



Cover Crop Interseeding

Effectively establishing cover crops earlier



Background

Cover crops can provide important benefits such as reducing erosion, increasing soil organic matter, recycling nutrients, fixing nitrogen (legumes), and suppressing pests. However, to achieve these benefits, cover crops must be managed properly. Late seeding after corn and soybean harvest often results in poor performance. Interseeding cover crops prior to harvesting is one way to overcome this obstacle and increase your return on investment with cover crops.



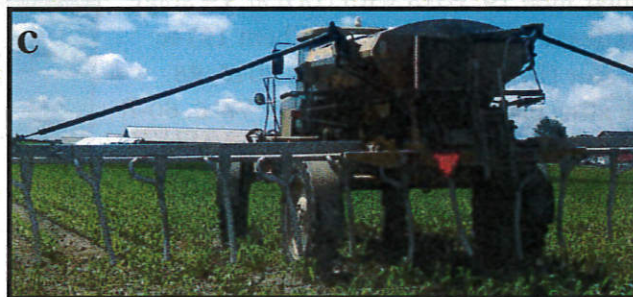
Above: Interseeded annual ryegrass at silage harvest on September 23, 2014 (Virgil, NY). Once the corn was harvested, this cover crop grew vigorously. See results from this on-farm trial below.

Data from New York

Results from on-farm and research station trials in 2013–2014 with the InterSeeder.

Interseeder Options

a) The InterSeeder (Penn State) drills cover crops in three 7.5" rows, b) the Dawn DuoSeed interseeder (Hershey Farm) drills cover crops in two 10" rows, and c) the RoGator interseeder (Donn Branton) broadcasts seed between 30" crop rows.



Treatment Information			Corn Silage †					Corn Grain ‡				
Treatment	Seeding Rate (by species) (lb/a)	Cover Crop	Fall 2013 Cover Crop ¹ (lb/a)	Fall 2013 Weeds (lb/a)	Adjusted Yield (tons/a)	Spring 2014 Cover Crop ² (lb/a)	Spring 2014 Weeds (lb/a)	Fall 2013 Cover Crop ³ (lb/a)	Fall 2013 Weeds (lb/a)	Adjusted Yield (bu/a)	Spring 2014 Cover Crop ⁴ (lb/a)	Spring 2014 Weeds (lb/a)
1	NA	No cover crop control	NA	678 (363)	18 (1)	NA	563 (153)	NA	24 (14)	157 (25)	NA	34 (10)
2	20	Annual Ryegrass	**2054 (475)	103 (17)	18 (1)	776 (207)	98 (24)	187 (42)	30 (9)	146 (18)	195 (44)	30 (9)
3	5	Daikon Radish	NA	NA	NA	NA	NA	181 (40)	10 (4)	153 (26)	0	33 (8)
4	10 20 15	Hairy Vetch Crimson Clover Red Clover	1273 (160)	61 (25)	19 (1)	715 (160)	176 (15)	359 (132)	29 (10)	147 (26)	847 (366)	31 (9)
5	7.5 10 5 10	Hairy Vetch Crimson Clover Red Clover Annual Ryegrass	1853 (84)	137 (60)	18 (1)	739 (248)	295 (52)	450 (44)	20 (8)	144 (24)	905 (386)	33 (11)

¹Sampling date 10/30/13, ²Sampling date 5/1/14 ³Sampling dates 11/20/13 (Musgrave) and 11/15/14 (Adams Center) ⁴Sampling dates 5/22/14 (Musgrave) and 5/13/14 (Adams Center)

**Standard error is found in parentheses next to each treatment mean

† Corn Silage treatment values are from Virgil, NY

‡ Corn Grain treatment values are from Adams Center, NY and Musgrave Research Farm, Aurora, NY



Two interseeders were used to establish seven cover crop treatments for this demonstration strip trial (map below). Left: RoGator (Branton) interseeder. Right: InterSeeder (Penn State).

Demonstration Plot Details: Western New York Soil Health Field Day

Planting date: May 27, 2015

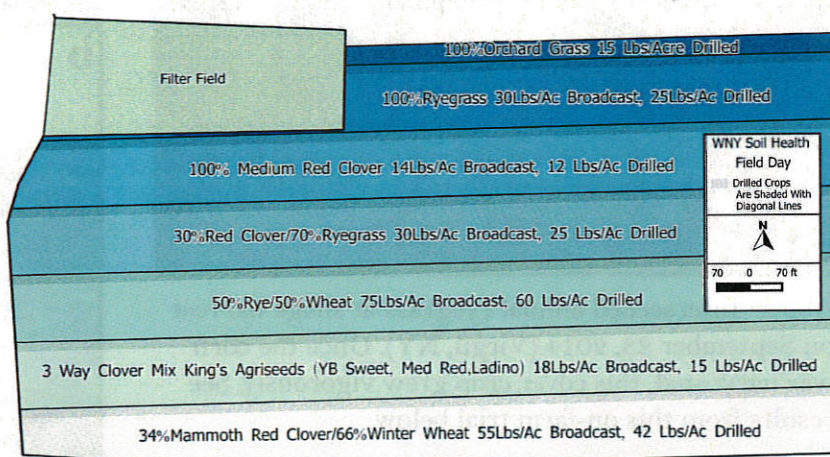
Variety: Mycogen TMF2Q413 (96-day RM)

Population: 34,000 seeds/acre

Herbicides: Glyphosate at 2 qts, Banvel at 0.5 pts, and 2-4D at 1 pt applied fall 2014 to control alfalfa sod. Touchdown at 24 oz. applied June 19, 2015 with corn at V4 stage.

Broadcast interseeding: AgChem 1274c RoGator (Branton) on June 24, 2015, 28 days after planting, at corn stage V5-6. 60-ft seeding width. Sidedress N at 46 lbs N/a.

Drill interseeding: InterSeeder on July 6 2015, 40 days after planting, at corn stage V7-V8. 10-ft seeding width. No sidedress N.



Above: Dueppengiesser Farm Field Map. Seven cover crop treatments seeded with two different interseeder machines (above).

Summary

Cover crop interseeding research in New York over the past three years shows that establishing cover crops prior to harvesting can have benefits. Interseeding enables the establishment and fall growth of legume and brassica cover crops that have traditionally been excluded by late seeding after corn and soybean harvest. Interseeding also increases the scavenging ability of grass cover crops and nitrogen recycling. Based on data from Willsboro, it appears that grass-legume mixtures can self-regulate and do well under both low and high nitrogen conditions. We also observed challenges with interseeding cover crops including reduced herbicide options, damage to headlands, and variability in cover crop performance. Although legume cover crops grow rapidly in the spring and can provide extra nitrogen if allowed to grow longer, early termination and corn planting maximizes yield potential. More research is needed to better understand the economics of interseeding and how termination timing in the spring affects the nitrogen credit from the cover crop.

Interseeding Demonstration: Donn Branton, Chad Branton, Brian Caldwell, Mike Dueppengiesser, Dave DeGoyler, Chris Pelzer, Rod Porter, Matt Ryan, Sandra Wayman. For more information about cover crop interseeding e-mail Matt Ryan at mrr232@cornell.edu. or visit our website at <https://scslabcu.wordpress.com/>

Common corn herbicides, estimated half-lives, cash crop restrictions and their potential to injure fall cover crops
 (Prepared by Bill Curran and Dwight Lingenfelter, Extension Weed Science, Penn State University)

Corn

Herbicide	Active Ingredient	Normal Rate/Acre	Half Life (days)	Cash Crop Restrictions	Fall Cover Crops OK to plant	Concern for	Other
2,4-D 4S	2,4-D	1-2 pt	7	Plant anything 30 days after application	All grasses	Wait 30 days before planting sensitive broadleaves	Amine formulations more water soluble and can leach into speed zone
Accent 75DF/ Steadfast 75DF	Nicosulfuron/ nicosulfuron+ rimsulfuron	0.66 oz/ .075 oz	21	Sensitive crops have 10-18 month restriction	Fall cereal grains, ryegrass	Small seeded legumes, mustards, sorghum	More persistent in high pH soils (>7)
Atrazine 4L	Atrazine	1-2 qt	60	Can plant corn, sorghum and soybean the following year (some products allow others)	Sorghum species	Cereals, ryegrass, legumes, and mustards	More persistent in high pH soils (>7) Rates >1 lb/acre can allow more flexibility
Balance Pro 4L	Isoxaflutole	2 fl. Oz	50-120	Small seeded legumes and vegetables have a 10-18 month restriction	Fall Cereals grains	Cereals, ryegrass, legumes, and mustards	15 inches of cumulative precipitation required from application to planting rotations crops except soybean, barely, wheat, sorghum, and sunflower
Callisto (includes Lumax, Lexar, Halex GT)	Mesotrione	3-6 fl. Oz	5-32	10 to 18 months for legumes and vegetables	All grasses	Small seeded legumes, mustards	Sequential applications (PRE fb POST) increase the potential for injury
Clarity/ Banvel 4S (Distinct and Status)	Dicamba	16 to 24 fl. Oz	5-14	15 days per 8 fl. oz/acre for small grains	All crops	Only at high rates or less than 120 days after application	Anything can be planted after 120 days with 24 fl. oz/acre or less
Dual II Mag 7.62E/Cinch	Metolachlor	1.67 pt	15-50	Labeled for use on many crops	Almost anything	Annual ryegrass or other small seeded grasses	Higher rates and later applications more of a potential problem
Capreno 3.45SC	Tembotrione + thienicarbazone	3 fl. Oz	50-120	Four mo. For wheat, 10 mo. For barley, sorghum, oats and alfalfa	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	15 inches of cumulative precipitations required from application to planting rotations crops except wheat
Corvus 2.63SC	Isoxaflutole + thienicarbazone	5.6 fl. Oz	50-120	Four mo. For wheat, 9 mo. For barley and 17 mo. For alfalfa, oats, sorghum, & canola	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	15 to 30 inches of cumulative precipitations from application to planting for sensitive crops

Harness 7E (Degree, Warrant)	Acetochlor	2 pt	10-20	Four mo. For wheat and 9 mo. For alfalfa and clovers	Most crops should be fine	Food or feed residues rather than crop injury may be a concern	Nonfood/feed winter cover crops are allowed after corn harvest
Impact 2.8SC	Topromesone	0.75 fl. Oz	14	Alfalfa, canola, soybean, and sunflower have a 9 mo. Restriction	Wheat, barley, oats and rye are allowed after 3 mo. Ryegrass should also be ok	Although many broadleaves are restricted, impact does not have much soil activity	We have not seen thin herbicide carryover in PA
Laudis 3.5sc	Tembotrione	3 fl. Oz	14	Four mo. For cereal grains 10 mo. For sorghum, canola, and alfalfa	Cereal grains after 4 months	Unknown-Small seeded legumes, mustards could be a problem	Other crops may be seeded after a successful field bioassay
Peak 57WG (Spirit)	Prosulfuron	1 oz	9-152	Cash crop restrictions ranged from 10 mo. For soybean and tobacco to 22 mo. For alfalfa and canola	Cereal grains and sorghum are labeled, other grasses	Small seeded legumes, mustards	More persistent in high pH soils (>7)
Permit/Sandea 75DF	Halosulfuron	2/3 oz	9-27	9 mo. For alfalfa, clovers, soybean and 15 mo. For canola	Cereal grains and sorghum after 2 mo. And other grasses	Small seeded legumes, mustards	Halosulfuron also an ingredient in Yukon
Resolve 25DF (Resolve Q)	Rimsulfuron	2 oz	2-4	Winter cereals have 3 mo. Restriction and many crops are restricted for 10 mo.	Based on the short half-life, most fall cover crops should be ok in PA	None	More persistent in drought conditions
Simazine 4L (Princep)	Simazine	1-2 qt	60	Can plant corn, sorghum, and soybean the following year (some products allow others)	Sorghum species	Cereals, ryegrass, legumes, and mustards	Soil pH >7
Stinger 3S (Hornet and Surestart)	Clopyralid	5 oz	40	Recrop intervals 10.5 to 18 mo. For legumes	All grasses	Small seeded legumes	

Corn and Soybean

Herbicide	Active Ingredient	Normal Rate/Acre	Half life (days)	Cash crop restrictions	Fall cover crops		Other
					Ok to plant	Concern for	
Glyphosate 4L	Glyphosate	.075 to 1.25 lb.	47	No restrictions pre-emergence	All	None	Glyphosate does not have soil activity at normal use rates
Gramoxone 2S	Paraquat	2 pt.	1000	No restrictions pre-emergence	All	None	Paraquat does not have soil activity at normal use rates
Harmony 50WDG	Thifensulfuron	1/8 oz.	12	Any crop can be planted 45 days after application	No restrictions for wheat, barley and oats	None with 45 day waiting interval	Harmony extra also contains tribenuron
Liberty 2.34L	Glufosinate	22-36 fl. Oz.	7	No restrictions for canola, corn and soybean. Small grains have a 70 day restriction	All	Food or feed residues rather than crop injury may be a concern	Glufosinate does not have soil activity at normal use rates
Outlook 6E	Dimethenamid	16 fl. Oz	20	Four mo. For cereal grains and anything the following spring	Most crops should be fine	Food or feed residues rather than crop injury may be a concern	Nonfood/feed winter cover crops should be ok after corn harvest
Prowl H2O 3.8CS	Pendamethalin	3 pt.	44	Wheat and barley after 4 mo. Other rotational crops the following year	Cereal grains	Small seeded legumes and annual ryegrass	We have not seen this herbicide carryover in PA nonfood/feed winter cover crops should be ok
Python 80WDG (Hornet & Surestart)	Flumetsulam	1 oz.	14-120	Cash crop restrictions from 4 mo. For alfalfa and cereals to 26 mo. For canola	Cereal grains	Small seeded legumes, mustards and annual ryegrass	Cover crops and forage grasses are restricted for 9 mo.
Metribuzin 75DF (sencor)	Metribuzin	0.33 lb.	14-60	Recrop restrictions range from 4 to 12 mo.	Cereal grains and ryegrass	Slight risk for small seeded legumes and mustards	Nonfood/feed winter cover crops allowed
Sharpen 2.85SC (Verdict & Optill)	Saflufenacil	3 fl. Oz.	7-35	Any crop can be planted 4 mo. After application	All	None	This product has been reported more persistent in western Canada

Soybean

Herbicide	Active Ingredient	Normal Rate/Acre	Half Life (days)	Cash Crop Restrictions	Fall Cover Crops Ok to Plant	Concern for	Other
Assure II/Targa 0.88E	Quizalofop	8 oz.	60	Most broadleaves ok	Most broadleaves	All grasses if less than 120 days or at high rates	Plant anything after 120 days
Authority 75DF (Spartan 4F)	Sulfentrazone	4 oz.	32-302	12 to 24 Months for legumes and some vegetables	Cereals and ryegrass	Small seeded legumes, mustards, sorghum	Labeled on tobacco, sunflowers, transplanted tomato
Classic 25DF (Canopy, Envive, etc.)	Chlorimuron	0.5-2 oz.	40	12 to 30 months for small seeded legumes	Cereals and ryegrass	Small seeded legumes, mustards, sorghum	More persistent in high pH soils (>7) and with higher soil applied rates
First Rate 84WDG	Cloransulam	0.3 to 0.6 oz.	8-33	Four months to wheat, 9 mo. To alfalfa, corn sorghum and oats, 12 mo. For barley, and 18 mo. For tobacco	Wheat, triticale, rye	Small seeded legumes, mustards, sorghum	The restrictions for transplanted tobacco is 10 mo. For 0.3 oz./acre. Sugarbeet and sunflower have a 30 month restriction
Pursuit 2S	Imazethapyr	4 fl. Oz.	60-90	Recrop restrictions range from 4 to 18 months	Wheat, triticale, rye, alfalfa, clover	Oats, sorghum, mustards	Any crop can be planted 40 months after pursuit applications
Raptor 1E	Imazamox	5 fl. Oz	20-30	Recrop intervals range from 3 to 18 mo.	Wheat, triticale, rye, alfalfa, clovers	Slight risk for mustards	Most cash crops allowed 9 mo. Following application
Reflex 2E/Flexstar 1.88E	Fomesafen	1.5 pt.	100	Recrop intervals range 4 to 18 mo.	Cereal grains	Small seeded legumes, mustards, sorghum	Since fomesafen is often applied postemergence, soil activity can surprise users
Scepter 1.5AS	Imazaquin	0.66 pt.	60-90	Recrop intervals range from 11 to 18 mo.	Cereal grains	Small seeded legumes, mustards	Carryover much more of a risk with drought
Select 2E	Clethodim	10 oz.	3 d	Most broadleaves ok	All broadleaves	None assuming at least 30 days	Plant anything after 30 days
Valor 51WDG	Flumioxazin	2.5 oz.	12-20	Recrop restrictions up to 10 mo. For no-till alfalfa, clover and 12 mo. For no-till canola	All grasses	Small seeded legumes and mustards	Based on the half-life all nonfood/feed winter cover crops should be ok