POTENTIAL FOR N CARRYOVER FROM 2003 TO 2004

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What is carryover (residual nitrate) N?

- Nitrogen in the nitrate form that remains in the plant root zone during the period between growing seasons
- Carryover is more likely if:
  - Corn after corn
  - Rainfall below normal
  - Yields and crop N use reduced
  - Medium and fine textured soils
  - Available N exceeds crop need

N Carryover in 2004

- Growing season rainfall below normal in 2003
- Potential for carryover N after corn in many fields
- N fertilizer prices may be high in spring 2004
- Sampling soil for carryover N could be beneficial

Previous work on N carryover

- N carryover can be frequent in Wisconsin
- Model developed to predict amount of carryover N
- Preplant soil nitrate testing can adjust N recommendations for carryover N

Information on N Carryover

- Estimates of 2004 carryover potential
- End-of-season (2003) soil nitrate measurements

N Carryover Estimates

- Nitrogen rate applied in previous year
- Soil moisture status in August of previous year
- Over winter percolation (October-April) through soil

N Carryover Estimates

- Indicate potential for nitrate carryover for selected soils and locations
- UW Soil Science website
  - http://www.soils.wisc.edu
  - Click WI-MN Nitrogen carryover

Components of N Carryover Estimates

- Nitrogen inputs
  - Background nitrate (50 lb N/a)
  - N additions (Fert., Manure, legume)
  - Soil N mineralization (50-100 lb N/a)
- Nitrogen removals
  - Crop N uptake
  - N losses

Estimated N carryover potential, Dec. 2003

		N Carryover		
		2003 N rate		
County	Soil	100	150	200
		lb N/acre		
Barron	Santiago	85	159	233
Columbia	Plano	62	112	187
Dodge	Plano	62	62	62
Grant	Fayette	62	105	180
Fond du Lac	Kewaunee	120	195	269

Estimated N carryover potential, Dec. 2003

		N Carryover		
		2003 N rate		
County	Soil	100	150	200
		lb N/acre		
Calumet	Kewaunee	71	145	219
Iowa	Rozetta	166	241	315
Waukesha	Plano	128	202	277
Winnebago	Kewaunee	62	66	141
Wood	Withee	181	255	329

Nitrogen recommendations based on preplant N testing in cont. corn, WICST trial, Arlington, WI (1993-2003)

Year	N recomm.	Year	N recomm.
	(lb N/acre)		(lb N/acre)
1993	160	1999	82
1994	118	2000	106
1995	98	2001	90
1996	96	2002	126
1997	80	2003	76
1998	140		

Unadjusted N recom.= 160 lb N/acre; Ave. N rate reduction = 55 lb N/acre/yr. Hedtcke & Posner, 2003

Previous crop & N rate effects on end-of-season soil nitrate-N, Arlington, WI, 2003

Previous crop (2002)	2003 N rate, lb/acre				
	0	120	150	180	210
	---------- soil nitrate-N, lb/acre ----------				
Corn	21	79	93	166	120
Soybean	15	33	53	87	162
Average	18 c	56 bc	73 b	127a	138 a

Nitrate-N, 0-3 ft, WICST trial

Previous crop & N rate effects on corn grain yield, Arlington, WI, 2003

Previous crop (2002)	2003 N rate, lb/acre				
	0	120	150	180	210
	---------- yield, bu/acre ----------				
Corn	119	174	176	182	184
Soybean	109	197	185	197	199
Average	115 c	184 a	180 a	190 a	190 a

WICST trial

Predicted & measured end-of-season N carryover, Arlington, WI, 2003.

	---------- N rate, lb/acre ----------		
Method	100 (120)*	150	200 (180)*
	------ Nitrate-N, lb/acre ------		
Predicted (12/03)	62	112	187
Measured (11/03)	79	93	166

* Values in ( ) are actual N rates applied in field experiment.

End-of-season soil nitrate-N in Polk County corn fields, November, 2003.

Field	Soil name	Nitrate-N (0-3 ft)	Adjustment to recomm.
		---------- lb N/acre ---------	
1	loamy	93	43
2	clay	97	45

Data from Ryan Tichitch, Polk Co. Extension

End-of-season soil nitrate-N in Barron County corn fields, November, 2003.

Field	Soil name	Nitrate-N (0-3 ft)	Adjustment to recomm.
		---------- lb N/acre ---------	
1	Freeon	17	0
2	Spencer	221	171
3	Scoba	45	0
4	Spencer	76	26
5	Freeon	83	33
6	Freeon	62	12

Data from Tim Jergenson, Barron Co. Extension

End-of-season soil nitrate-N in Barron County corn fields, November, 2003.

Field	Soil name	Nitrate-N (0-3 ft)	Adjustment to recomm.
		---------- lb N/acre ---------	
7	Almena	138	88
8	Spencer	90	40
9	Almena	63	13
10	Anigon	109	59
11	Almena	36	0

Data from Tim Jergenson, Barron Co. Extension

Predicted* & measured end-of-season N carryover, Polk & Barron Cos., 2003.

No. of fields	Nitrate-N (0-3 ft)	N rate adjust.
	---------- lb N/acre ----------	
5	<70	<20
6	76-109	26-59
2	>130	>80

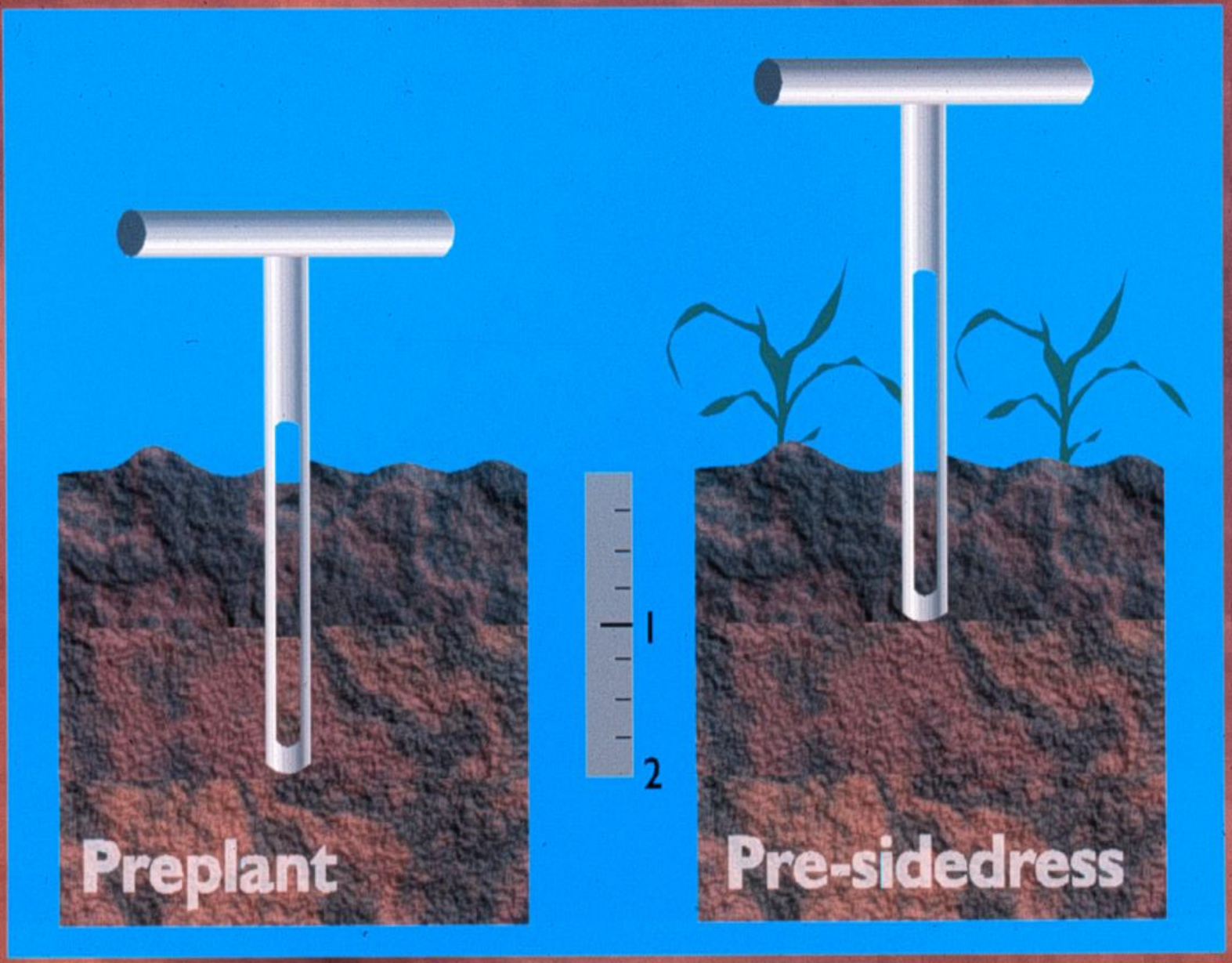
*Predicted N carryover = 85 and 159 lb N/a for N rates of 100 and 150 lb N/acre

N Carryover Summary

- Predicted values indicate N carryover is likely in many areas
- Predictions are a guide for sampling not a substitute for sampling
- Reasonable agreement between predicted carryover N and end-of season measurements at Arlington

N Carryover Summary

- Residual nitrate-N in end-of-season samples from Polk and Barron Counties varied among fields
- About half of the fields had enough residual nitrate to justify spring sampling
- Preplant testing is needed to determine N carryover amounts and account for overwinter losses.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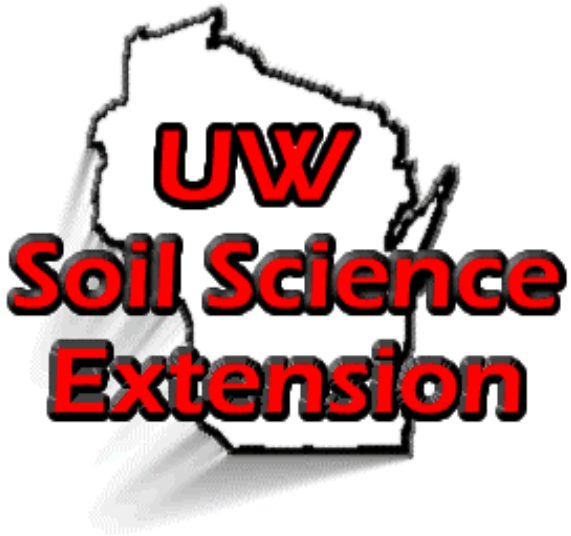

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Nitrogen Recommendations Based on the Preplant Soil Nitrate Test

Example:

STD. N REC.

160 lb N/a

SOIL NITRATE

140 lb N/a

CORRECTED SOIL NITRATE

140 – 50 = 90lb N/a

N RECOMMENDATION

160 – 90 = 70 lb N/a

Preplant Soil Nitrate Test (PPNT)

- Collect samples in early spring (preplant)
- Sample 0-1 ft. and 1-2 ft. depths
- Combine 15 cores per 20 acres
- Dry or freeze soon after sampling
- Nitrate in 2-3 ft. depth predicted
- Nitrogen recommendations

Preplant Soil Nitrate Test (PPNT)

- Measures residual (carryover) nitrate
  - Corn after corn
  - Medium and fine textured soils
  - Normal or below normal rain
  - Available N exceeds crop need
- Not useful on sands, loamy sands