

Northeast Cover Crop Efforts

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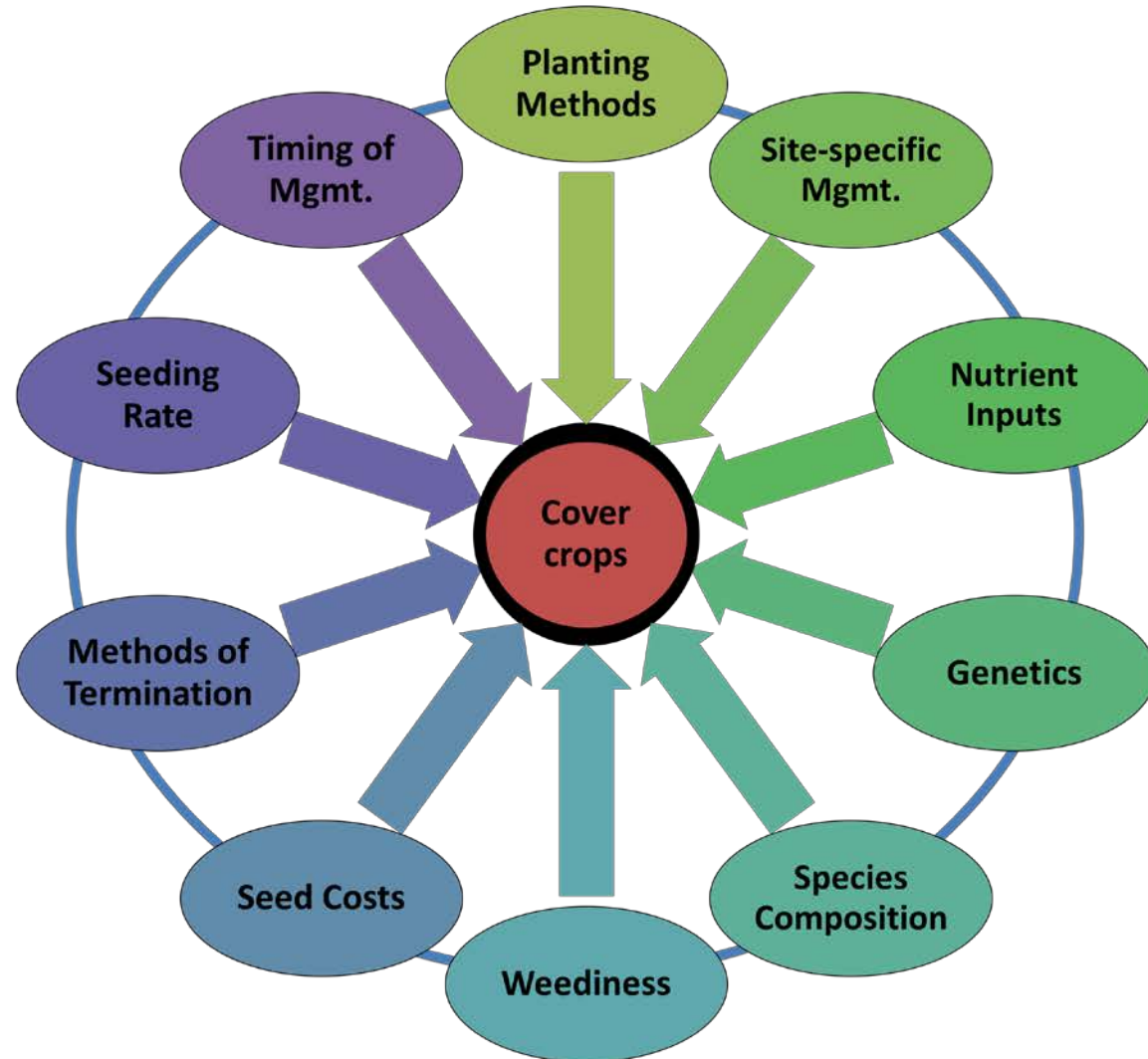
Dr. Steven Mirsky (Research Ecologist)

- USDA-ARS Beltsville Agricultural Research Center
 - Sustainable Ag. Systems Laboratory
- Education
 - Ph.D. – Agronomy
 - M.S. – Soil Science
 - BA – Agroecology



United States Department Of Agriculture
Agricultural Research Service

Research approach to quantifying the effects of cover crops on agro-ecosystem services



Cover crop effects on agro-ecosystem services

- N scavenging, availability, fixation, and use efficiency; weed control, water and soil quality, and GHG emissions

Cover crop management

- Planting and termination timing/methods, seeding rates, mixtures, integration with animal manure
- Species specific responses to climate and edaphic properties

Cover crop germplasm assessment

- National legume cover crop breeding program

Develop cover crop-based no-till crop production systems

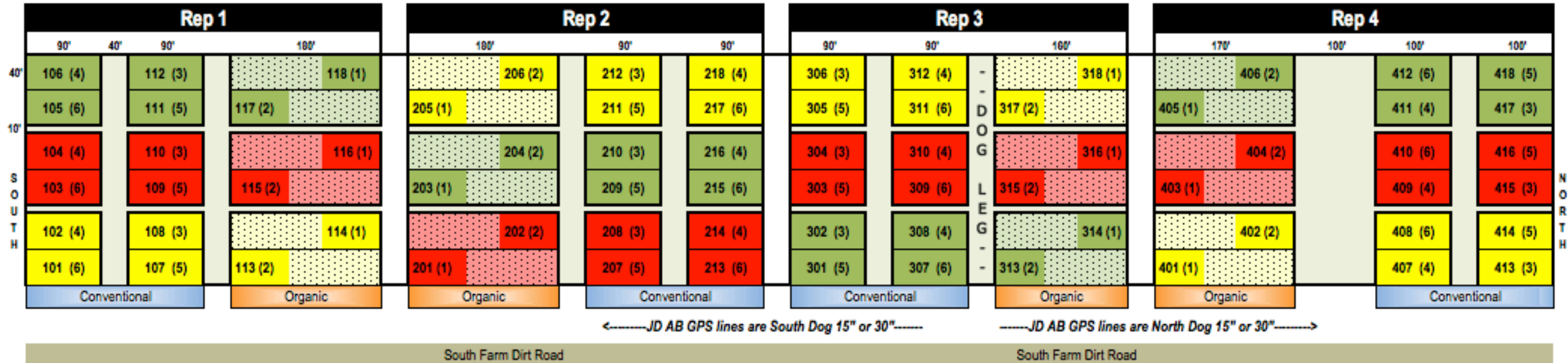
- Organic and conventional systems

Ecologically based weed management

- Multi-tactic approaches; weed-crop competition

Lower Chesapeake Bay – Long-term Agricultural Research (LCB-LTAR)

Cover Crop Systems Project (CCSP)



System Descriptions

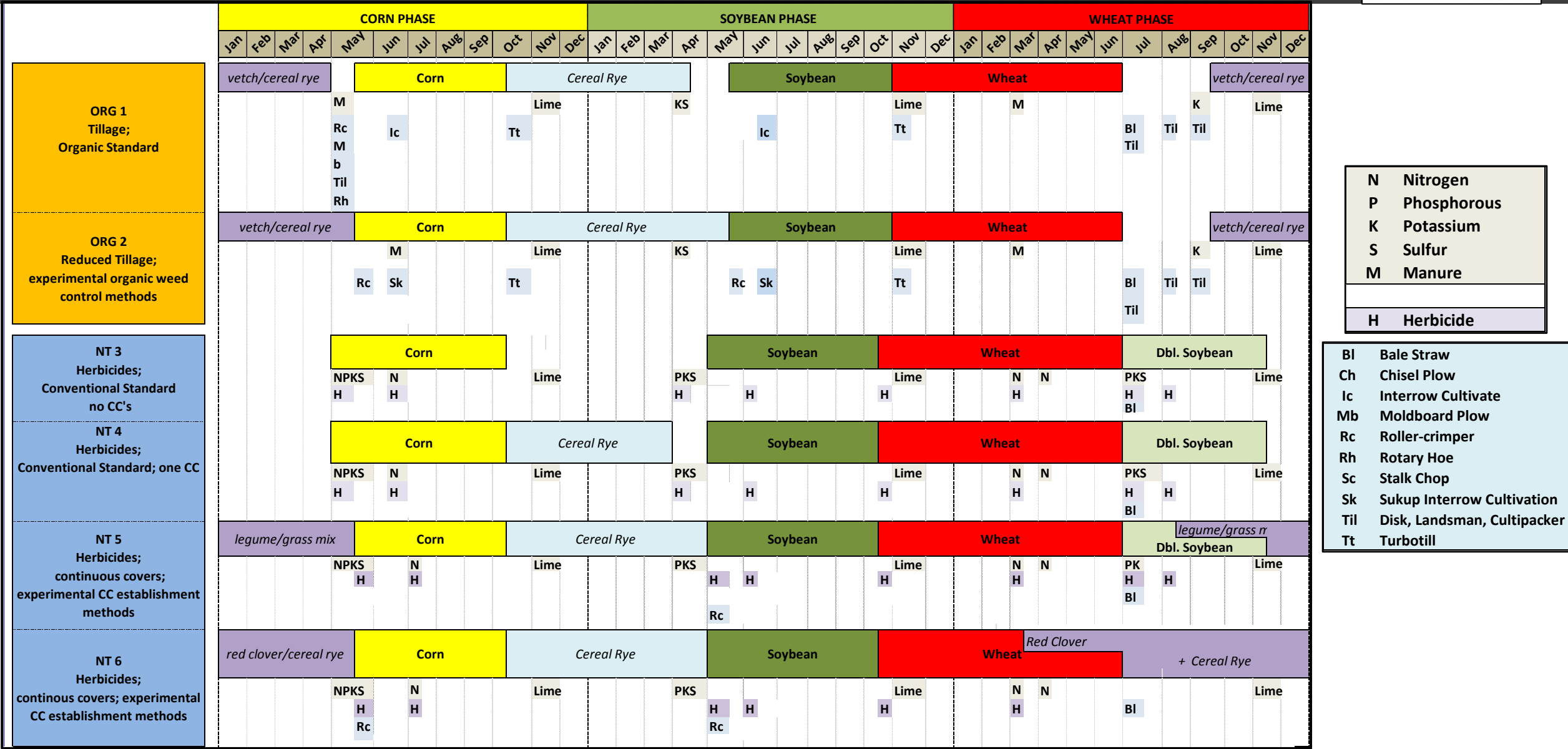
	system (#)	CORN	SOYBEANS	WHEAT
ORGANIC	1	r/v - C - r	r - SB - w	W- r/v
	2	r/v - C - r	r - SB - w	W- r/v
CONVENTIONAL	3	C	SB - w	W - DB
	4	C - r	r - SB - w	W - DB
	5	g/l mix - C - r	r - SB - w	W - DB/ interseed g/l mix*
	6	g/l mix - C - r	r - SB - w	W/ interseed g/l mix*

Crop Designations
C- Corn
SB- Full Season Soybeans
W- Wheat
DB- Double Crop Soybeans
r/v- cereal rye and hairy vetch mix
r- cereal rye
g/l mix- grass legume mix *

^ No sampling ^
AREAS IN TRANSITION
Field operations are not affected

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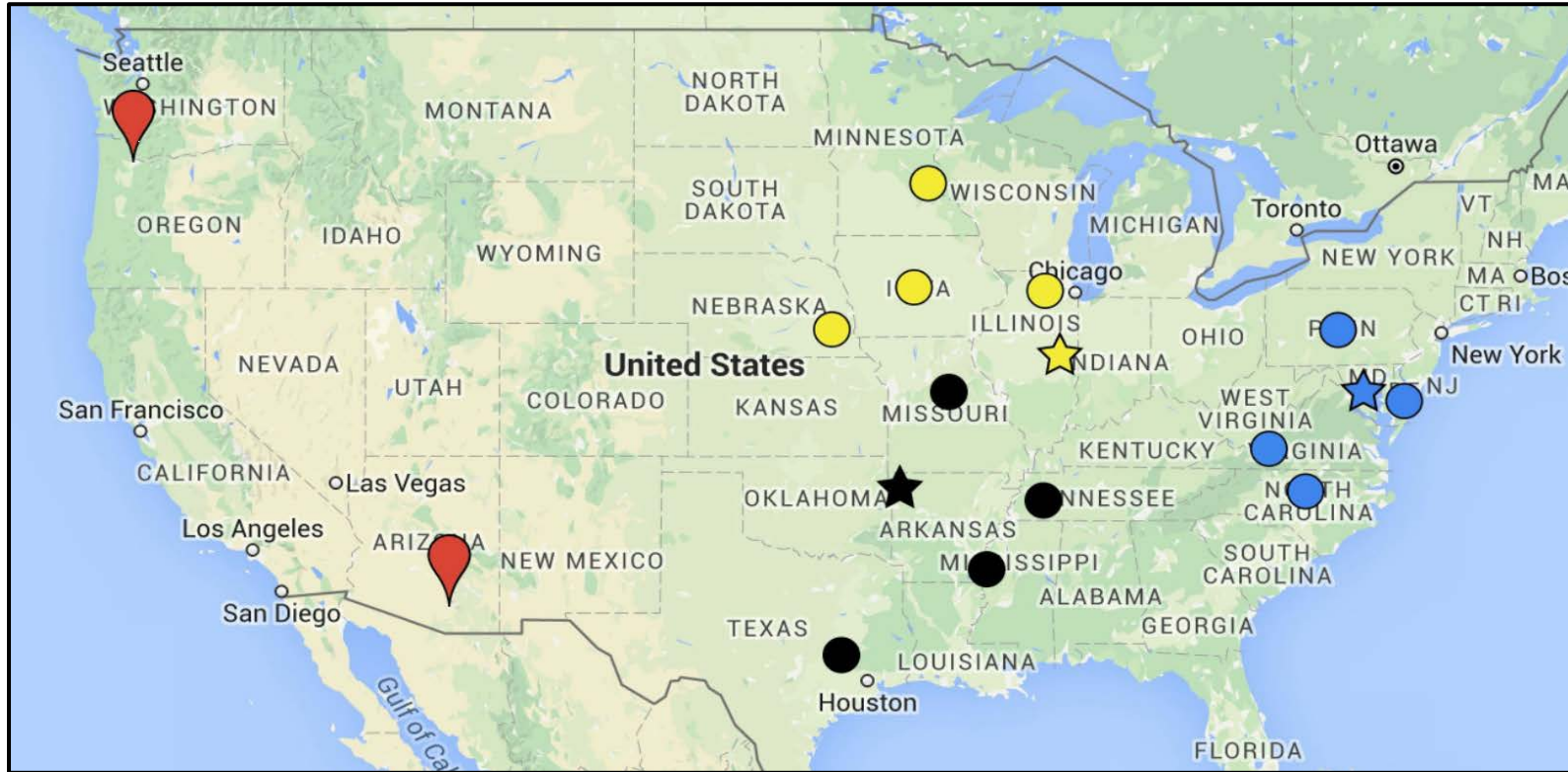
Conservation Innovation Grant - Modeling

- Team members in PA, MD, NC, GA
- Short-term benefits of cover crops
 - Water infiltration, availability, use efficiency
 - Nitrogen availability and use efficiency
- Validate, calibrate, and improve process-based models for H₂O and N estimation
- Define mechanistic relationships governing surface and incorporated cover crop decay
- Decision support tools for farmers on water and adaptive N management



An IPM approach to addressing the multiple herbicide-resistant weed epidemic in three major U.S. field crop production regions

(USDA-ARS Area-wide funded project)



National effort examining multi-tactic weed mgmt.

- Emphasis on role of cover crops

Creating The Cover Crops That Organic Farmers Need: Delivering Regionally Adapted Varieties Across America



United States
Department of
Agriculture

National Institute
of Food and
Agriculture

Priority Traits Ranked by Farmers

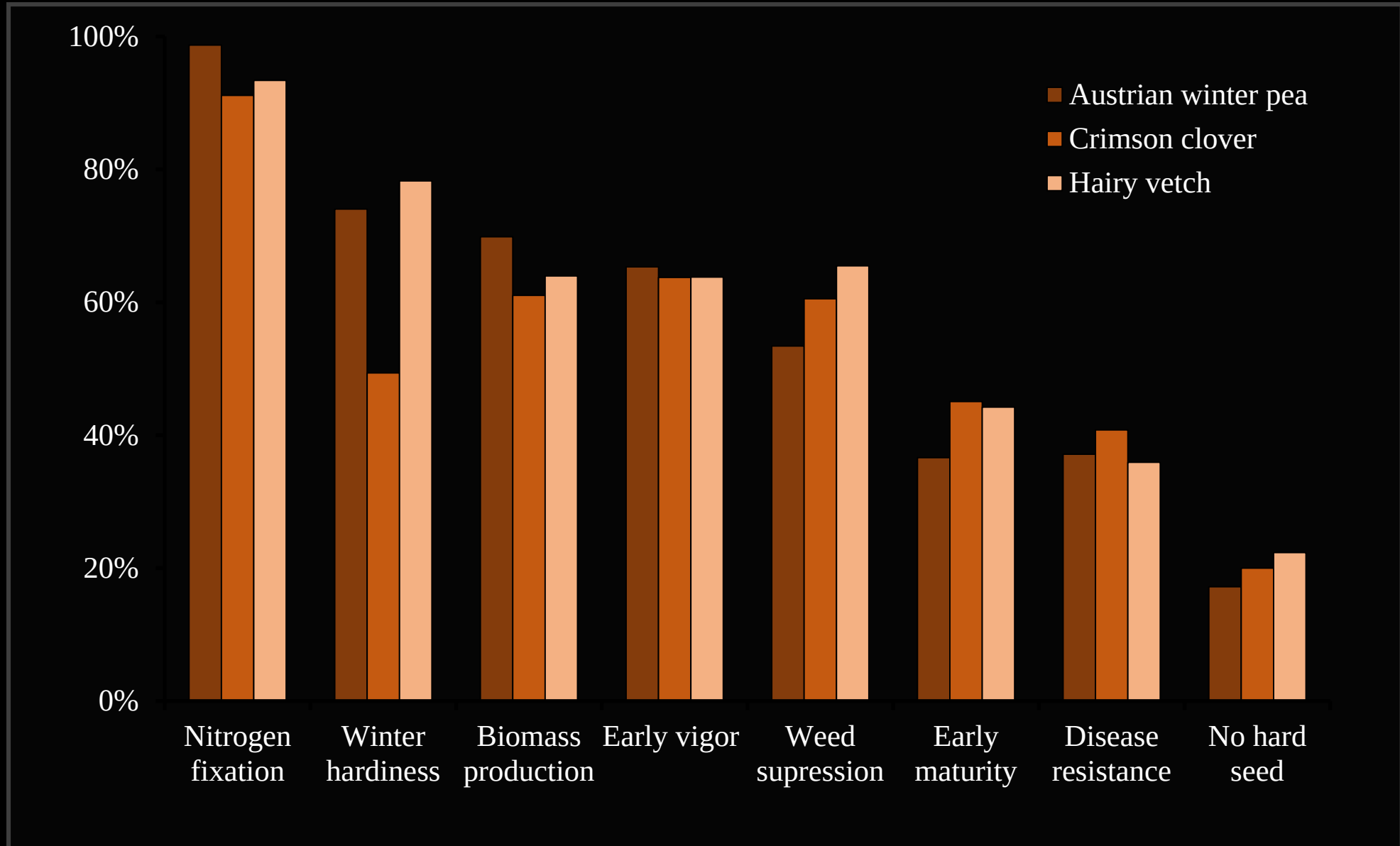


Figure by Sandra Wayman (504 respondents shown)



Matt Ryan (Cornell)



Jude Maul (USDA-ARS)



Steven Mirsky (USDA-ARS)



Gerald Smith (Texas A&M)



Rebecca McGee
(USDA-ARS)



Chris Reberg-Horton (NCSU)



Laurie Drinkwater (Cornell)



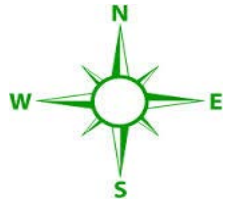
John Englert (NRCS PMC)



Lisa Kissing Kucek



Heathcliffe Riday (USDA-ARS)



Pullman WA. USDA-ARS/Washington State University

- Hairy vetch and winter pea breeders/curators;
- Mass selection of winter pea
- Seed germplasm repositories and seed increases

Ames, IA. Practical Farmers of Iowa

- Participatory germplasm screening
- *On-farm selection*

Madison, WI. USDA-ARS Dairy Forage Research Center

- Participatory germplasm screening
- Breeding plots
- Recurrent selection of hairy vetch

Ithaca, NY. Cornell University

- Participatory germplasm screening
- Mass selection of winter pea
- Bio. N fixation screening

Beltsville MD. **Lead** USDA-ARS Sustainable Ag Systems Lab.

- Participatory germplasm screening
- Recurrent selection of hairy vetch/crimson clover
- Mass selection of winter pea
- Bio. N fixation screening

Raleigh NC. North Carolina State University

- Participatory germplasm screening
- Recurrent selection of hairy vetch/crimson clover
- Mass selection of winter pea
- On-station germplasm screening

Research station & on-farm selection

Overton, TX. Texas A&M AgriLife Research.

Crimson clover breeder

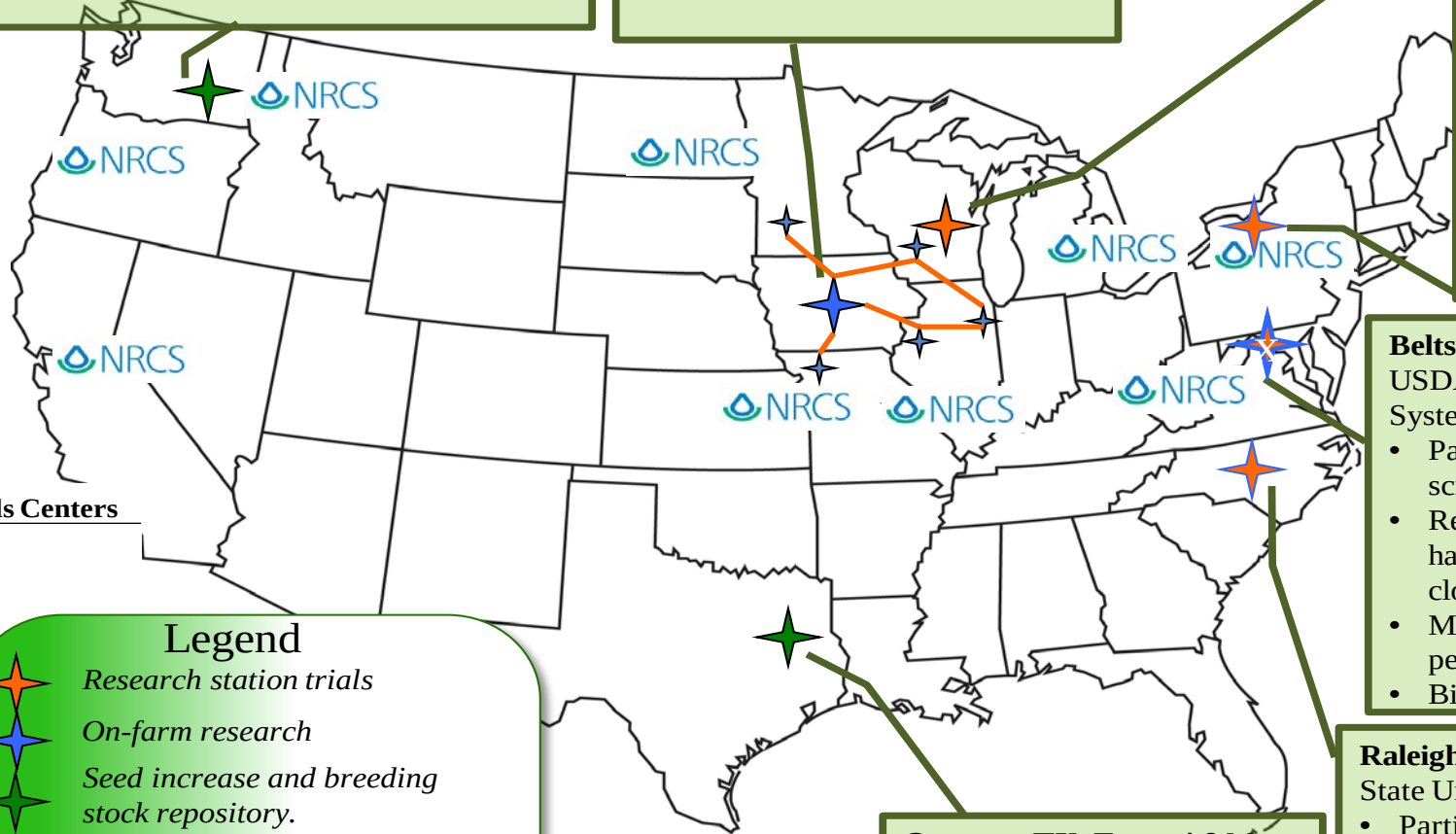
- Breeding plots
- Recurrent selection of crimson clover
- Seed germplasm repository and seed increases

Legend

- Research station trials*
- On-farm research*
- Seed increase and breeding stock repository.*
- National Plant Materials Centers*
- Industry collaborator/ Product distribution Ernst Conservation Seed.*

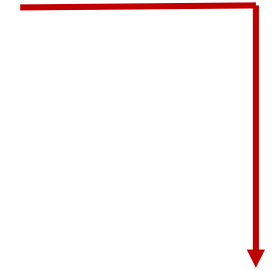
Plant Materials Centers

Big Flats	NY
Beltsville	MD
Elsberry	MO
Manhattan	KS
Bismarck	ND
Lockeford	CA
Corvallis	OR
Pullman	WA
Rose Lake	MI



Northeast Cover Crops Council

- Project that ties Dr. Mirsky's program together
- Funding sources: USDA-NIFA OREI breeding grant, USDA-NIFA Post Doctorate fellowship, NE-SARE PDP grant
- Team members to date: USDA ARS, NRCS, & PMC's, universities, seed companies
- NRCS Soil Health Initiative
- Goal: support and encourage cover crop use in the Northeast
 - identify knowledge gaps
 - meta-analysis across region to fill gaps
 - provide precise info to farmers using process based models to create decision tools to predict cover crop growth and development



Northeast Cover Crops Council

- Goal: support and encourage cover crop use in the Northeast
 - encourage cross-collaboration and research
 - provide resources to farmers
 - suite of cover crop decision tools
 - website
- SESYNC post-doc?
 - data synthesis, meta-analysis, and database management
- **1st meeting March 31 - April 1, 2016**



Acknowledgements for NECCC

- USDA-OREI project # MD.W-2015-07406
- USDA-NIFA Fellowship proposal # 2015-03658
- SARE project # ENE16-144
- Our many collaborators!



A close-up photograph of a field of tall, slender green grass. Interspersed among the grass are several small, purple, tubular flowers. The scene is brightly lit, suggesting a sunny day. The text "Questions?" is overlaid in the center of the image.

Questions?