Pre-Commercial Screening of the Leading Biofuel Crop Miscanthus x giganteus for Invasive Plant Traits

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Miscanthus (*Miscanthus X giganteus*), a perennial grass native to central Japan, is a leading candidate as a dedicated biofuel feedstock due to its broad environmental tolerance, rapid growth rate, ability to grow in low production soils, and sterility. Aside from sterility, however, these characteristics also increase the probability of miscanthus escaping cultivation and becoming an invasive weed. Giant reed *(Arundo donax)*, a perennial grass native to the Mediterranean region, is an economically important invasive plant occurring in waterways and riparian zones throughout California and the southwestern US. Both species are potential biofuel crops and share life history characteristics and habitat preferences. To quantify the invasive potential of miscanthus in California environments, we assessed vegetative propugule shoot and root regeneration, establishment, and performance, under various types of abiotic stress. Miscanthus rhizome fragment weighing 1, 2, 5 and 10 g all generated shoots buried to a depth of 0, 5 and 10 cm. All treatment groups generated shoots and roots resulting in robust plants, except 1 g at 10 cm. Miscanthus and giant reed stem fragments weighing 1, 2, 3, and 5 g containing one node were placed and 5 and 10 cm and failed to produce any shoots that emerged, but generated shoots and roots in standing water, submerged under water with soil contact, and on the soil surface. Miscanthus and giant reed plants grown in pots for 8 weeks at soil moisture tensions ranging from flooded, control (approximately 0.0 Mpa), -0.27 Mpa, and -4.0 Mpa. Plants under drought treatments suffered reduced growth. All the plants experiencing -0.27 Mpa soil tension maintained photosynthetically active foliage for 8 week. The shoots of plants that experienced -4.0 Mpa soil tension were necrotic at the time of harvest. Rhizome fragments taken from -0.27 Mpa and -4.0 Mpa were placed in control conditions and, for both species, 75% of the fragments produced shoots. The ability of miscanthus to produce shoots and persist in both droughty and flooded conditions increases the probability of escaping field boundaries and establishing without human intervention in waterways or riparian areas.