Cover Cropping in Upper Midwestern Organic Farming Systems

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Unique Aspects of Cover Cropping In Organic Systems

- Required as part of organic regulation
- Essential component of fertility and weed management plans
- Management considerations differ from conventional systems
  - No efficacious and economic herbicides available – termination must be achieved through winterkill, senescence, or mechanical means
  - Without insecticide seed treatments, insect interactions may be weighed and managed differently
  - More severe consequences of intended interactions – exacerbation of disease, contamination from volunteer crops

Unique Challenges of the Upper Midwestern Organic Systems

- Short growing season – difficult to fit cover crops in after corn and soybean harvest
- Wet springs – risk of not being able to get into fields and due timely incorporation of cover crops
- Few legume species that will overwinter

Where are some successes and innovations?

Interseeding

Fitting cover crops into the rotation

Cover Crop-Based Rotational No-Till

- Using fall-planted cover crop for weed suppression

Crimping Rye

July 17, 2016

August 21, 2016

Soybean Yields across Experiments

	Till(bu/ac)	Cover Crop No-Till (bu/ac)
2009	47	30
2008/2009 (Bernstein)	54	43
2011	52	53
2012		drought
2013	50	45
2014	47	44
2015	60	55
2016	57	61
2017	48	47

Benefits of organic cover crop-based reduced-till

- Increased soil microbial biomass
- Increased potentially mineralizable nitrogen
- Increased soil bulk density
- Increased water absorption/decreased run-off
- Increased soil moisture later in the production season
- Increased profitability due to decreased labor and fuel use (if yields are within 10-15%)

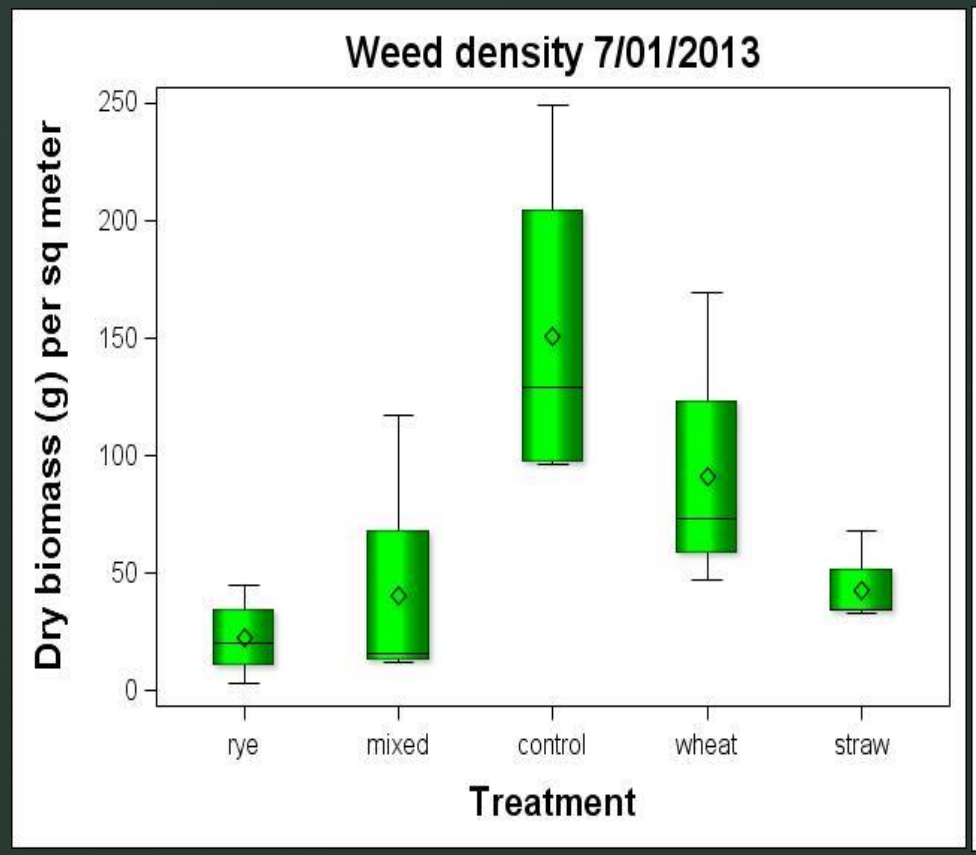
Cover Crops with Specialty Crops

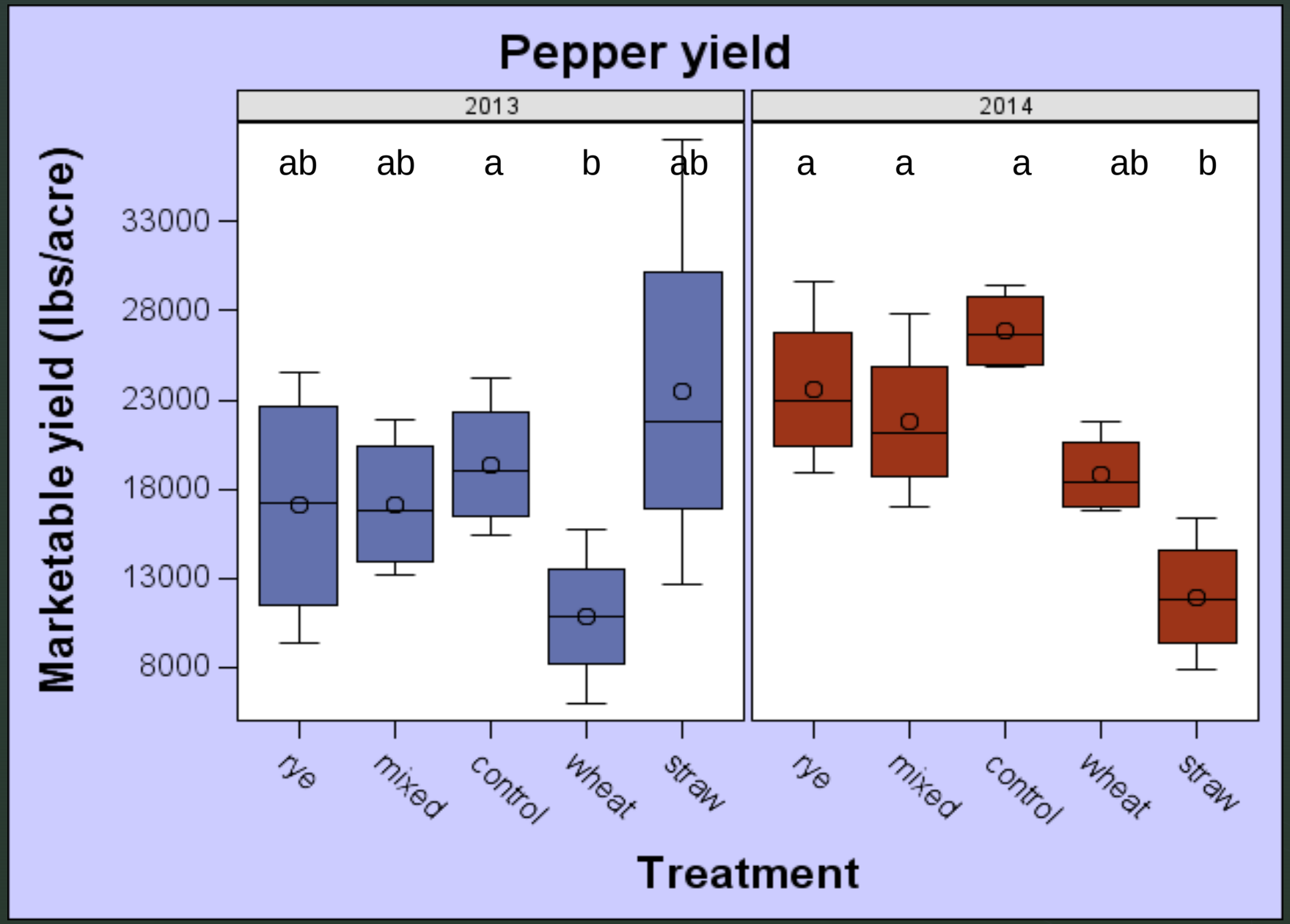
Treatments

Winter Wheat

Cereal Rye

Weed Density and Time Required for Weed Management (July 1 and 2, 2013)

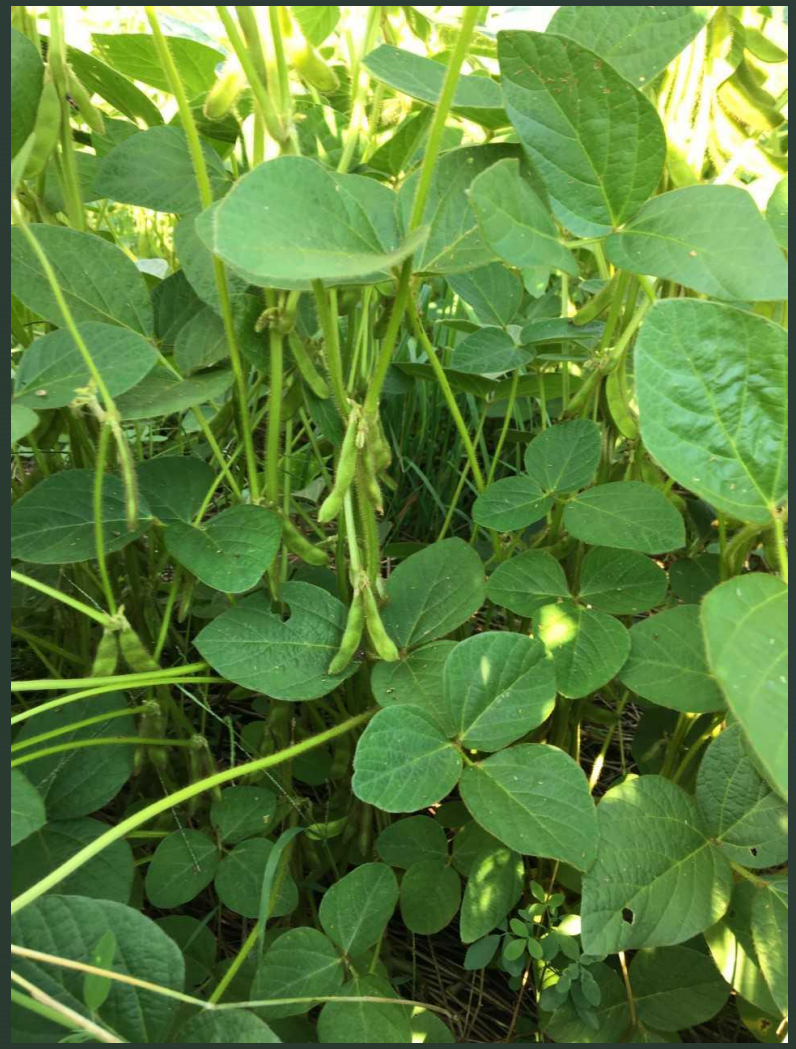




Letter groups represent a statistically significant difference between treatments.

Novel Intercropping Techniques

- Fitting cover crops into the rotation
- Weed management
- Reducing tillage



Where is more research needed?

Broad research needs

- Breeding
  - Overwintering
  - Optimizing services – weed suppression, N fixation
- Agronomics
  - Predicting intended and unintended consequences
  - Equipment optimization
- Quantifying ecosystem services

Legume Cover Crops

- Predicting N contribution to subsequent crops
- Breeding

Cover Crops and Mixtures

- Optimizing ecosystem services