



Are Graziers and Plant Breeders Responsible for Reed Canarygrass Invasion?



WISCONSIN GRAZING LANDS CONSERVATION INITIATIVE GRANT PROGRAM

Randy Jackson, Dept. of Agronomy at University of Wisconsin-Madison and Mike Casler, U.S. Dairy Forage Research Center at University of Wisconsin-Madison

Research Brief

#6

Reed canarygrass is a plant with multiple personalities. To conservationists, it is an invasive weed that displaces native species from wetlands throughout much of North America. To pasture managers, it is a productive, highly adaptable forage species that performs well in a wide range of settings. The dual nature of such species leads to a major concern that breeders' efforts to improve agronomic traits in crops can lead to novel invasive species. Reed canarygrass which has been improved by breeders for use as a forage crop was used as a case study to evaluate the potential of plant breeding to give rise to invasive species.

North American and European cultivars, European wild, and North American invader populations of reed canarygrass (*Phalaris arundinacea*) were evaluated in upland and wetland environments to identify differences in vigor between the groups of populations. There is little genetic pattern among populations in Europe and Asia, suggesting that the use of the species in agriculture in Europe for the past 200 years has led to significant mixture of populations in these regions. Analysis of early North American herbarium specimens confirmed the existence of a unique native North American population of the species that was present throughout North America in the late 19th century and may still be present in Alaska and remote regions of Canada.

The vast majority of present-day North American populations (>99%) are of Eurasian origin. In these populations, there is no evidence of an invasive genotype or over representation of subpopulations closely related to modern varieties, indicating that the development of improved varieties is unlikely to be the cause of invasion by the species.

The study results indicate that while cultivars were among the most vigorous populations in an agricultural environment (upland soils with nitrogen addition), there were no differences in above- or below-ground production between any populations in wetland environments. While early introductions of the species for agriculture were likely the source of North American invader populations prior to invasion, there do not appear to be major differences in biomass production or fecundity between modern cultivars and wild populations in wetland environments.

These results suggest that breeding has only marginally increased vigor of reed canarygrass in upland environments and that this increased vigor does not seem to translate into increased invasiveness in wetland environments. Breeding focuses on selection for improvements of a specific target range of environments, and stability across a wide range of environments has proved elusive for even the most intensively bred crops. The study concludes that breeding efforts are not responsible for wetland invasion by reed canarygrass. This information is useful to farmers because it determines that improved forage varieties are not responsible for invasion by the species.

The Grazing Lands Conservation Initiative Grant Program is a partnership between the private sector GLCI Steering Committee, the USDA Natural Resources Conservation Service and the WI Department of Agriculture, Trade, and Consumer Protection. This series of research briefs summarizes projects funded by this program. Our mission is to expand the use of profitable, grazing-based livestock production systems that foster environmental stewardship. This is accomplished through high quality technical assistance to owners and operators of private land, university and producer coordinated research, and educational programs. For more information on the program or on the research in this Brief, contact: Laura Paine, Grazing and Organic Agriculture Specialist, WI Department of Agriculture, Trade, and Consumer Protection, (608) 224-5120, laura.paine@wi.gov; or Rhonda Gildersleeve, Extension Grazing Specialist, University of Wisconsin-Extension, (608) 723-6243, rhonda.gildersleeve@ces.uwex.edu. This summary was written by Ken Barnett with University of Wisconsin-Extension.