

WHY CROP WEEDS SHOULD NOT BE CONSIDERED INVASIVE. Robert G Hartzler, Department of Agronomy, Iowa State University, Ames, 50011.

Alien species, such as giant foxtail, velvetleaf and common cocklebur, have cost Midwest farmers billions of dollars in yield losses and the need for increased control tactics (herbicides, tillage, etc.). There is no doubt that additional species capable of invading North American agronomic fields reside on other continents. The purpose of this talk is not to belittle the importance of these alien threats, but to make the case that invasive plants pose a greater threat to non-managed landscapes (prairies, woodlands, etc.) than agronomic fields. Weeds are an inherent component of crop production systems, and repeated disruptive tactics are required to maintain weeds below economic levels. The biological traits that favor invasion of agronomic crops typically are different than traits that favor invasion of areas with less frequent disturbance, thus most agronomic weeds are not successful at invading non-disturbed habitats. The tactics used to manage agronomic weeds usually do not discriminate between alien and native plants. Thus, native plants are just as problematic for farmers as aliens. While the introduction of a new alien might force changes in the type of management strategies used, it is unlikely that this introduction would cause a significant increase in the inputs needed to manage weeds. In contrast to agronomic fields, habitats that are not continuously disturbed have relatively stable plant communities and should not require repetitive intervention to manage weeds. Introduction of invasive species adapted to these ecosystems can result in the need for implementation of disruptive control tactics where previously intervention was not required.

Farmers are continually faced with weed shifts that force changes to weed management programs, and these shifts usually occur without introductions of new species. The rise in importance of giant ragweed and waterhemp, two native ruderals, illustrates the adaptive nature of successful weedy species. Based on the number of citations in the NCWSS Proceedings, research projects investigating these two weeds increased 43 fold between 1982 and 2003. Several factors likely are responsible for the rise in importance of these two species, some associated with changes in crop production practices, and some due to weedy adaptation. The evolution of herbicide resistance in waterhemp is one factor contributing to its rise as a dominant weed in many states (IA, IL, KS, MN, MO). Biotypes possessing resistance to three different sites of action have eliminated the majority of herbicide options for controlling this weed in soybean. While the historic range of waterhemp extends across the North Central region, the spread of 'difficult to control' waterhemp can be tracked across the region much like a newly introduced species. Management problems with waterhemp were first reported in MO and southern IL in the mid to late 1980's, and during the 1990's the 'problem' biotypes spread to the west, north and east. The reason for this pattern of range expansion is unclear. Giant ragweed presents another example of adaptation of a native plant with weedy characteristics. Giant ragweed is considered the primary weed problem for farmers in OH and IN, but the species diminishes in importance moving west across the region. Differences in emergence patterns of giant ragweed across the region are strongly correlated with the magnitude of problems caused by the species. Research suggests emergence characteristics favorable for survival in agronomic fields evolved first in the eastern Cornbelt and are moving westward.

The rise in importance of waterhemp and giant ragweed illustrate that adaptations in established native species can be as problematic as the introduction of a new alien plant, and result in the need to continually modify weed management systems. The cost associated with invasions of less intensively managed areas can be much greater than that of agronomic fields where control measures are already needed. Because of this, I believe research and regulatory efforts should focus on species adapted to natural areas rather than species adapted to cropland.