Cover crop establishment methods

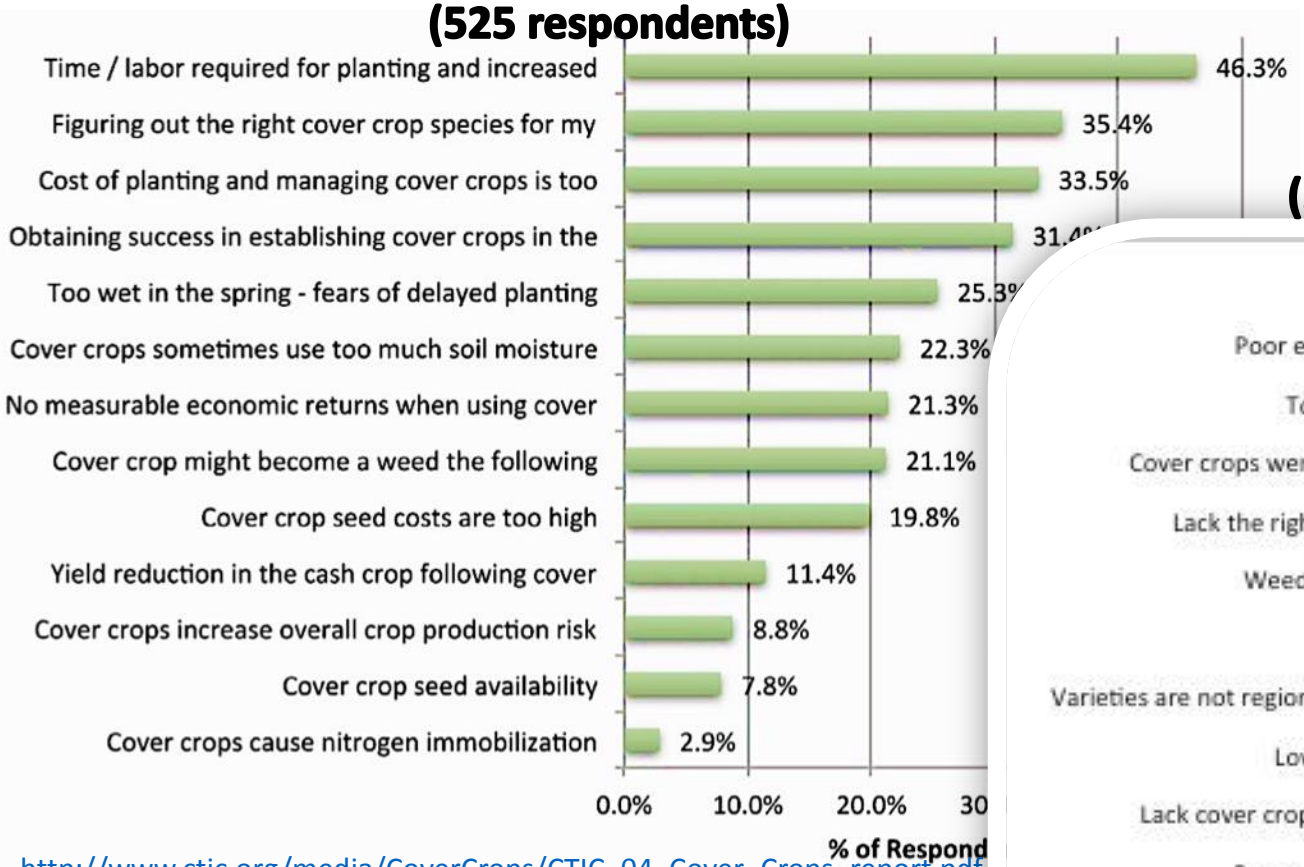
Dr. Steven Mirsky; USDA-ARS;

Cover crops for soil health: NE-SARE professional development workshop

USDA ars
Agricultural Research Service
Sustainable Agricultural Systems

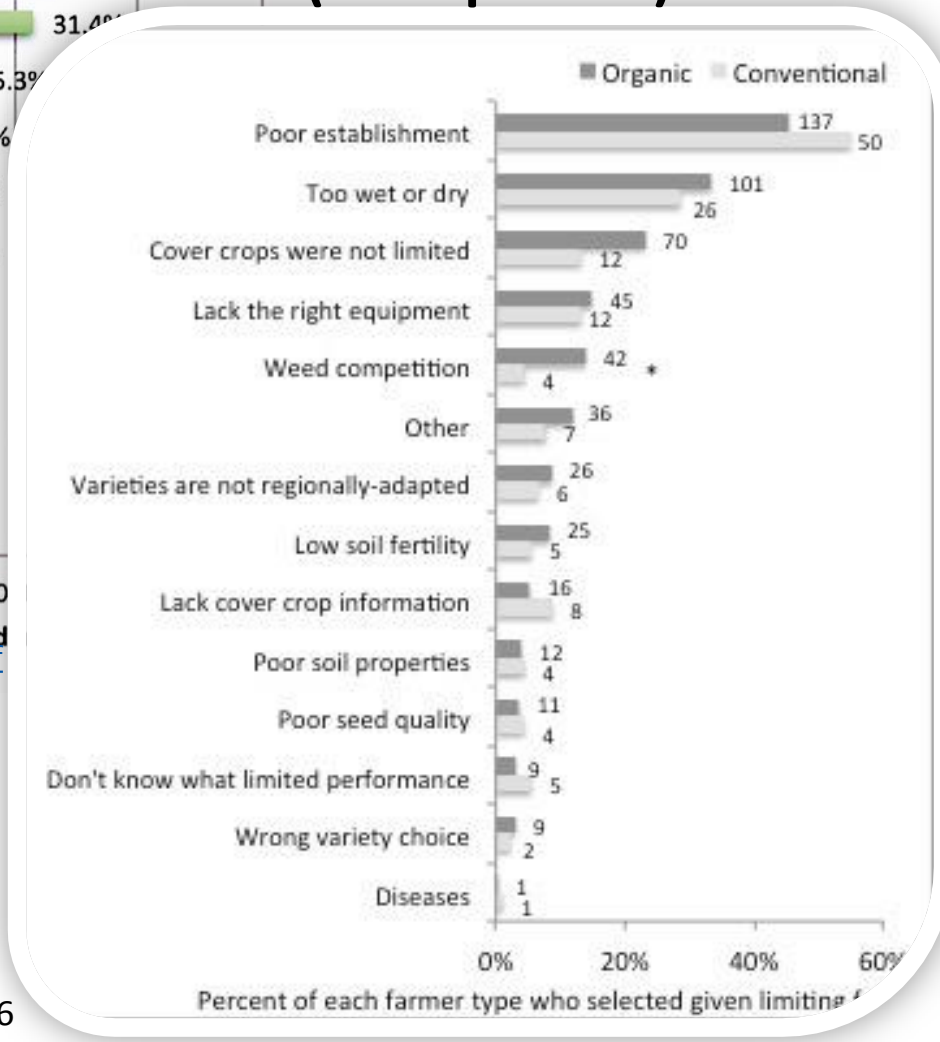
Barriers to cover crop adoption

(525 respondents)



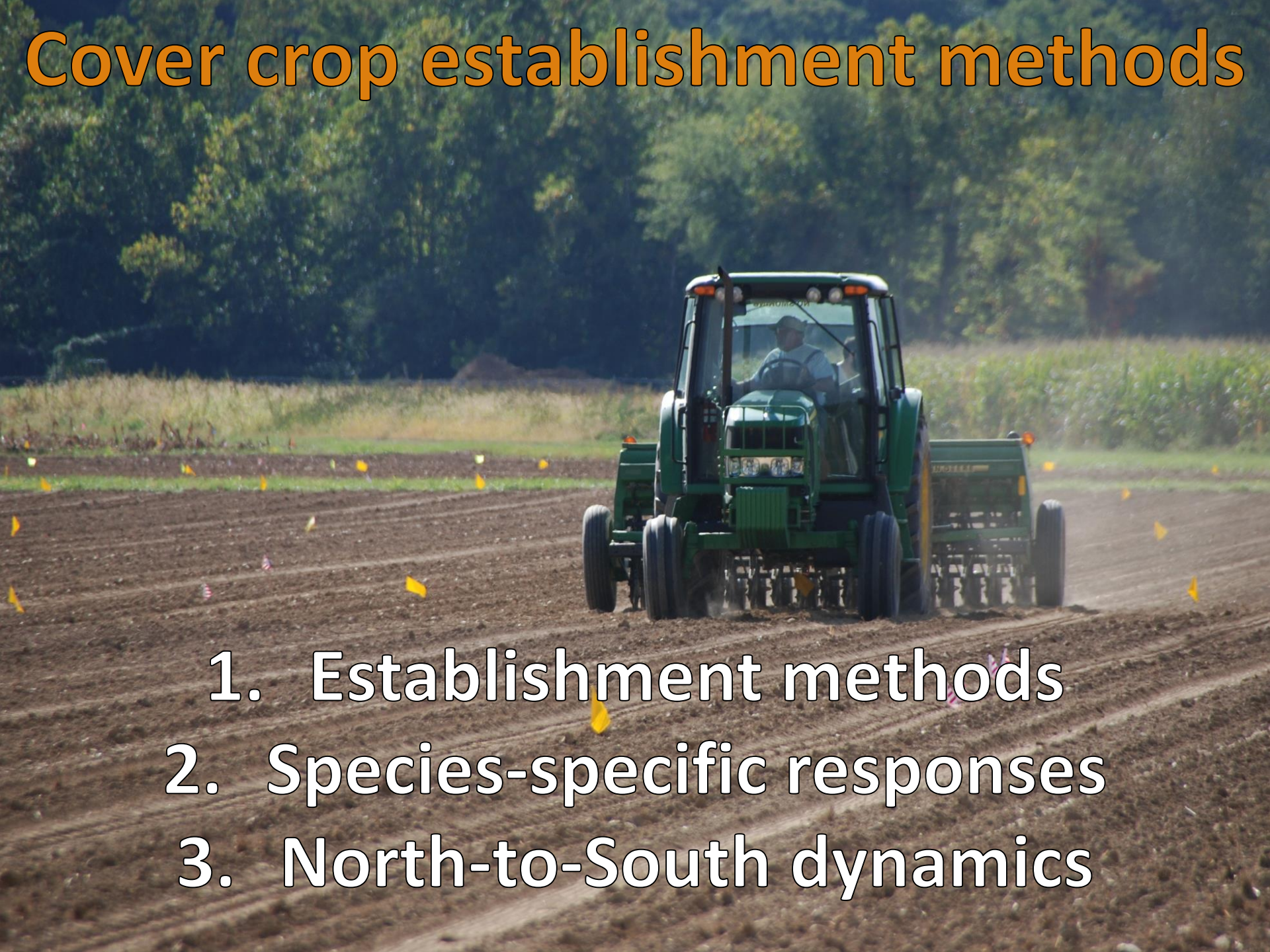
http://www.ctic.org/media/CoverCrops/CTIC_04_Cover_Crops_report.pdf

(504 respondents)



Waymen et al. 2016

Cover crop establishment methods



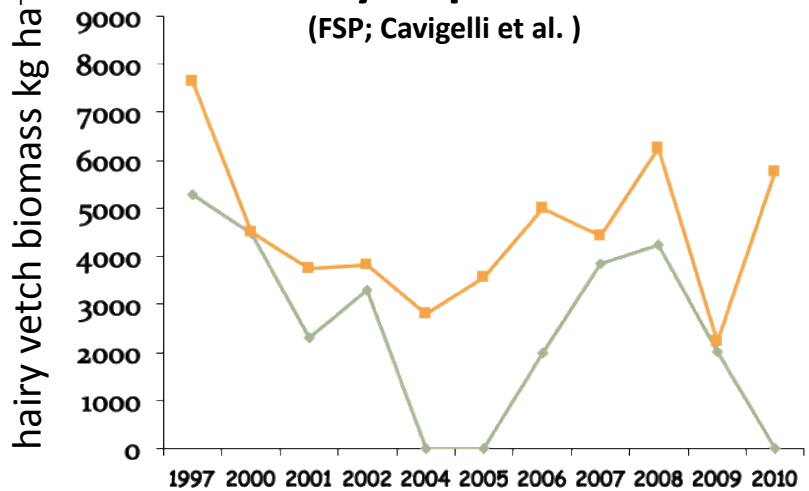
1. Establishment methods
2. Species-specific responses
3. North-to-South dynamics

Barriers to cover crop adoption
(beyond cost)

Establishment
(engineers, species testing, seed coat technology)

Germplasm

Variability in performance
(FSP; Cavigelli et al.)



Information on management

Variability in performance

Establishment

(Seedbed prep., machinery, timing, soil conditions)

Growth and Development

(Drought/flooding, fertility, weeds, composition)

Termination

(Herbicides, tillage, roller-crimpers, Mowing)

- Early innovators
- More regional species testing
- Seed coating technology

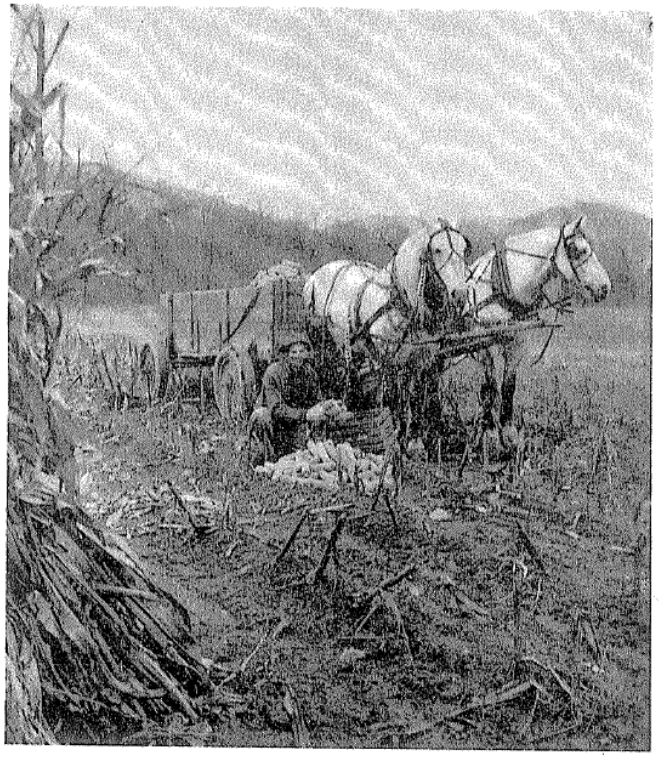
Post-harvest drill

Cover Crop Interseeding

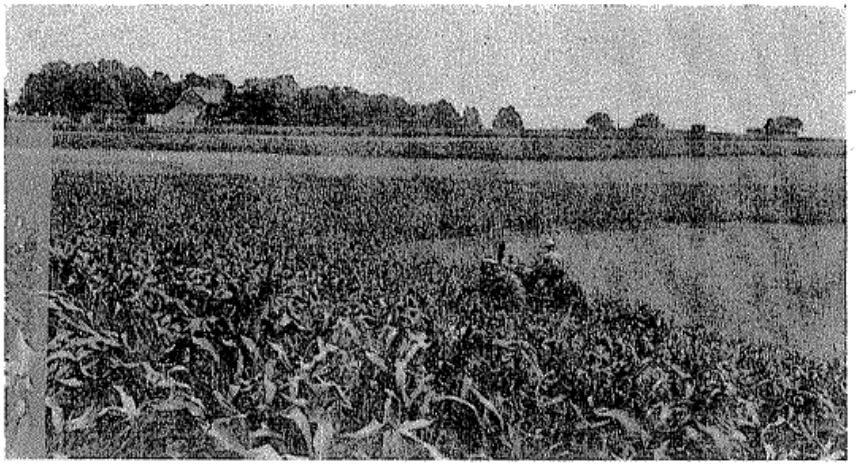
Interseeding cover crops into corn (1947)

CIRCULAR 305 FEBRUARY 1947

EFFICIENT CORN GROWING



Satisfaction in a crop well grown.



The last cultivation of corn planted in contour strips.

COVER CROPS IN CORN

Where corn ground is not to go into winter grain, sowing a cover crop is always desirable. If successful it covers the soil and reduces winter washing and the leaching out of plant food. It also adds organic matter through its top and root growth and helps maintain soil condition. The cheapest, surest, and most generally satisfactory cover crop is domestic ryegrass sown at about 20 pounds to the acre. If sown before or right after the last cultivation, before the season normally becomes too dry, a good stand generally is secured. A cover crop is particularly valuable on washy slopes and where corn is to be followed by corn or potatoes.

Organic farmer John Myer
interseeding cover crops in 1997

http://mysare.sare.org/mySARE/assocfiles/917698final.pdf

Aerial seeding crimson clover into soybeans

(Bill Mason Farm, Eastern Shore MD)

Broadcast with disturbance

(turbo-till is often used)

Technology to avoid dropping seed into the crop canopy

Picture courtesy of David Wilson

HAGIE

Interseeding with high-boys

(Charlie Martin's custom high-boy operation)

Article in No-till Farmer

(NY farmer)

"New York strip-tiller Donn Branton converted a RoGator into a dual-purpose machine that seeds covers and dry fertilizer into standing corn and soybeans."

http://www.no-tillfarmer.com/pages/Spre/Feature-Rigging-Up-A-Late-Season,-Cover-Crop,-Fertilizer-Solution-10-1-14.php

New robotic options

(Charlie Bares; Rowbot Inc.)

European inter-row cover crop seeders

Penn State 3-way cover crop interseeder

Dawn Biologic

DuoSeed II - Ultra-Narrow Seeding Unit

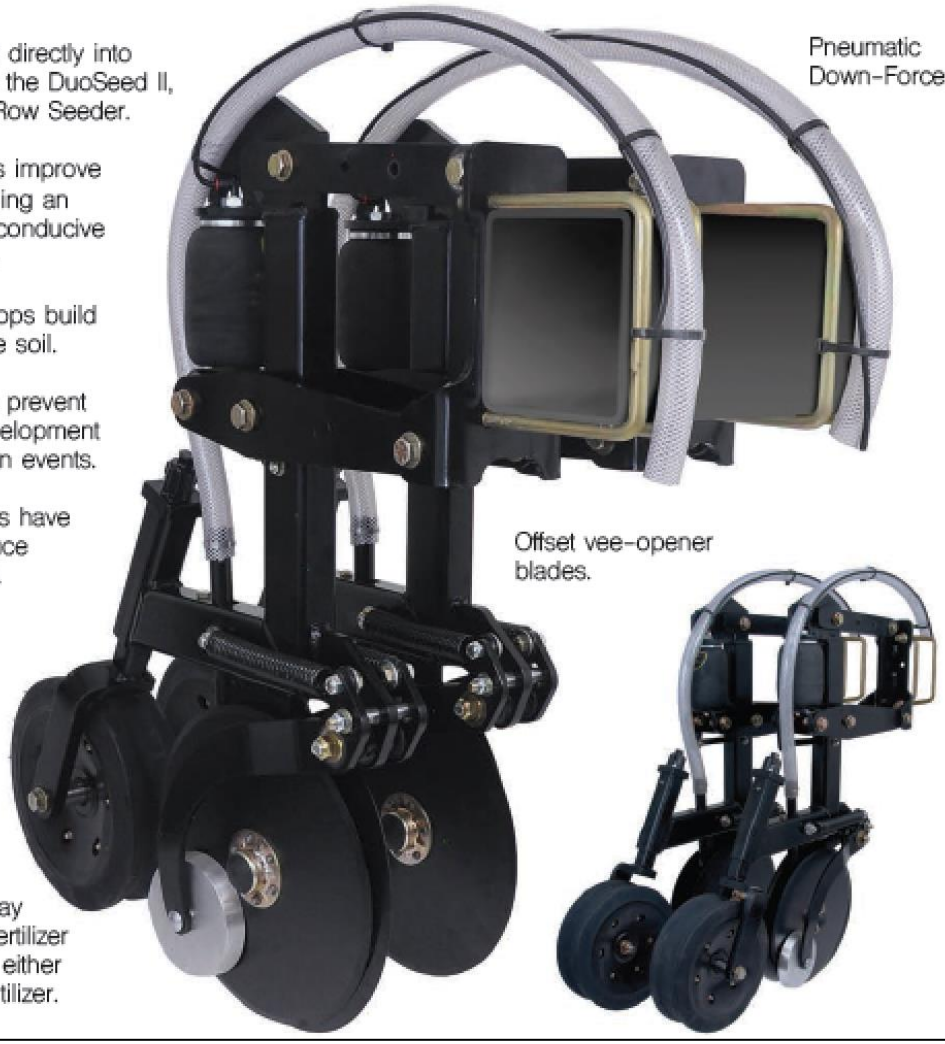
Plant cover crops directly into your cash crop with the DuoSeed II, Ultra-Narrow, Inter-Row Seeder.

Low laying covers improve soil health by providing an environment that is conducive to nutrient recycling.

Legume cover crops build nitrogen levels in the soil.

Cover crops help prevent erosion and the development of rills during big rain events.

Some cover crops have been shown to reduce pressure from pests.



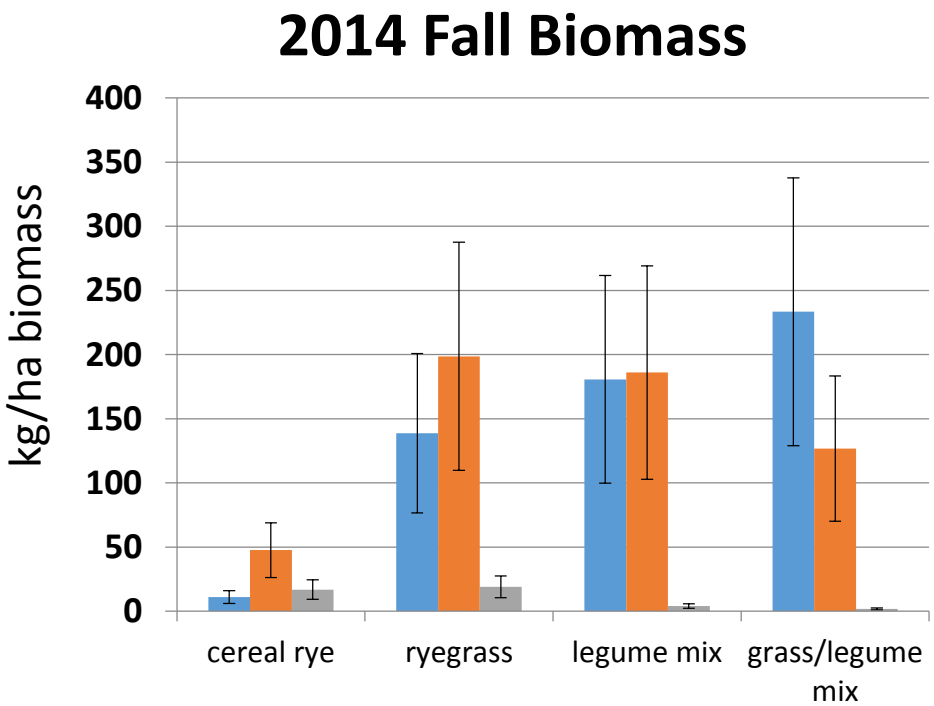
The DuoSeed II may also be used as a fertilizer opener for applying either liquid or granular fertilizer.

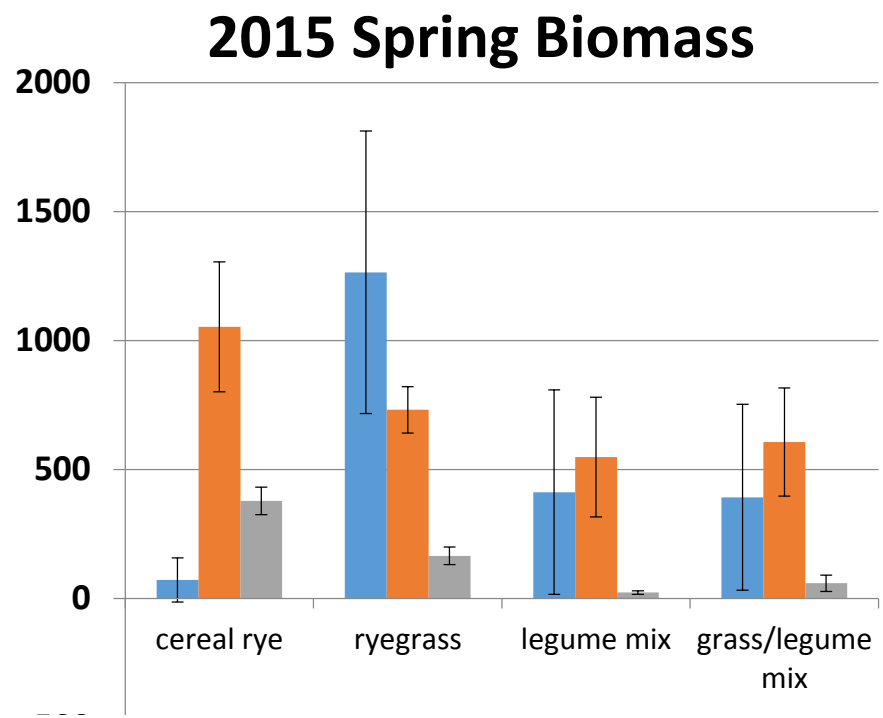
On-farm trial in Central NY (October 30, 2013

Grazing and harvest opportunities

Establishment methods trial

(species*establishment methods)





(colder than average)

Interseeded double-crop soybeans

Frost-drilled red clover

(cereal rye drilled in the fall)

Species-specific relationships

Post-harvest drilling:

- All species; establishment and survivorship is a challenge

Post-harvest broadcast application:

- Depends on if followed by turbo-till (equivalent)

Interseeding:

- Surface applied
  - Small seeded: Red clover, crimson clover, annual ryegrass, forage radish
- Good seed to soil contact
  - More flexibility; still needs to be shade tolerant (annual ryegrass, clovers, vetches, cereals?)

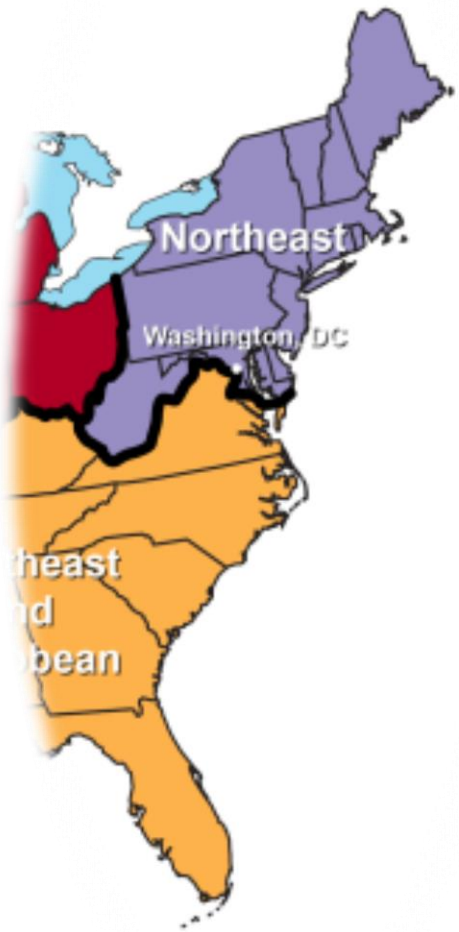
Frost seeding

- Red clover

Questions

Northeast Cover Crop Council

Goal: Support and encourage cover crop use in the Northeast



- Annual conference
- Networking (researchers, ag. professionals, growers)
- Data synthesis
- Define and address knowledge gaps
- Web-based decision support tools
- 1st meeting March 31 - April 1, 2016

Cover Crop Breeding

Traits of interest

- Winter hardiness *
- Nitrogen fixation *
- Soft seed *
- Rapid emergence/growth *
- High biomass production *
- Drought tolerance
- Lower digestibility
- Determinate reproduction
- Shade tolerance