

Update on the Penn State Interseeder and Applicator



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Cover crops can protect soil and improve productivity

- ✓ Increased yields
- ✓ Reduced agricultural runoff
- ✓ Reduced erosion
- ✓ Nutrient retention
- ✓ Livestock forage
- ✓ Conservation compliance
- ✓ Increased farm profits



Previous attempts to expand cover cropping have had limited success

- Aerial applications inconsistent
- Living mulches too competitive
- Late drilling has little benefit in fall and later development in spring



Early season interseeding

- Seed cover crops at V6
- End of critical weed free period for corn
- Used in Europe and Canada and Pacific NW
- Previous tests indicate minimal or no impact on corn yields

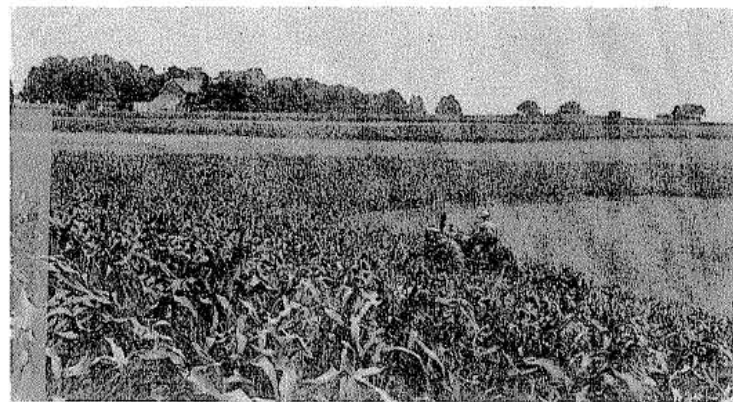


EFFICIENT CORN GROWING



Satisfaction in a crop well grown.

The Pennsylvania State College
SCHOOL OF AGRICULTURE
Agricultural Extension Service
State College, Pennsylvania



The last cultivation of corn planted in contour strips.

pays, and unless very shallow it is detrimental. The ground by that time is well shaded and filled with corn roots so that weeds will not generally compete seriously with the crop.

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.

HARVESTING

If corn is to be shocked, cutting should start as soon as the grain is fairly hard and while the blades are still green and in condition to make nutritious and palatable feed. Low cutting reduces the number of corn borers which will pass the winter in the stubble. Topping corn before it reaches the dough stage will reduce the yield of grain and topping is seldom economical.

Corn will generally dry more rapidly standing on the stalk or in small shocks than in the crib. Cribbing should not start until the corn is hard and fairly dry or until cold weather reduces the danger of spoilage. Clean husking or picking aids the circulation of air and promotes better drying in the crib.

Other locations

- Brazil: "Intercropping systems with corn and guineagrass did not reduce the corn grain yield compared with sole corn crops"
- Quebec: "The ability to produce silage equal in yield to monocrop corn at a reduced cost and risk of environmental damage makes this an attractive intercropping system"
- Ontario: "Intercropping corn with red clover could provide soil protection without impacting silage corn yields"
- Michigan State: "Interseeding red clover found that interseeding red clover in corn over four years had no impacts on corn yields"

Today's Objective

- Provide update on design
- Share results of demonstrations
- Update on herbicide management
- Impacts on soil nitrate
- Future potential



Newest Version Design Components

- Liquid N stream applied adjacent to corn row
- Herbicide applied under corn canopy
- Drill units between rows
- Assist wheels to carry weight
- Ground drive
- Loading platform
- Conversion to Drill Unit
- Hitch for Towing



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Three Functions in a Single,
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Cover Crop Planter • Liquid Fertilizer & Herbicide Applicator • No-Till Grain Drill

Multipurpose Cover Crop InterSeeder™

Save Time, Reduce Costs & Improve Crop Yields

Time is money. That's why the InterSeeder™ sows three rows of standing cover crops, spreads post emergent herbicides, and applies directed fertilizer, simultaneously. In addition, the InterSeeder™ is also an ideal no-till grain drill. This versatile, multifunction machine, reduces time, saves energy, and eliminates costs. Besides helping your bottom line, the InterSeeder™ simplifies no-till relay planting, enabling sustainable farming and improved crop yields. It is good for you and good for the environment.

“ We've used the InterSeeder for two years... its easy to operate, followed the rows well, produced nice even stands, didn't compete with the corn and we're anxious to do more. ”

- Bob Buhl
Erie County, PA Dairy Farmer







Penn State **Extension**



June 26



July 8



August 29



October 2



Potter County Conservation District

Penn State Extension

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Clinton Co. Conservation District: February 2015

INTERSEEDER RENTAL PROGRAM



Benefits of Interseeding

- Cover crop is established before harvest
- Summer planting window allows for more seeding options
- Increases diversity
- Natural weed control



- Tractor 3 point hitch or tow behind
- Also converts to a 10' no-till drill

NOW AVAILABLE FOR RENT!



Interseeding effect





With this system, there could be potential for delayed burndown of cover crops to increase DM accumulation in the spring.

Proof of Concept

Working field units in:

- ✓ PA
- ✓ MD
- ✓ NY
- ✓ VT
- ✓ MO
- ✓ MN
- ✓ ME



PSU Research in Progress - Effect of herbicides on inter-seeded cover crops at Rock Springs in 2013 and 2014

(Corn planted early to mid May and inter-seeded mid to late June -

Herbicide	Rate	Time	Crimson clover		Red clover		Hairy vetch		Annual ryegrass			
			2013	2014	2013	2014	2013	2014	2013	2014		
			-----% Reduction-----									
Dual II Mag	1.67 pt	PRE	22	28	26	26	25	23	91	55		
Outlook	16 fl oz	PRE	6	10	0	15	15	14	30	55		
Harness	2 pt	PRE	17	20	20	18	14	11	41	44		
Prowl H2O	3 pt	PRE	10	15	20	30	10	14	40	32		
Zidua	2.5 oz	PRE	0	24	9	20	22	26	92	60		
Sharpen	3 fl oz	PRE	8	23	7	11	14	14	5	15		
Resolve	1 oz	PRE	2	29	2	19	16	26	10	20		
Atrazine	1.5 qt	PRE	12	26	12	19	36	28	15	28		
Metribuzin	4 oz	PRE	12	21	14	15	15	19	21	20		
Balance Flex	5.3 fl oz	PRE	27	28	41	43	26	35	20	18		
Callisto	5.4 fl oz	PRE	30	25	90	48	51	24	0	20		
Impact	0.75 fl oz	POST	27	33	46	50	19	29	17	14		
LSD (0.05)			12	17	14	17	17	17	15	17		

(0 = no effect; 100 = complete loss – numbers in bold had most injury)

Summary For Corn Herbicides

Preliminary Recommendations for the Northeast

Grass Herbicides	Active Ingredient
Injury Possible	
Dual II Magnum 7.64 EC	s-metolachlor*
Zidua 85 WG	pyroxasulfone*
Potentially Safe Products	
Prowl H2O 3.8 CS	pendimethalin
Outlook 6 EC	dimethenamid-p*
Harnes 7 EC	acifluorfen*

Broadleaf Products	Active Ingredient
Injury Possible	
Callisto 4 SC	mesotrione*
Impact 2.8 SC	topramezone*
Balance Flexx 2 SC	isoxaflutole*
Potentially Safe Products	
Resolve 25 WG	rimsulfuron
Atrazine 4 L	atrazine (<1.0 lb)*
Sharpen 2.85 SC	saflufenacil*

*Pre-mixed products also contain many of these active ingredients

2013-14 Results

- Good initial stands
- June precipitation
- Seed to soil contact
- Furrow design
- Species selection





**Lawrence Co. Conservation District
Sept. 2014**

Erie County Conservation District



October 2014



November 2013



Tioga County Conservation District October 2014

Interseeded field in May: Lancaster



Centre County, Fall 2011: Sinking Creek Flood Plain



Centre County 2011: Potential for Grazing



Organic corn silage: Rock Springs

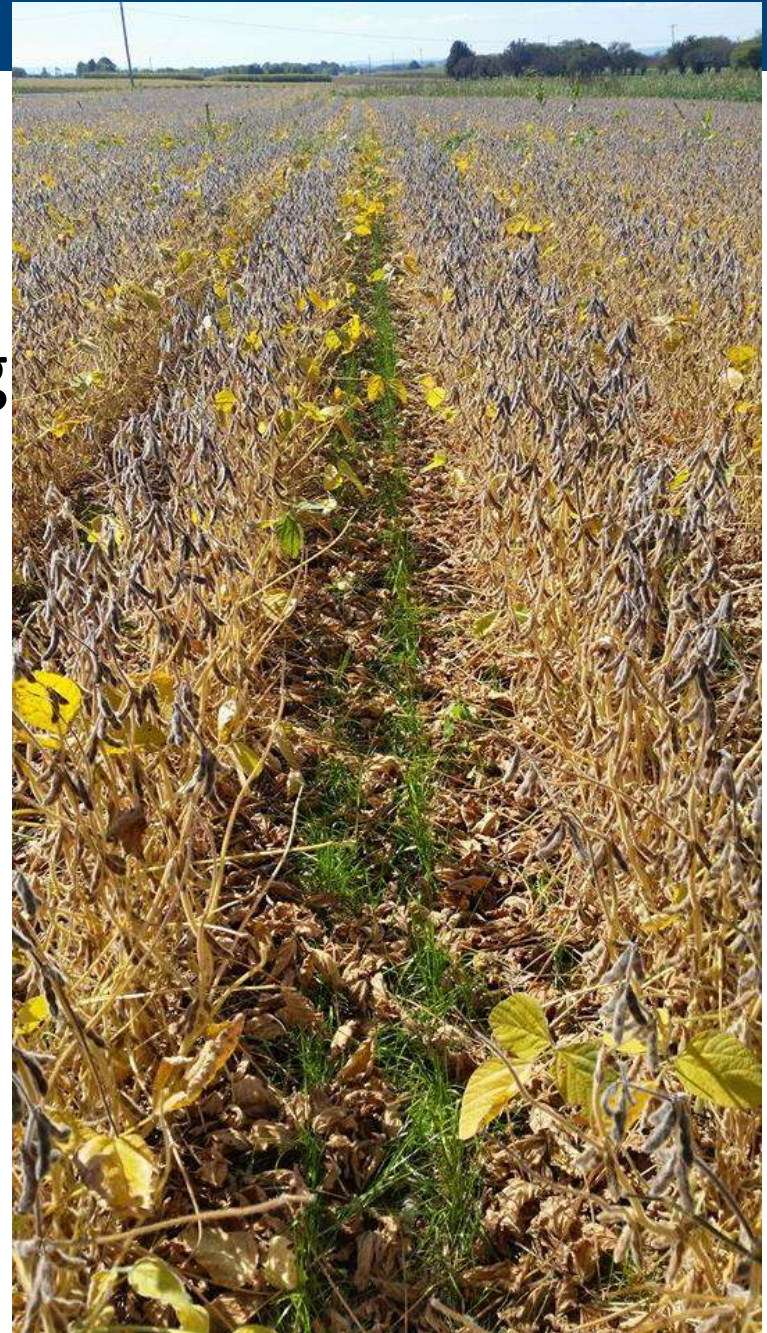


One Pass Food Plot Establishment



Soybeans

- Soybeans can be challenging
- Early seeding
- Early varieties
- 30 inch rows
- 2 vs. 3 row config.?



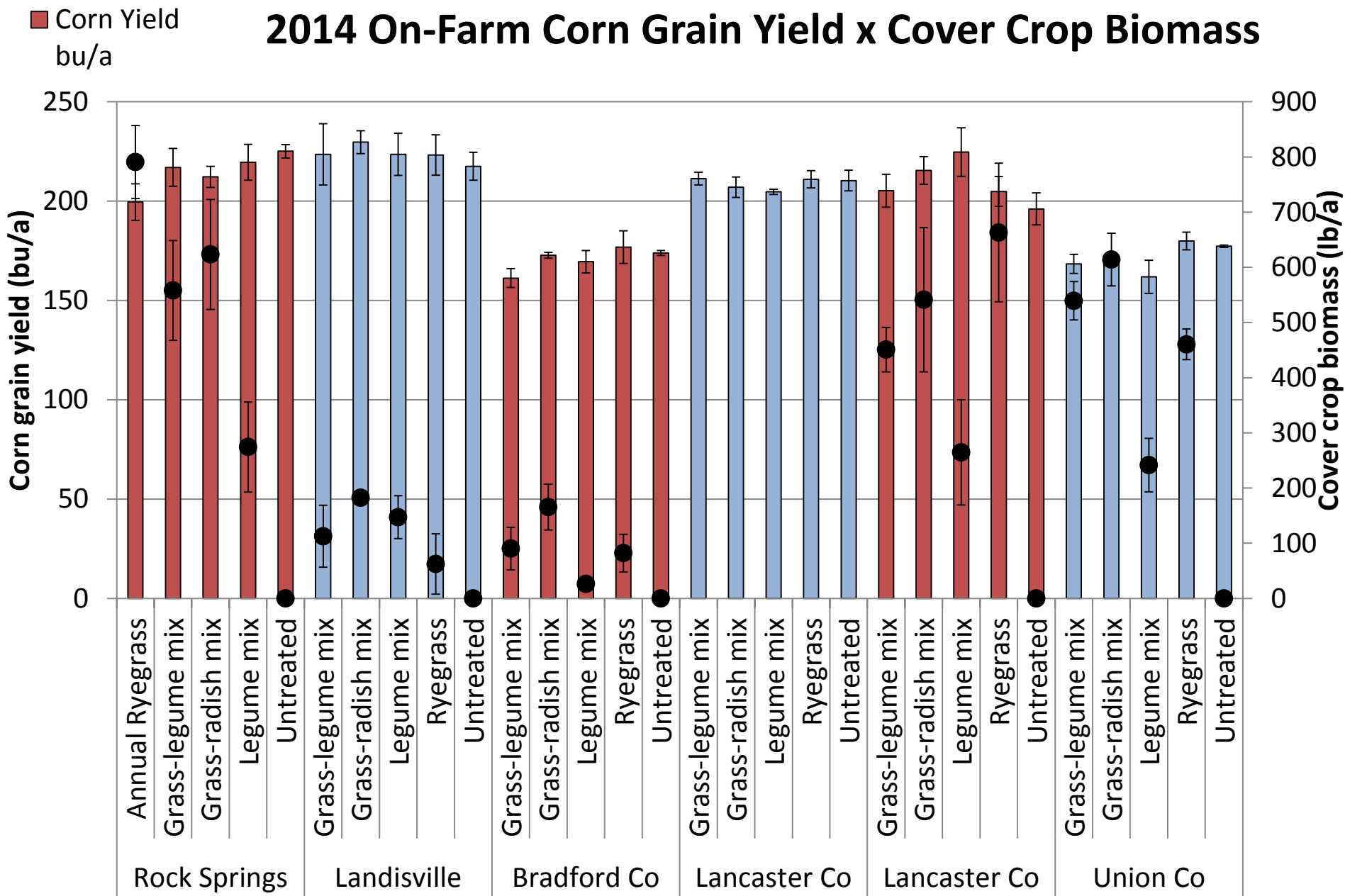
Lancaster 2013: Summer



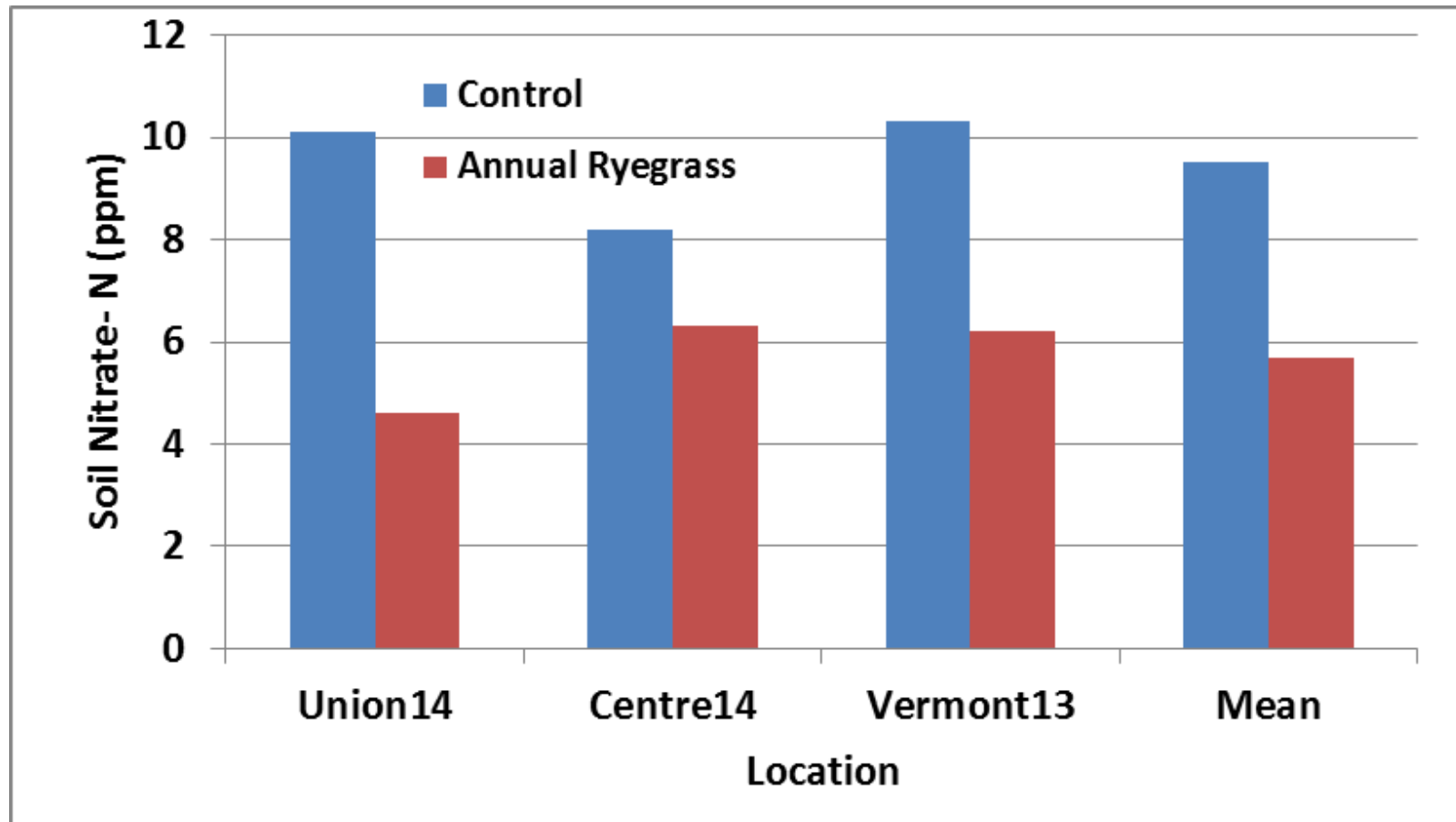
Lancaster 2013: Fall



2014 On-Farm Corn Grain Yield x Cover Crop Biomass



Fall Soil Nitrate Impacts: Three Trials



Economics

- Low seed cost
- Moderate herbicide costs
- No extra trip for seeding
- Conversion to drill:
multipurpose machine
- Update machine
- Yield increase?
- N savings?
- NRCS funding



Conclusions

- Interseeding seems to have potential
- Research and demonstration continues to expand as commercialization is starting
- Great example of multi institutional collaboration
- Special thanks to many conservation districts for support



Interseeding effect

