

Weed Biology & Management

Biology and Management of Johnsongrass (*Sorghum halepense*) in Christmas Tree Production



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Sorghum halepense, also known as Johnsongrass and Aleppo grass, is a perennial grass weed primarily established in disturbed areas, rangelands, pastures, abandoned fields, canals, and cropping systems (Ceskeski et al., 2017). Native to Mediterranean regions of Europe and Africa, Johnsongrass was first introduced into the United States in 1830. Brought from Turkey to South Carolina as a forage species, Johnsongrass has escaped cultivation and widely spread across southeast and west parts of the United States including California and New Mexico classifying it as a “C” list noxious weed in 24 states (Janet, 2004). In the plant family Poaceae, Johnsongrass is a summer perennial growing 6-10 feet high and is generally rhizomatous (Janet, 2004).

Biology of Johnsongrass

Johnsongrass grows in hot, arid climates in habitats such as cultivated fields, pastures, banks of ditches, irrigated canals, moist sites, roadsides, gardens, prairie restorations, and waste areas. It grows well in moist soil environments as well as drier topsoils that are above high-water tables because of its extensive rhizome system (Ceskeski et al., 2017).

Emerging early summer, Johnsongrass is a high-growing perennial reaching up to 10 feet. Leaves are 12-30 inches long with flat blades 0.5-1 inch wide, and its erect stems are solid containing swollen nodes. It also produces rhizomes (0.75 inches diameter and several feet in length), which are fibrous roots under the soil. Rhizomes tend to be cream colored with purple and red marks. Johnsongrass can grow from

seeds or from overwintering rhizomes. For seeds to germinate, the temperature needs to be about 70-75 degrees Fahrenheit while for rhizomes it only needs to be 60 degrees. The seeds are purplish or glossy red. Plants tend to grow in early summer around April (Ceskeski et al., 2017).

Johnsongrass can form a horizontal system called rhizomes, which can be up to 8 inches deep in the soil. A rhizome can grow up to several feet during a growing season and 200-300 feet of new rhizome growth per year. For every node produced, a new plant grows from beyond that node. (Ceskeski et al., 2017). Shoots bulge from the crown base while standing upright and unbranched. The first leaf blades are parallel to the ground with hairless smooth edges and a whitish mid-vein. The nodes of the stem have fine hairs, which is the only location on the stem

Series for Christmas Tree Production



Figure 1. Inflorescence of Johnsongrass. Photo credits: Plant & Pest Diagnostics, Michigan State University.

that has hair. Additionally, the stems located below the ground are dense and fleshy (University of California Agriculture and Natural Resources, 2023).

The inflorescence is conical shaped with open panicles (Figure 1). The panicle ranges from pale green to purple brown at around 15-35 mm long. The stem with the rachis is short and hairy while the stem with the pedicels is long and hairy. The spikelets are paired with one being seed-bearing and the other having the stalk and stamens. The purplish to greenish-yellow glumes that surround the spikelets have rounded back with an acute tip completely covering the florets (Montana Field Guide, 2023). Johnsongrass produces flowers from May to October. The flower head has a pyramidal shape with open, well branched flowers (University of California Agriculture and Natural Resources, 2023). The flowers bloom green and mature into dark red/purple brown (Janet, 2004). Eight to sixteen hours of daylight is required for this plant to flower. Johnsongrass can produce up to 80,000 seeds in one growing season. The seed head (around a foot long) has a whorled pattern and at the tips of the branches, spikelets (flowers) occur in pairs of three. Fertile spikelets have either bent or no bristles (Prather, 2016).

New populations tend to be established by seeds while population growth is controlled from asexual regeneration by rhizomes. Under ideal conditions, Johnsongrass has high seed production in the early summer with lower seed production in late summer. Total estimated production of seeds is 90 gallons/acre in southern locations. When conditions are poor, rhizome produces new Johnsongrass weeds. Johnsongrass

seeds can be dispersed with wind, water, machinery, and animals. The spikelets disperse under the parent plant (Janet, 2004). The size of the seeds average from 1/116 of an inch to 3/16 of an inch retaining a football shape (Ceseski, 2017).

Similar Species:

A similar species is shatter cane sorghum. Shatter cane seeds are oval shaped instead of a football shape. They also have a waxier stem and have leaves with a v-shaped midrib. Another similar summer species is Barnyardgrass (*Echinochloa crus-galli*). Barnyardgrass does not have ligules and panicles are not arranged in pyramidal form. Other similar species such as giant reed, perennial ryegrass, and tall fescue can be distinguished from Johnsongrass by their presence of aruricles (Ceseski, 2017).

Management of Johnsongrass:

Physical and Cultural Control: Identifying and locating Johnsongrass is important to subdue future infestations. Growers should monitor disturbed areas nearby and make sure any equipment is cleaned before relocation to prevent the spread of rhizomes or seeds. Johnsongrass should only be hand-weeded when the plants are young, and the soil is soft. If the weed is not thoroughly removed, rhizomes fragments left in the soil can sprout new weeds. Mowing is also important to depleting energy stores in rhizomes and should be done in intervals of 2 to 4 weeks when the plant is 8-12 inches tall.



Grazing can be another option of seedling and sprout control but cannot control rhizome new plant sprouts. Grazing may not be possible if the Johnsongrass leaves build up toxic amounts of cyanide, which could harm the animals (Ceskeski et al., 2017). To avoid new introduction of seeds, mulch can be used. Johnsongrass has little



shade tolerance and does not establish population under canopies (Janet, 2004).

Chemical control: Chemical control includes the application of preemergence and

postemergence herbicides. Preemergence herbicides need to be applied either before germination of the weed seeds or just after the germination, when the seedlings are very small. The following are some of the preemergence herbicides that are labeled for use in Christmas tree production and have shown good to excellent control of Johnsongrass: indaziflam (Marengo), prodiamine (Barricade), pendimethalin (Pendulum Aquacap), and s-metolachlor (Pennant Magnum) (Yu et al., 2022). Postemergence herbicides are applied at later stages, and they are most effective when applied to young actively growing weeds that have not reached their reproductive stages. glyphosate (Roundup) has shown good control of Johnsongrass (Yu et al., 2022). Other



postemergence herbicides that can provide good control are clethodim (Envoy Plus), fluazifop-butyl (Fusilade), and sethoxydim (Segment) (Yu et al., 2022). It is highly recommended to read the manufacturer's label of the herbicides before application and make sure the application timing is right and the herbicide is safe for the Christmas tree varieties.

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