Inter-seeding alfalfa into corn silage

Intensifying Wisconsin's forage production system

THE UNIVERSITY of WISCONSIN MADISON

UW Extension
University of Wisconsin-Extension

USDA United States Department of Agriculture

Forage Nutrition Environment
U.S. Dairy Forage Research Center

Interseeding alfalfa into corn silage

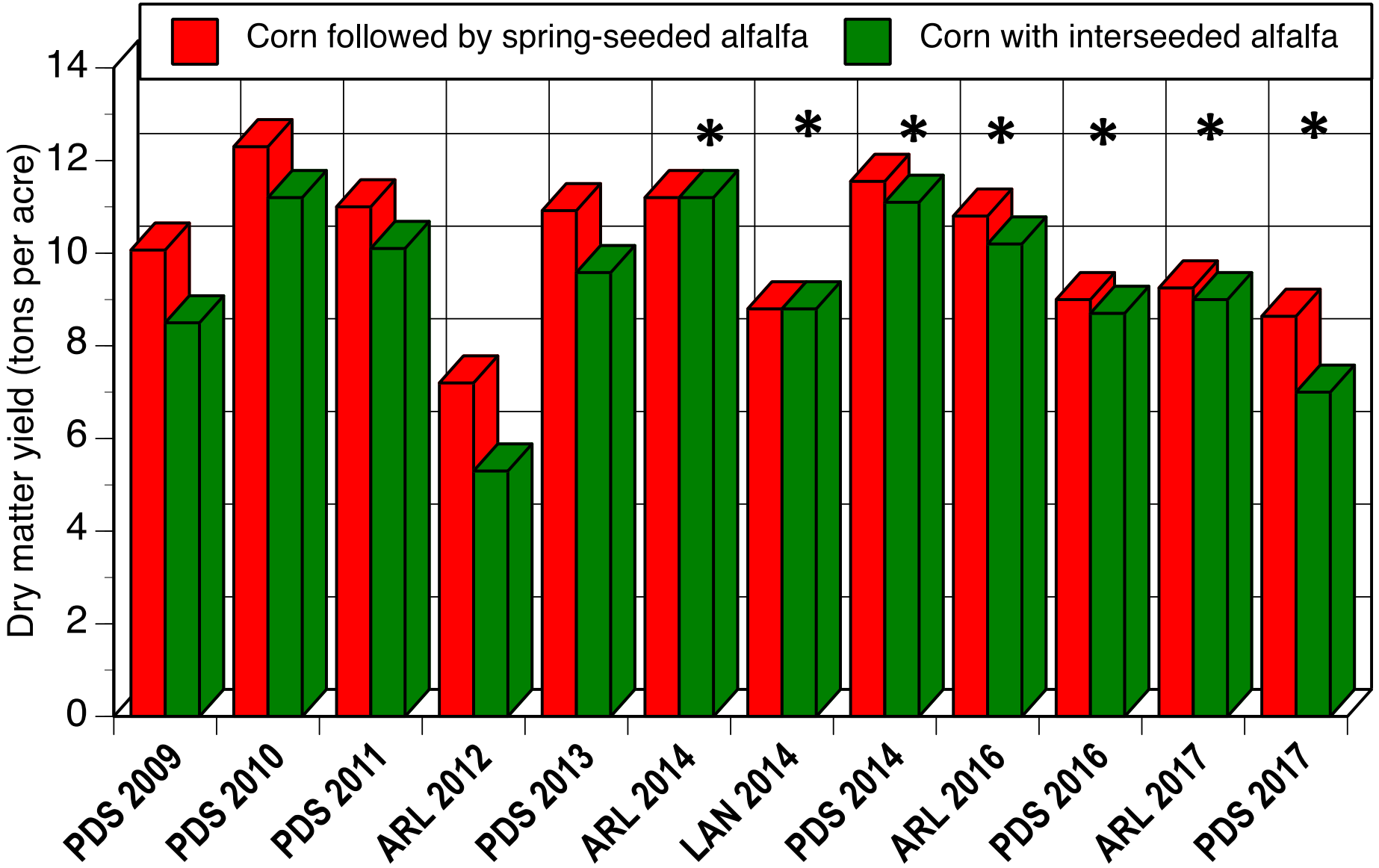
May

June

October

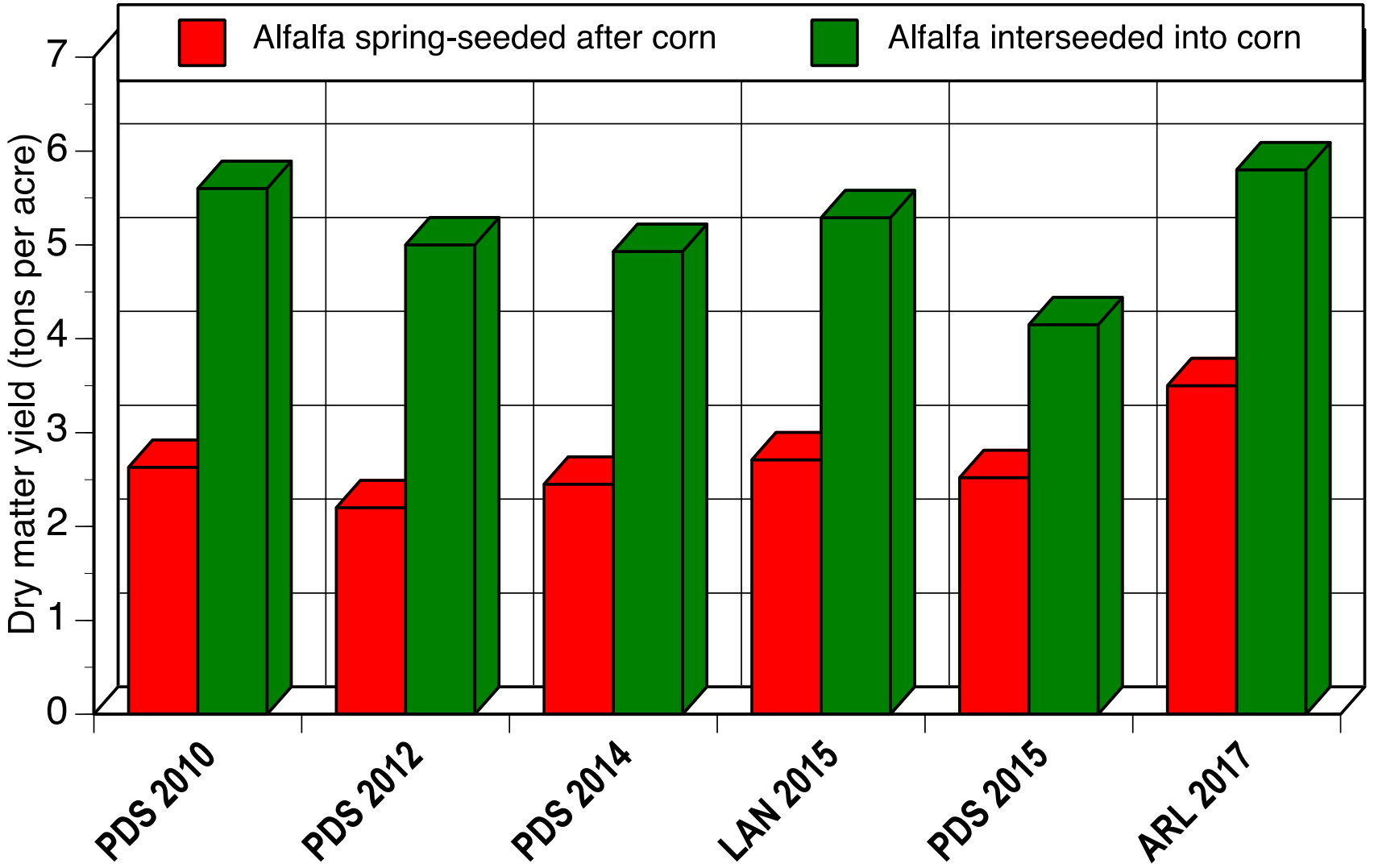
- Alfalfa planted in corn inter-rows
- Corn silage harvested
- Alfalfa re-grows as subsequent year’s crop

Alfalfa interseeding can reduce silage corn yields



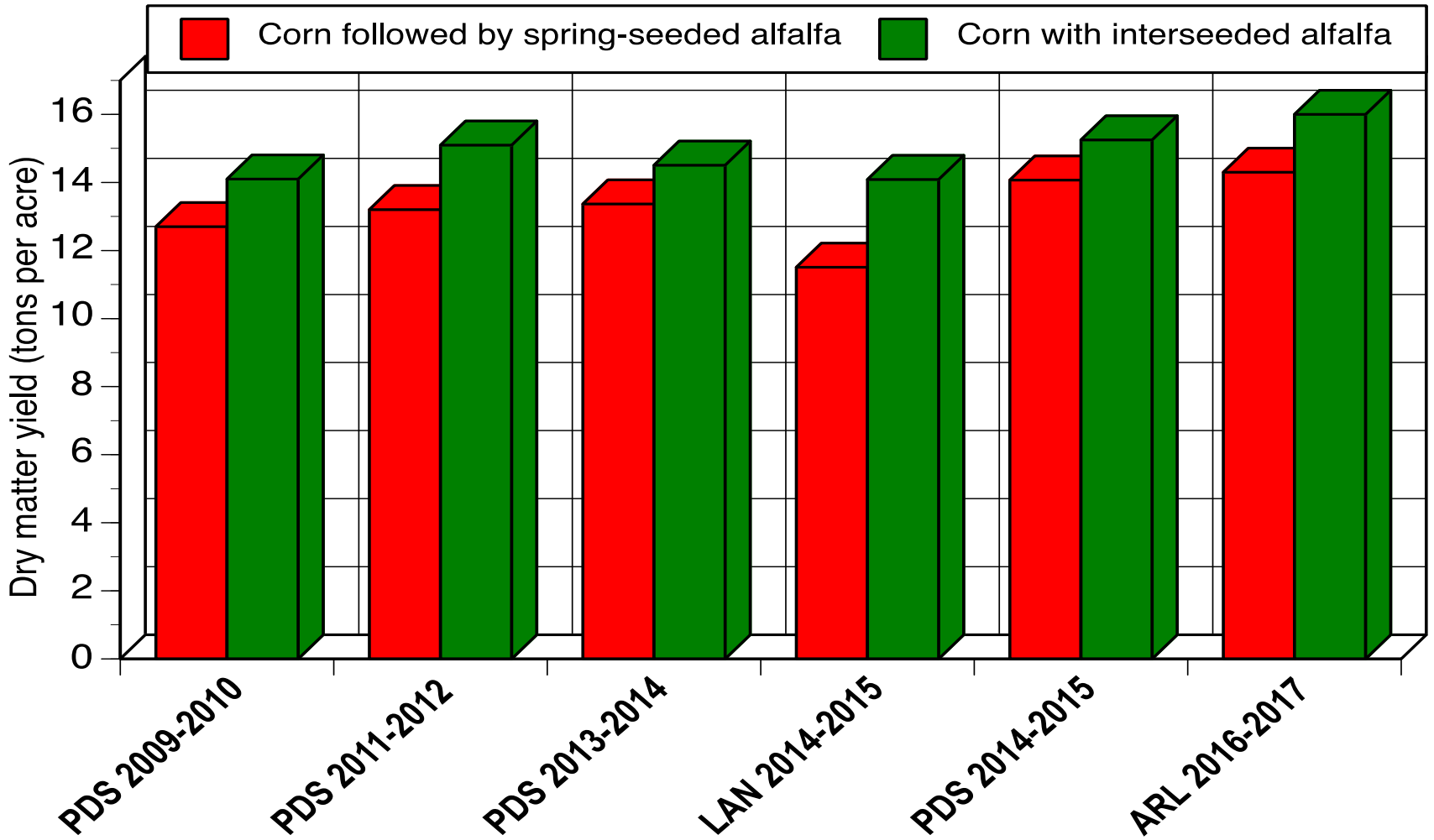
*Yield drage reduced/eliminated when N rate increased to 200 lbs/A

Successful establishment by interseeding roughly doubles first year alfalfa yields



To increase survival of alfalfa use prohexadione (Kudos)

When successful alfalfa interseeding increases total yields of corn plus first year alfalfa



12% increase
= 1.6 tons per acre

But we get failed alfalfa establishment

Can we improve alfalfa establishment success ?

- What impacts establishment?
- Do added inputs make this system too expensive?

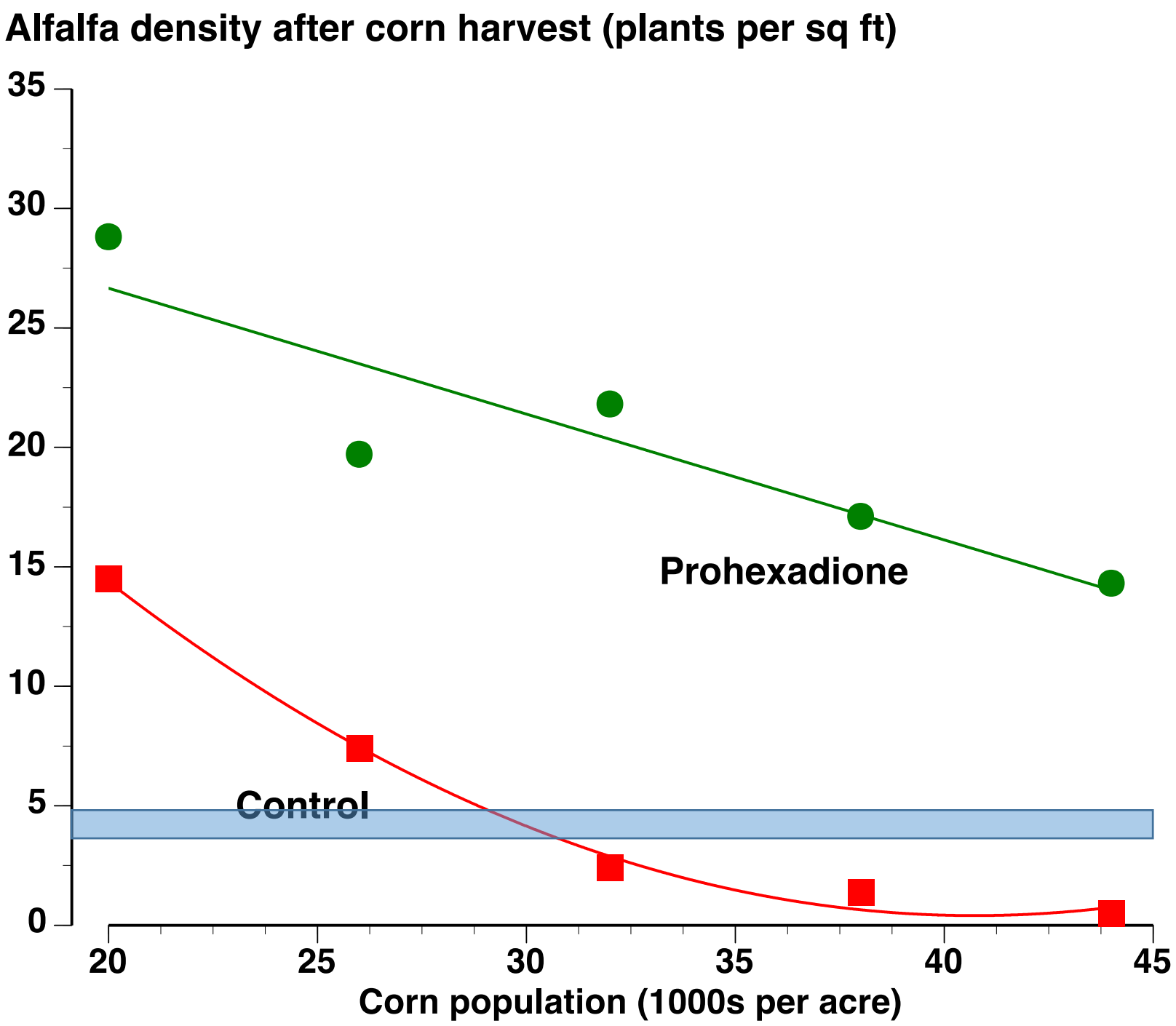
Researching how to minimize failure

presentation at WI Ag Classic

	Problem	Activity	Research
★	Corn density	Evaluating effects between 20-45K	2017-current
	Corn competition	Planting timing corn vs alfalfa	2016-17, 2020
	Nitrogen fertilization	Split vs at plant at various rates	2017-18
	Alfalfa variety	Screening current varieties for tolerance	2016-current
★	Alfalfa root development	Apply prohexadione (Kudos)	2011-current
★	Potato leaf hopper	Apply insecticide (Warrior II)	2017-current
★	Alfalfa foliar diseases	Apply fungicide (Priaxor)	2017-current
	Wheel traffic	Currently evaluating impact	2017-current

High corn density reduces establishment

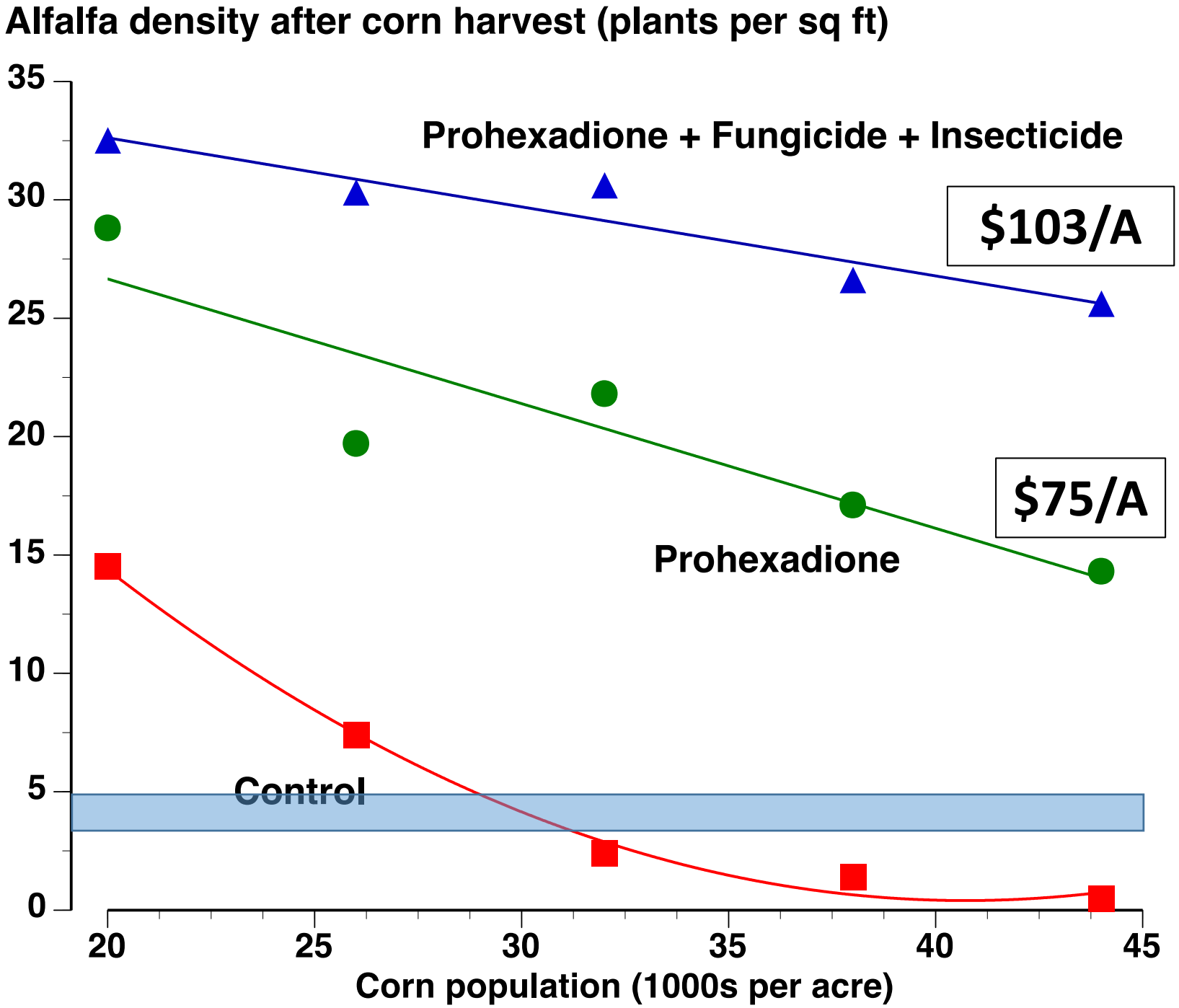
2017 study



Adding Fungicides + Insecticides to PHD helps

High corn density reduces establishment

2017 study



Can we reduce the cost by applying all at once?

- Current recommendation ($103/A)
  - Kudos 26oz/a in middle of june
    - $65/a+ appl cost $(10/a)=$75
  - Priaxor 4 fl oz/A + Warrior 1 oz/a applied 2 weeks later
    - $15+3/a+ appl cost $(10/a)=$28
- Can we apply all at once in June?
  - Initial data suggests YES
- Can we reduce Kudos rate if apply fungicide and insecticide
  - Initial data suggests YES (<$50/a)

Economic viability of interseeding

- Compared corn silage-alfalfa rotations with and without interseeding
  - Inter-seeding increased net returns (6-32%)
- Maintaining a corn silage yield penalty below 15% ensured profitability

Challenges from 2018

Efforts will continue in 2019

Problems researching	Research stations	On farm
Corn density	2019	
Corn/alfalfa planting timing	2020	
Nitrogen fertilization	2019	
Alfalfa variety performance	2019	2019
Optimization of Kudos	2019	2019
Optimization of fungicide	2019	2019
Optimization of insecticide	2019	2019
Wheel traffic	2019	
Corn variety performance	2020	

Looking for cooperating farms

Establishing alfalfa by interseeding with corn silage

Interseeding alfalfa with corn silage is a novel technique for establishment of alfalfa fields. Proper management practices can minimize impacts to corn silage yield while also providing cover of soil during fall-spring and allow for full yield of alfalfa in subsequent years.

How?

In Wisconsin the interseeding system is effective when corn silage is planted at moderate densities in early to mid-May, followed by alfalfa interseeded between the rows. Crop management methods have been developed to maximize corn yield and alfalfa establishment as well as minimize pest impacts as the two crops grow together during the summer. Following silage harvest in the fall the field is treated as an established alfalfa field.

Research Insights

Results from interseeding experiments in Wisconsin demonstrate:

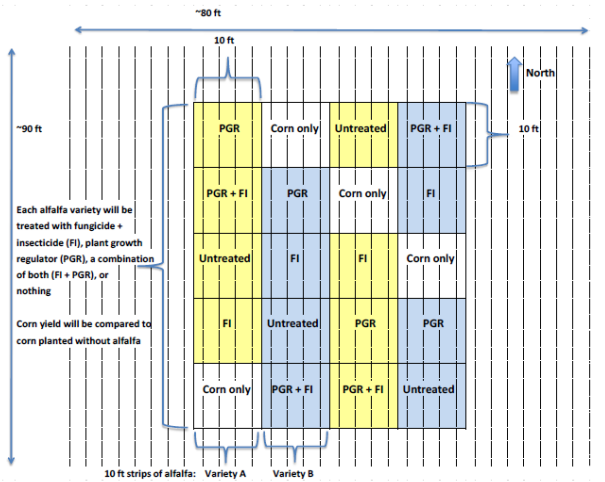
- Establishment of alfalfa by interseeding doubles first-year alfalfa yields compared to spring-seeded alfalfa.
- Interseeded alfalfa reduces erosion and loss of phosphorus and nitrogen from cropland.
- Alfalfa varieties differ greatly in performance when interseeded.
- Plant protection chemicals (such as fungicides, insecticides, and plant growth regulators) can greatly increase establishment success of interseeded alfalfa.
- Weeds can be effectively controlled with timely applications of herbicides such as Warrant for establishment of conventional alfalfa or glyphosate for Round-up Ready alfalfa varieties.

Ongoing Research Efforts

Improved understanding how crop management and environmental factors influence the success of alfalfa establishment by interseeding in corn is needed. Current research efforts are focusing on developing agronomic practices that can optimize corn yield and alfalfa establishment, including recommendations for nitrogen fertility, seeding rates, and plant protection chemical application. Researchers are also working with stakeholders to register products that can enhance alfalfa establishment in this system.

Interseeding Corn and Alfalfa On-farm Research Project

Our research group is cooperating with farmers to establish on-farm experiments at three farms in each of four states (ID, MI, PA, WI). On each farm two alfalfa varieties will be interseeded into corn silage, and the effects of different plant protection chemicals will be tested. As illustrated below, the experiment at each farm will be carried out on twenty small plots (10' x 20'). Each treatment will be applied to two plots in the experimental area to test the consistency of alfalfa and corn responses to various plant protection chemicals. The experiment will be surrounded on all sides by 20' corn borders, so that the total area required on each farm will be approximately 1/4 of an acre.



Farmers participating in this project will:

- Identify an appropriate field to establish interseeded alfalfa that meets project criteria: moderately well-drained to well-drained; pH ≥ 6.5; optimal levels of P, K, S, and B for alfalfa establishment; limited crop residues.
- Share the management history of the field including crop rotation used, soil test results, fertilizer and liming rates for the last 3 years, and herbicides used the prior two years.
- Plant silage corn on ~1/4 acre: short to mid-season hybrid planted in the recommended planting window in 30" rows at a density between 25K and 40K seeds per acre. This area can be located near the edge of a larger corn field.
- Fertilize corn and interseeded alfalfa according to typical practices for corn silage. Manure or chemical fertilizer application rates and timings must be recorded.
- Harvest corn silage from borders areas at typical harvest timing (at least 3 weeks before first frost date).
- Not permit herbicide applications in the experimental area or traffic through plots after planting alfalfa.

Researchers will:

- Interseed 2 alfalfa varieties between corn planting and the VE growth stage of corn.
- Provide weed control (PRE application of Warrant, POST of Buctril (if needed) in the ¼ acre area
- Apply plant protection treatments approximately 5 and 8 weeks after alfalfa interseeding.
- Take monthly measurements of plants and soil from May through late October.

As several agrichemical products that will be utilized in this research (Warrant herbicide, Kudos plant growth regulator) are not yet registered for use in corn and alfalfa, scientists will harvest and properly discard corn and terminate alfalfa stands in late October at the end of the study. Corn from the untreated 20' border areas can be utilized by cooperators. Cooperators will receive a modest honorarium ($200) from the University of Wisconsin to help offset costs.

Can we make this work as a one-pass system?

- Applied
  - Early vs Late (application cost $10/a)
  - 8 vs 16 oz/A Kudos ($16-$32/A)
  - Priaxor ($15/A) , Warrior II ($3/A)

- Standard ($100/A)
  - Kudos 26oz/a (early)
    - $52/a+ application cost $(10/a)=$62
  - Priaxor 4 fl oz/A + Warrior 1 oz/a (late)
    - $15+3/a+ application cost $(10/a)=$28

Treatment	Kudos (oz/A)	Plants/ft2	
UTC	0	i	1
Priaxor (Early)	0	ghi	2
Priaxor (Late)	0	fghi	2
Warrior (Late)	0	efgh	2
Priaxor + Warrior (Late)	0	defg	3
Kudos Early	8	hi	1
	16	ghi	1
Kudos Late	8	cde	4
	16	cd	4
Kudos + Priaxor (Early)	8	hi	1
	16	def	3
Kudos + Priaxor (Late)	8	de	4
	16	b	7
Kudos + Priaxor + Warrior (Late)	8	b	7
	16	bc	6
Standard ($100/A)	26	a	12

Can insecticides + fungicides result in reduced Kudos application rate?

2018 study (Arlington)