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Using Japanese Millet as a Summer Cover Crop

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Like winter cover crops, summer cover crops reduce soil erosion, scavenge nutrients, and help build soil organic matter. Summer cover crops can also be an important tool for fighting weeds, particularly for farmers who choose not to use herbicides. Fast-growing summer cover crops reduce growth of summer annual weeds in fallow fields. They can also compete with perennial weeds, reducing carbohydrate storage in crowns or rhizomes. This reduces weeds' ability to regrow following cultivation or tillage. For vegetable growers, summer annual grass cover crops can be a valuable rotation crop as grasses generally do not share insect pests or pathogens with vegetable crops. One summer annual grass well-suited to New England conditions is Japanese millet.

What is Japanese Millet?

Japanese millet (*Echinochloa esculenta*, formerly *E. utilis*) is a summer annual grass native to eastern Asia. It was domesticated in Japan at least 4,000 years ago, and was an important food and forage crop in areas that were too dry or cool for growing rice (Yabuno 1987). Japanese millet is not related to the more widely known pearl millet (*Pennisetum glaucum*). Rather, it is closely related to barnyard grass (*Echinochloa crus-galli*) and the native New England species *E. muricata* and *E. walteri* (Michael 2003). Like its wild cousins, Japanese millet prefers fertile soils, is tolerant of high soil moisture, and grows poorly in sandy soil.

In the United States the primary use of Japanese millet is as a feed for waterfowl and a component of wildlife meadow mixes (Shehan 2014). The seed is a preferred food source for ducks, doves, and turkeys, and is attractive to pheasants. Japanese millet also has potential for use as a cover crop or for temporary pasture. Under favorable conditions Japanese millet can grow to 4 feet in 45 days, producing over 2 tons of biomass per acre (Shehan 2014). Japanese millet has better forage quality than pearl millet, can be grazed or mowed repeatedly, and does not produce prussic acid.

Figure 1. Japanese millet seeded June 24 and photographed August 23. Dry biomass in this planting exceeded 5 tons/acre.

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In New England Japanese millet is best used as an alternative to buckwheat on fields that are to be left fallow for at least 6 weeks during the summer. It is generally grown as a monoculture, but researchers in North Carolina reported success with a mixture of forage soybeans and Japanese millet seeded at 54 and 12 lbs per acre, respectively (Creamer and Baldwin 2000). Japanese millet can produce more biomass than buckwheat in highly fertile soils, and can be left to grow for up to 10 weeks without maturing seed. Japanese millet is extremely tolerant of wet soils, and has better cold-climate tolerance than sorghum, sudangrass, or corn (Shehan 2014).

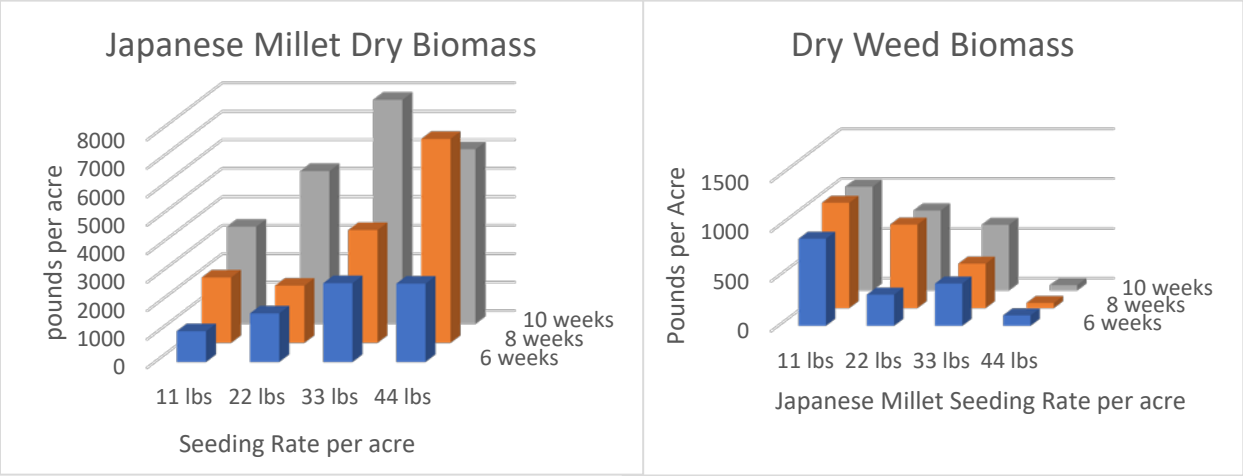

Figure 2. Effect of Japanese seeding rate on weed suppression and millet biomass production. Millet was seeded on June 20th in Kingston, RI and fertilized with 40 lbs nitrogen per acre.

A seeding rate of 44 lbs/acre is recommended when Japanese millet is grown as a monoculture to maximize weed suppression and biomass production. Japanese millet is very forgiving of seeding depth, with recommendations ranging from 1/4-inch deep in wetland soils to 1-inch deep in dry upland soils. Japanese millet can be seeded using a grain drill, a no-till grass drill, or a Brillion seeder, or it can be broadcast and incorporated by shallow cultivation. An excellent nitrogen scavenger, Japanese millet responds strongly to soil fertility. It is an excellent choice for a catch-crop following early summer incorporation of manure, legume cover crops, or sod.

Japanese millet seed will germinate with a soil temperature of 60°F at 2 inches depth, but growth rate and weed suppression are best if seeding is delayed until soil temperatures reach 70°F. In Rhode Island, seeding Japanese millet from mid-June to mid-July produced the most biomass. Vegetative growth rate in Japanese millet is strongly influenced by temperature, with plants growing faster at warmer temperatures (Muldoon et al. 1982). Vegetative growth stops at flowering. Japanese millet is a quantitative short day plant with a threshold of 13 hours (Muldoon 1985b). This means that in southern New England the transition from vegetative growth to flowering occurs more quickly after August 15th than earlier in the growing season. The difference is substantial; at constant temperature the vegetative stage (from germination to flowering) lasts almost five times longer under the long days of June and July as under the shorter days of late August and September (Swanton et al. 2000). July and August are generally warmer than June in New England, and increased rate of growth minimizes differences in biomass at flowering between Japanese millet stands seeded in June and those seeded in July. Biomass production is greatly reduced when Japanese

Figure 3. Japanese millet seeded May 21, 2015 into 61°F soil. Based on samples collected July 1, this planting produced 1200 lbs/acre of Japanese millet dry biomass. Photographed July 8, 2015.

millet is seeded in August or September as plants produce only 6-8 leaves before vegetative growth stops and flowering begins.

Seeding rate, nitrogen availability, soil moisture, soil temperature, air temperature, and seeding date all have strong effects on growth of Japanese millet. Biomass production varies widely from year to year, between fields, and from place to place within a field.

Japanese millet can be terminated by mowing after flowering. It will regrow if mowed to 4 inches or above during vegetative growth. The residue is compatible with the use of reduced tillage practices to establish the next crop. Frost will kill Japanese millet, but leaving it to winter-kill is not recommended. If Japanese millet seed is allowed to mature, it can overwinter and cause a weed problem the following year. Residue from Japanese millet terminated by mowing in mid-September is generally not sufficient to suppress chickweed and other fall weeds in Rhode Island, particularly in years with mild Fall weather.

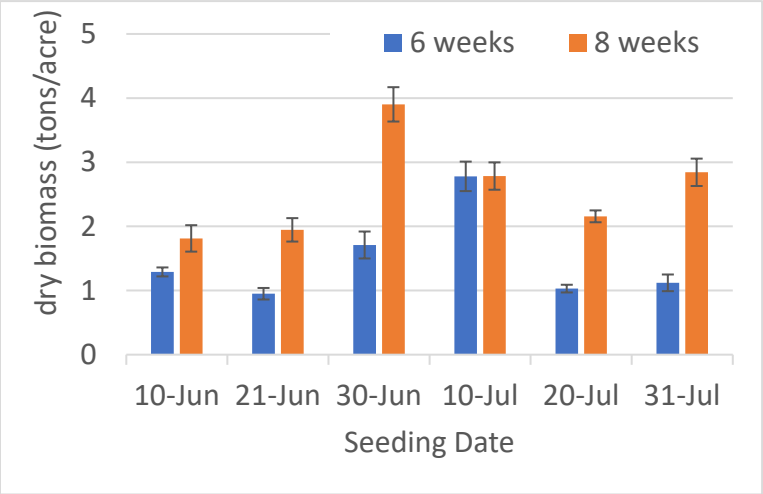

Figure 4. Effect of seeding date on Japanese millet biomass in Kingston, RI in 2017. The seeding rate was 30 lbs/acre. All plots received 40 lbs/acre supplemental nitrogen.

Acknowledgements

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