NC-1026 (2006-2011)

Improved Weed Management Decision Support Systems

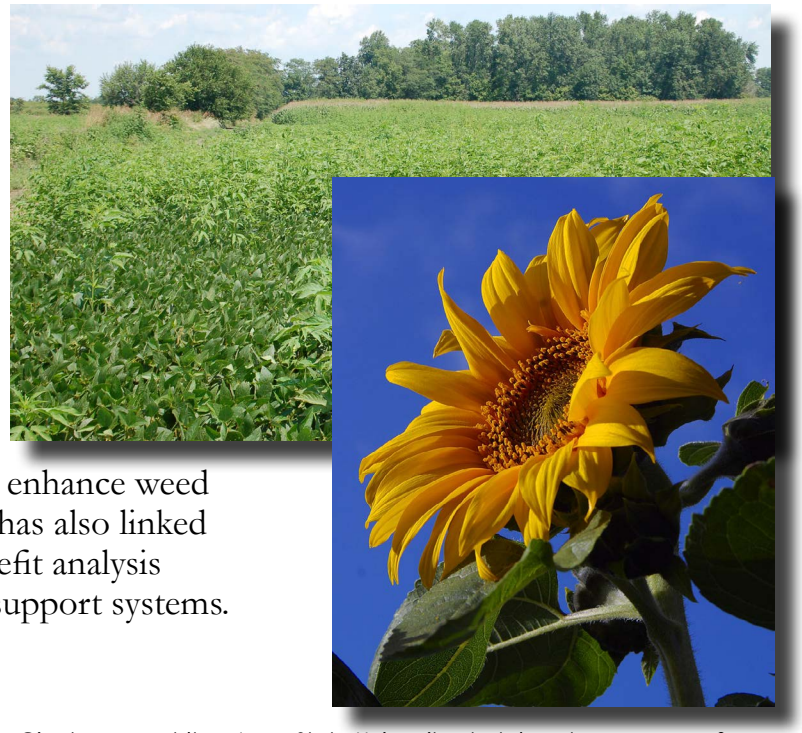
This project provided the data needed to refine and validate existing decision support systems (e. g., WeedSOFT, FoxPatch, and WEEDSIM), improving Integrated Weed Management and reducing herbicide use for row crops in the North Central U.S.

Who cares and why?

Grain producers use herbicides to control weeds that can significantly reduce the yield and quality of their crops; however, these chemicals are increasingly expensive. Many weed species are developing resistance to commonly used herbicides, and herbicide use also raises environmental and social concerns. Producers need to integrate alternative methods for controlling weeds in order to improve profitability, reduce environmental impacts, and prevent the establishment of resistant weed species. Weed science has lagged behind other pest management disciplines in the development of an integrated approach. One major impediment to developing Integrated Weed Management (IWM) systems is a lack of information on weed ecology at both local and regional scales. To develop strategies that are proactive, rather than reactive, weed management efforts need to begin addressing the question, "Why does a given weed species succeed under certain conditions and not others?" Scientists need to better understand the patterns and processes of weed ecology and weed/crop interactions on a regional scale in order to provide a broader context for weed management decision making. More specifically, scientists need to develop integrated strategies that focus on economically and environmentally sustainable solutions to complex weed management problems.

What has the project done so far?

The NC-1026 project has fostered a wide range of collaborative research projects among its members. Researchers have conducted in-depth studies to describe populations of giant ragweed and common sunflower and how they are affected by environmental factors and herbicides. In the first two years of this project, the group developed a standardized protocol for this experiment and have conducted it at more than five locations. NC-1026 researchers have used the resulting information to develop and enhance weed management decision support systems. The group has also linked weed ecology information with economic cost-benefit analysis through bioeconomic weed management decision support systems.



Giant ragweed (top, Iowa State University photo) and common sunflower (bottom) can quickly take over fields, reducing crop yield and quality and resulting in higher costs for farmers.

Impact Statements

Showed that research conducted at multiple locations throughout the region over multiple years provides better information for decision making than single location experiments.

Demonstrated that weed germination and emergence is environment specific, helping researchers and farmers effectively predict where and when weeds problems will occur.

Discovered that weeds that survive sublethal doses of herbicides often do not affect crop yield because they produce substantially fewer seeds than untreated weeds.

Provided greater insight into how management strategies and environmental factors influence the degradation and longevity of weed seed banks.

Developed the computer-based decision support system, WeedSOFT, which was distributed to more than 500 users in nine states over the last two years and improved the recommendations made by this and other weed management decision support software.

Used research-based information to make educational modules for a web version of WeedSOFT.

What research is needed?

With additional resources, this research group could investigate additional strategies for managing weed seed banks and weed populations. We need answers to more questions: Why do certain weed species invade some fields but not others? What effect do cropping systems have on weed invasion? What genetic or physical traits influence the ability of weed species to adapt to different systems? What type of genetic or environmental influences affect weed invasion? This knowledge will be important for building new models for managing weeds.

Want to know more?

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Edited and designed by Sara Delheimer

Online WeedSoft modules help farmers calculate and compare yield losses due to weeds and the costs of weed management strategies.