continue to provide the most effective control of plants growing among crops in Europe and North America (e.g. Bridges & Chandler 1987), herbicide-resistant strains have been reported (Smeda et al. 1997), and biological controls are being studied (Milhollon 2000; Chandramohan et al. 2002 ). Alternative management systems involving such measures as crop rotation can be effective in areas where herbicides are unavailable or too expensive (Ugen & Wortmann 2001). Various kinds of mechanical control have been used to prevent seed dispersal and rhizome production before the plants become fully established. These include slashing the plants at the beginning of the flowering stage in field margins, ditch banks, canals and crop land; avoiding animal grazing in infested areas; and cultivation within the first month after shoot emergence to prevent new rhizome production (The Nature Conservancy Element Stewardship Abstract). McWhorter (1989) considers that cultivation is most effective when the grass is about 36cm tall, helping to prevent the plants from maturing and spreading. The Nature Conservancy’s Stewardship Abstract contains information on control methods.
For details on preventative measures, chemical and physical control options, please see management information.

Pathway
Originally planted in the 1800s as a forage crop (this method may be unlikely at present)Seeds may be found in the coats of livestock

Principal source: Pacific Island Ecosystems at Risk (PIER), 2006. *Sorghum halapense* (L.) Pers., Poaceae
Compiler: IUCN SSC Invasive Species Specialist Group
Updates with support from the Overseas Territories Environmental Programme (OTEIP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

Review: Dr. Ardath Francis, Agriculture and Agri-Food Canada.

Publication date: 2010-10-04

ALIEN RANGE
[1] AMERICAN SAMOA
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[1] NEW ZEALAND
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[1] SWAZILAND
[1] TURKEY
[1] WALLIS AND FUTUNA

BIBLIOGRAPHY
27 references found for *Sorghum halepense*

Management information


California Dept. Of Food & Agriculture - Noxious Weeds database

Summary: Contains information on both *S. halepense* and the related *S. bicolor* (syn. *S. bicolor* ssp. *drummondii*). Provides good info on reproduction and growth. Has a small amount of management information.


Summary: Uses *Clidemia hirta* in Hawaii as an eradication case study. *Clidemia* is in the Melastomataceae and somewhat similar ecologically to miconia.

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


Summary: The National Pest Plant Accord is a cooperative agreement between regional councils and government departments with biosecurity responsibilities. Under the accord, regional councils will undertake surveillance to prevent the commercial sale and/or distribution of an agreed list of pest plants.


Pacific Island Ecosystems at Risk (PIER), 2006. *Sorghum halepense* (L.) Pers., Poaceae


Royal New Zealand Institute of Horticulture (RNZIH), 2005. Johnson grass *Sorghum halepense*


Swaziland’s Alien Plants Database, Undated. Sorghum halepense

Summary: A database of Swaziland’s alien plant species.


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]

Washington State Noxious Weed Control Board. 2002. Information on Johnsongrass

Summary: Good summary of information on S. halepense. Mainly general information, but has short sections on control methods.

General information


Summary: Produced as a cooperative project between the Biological Diversity of the Guianas Program (Smithsonian Institution; Washington; DC USA) and the ORSTOM Herbarium (Cayenne; French Guiana); under the auspices of the Centre for the Study of Biological Diversity (University of Guyana; Georgetown; Guyana).


Summary: English:
La lista de especies del Sistema de información sobre especies invasoras en México cuenta actualmente con información sobre más de 100 especies. Estas incluyen su nombre científico, familia, género y nombre común, así como su estatus de invasión en México, vías de introducción, y enlaces a sitios especializados. Algunas de las especies de mayor riesgo ya tienen una garantía directa a la página de alertas. Es importante destacar que esta lista está en constante proceso de actualización y, por favor, consulte la página principal (http://www.conabio.gob.mx/invasoras/index.php/Portada) para obtener más información. Especies invasoras - Plantas 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 información sobre especies invasoras en México cuenta actualmente con información sobre más de 100 especies. Estas incluyen su nombre científico, familia, género y nombre común, así como su estatus de invasión en México, vías de introducción, y enlaces a sitios especializados. Algunas de las especies de mayor riesgo ya tienen una garantía directa a la página de alertas. Es importante destacar que esta lista está en constante proceso de actualización y, por favor, consulte la página principal (http://www.conabio.gob.mx/invasoras/index.php/Portada) para obtener más información. Especies invasoras - Plantas is available from: http://www.conabio.gob.mx/invasoras/index.php/Especies_invasoras_-_Plantas [Accessed 30 July 2008]


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 bio-sciences articles from BioOne journals.

MAF (Ministry of Agriculture and Forestry)/Biosecurity New Zealand Biosecurity website (New Zealand)

Summary: A small amount of info.


Summary: Resource that includes the distribution of invasive species throughout the Pacific Islands.
