Cover Crops and Nitrogen Credits

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Cover crops and N credits

- Review of cover crop systems in WI
- Review of recommended N credits
- Highlight field research

Types of cover crops used in WI

Cool-season grasses

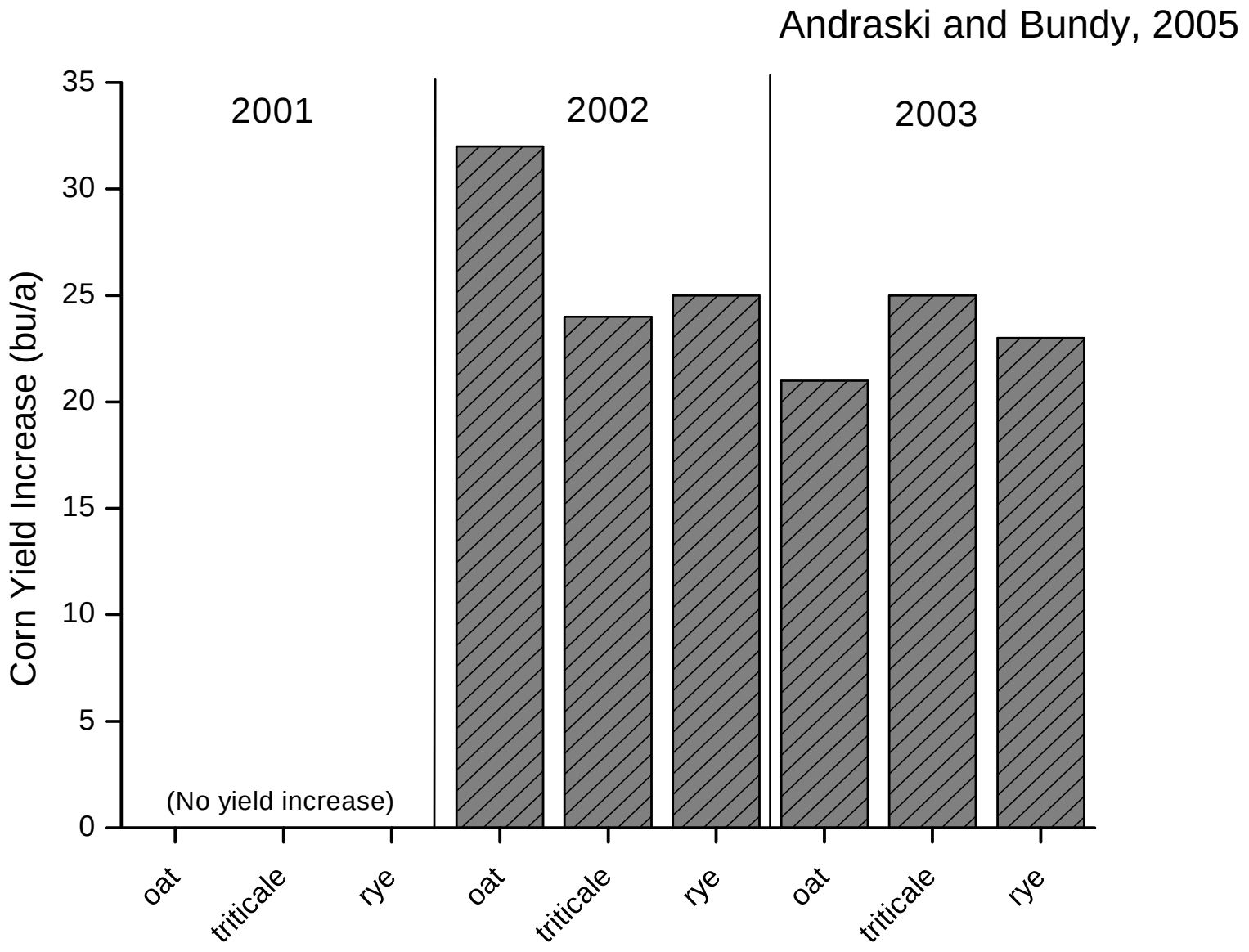
Green manures

Cool season grasses

- Oats, rye
  - Grow quickly
- Provide ground cover in systems that have little crop reside
  - Potatoes
  - Corn Silage
- “Trap” crop for nitrate
- Build soil organic matter

Is there an N credit for cool-season grasses?

- No
- A reduction in N rates with use of cool-season grasses has not been shown to be effective in midwestern cropping systems
- …but are there other advantages?

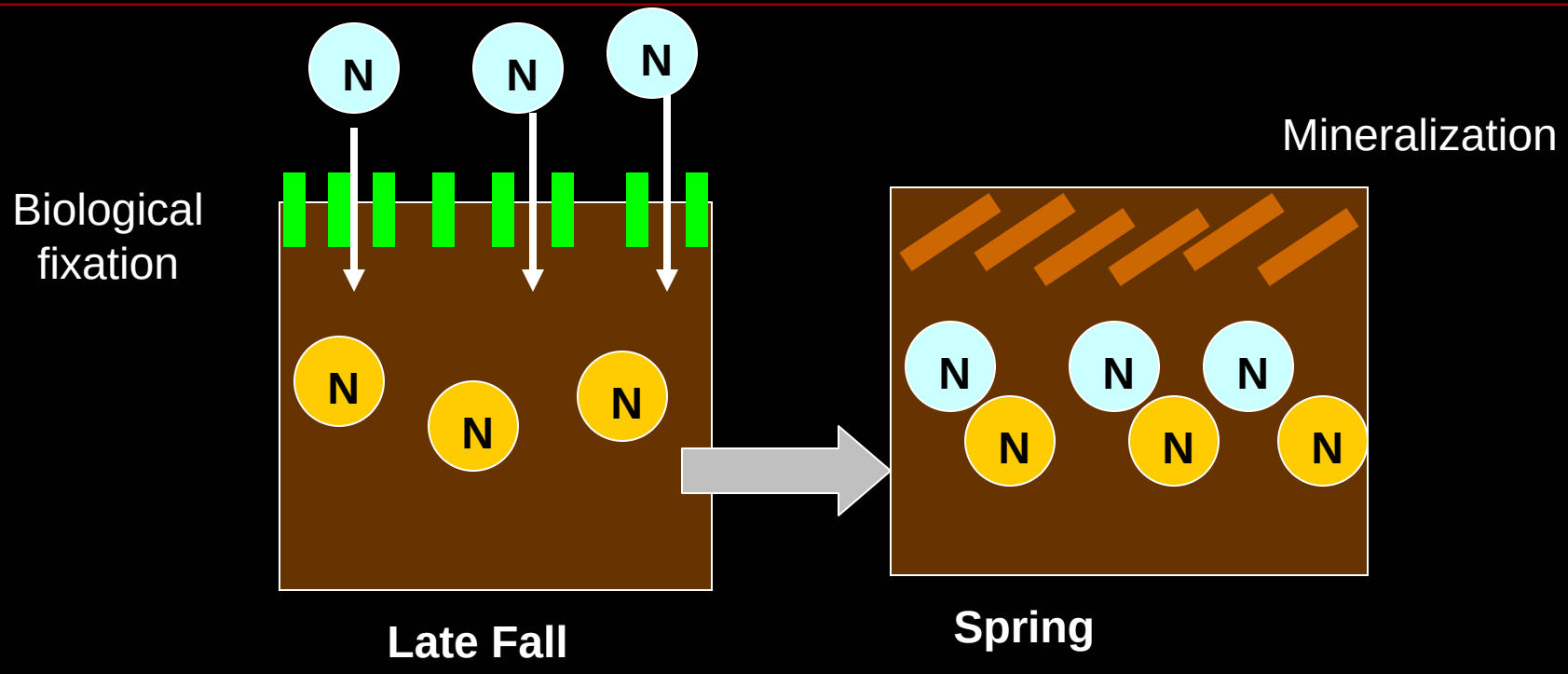


Potential yield increase on sandy soils

Legume cover crops (aka Green Manure)

- Add free N to soil system
- Take longer to establish than rye or oats
- Planted after “short-season” crops (wheat, vegetables) for N addition to high N demand crops (corn)

Why does it work?



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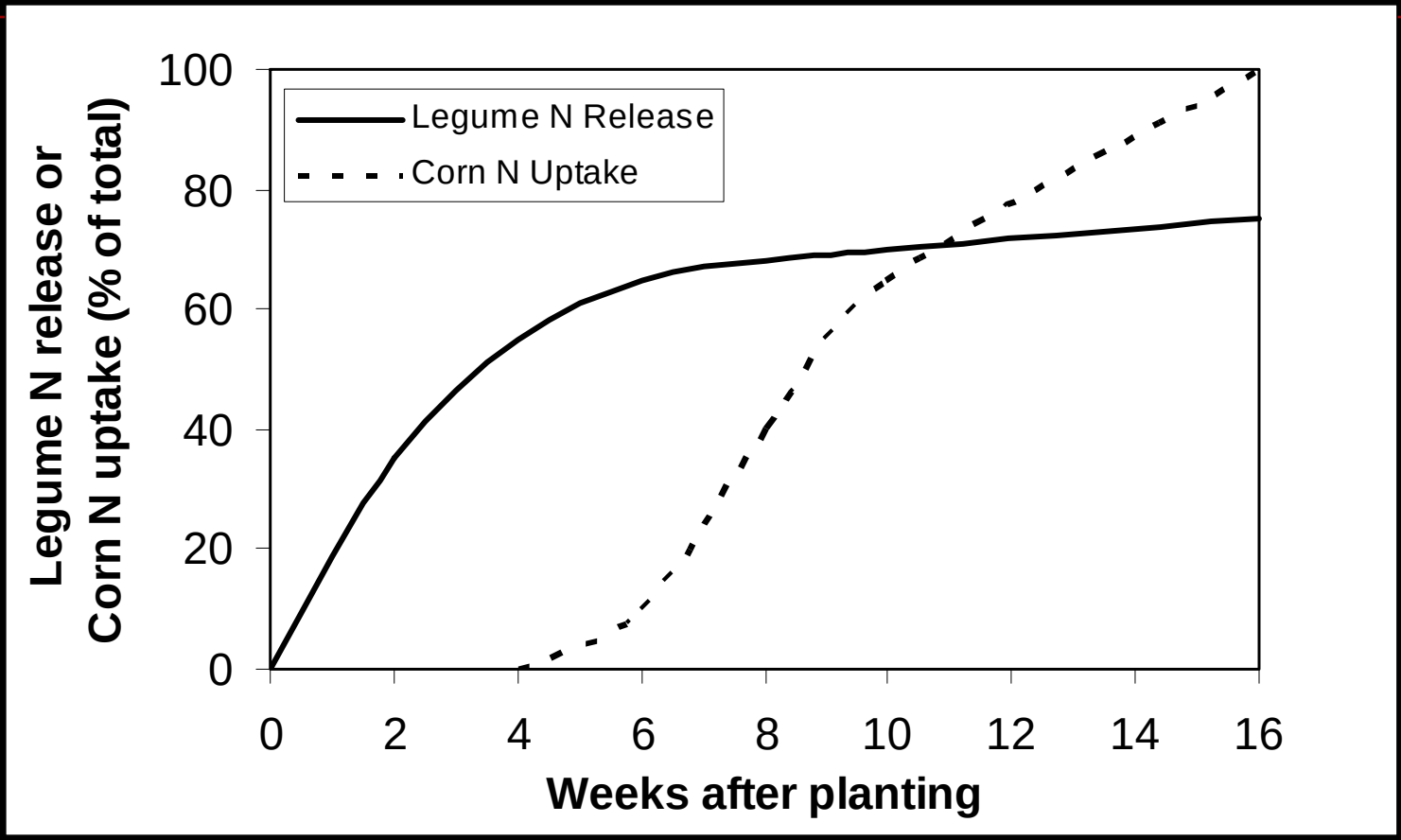
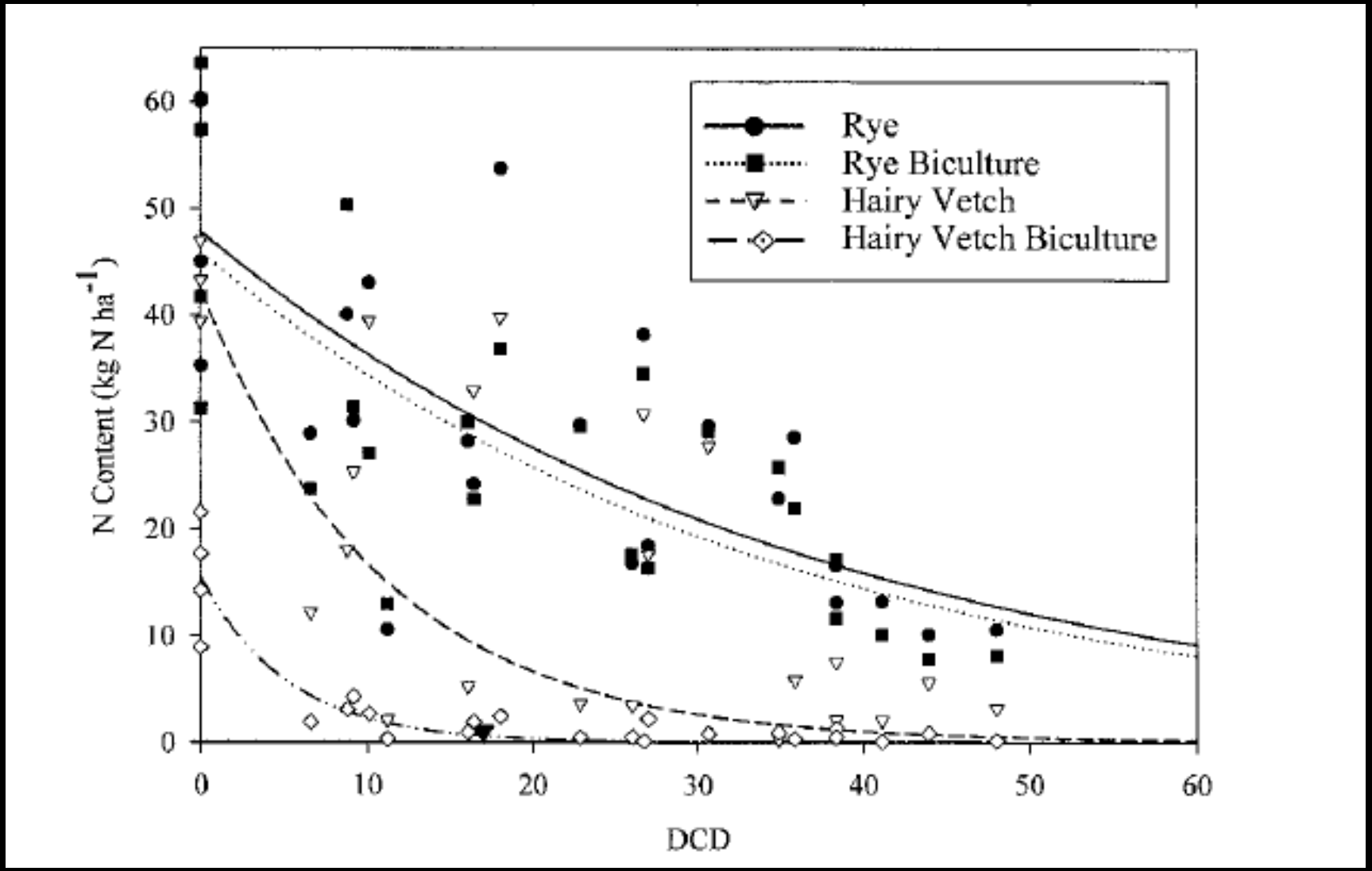


Table 9.5. Green manure nitrogen credits.

Crop	< 6" growth	> 6" growth
	——— lb N/a to credit ———	
Alfalfa	40	60–100 [a]
Clover, red	40	50–80 [a]
Clover, sweet	40	80–120 [a]
Vetch	40	40–90 [a,b]

[a] Use the upper end of the range for spring seeded green manures that are plowed under the following spring. Use the lower end of the range for fall seedings.

[b] If top growth is more than 12 inches before tillage credit 110–160 lb N/a.



Ruffo and Bollero (2003) Univ. Illinois

Research – Lancaster, WI

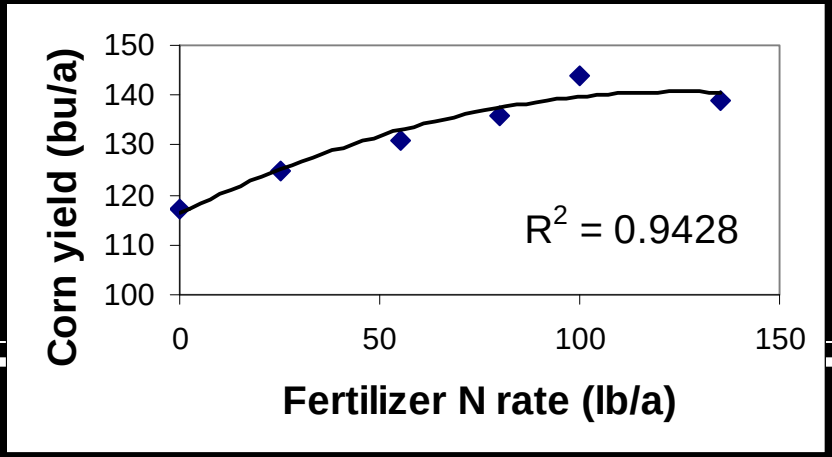
- 1999, 2001
- 7 cover cropping systems
  - None
  - Alfalfa
  - Hairy Vetch
  - Red Clover
  - Medic
  - Berseem Clover
  - Crimson Clover

Research – Lancaster, WI

- Cover crops planted after winter wheat harvest
- Corn planted following spring
- 1999: 0, 30, 60, 90, 120, 150 lb-N / ac
- 2001: 0, 25, 55, 80, 100, 135 lb-N / ac

Research – Lancaster, WI

- How do we evaluate the N credit?
- Build response curves for each system
- Determine the economic optimum N rate and yield at optimum N rate (0.1 N/corn price ratio)



N credit = 19 to 38 lb/a (average)

26 to 40 lb/a (high end)

14 to 36 lb/a (low end)

1999

	EONR		Yield @ EONR
	lb/a		bu/a
Fallow	105	(87 - 123)	204
Hairy Vetch	86	(72 - 97)	209
Alfalfa	150+		209
Red Cl.	150+		205
Medic	150+		216
Berseem Cl.	84	(67 – 101)	207
Crimson Cl.	67	(51 – 83)	204

N credit = 12 to 69 lb/a (average)

6 to 65 lb/a (high end)

18 to 72 lb/a (low end)

2001

	EONR		Yield @ EONR
	lb/a		bu/a
Fallow	96	(82 – 109)	140
Hairy Vetch	27	(10 – 44)	145
Alfalfa	83	(64 – 103)	144
Red Cl.	51	(39 – 63)	138
Medic	69	(59 – 79)	150
Berseem Cl.	84	(73 – 95)	149
Crimson Cl.	56	(47 – 65)	149

Conclusions

- There is significant value to using legume cover crops/green manures in a winter wheat-corn rotation
- There will be year to year variability with cover crop benefits.
- Other legume cover crops are beneficial to Wisconsin cropping systems.

Questions?