Switchgrass (Panicum virgatum) is a native C4 perennial grass that has been cultivated for forage, soil conservation, landscaping, and prairie restoration, with planned expansion to millions of hectares to meet demands for cellulosic biomass. Transgenic traits examined in switchgrass field trials include increased biomass, nitrogen use efficiency, drought tolerance, herbicide tolerance, sterility, and reduced lignin content. Current cultivars may not be invasive, but fitness-enhancing traits and massive increases in propagule pressure may lead to weed problems in some cases. To address existing knowledge gaps, we are investigating pollen-mediated gene flow, seedling establishment, and the relative competitive ability of current nontransgenic cultivars vs. wild biotypes in a variety of locations (OH, IA, KS). Wild and cultivated switchgrass with matching ploidy (4x or 8x) are sexually compatible and both ploidy levels are common. Flowering times of these biotypes overlap, indicating that crop-to-wild gene flow is possible. Preliminary results from a gene flow study in Ohio suggest that cultivar pollen can sire seeds on wild sentinel plants up to 100 m away, which was the maximum distance tested. In common garden experiments, wild plants were significantly shorter than several cultivars and did not differ greatly in shoot number, but produced fewer seeds per plant than Kanlow; updated results on growth and competitive ability from 2012 will be presented. Seed burial experiments showed that cultivars have lower seed dormancy and longevity than wild plants. Recruitment from seed addition experiments was relatively low for both wild and cultivated genotypes. However, we found many cultivar volunteers in a common garden experiment in Ohio, including crop-wild hybrids. Under certain conditions, we expect that cultivated switchgrass can establish persistent volunteer populations that are genetically distinct from remnant wild populations. The ecological and evolutionary consequences of this process merit further consideration if new, higher-yielding cultivars are grown widely.

Keywords: gene flow, fitness, invasive, genetic diversity