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A PROGRAM TO STIMULATE COVER CROP ADOPTION AFTER CORN SILAGE WITHOUT CARROTS OR STICKS

Penn State **Extension**

Cover Crops After Corn Silage

The 'Low Hanging Fruit'

- 30-40% of corn acreage in Pennsylvania
- Early establishment of cover crops possible
- Nutrient uptake helps nitrate losses in fall and spring
- Otherwise bare soil now protected from erosion
- Since most P moves with soil – P losses reduced
- Dairy farmers need to spread manure – compaction reduction with cover crops
- Dairy farmers need forage – options to use cover crops for silage

Outreach / Research Program

- Approx 10 demo farmers/yr
- Farmers work with Extension Educators
- Test cover crop mixes in small plot, replicated trials at all locations
- Take biomass data in fall and spring and analyze for nutrient content
- Have farmer plant 10 acres of new cover crop mix of his/her choice for evaluation
- Hold field days in fall and spring
- Farmer involvement important
- Make 5 videos
- Fact sheet
- Articles
- Coverage in press

Testing cover crop mixtures

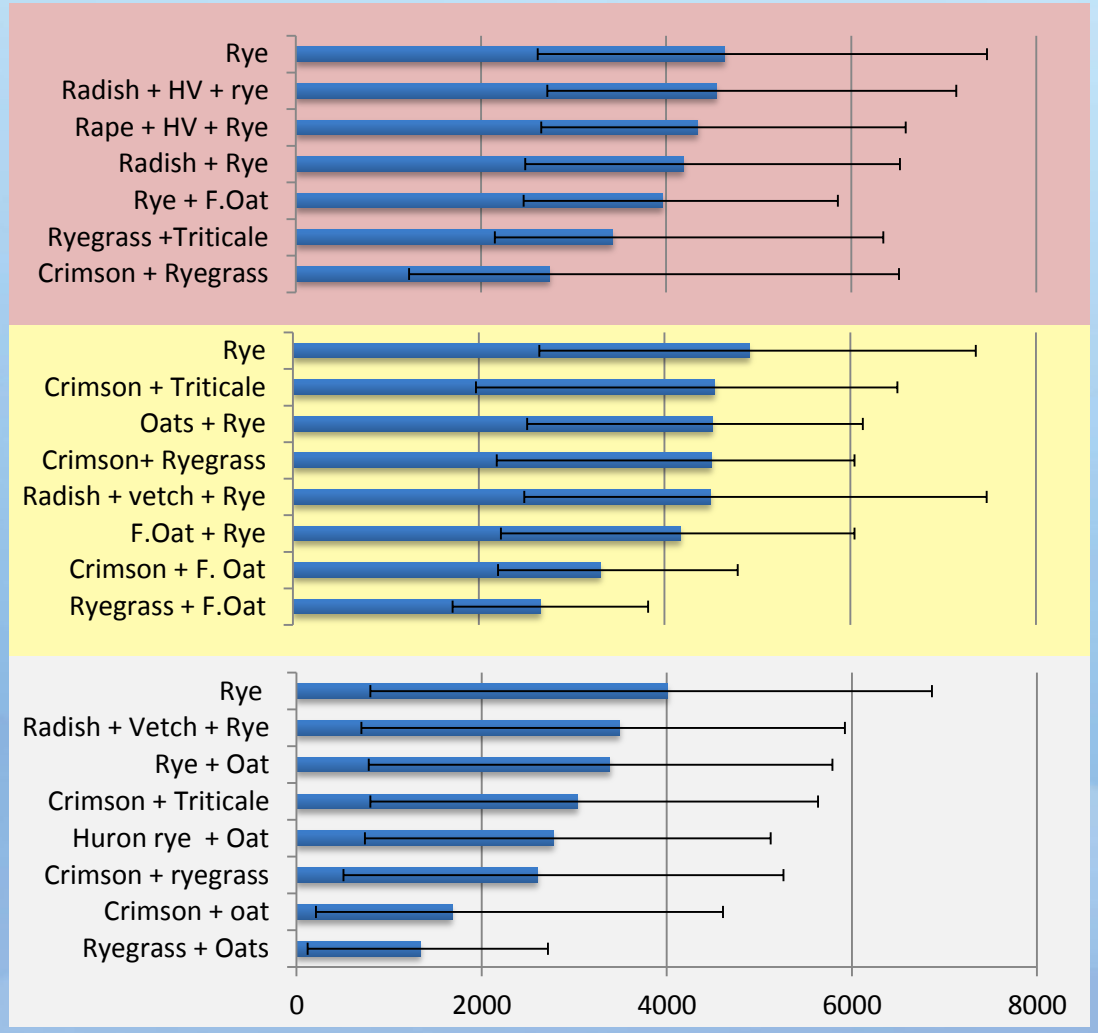
- Search for species that complement each other:
- Soil erosion control in fall and winter
- Soil erosion control in spring
- Nutrient uptake in fall and winter
- Nutrient uptake in spring
- Nitrogen fixation potential
- Root system – taproot vs fine roots
- Feed production potential in fall
- Feed production potential in spring

Example of Geographic Spread (2010/11)

Spring Biomass

Spring Cover crop Biomass (lbs/A)

Summary of 9-10 annual on-farm cover crop trials in PA



Dry matter (lbs/A), average, minimum and maximum

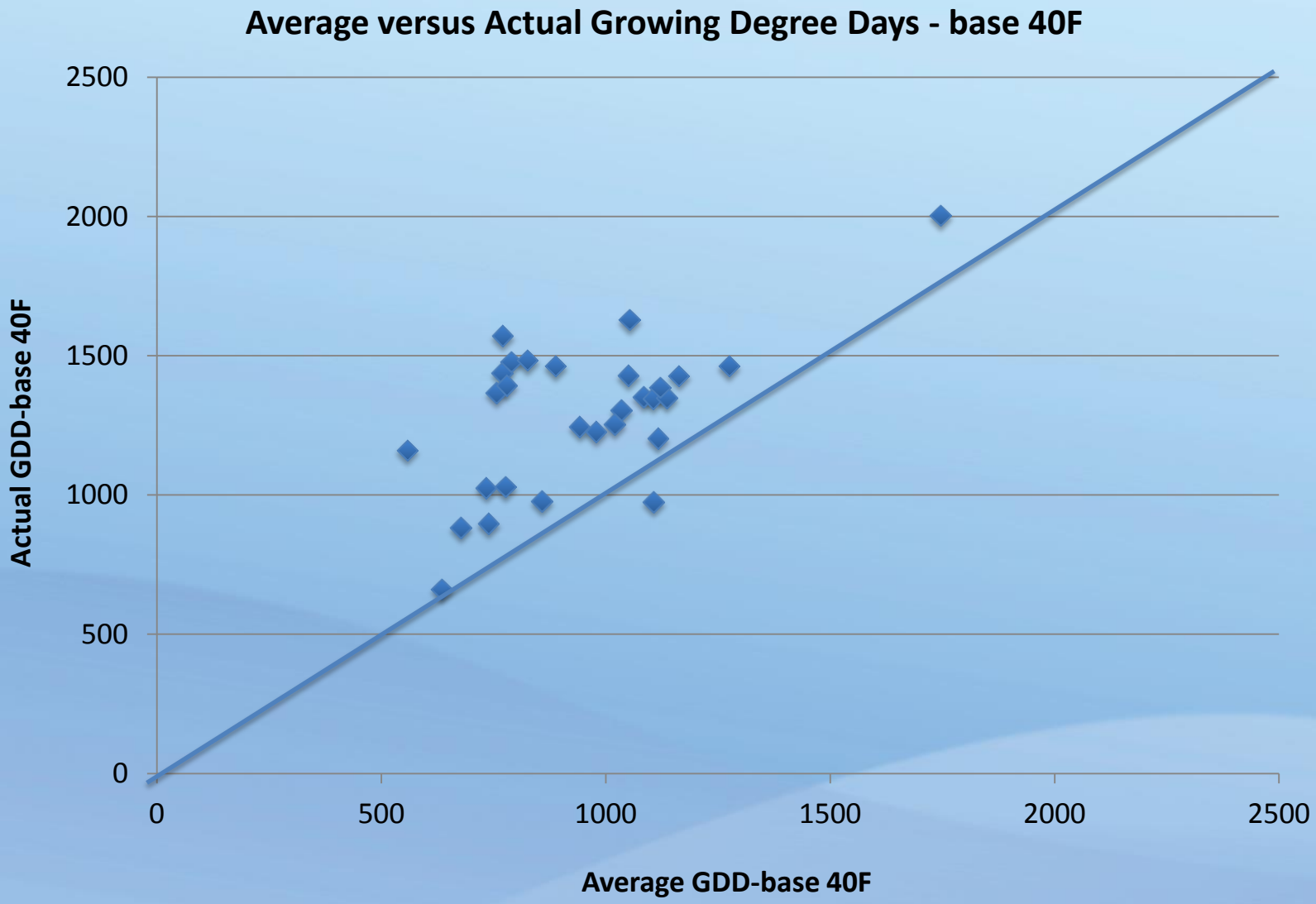
Calculations based on 4 reps (2011) or 3 reps (2012+2013)

Spring Cover crop Biomass N (lbs/A)

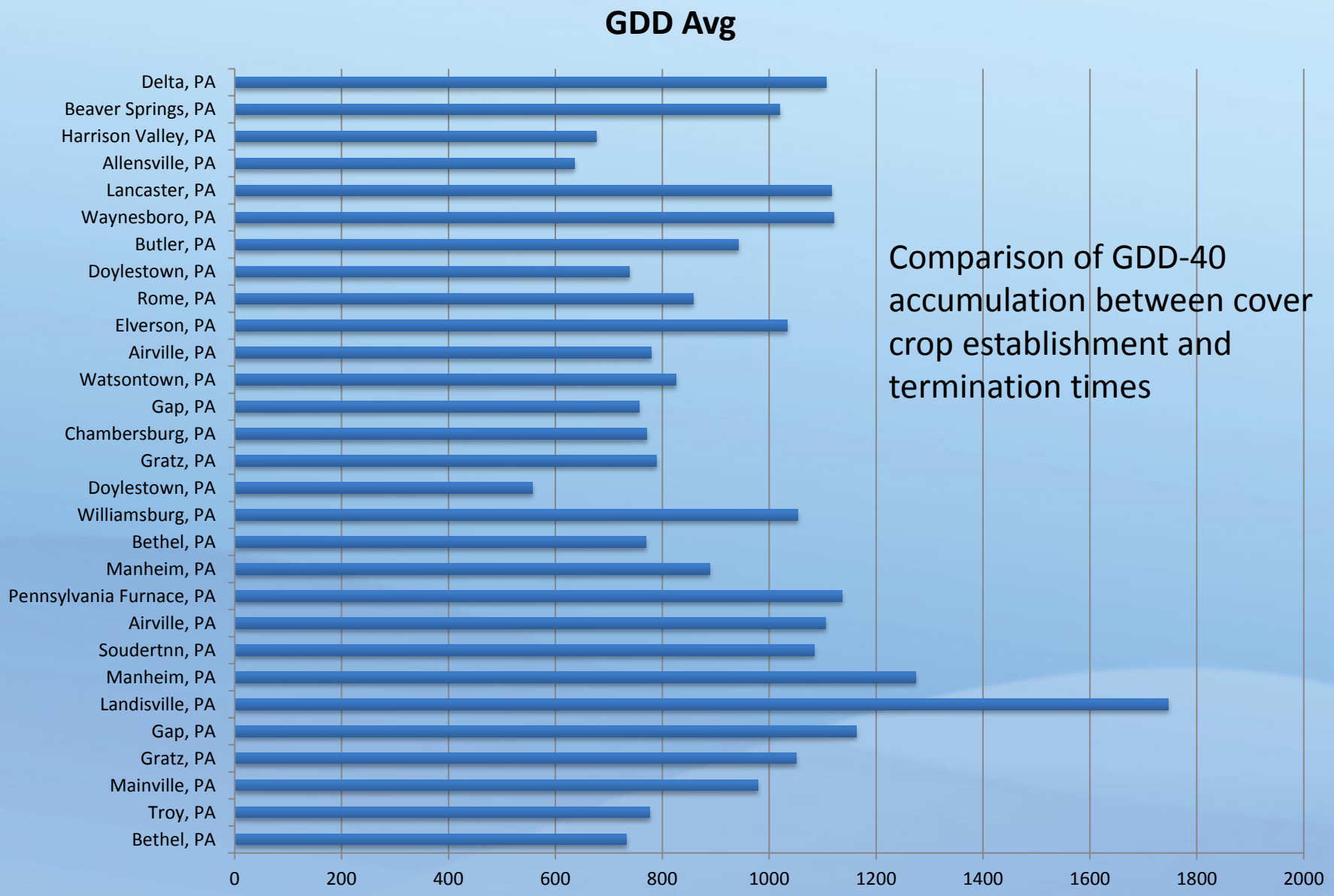
Summary of 9-10 annual on-farm cover crop trials in PA

Calculations based on 4 reps (2011) or 3 reps (2012+2013)

		Average	Minimum	Maximum
		(lbs/A)		
Spring 2011	Crimson + Ryegrass	70	21	104
	Ryegrass +Triticale	73	41	126
	Rye + F.Oat	76	44	139
	Radish + Rye	82	49	161
	Rape + Vetch + Rye	87	50	169
	Radish + Vetch + rye	89	52	164
	Rye	93	47	182
Spring 2012	Ryegrass + F.Oat	52	21	74
	F.Oat + Rye	69	26	107
	G.Oats + Rye	73	34	97
	Radish + Vetch + Rye	82	39	120
	Rye	84	35	120
	Crimson + F. Oat	103	57	144
	Crimson+ Ryegrass	106	63	140
	Crimson + Triticale	112	65	147
Spring 2013	Ryegrass + G.Oat	31	5	72
	Crimson + G.Oat	54	7	135
	Huron rye + G.Oat	66	16	125
	Rye + G.Oat	66	17	122
	Crimson + Ryegrass	70	18	125
	Radish + Vetch + Rye	79	16	158
	Rye	82	16	176
	Crimson + Triticale	83	23	130

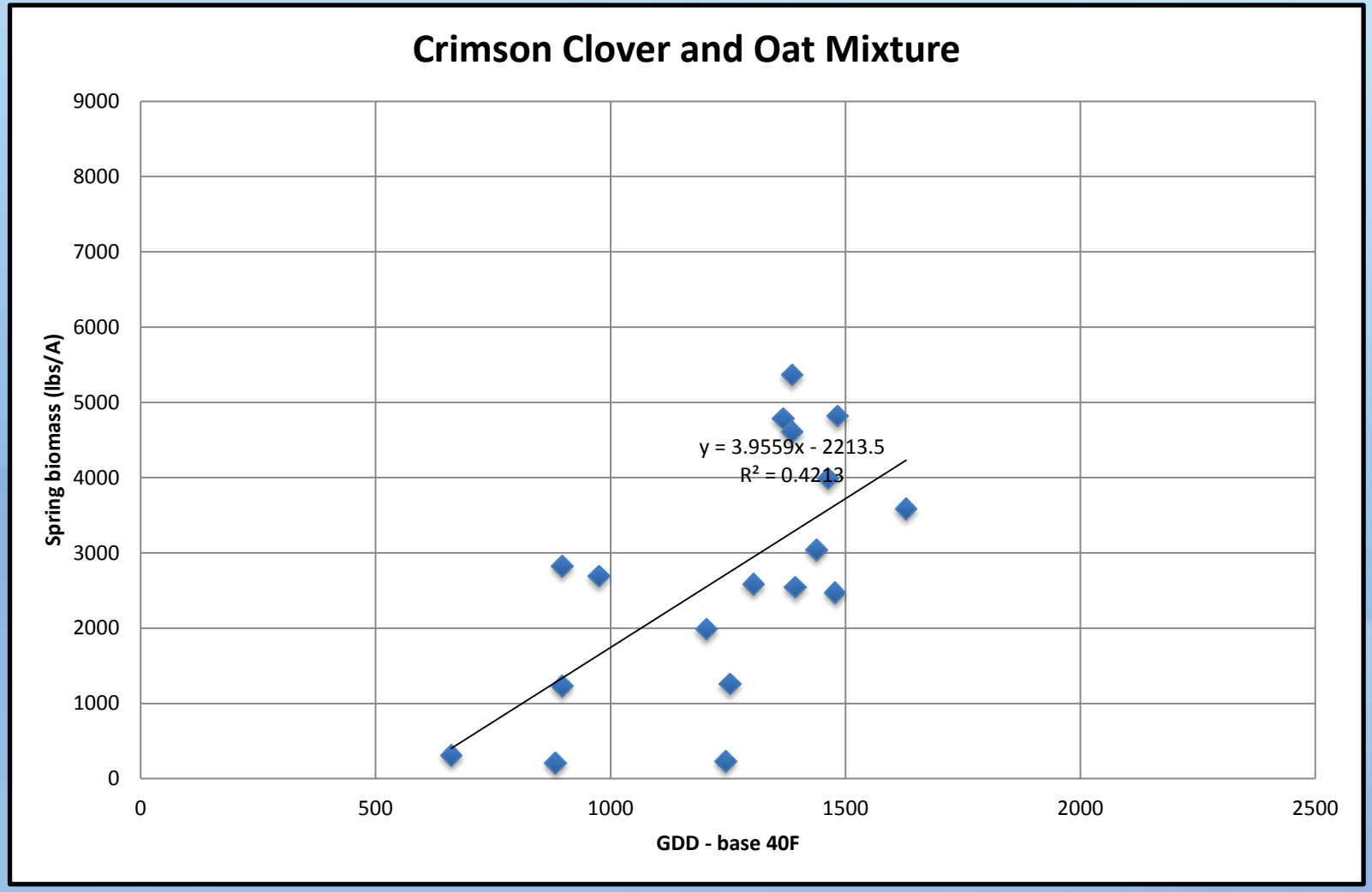


Growing degree calculations from
http://www.weather.com/outdoors/agriculture/growing-degree-days/



Comparison of GDD-40 accumulation between cover crop establishment and termination times

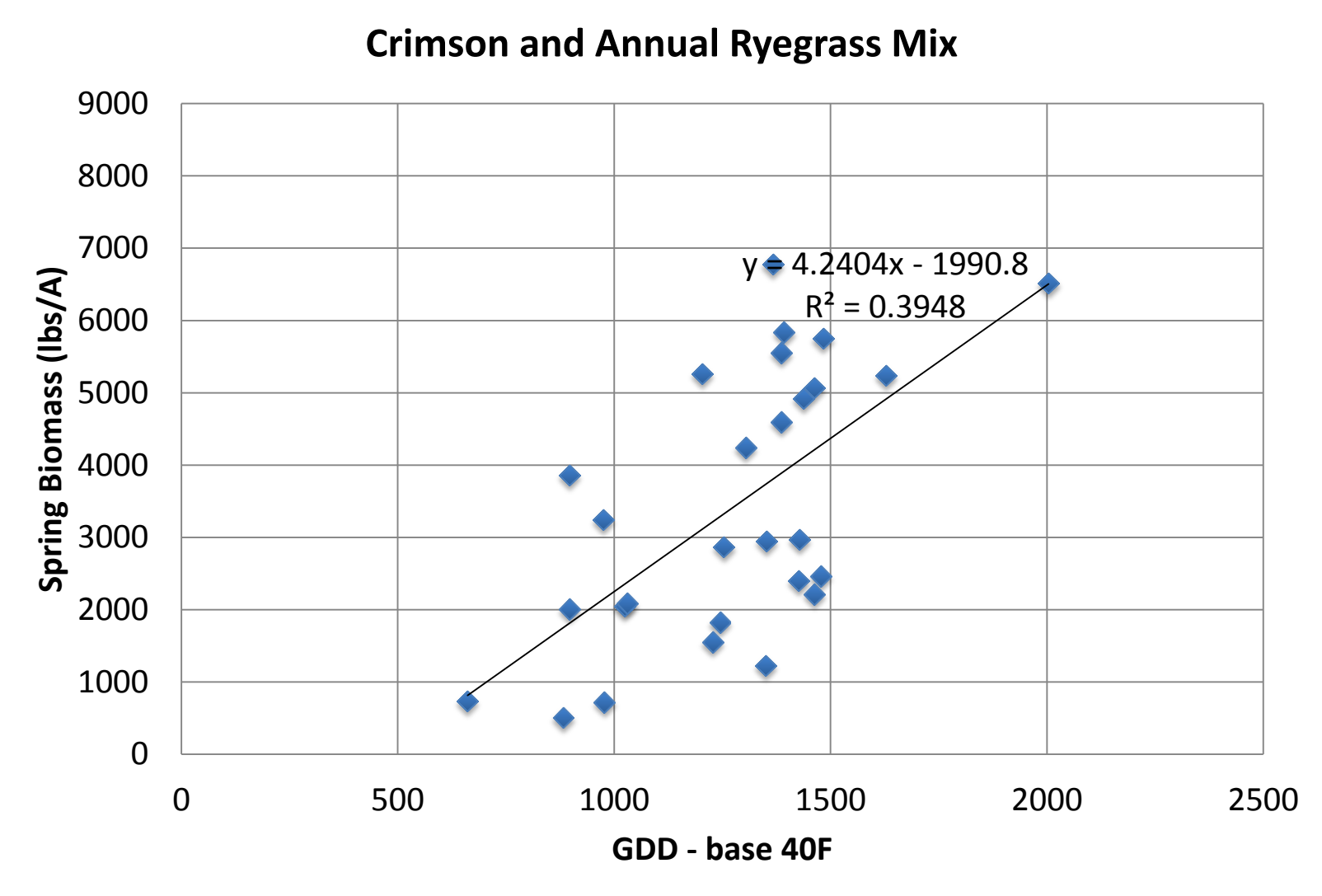
Spring Biomass vs GDD accumulation



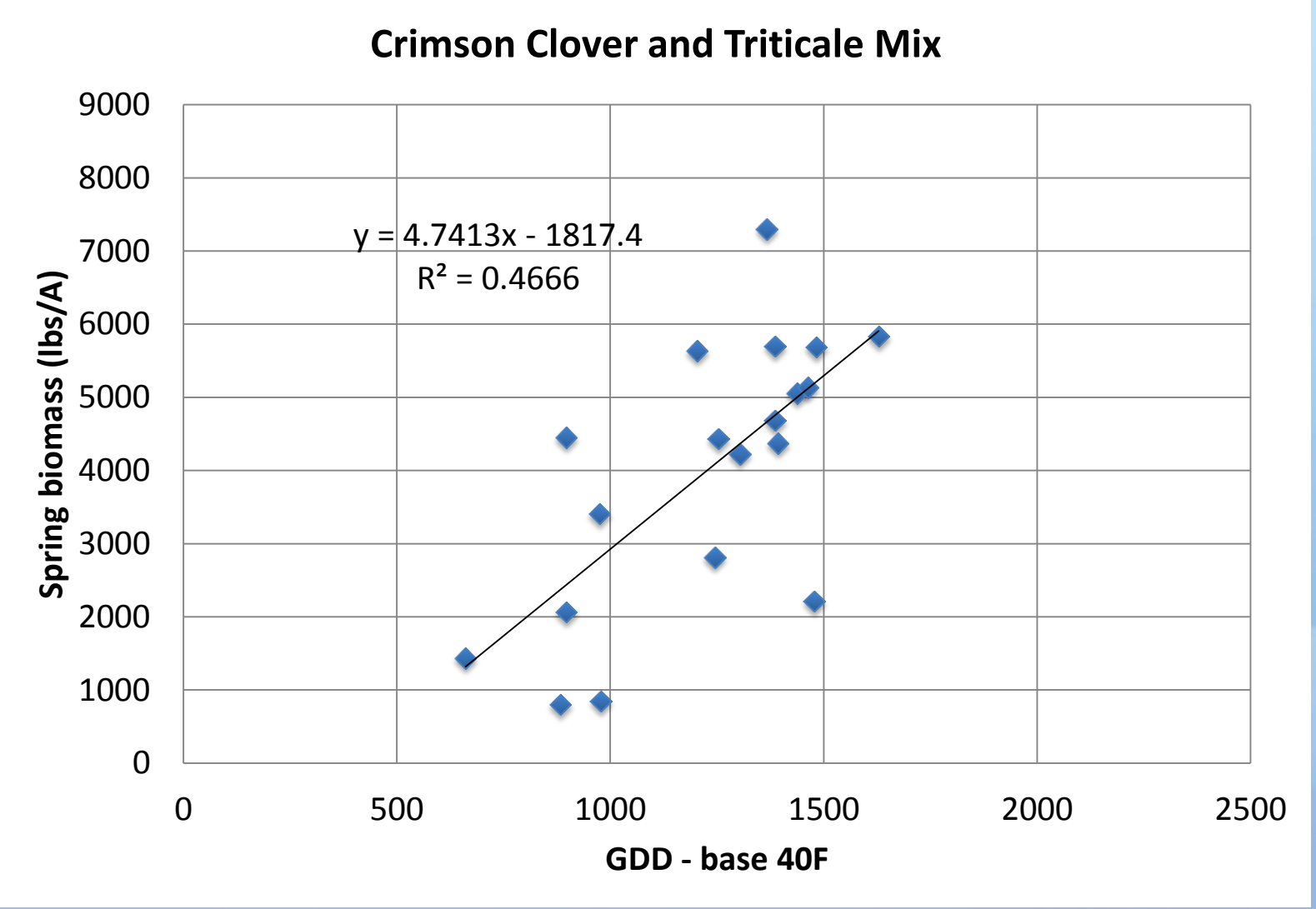
Mid-May picture of crimson clover established with oats in late August in Central Pennsylvania

Spring picture of crimson clover/oat in spring where oat was very competitive

Spring Biomass vs GDD accumulation



Spring Biomass vs GDD accumulation

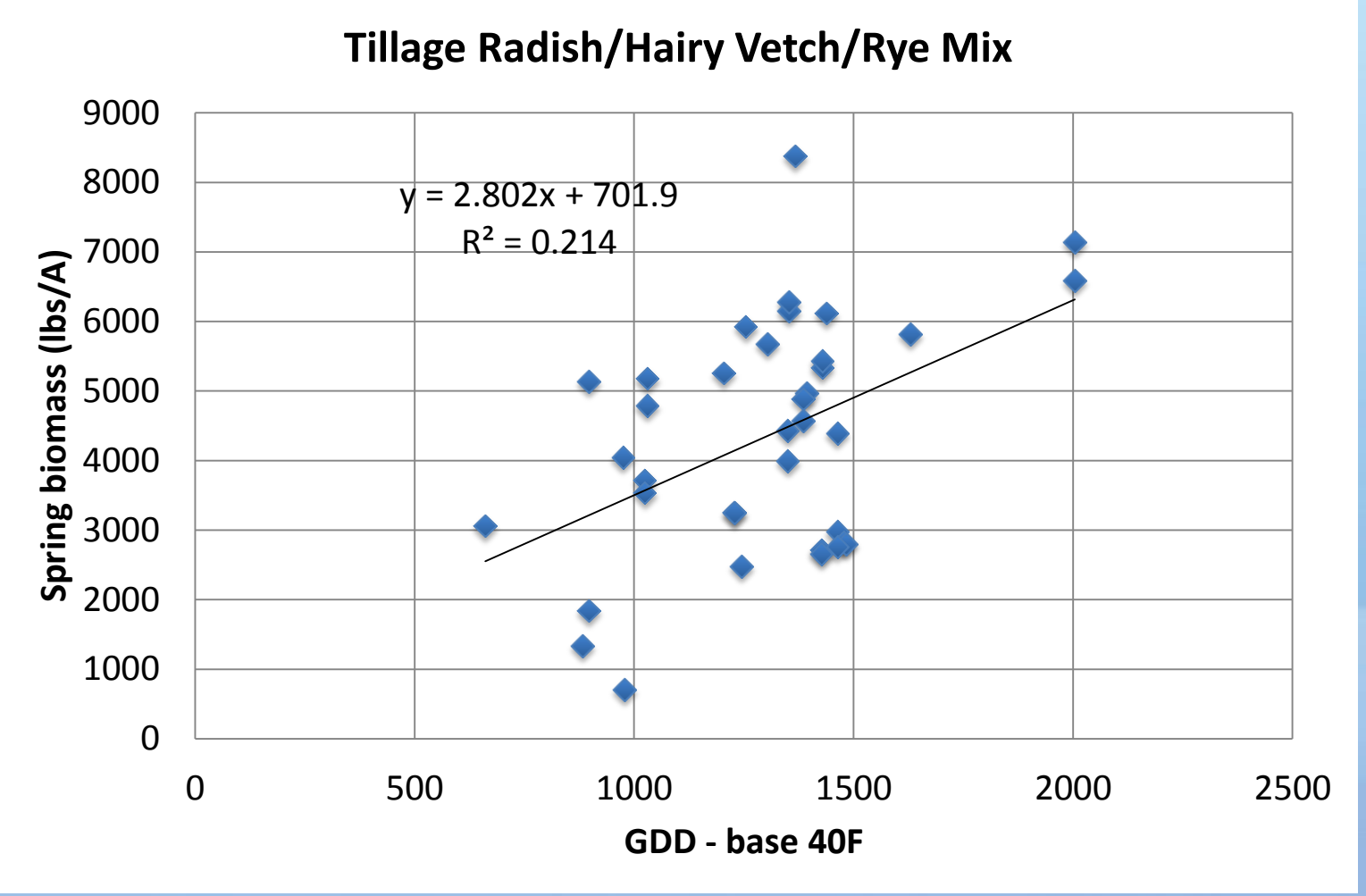



Crimson clover/annual ryegrass
Crimson clover/triticale

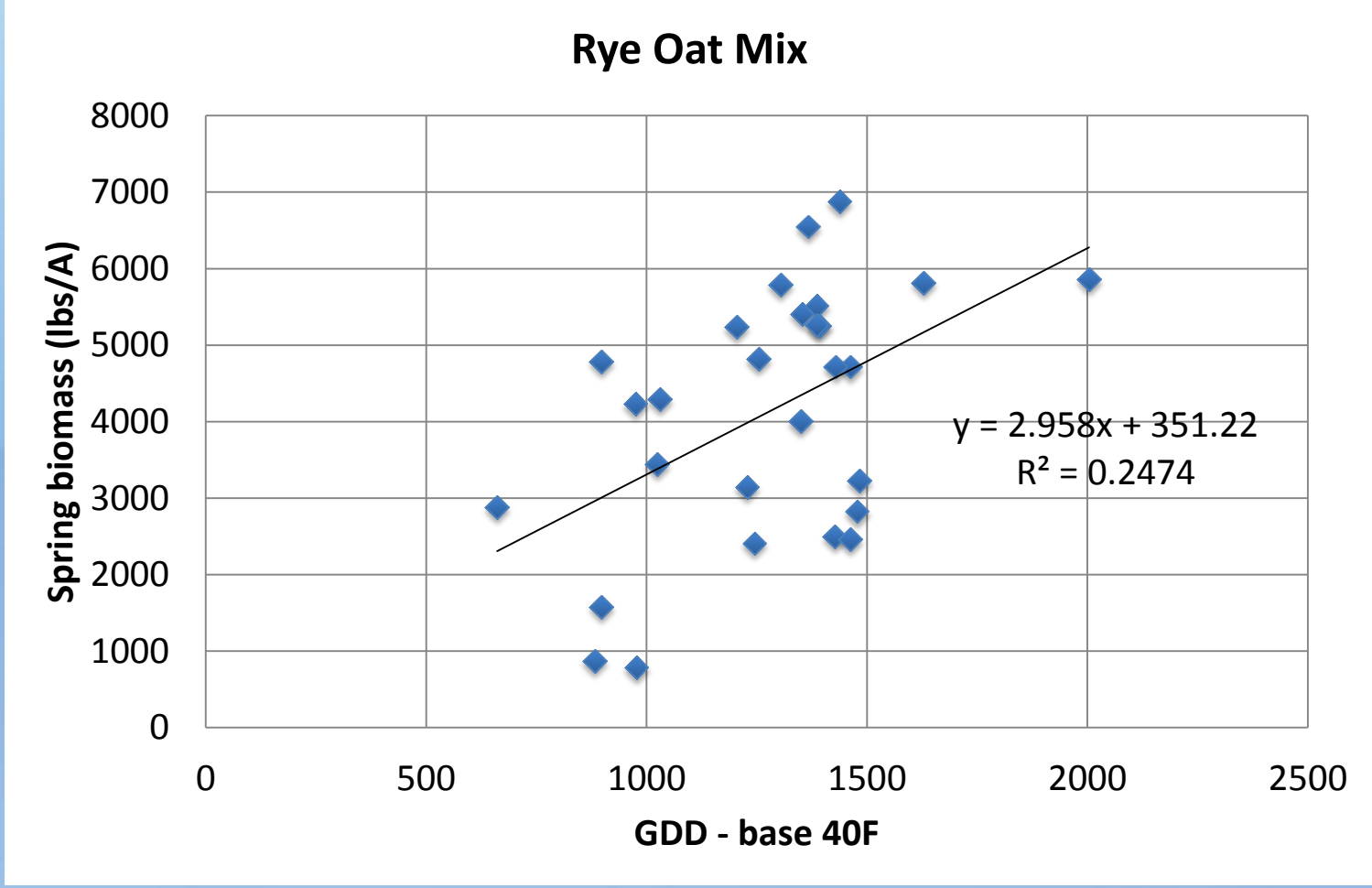

Ryegrass interseeded into corn


Ryegrass/red clover interseeded into corn

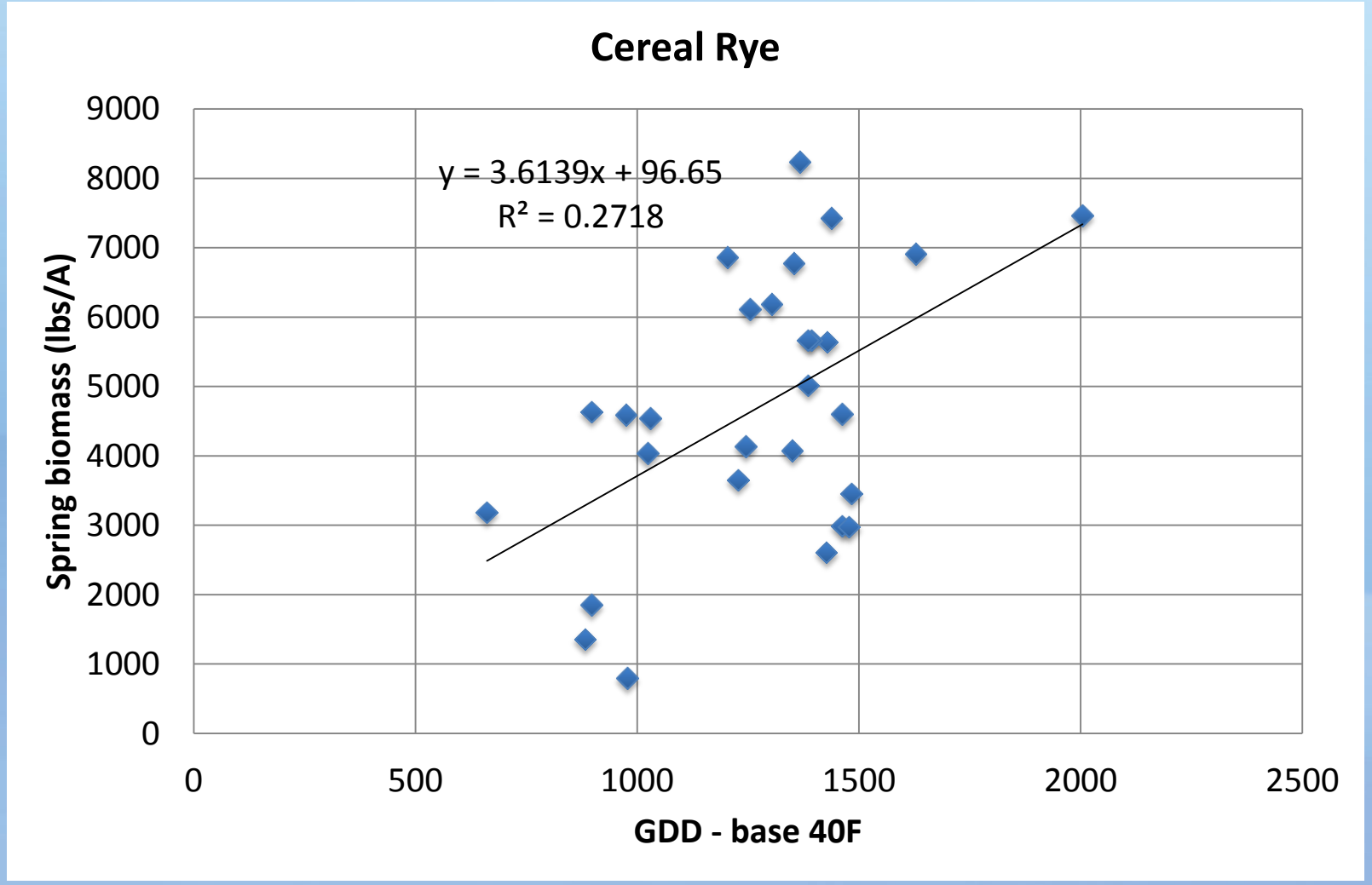
Spring Biomass vs GDD accumulation



Spring Biomass vs GDD accumulation



Spring Biomass vs GDD accumulation

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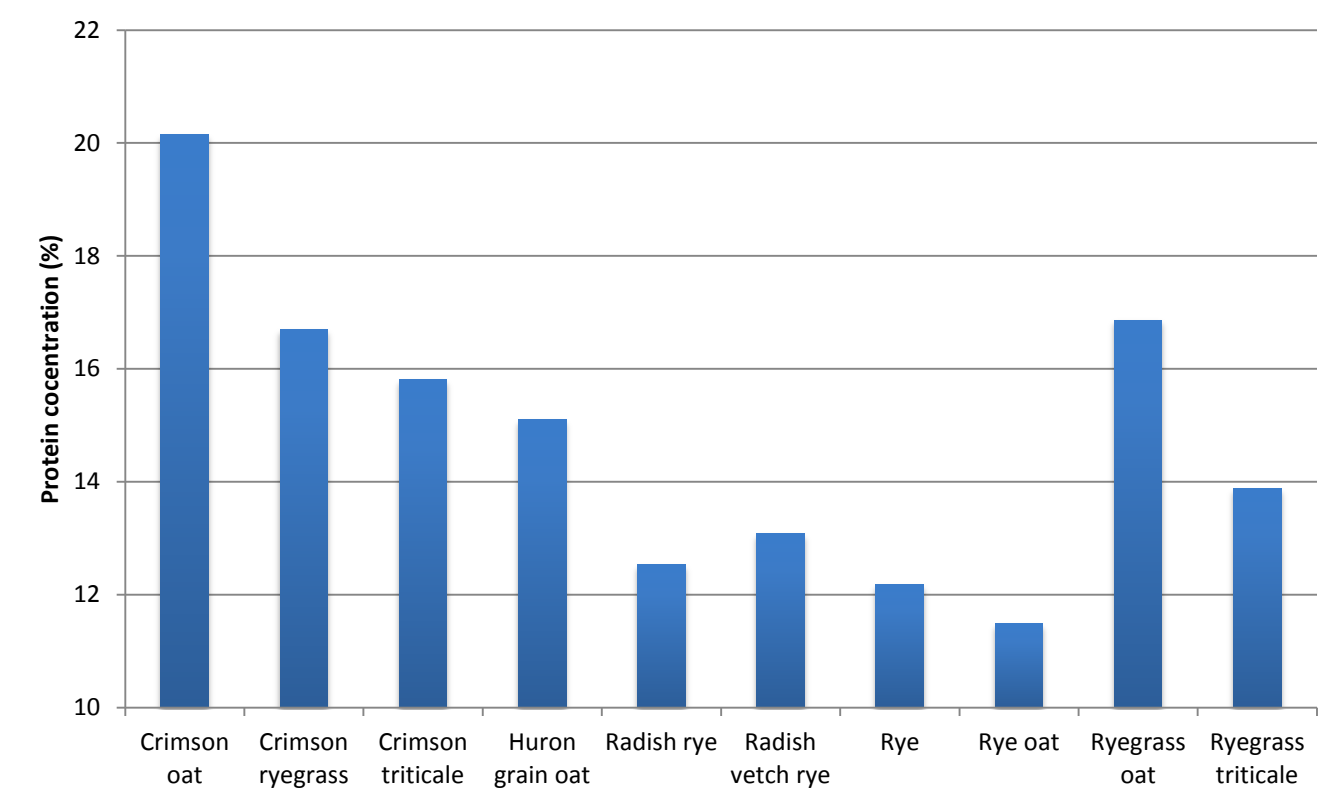
Average Protein concentration

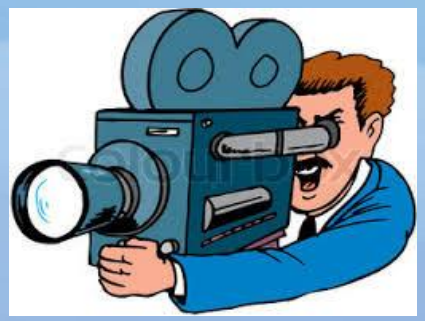


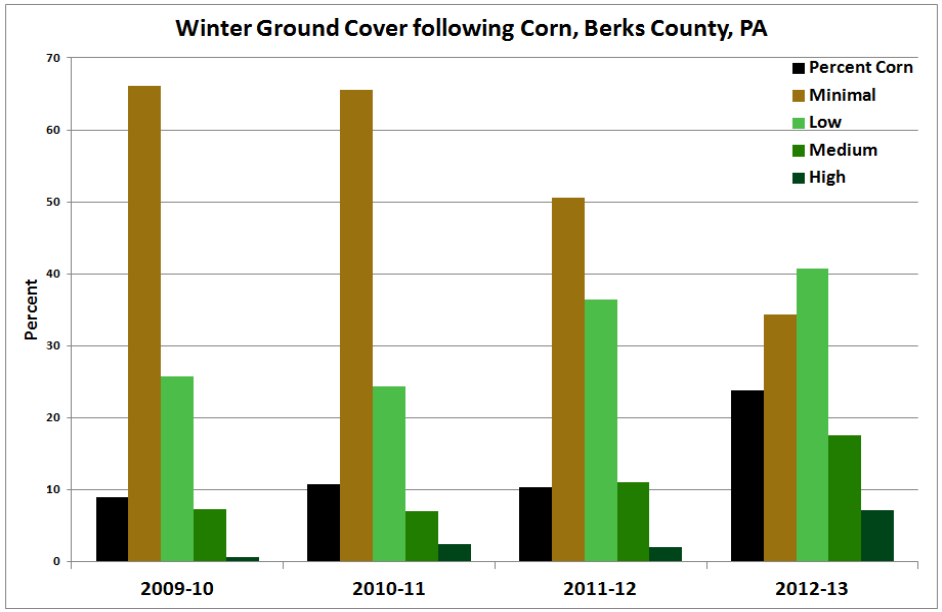
Select forage quality from spring 2011 biomass sampling

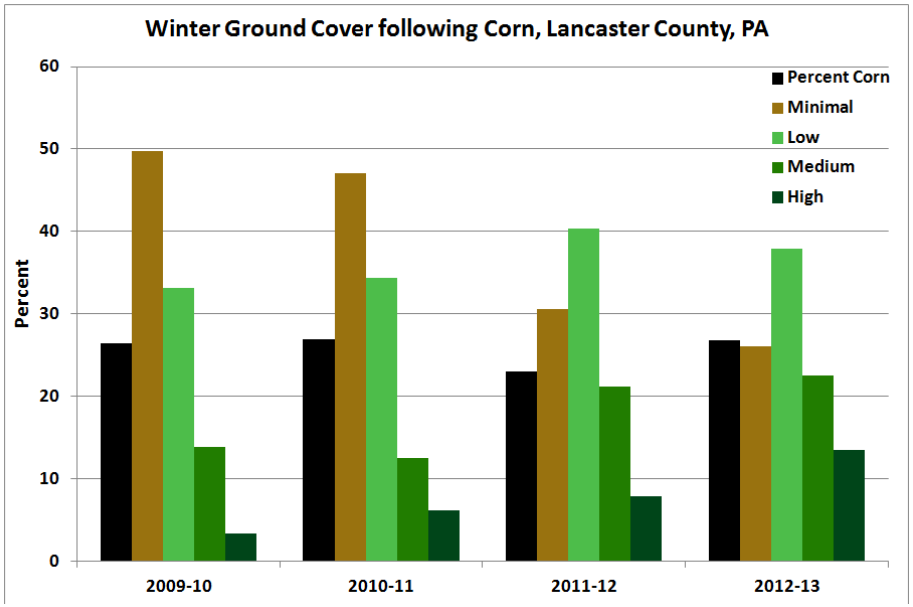
Location	Species	CP	NDF	RFV
Lancaster	Annual rye + crimson clover	12.5	50.2	111
(Landisville)	Annual rye + triticale	9.2	57.5	101
	Cereal rye (full boot)	8.6	70.2	70
Bradford	Annual rye + crimson clover	12.6	37.8	179
	Annual rye + triticale	15.0	43.4	147
	Cereal rye (veg-to-early boot)	12.3	55.6	104
Dauphin	Annual rye + crimson clover	24.5	47.7	135
	Annual rye + triticale	22.3	49.1	130
	Cereal rye (very early boot)	21.5	52.0	120
Montgomery	Annual rye + crimson clover	20.0	43.8	153
	Annual rye + triticale	16.2	44.8	146
	Cereal rye (very early boot)	15.6	53.2	112

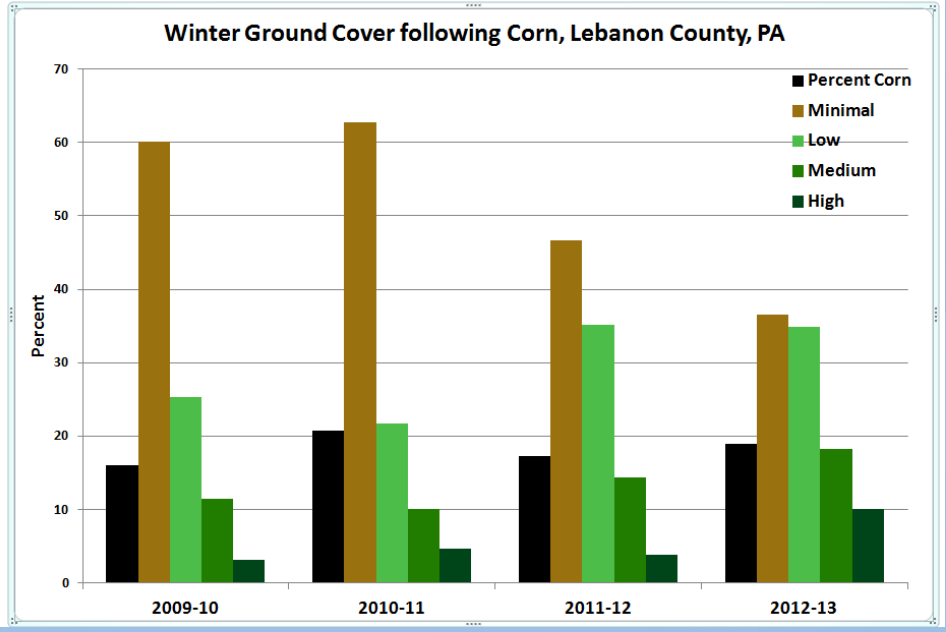
‘Without Carrot or Stick’: activities

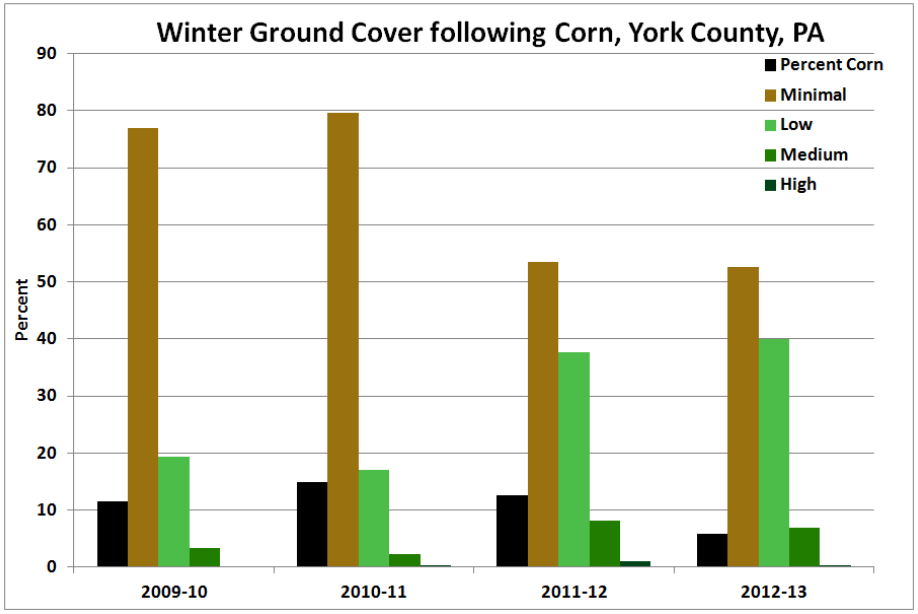
- Ca 10 on-farm demos established every fall
- 52 field crop walks
- 27 in-door presentations
- 1886 attendees
- 5 videos – viewed 5000+ times
- 21 Field Crop News articles – 1800 subscribers
- Fact sheet
- 2 articles in Lancaster Farming (56,000 subscribers)




Winter Ground Cover following Corn, Berks County, PA
Percent Corn
Minimal
Low
Medium
High
Percent
0
10
20
30
40
50
60
70
2009-10
2010-11
2011-12
2012-13


Winter Ground Cover following Corn, Lancaster County, PA
Percent Corn
Minimal
Low
Medium
High
Percent
0
10
20
30
40
50
60
2009-10
2010-11
2011-12
2012-13


Winter Ground Cover following Corn, Lebanon County, PA
Percent Corn
Minimal
Low
Medium
High
Percent
0
10
20
30
40
50
60
70
2009-10
2010-11
2011-12
2012-13


Winter Ground Cover following Corn, York County, PA
Percent Corn
Minimal
Low
Medium
High
Percent
0
10
20
30
40
50
60
70
80
90
2009-10
2010-11
2011-12
2012-13

Conclusions

- Outreach program of on-farm demonstrations, farmer and extension educator involvement, using multiple outlet methods proved highly effective in stimulating cover crop adoption without carrots or sticks
- Cover crops after corn increased approximately 25-30% of corn acres in 4 years.
- Project resulted in valuable research data.