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A State-Specific Online Cover Crop Decision Tool for Midwest Farmers

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Abstract: The Midwest Cover Crops (MCCC) spearheaded the creation of a state/province-specific online cover crop decision tool with the goal of increasing cover crop use and thus the sustainability of Midwestern cropping systems. The tool allows users to input their location, cash crop and field information, and desired cover crop attributes. As users input more information, the tool immediately updates the list of appropriate cover crops. This dynamic tool thus will serve as an excellent teaching tool, as well as decision tool, for Extension personnel and farmers seeking to make better cover crop choices.

Introduction

Singer, Nusser, and Alf (2007) surveyed farmers in Iowa, Illinois, Indiana, and Minnesota about cover crop adoption and found that only 11% of farmers had used cover crops in the previous 5 years. This is a troubling finding because of the many benefits of cover crop use. According to Mutch and Snapp (2003), cover crops can:

- Improve the soil,
- Protect against erosion,

- Produce and scavenge nitrogen,
- Help manage weeds, pests, and diseases, and
- Attract/support beneficial organisms.

A diverse group from academia, production agriculture, NGOs, commodity interests, and state and federal agencies formed the Midwest Cover Crops (MCCC) in 2007 in order to foster the widespread adoption of cover crops in the Midwest <<http://mccc.msu.edu/> 2011>.

The failure to adopt cover crops has been attributed to lack of knowledge about cover crop options and their benefits, inaccessibility of cover crop information, and economic risk (Snapp et al., 2005, Singer et al., 2007).

To address these problems, the MCCC spearheaded the creation of a state- and province-specific cover crop decision tool. The MCCC aims to increase farmer knowledge and use of cover crops by providing specific, easily accessible information in a format that facilitates decision-making.

We chose a Web-based platform for the tool due to the accessibility provided by the Internet and to allow for immediate implementation of the tool, data updates, and integration with other online resources. Studies indicate that farmers are embracing electronic technology, including computers, GPS, and the Internet (Guenther & Swan, 2011; Burke & Sewake, 2008).

The tool provides farmers and Extension personnel with a resource to help make cover crop selections specific to a location and screened by multiple criteria. Between February 2011 and July 2011, 1,771 unique visitors accessed the MCCC cover crop decision tool, reflecting the timeliness of and interest in such a resource. The site was visited by individuals from 27 countries and 48 states. Ranked for number of visits by country are U.S.A., Canada, and New Zealand, and by state are Michigan, Indiana, Ohio, Illinois, Missouri, Wisconsin, Iowa, and Minnesota.

Description

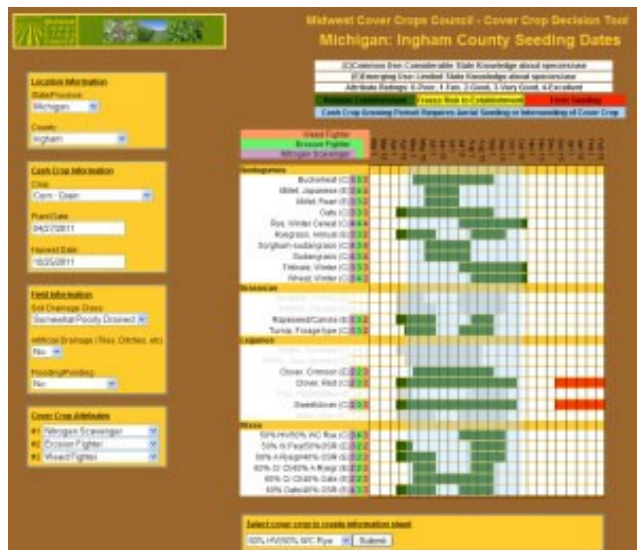
This article details the tool and its capabilities. The database development process for the underlying state/province databases is beyond the scope of this discussion. The MCCC cover crop decision tool for agronomic systems can be found at <<http://mccc.msu.edu/SelectorTool/2011CCSelectorTool.pdf>>. Upon entering location information, the basic output is a chart displaying seeding windows for all the recommended cover crops in that state/province (Figure 1). As additional information is input, unsuitable cover crops are screened out. Parameters that control the chart are the following.

1. **Location Information:** Selecting state/province and county adjusts seeding windows based on county frost/freeze dates calculated from National Oceanic and Atmospheric Administration National Climate Data Center information.
2. **Cash Crop Information:** Input of cash crop planting and harvest dates shows the relationship between cash crop and cover crop growing periods, indicating the need to aerial seed or interseed in order to use a cover crop.

3. **Field Information:** Field information can be specified, including Natural Resources Conservation Service soil drainage classification, artificial drainage, and flooding/ponding. As an example of the tool's functionality, a poorly drained soil without tile that is susceptible to brief (fewer than 7 days) flooding will screen out cover crops that perform poorly under wet soil conditions.

4. **Cover Crop Attributes:** In most cases, farmers have one or more benefits they wish to derive from using a cover crop. Some commonly desired attributes include erosion fighter, nitrogen source, nitrogen scavenger, and soil builder. Up to three attributes can be selected from the list of 11 to further refine appropriate cover crop choices. Ratings for each attribute from 0 (poor) to 4 (excellent) are displayed after the cover crop name for comparison to help identify cover crops with the highest combined attribute ratings. Any cover crop rated less than 2 (good) on any desired attribute is screened out of the results.

Figure 1.
MCCC Cover Crop Decision Tool Output



An information sheet can be created for each cover crop that includes additional information such as basic cultural traits, planting and termination recommendations, and environmental tolerances. Ratings are given for advantages and disadvantages. Comments provided by state/province cover crop experts provide guidance on practical considerations to improve the successful use of the selected cover crop. Online references are listed directing the user to fact sheets, bulletins, and articles that include further information.

One goal of this project is to increase farmer knowledge of cover crops and their use. The decision tool was designed as a teaching instrument. Its dynamic nature allows it to immediately update when a parameter is changed, so users can see the influence their latest input has on cover crop choices and how it may be limiting those choices. Farmers can adjust their inputs to learn how modifying their practices may affect the list of suitable cover crops.

To increase the likelihood of farmer success and satisfaction with cover crops, state/province cover crop expert teams took care to be conservative throughout the development process when specifying planting

dates and cover crop ratings. These teams will update the databases periodically and incorporate user comments/suggestions.

The tool has been developed and implemented for Indiana, Ohio, and Michigan; it is in various stages of development for Minnesota, Wisconsin, Ontario, Iowa, and Illinois. A version tailored to vegetable production systems is nearing completion for Michigan, with plans to include Wisconsin and Ontario.

Conclusion

The MCCC cover crop decision tool is a dynamic, user-friendly online tool that helps farmers make better cover crop decisions tailored to their state/province and specific needs. By providing farmers with state-specific, easily accessible information, the MCCC hopes to increase cover crop use, thus bolstering the sustainability of Midwestern cropping systems.

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