

DEVELOPING A MULTI-INSTITUTION COVER CROP COURSE Training the next generation of cover crop professionals

AGRONOMY AND HORTICULTURE

BACKGROUND

- Increasing interest in the use of cover crops in US agriculture necessitates that educators adequately prepare undergraduate students with an enhanced cover crop curriculum.
- The goal of our work is to create and deliver a novel, multi-institution multiregion upper-level undergraduate course centered on cover crops for a range of cropping systems and agroecoregions using a collaborative and experiential learning approach.





University of Nebraska-Lincoln students complete cover crop challenge activities in Spring 2019.

SURVEY METHODS

In September 2018, we deployed a survey to assess existing gaps in undergraduate cover crop education consisting of nine questions though Qualtrics. We recruited participants through a snowball sampling method using a number of professional list serves including the Cover Crop Councils, as well the Agronomy-Crop Science-Soil Science Society of America's related community email lists.

- course (Fig. 2).

Effects on soil health and nutrient management Cover crop establishment methods and timing Effects on weeds and other pests Conservation and environmental impacts Cover crop termination methods and timing Economics and system profitability Cover crop species and variety selection Effects on cash crop performance Increasing cropping system resilience Cover crop mixtures and intercropping Grazing and harvesting cover crops for forage





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SURVEY RESULTS

• The survey was completed by 157 agriculture professionals across 44 U.S. states (Fig. 1) and included representation from 7 international institutions.

• Nearly all respondents (97%) agreed with the statement, "Students interested in agriculture should learn about cover crops as part of their undergraduate education."

• Despite the perceived importance of cover crops in undergraduate education, no single respondent identified a course dedicated solely to the study of cover crop principles, management, and benefits.

• While 69% of respondents noted that their institution provides a course that includes some element of cover crop education, only half include experiential learning activities or more than two lectures on cover crops.

• Respondents rated a number of topics as important to include in an undergraduate cover crop

• Respondents noted that advances in technologies offered new opportunities for training and experiential learning (Fig. 3).

Tools for measuring ground cover

Soil temperature and moisture sensors

Penetrometers to measure soil hardness

Canopy sensors for measuring NDVI, etc.

Light sensors for measuring LAI, etc.

Cameras and videography equipment

Unmanned aerial vehicles (drones)

Online social media tools

Robotic tractors and equipment

Management decision support tools

Environmental impact models

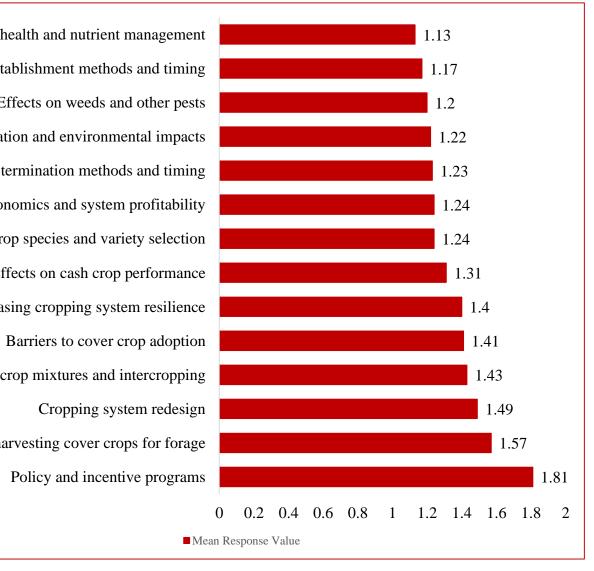


Figure 2. Ranked responses to the question "Rate the importance of including the following topics in an undergraduate course on cover crops?" where 1=critically important, 2=somewhat important, and 3=not important (n=146-148).



Richard Smith University of New Hampshire



Kate Tully University of Maryland



Erin Haramoto University of Kentucky



Dara Park

Clemson University





Karen Renner Michigan State University

Figure 3. Percent of respondents selecting the above digital tools and equipment that "should be integrated into a cover crop course."

Sam Wortman University of Nebraska



1.27

0.00 2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00



Dean Baas Michigan State University

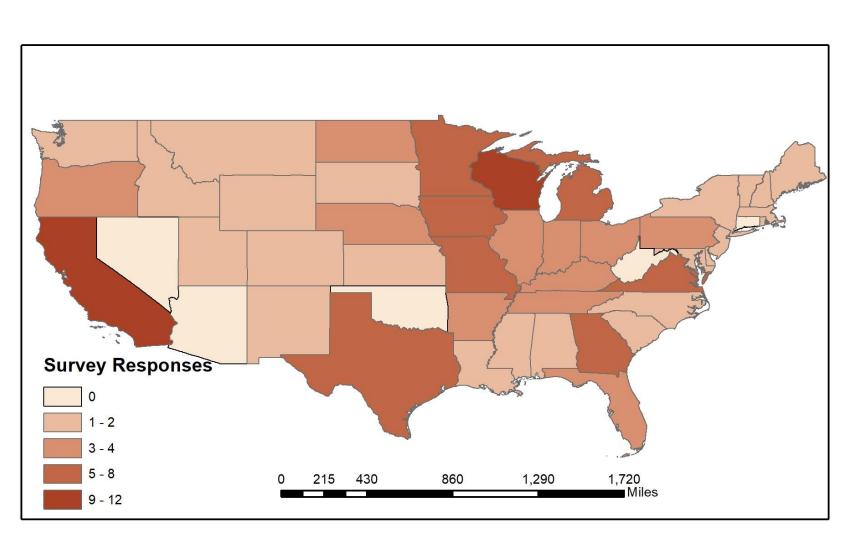


Figure 1. Map of US states representing agriculture professionals who completed the cover crop education survey. The majority of institutions represented were public, four-year institutions although the respondents also represented private institutions and vocational or technical schools.



Cornell University students complete cover crop challenge activities in Fall 2019.

COURSE EXECUTION

The course will be offered concurrently at approximately seven institutions beginning in the 2021-2022 academic year. We will use Canvas, an open-source learning management platform, to connect students and instructors. There will be weekly laboratory, greenhouse and field experiments with an intercollegiate cover crop competition. An open-access lab manual will be published for the course.



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