

JAPANESE MILLET

Echinochloa esculenta (A. Braun) H. Scholz

Plant Symbol = ECES



Photograph of Japanese millet. Photo by David Fenwick on AphotoFlora, <http://www.aphotoflora.com>, hosted by the USDA-NRCS PLANTS Database.

Alternate Names

Common Names: barnyard millet, white millet, black millet, alkali millet, water grass, duck millet, Shirohie millet (Australia)

Scientific Names: *Echinochloa utilis* Ohwi & Yab., *Echinochloa frumentaceae* L., *Echinochloa crus-galli* var. *frumentacea* (Roxb.) Wight.

Description

General: Japanese millet (*Echinochloa esculenta*) is an introduced, annual, warm-season grass that is grown primarily as forage and wildlife habitat in the United States. It is a domesticated species derived from wild millet barnyardgrass (*E. crus-galli*). It is robust with coarse, hairless leaves 4–20 in (10–50 cm) long (Mitchell, 1989) has a thicker stem than most millets, grows 2–4 ft (60–122 cm) tall, with a brown to purple inflorescence. There are 5–15 racemes (stalked inflorescences) that curve inward, pressed closely to the main stem. The spikelets are awnless, slightly warty, with bristly nerves. It has a fibrous root system that can reach to 1½ ft (46 cm) deep (Pittman and Sweeney, 1983).

Japanese millet is sometimes confused with barnyard grass (*E. crus-galli*), but has a compact inflorescence with reddish-purple seed with no awns, while barnyard grass has an open-branched panicle and white seeds with conspicuous awns.

Distribution: Japanese millet is thought to have been domesticated from barnyard grass (*E. crus-galli*) in eastern Asia and is sometimes referred to as billion-dollar grass (*E. frumentacea*). Billion-dollar grass is an introduced species in the United States thought to have originated in tropical southern Asia (Yabuno, 1987). It can be grown throughout the United States, and its range extends from Canada to northern Mexico (Mitchell, 1989). For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

Habitat: Japanese millet can occur in wetlands and non-wetland sites depending on the region where it is found. It can be found along rivers and ponds, is abundant in freshwater marshes, and can be a weed in rice fields (Anitha, 2013). It does not grow well on sandy soils (Curran and Lingenfelter, 2012).

Adaptation

Japanese millet can grow in flooded soils and standing water (Hancock Seed Co., 2013) as long as a portion of the plant remains above the water's surface (Surrency and Owsley, 2006). It is better suited for colder climates and wetter soils than other annual summer grasses such as sorghum (*Sorghum bicolor*), browntop millet (*Urochloa ramosa*), and corn (*Zea mays*) (Curran and Lingenfelter, 2012; Mitchell, 1989); however it has limited frost tolerance and will winter kill (Marr et al., 1998). It can grow at low and medium altitudes (Farrell, 2011). It is adapted to soils with pH as low as 4.5 and salinity of 2,000–3,000 parts per million (Farrell, 2011; Mitchell, 1989), but grows best in sandy-clay loams (FAO, 2014) with pH values from 4.6–7.4 (Mitchell, 1989).

Uses

Forage/Feed: Japanese millet is often grown as forage in the United States. It can produce up to 3,500 lb/ac of dried aboveground biomass (Creamer and Baldwin, 1999). The straw has greater protein and calcium content than rice, oat, and timothy (Yabuno, 1987).

Cover crop/green manure:

Japanese millet is a weed-suppressing cover crop that can grow up to 4 ft in 45 days (Curran and Lingenfelter, 2012). It is considered a good smother crop and has been shown to reduce the dry weight and the number of plants of yellow nutsedge (*Cyperus esculentus*) through root competition for nutrients and water (Thullen and Keeley, 1980). It is a good N scavenger and can be used as a fast-

growing catch-crop. When Japanese millet is combined with cowpea, it can provide good weed suppression and improve the N fixation of cowpea (Brainard et al., 2008); however, it may be too aggressive to be beneficial in most mixes (Marr et al., 1998). It is not recommended for aerial seeding. It has a C:N ratio of 42 and can add 35 lb/ac N in aboveground biomass (Creamer and Baldwin, 1999).

Wildlife: Japanese millet is most often planted in the United States as feed for waterfowl (Mitchell, 1989). The seed produced by Japanese millet is a preferred food source for ducks, doves, and turkeys (Stewart and West, 2004) and is also a fair food source of pheasant (Mitchell, 1989). It can be planted around the edge of ponds and impoundments to provide good hunting habitat in shallow-water areas. For duck habitat, it is interplanted with corn to add dietary diversity near flooded areas (Stewart and West, 2004). It is also eaten by a number of songbirds such as sparrows, finches, and cardinals (Farrell, 2011). For a comprehensive list of bird species see Mitchell (1989).

Critical Area Planting: Japanese millet's fast growth and fibrous root system makes it a good plant for controlling erosion (Marr et al., 1998). It has been shown to increase the bearing capacity in waste clay settling ponds produced by mining activities (Pittman and Sweeney, 1983).

Ethnobotany

Japanese millet was once grown as a staple food crop in Japan in regions where rice could not be cultivated, or as an emergency/subsistence crop when rice harvests failed (Yabuno, 1987). The grain contains twice the protein content of regular milled white rice (Yabuno, 1987). The seed is gluten-free.

Status

Weedy or Invasive: Japanese millet has the ability to become weedy, often reestablishing itself in fields where it has been previously grown (Harper, 2009) and/or escaping to roadsides, ditches, and waste places (Mitchell, 1989). It produces a large amount of seed that can easily scatter and germinate (FAO, 2014). Because it is a popular seed for waterfowl food plots, it may also be transported through bird activity and migration. It can be problematic in some rice fields. Please consult with your local NRCS Field Office, Cooperative Extension Service office, state natural resource, or state agriculture department regarding its status and use.

Please consult the PLANTS Web site (<http://plants.usda.gov/>) and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Planting Guidelines

Japanese millet can be successfully seeded into duck field impoundments, drained marshland, pond and lake edges, bottomland stands, and beaver ponds (Mitchell, 1989). It

should be seeded in full sun from mid-June in the Northeast to July–August in the Southeast, at 20–25 lb/ac, ¼–½ in deep (Curran and Lingenfelter, 2012) or 8–12 lb/ac in a mix. In some warmer regions it may be planted as early as April (Baldwin and Creamer, 2009). It can be broadcast at 20 lb/ac and covered lightly ¼ in deep for wildlife food planting (Stewart and West, 2004) or directly seeded into mud flats or well-prepared fields. If there is concern about smothering native species when reseeding meadows, a lower seeding rate of 10 lb/ac should be used (Ernst Seed, 2013). Moist soil is required for optimum germination. In flooded fields, seeds should be first pretreated by soaking overnight to ensure the seed sinks during seeding (Mitchell, 1989). Typically, stands require no soil amendments.

Management

Japanese millet grows best in full stands without companion plants (Stewart and West, 2004). It can tolerate frequent cuttings (Marr et al., 1998) but should be allowed to at least reach 20 in before cutting (Pritts and Nonnecke, 2005). It can be terminated by mowing or undercutting (Creamer and Baldwin, 1999), and will not survive fire (FAO, 2014). For waterfowl food planting in the Southeast, plant in late summer when the soil is dry enough to plant and flood two weeks before duck season (Stewart and West, 2004). Water control structures may be used to dewater sites in either late spring or summer and to flood the site again before fall migration (Mitchell, 1989). Water drawdown in spring however should not interfere with spring waterfowl migration or late-season wood duck hatching.

Pests and Potential Problems

Japanese millet may be a host for root knot nematodes (Radovich, 2010).

Environmental Concerns

Seeds and Plant Production

Seeds can reach maturity in 50–60 days (Stewart and West, 2004), but most varieties will mature in 80–90 days (Surrency and Owsley, 2006). It will produce approximately 1,500–2,000 lb/ac seed (Mitchell, 1989) with 142,900 seeds/lb (Advance Cover Crops, 2013). Many seeds will remain on the seedhead into January (Mitchell, 1989).

Cultivars, Improved, and Selected Materials (and area of origin)

Yabuno (1987) reports that there are 120 cultivars of Japanese millet grown at the Tohoku Agricultural Experiment Station, Japan. Japanese millet 'Chiwapa' is a cultivar developed by the USDA-NRCS Mississippi Plant Materials Center in 1965. Japanese millet is readily available from a variety of commercial seed dealers. Cultivars should be selected based on the local climate, resistance to local pests, and intended use. Consult with your local land grant university, local extension or local USDA NRCS office for recommendations on adapted cultivars for use in your area.

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