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# USING THE PSNT AND NITROGEN CREDITING TO IMPROVE CORN NITROGEN RECOMMENDATIONS

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# Introduction and Rationale

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- Excess N can lead to reduced economic returns and environmental problems.
  - The PSNT and N crediting can improve accuracy of N recommendations.
  - These practices are often not used due to concerns about reliability and profitability.
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# Objectives

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- Compare the PSNT and N crediting for predicting optimum N rates for corn.
  - Determine economic benefits of using the PSNT and N crediting in corn production.
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# Procedure for N Crediting/PSNT Evaluation

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- 101 corn N response trials on research and private farms, 1989-1999
  - High (56%) and medium (44%) yield potential soils
  - Sites included N fertilizer, manure, legume N, and rotation variables
  - Book value N credits (BVNC) calculated
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# Corn Nitrogen Recommendations Based on Presidedress Soil Nitrate Test (PSNT)

## Soil Yield Potential

PSNT Result	Very High/High	Medium/Low
— ppm N —	— N Application Rate, lb/a —	
> 21	0	0
20-18	60	40
17-15	100	40
14-13	125	80
12-11	150	80
< 10	160 **	120 **

\*\* Unadjusted nitrogen application rate.

# Procedure for N Crediting/PSNT Evaluation

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- Three N rate recommendations compared at each site for accuracy vs. EONR and for economic return
    - PSNT
    - Book value credits (BVNC)
    - Base N rate (no credits)
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# Site-specific factors affecting PSNT performance

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- Years since manure or legume N input
    - $>3$ , 1-3,  $<1$
  - Soil yield potential
    - Medium, High or very high
  - Air temperature vs. ave.
  - Precipitation vs. ave.
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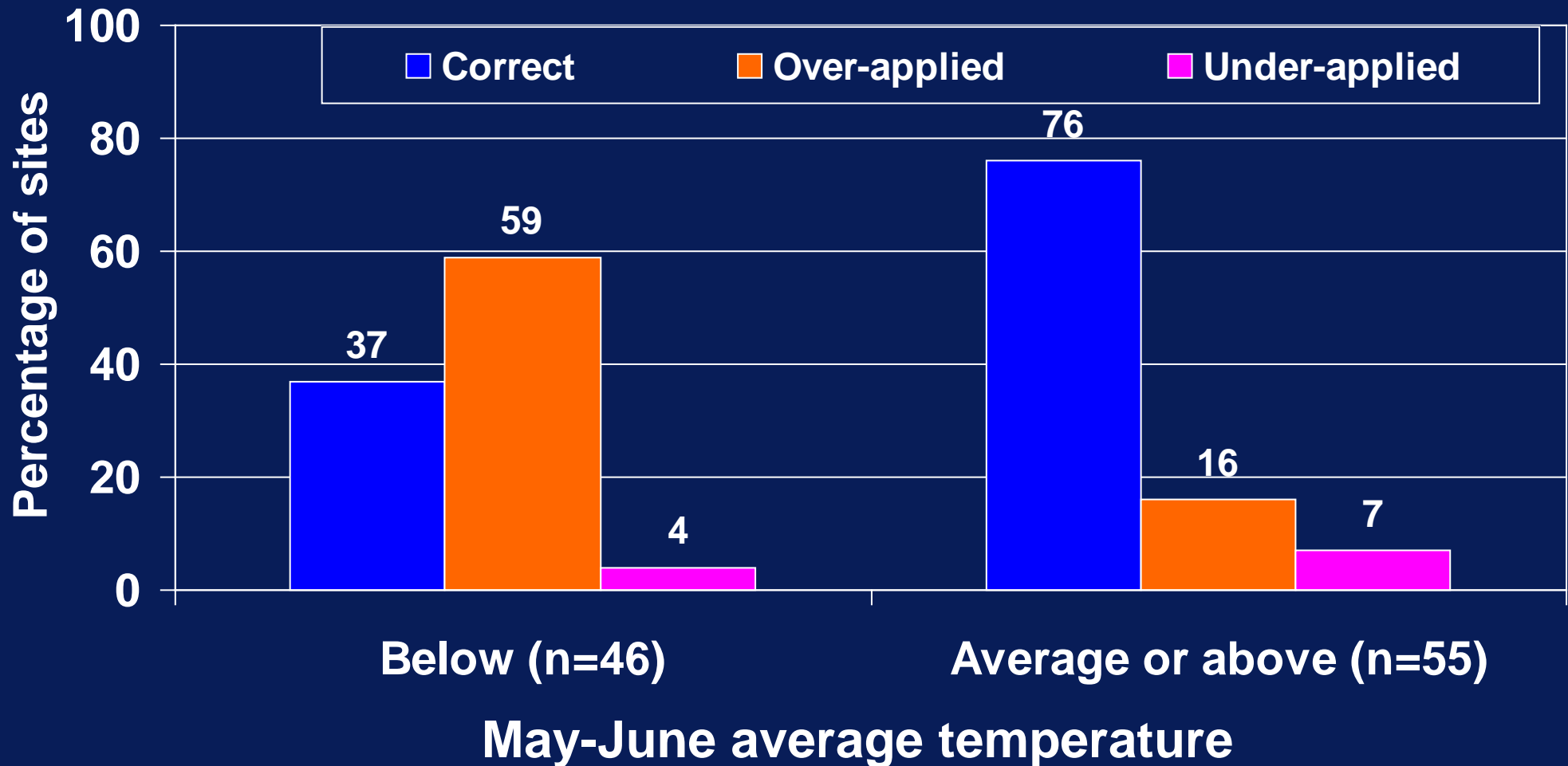
# Accuracy Criteria for N Recommendations

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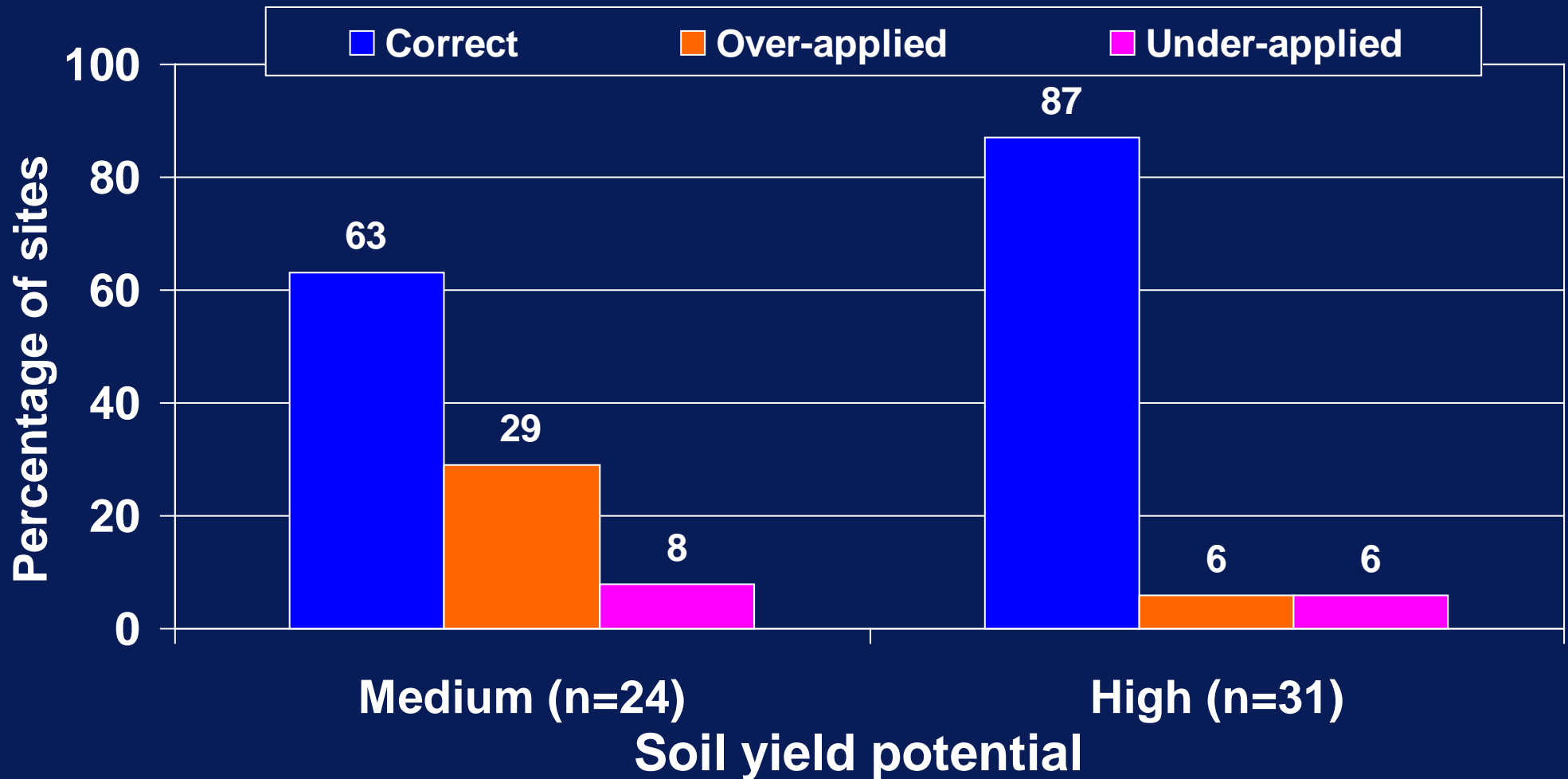
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- Correct = +/- 34 kg N/ha of EONR
  - Over-applied = > 34 kg N/ha above EONR
  - Under-applied = > 34 kg N/ha below EONR
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# Temperature effects on accuracy of PSNT-based N recommendations

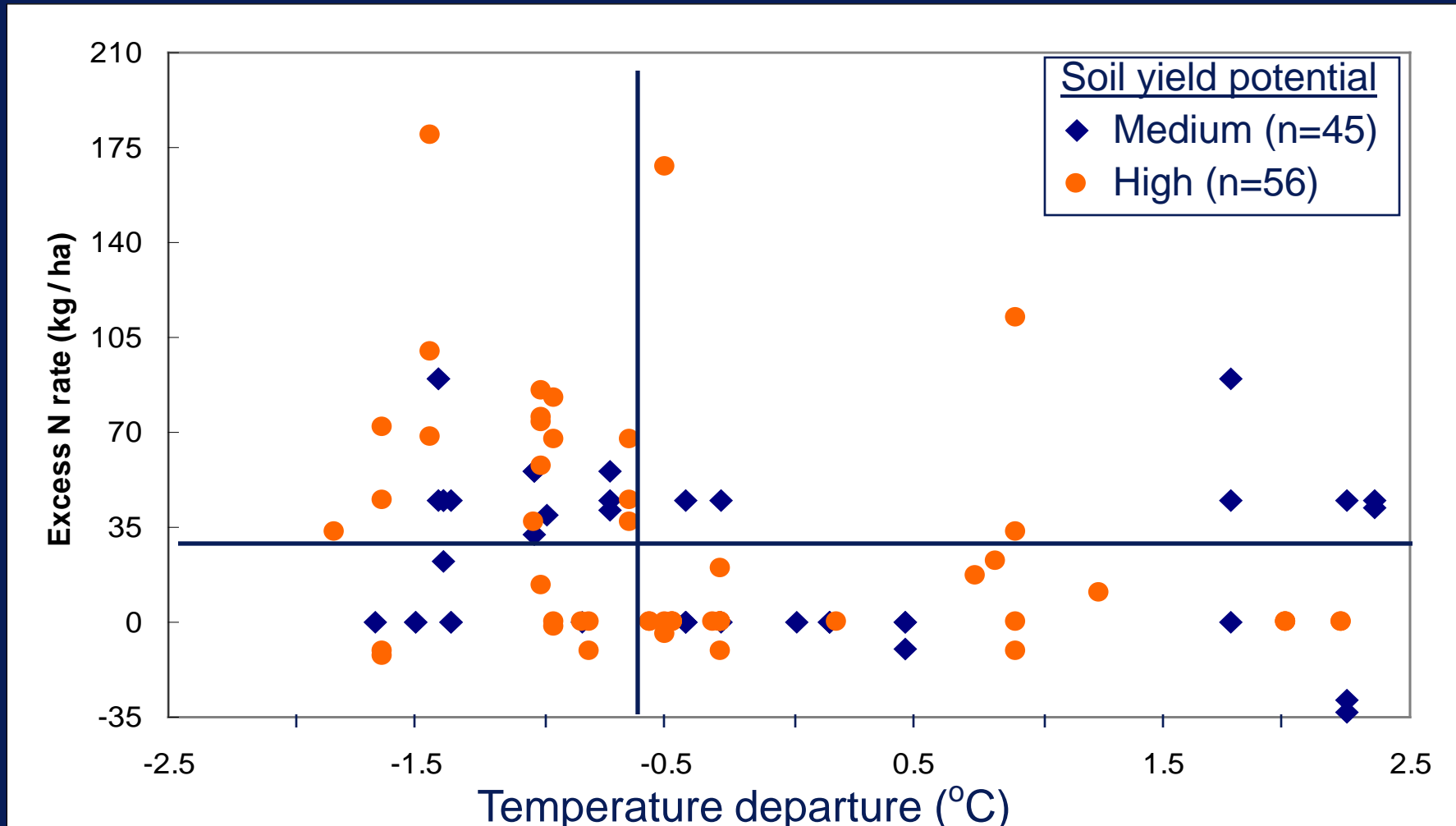


# Soil yield potential effects on accuracy of PSNT-based N recommendations



Ave. or higher May-June temps.

# May-June temperature effects on PSNT-based N recommendations



# Economic gains from PSNT- and BVNC- based N recommendations <sup>1/</sup>

Management System <sup>2/</sup>	Increase in return	
	PSNT	N credits (BVNC)
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	\$ / ha	
< 1 year	36	31
1-3 years	40	2
> 3 years	0	0

<sup>1/</sup> High yield potential soils, Ave. or above May-June air temps.

<sup>2/</sup> Years since manure or legume N inputs

# Conclusions

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- Accuracy of PSNT rate recommendations is lower if May-June temps. are below normal.
  - PSNT is more accurate on high than on medium yield potential soils.
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# Conclusions

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- Economic returns are higher with PSNT where manure or legume N inputs occurred within 1-3 yr.
  - Economic returns are higher with BVNC for 1<sup>st</sup> yr manure or legume N inputs and on medium yield potential soils.
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# Conclusions

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- Using PSNT or BVNC lowered N rates by 90 to 102 kg N/ha where manure or legume N inputs occurred within 3 yr.
  - Adjusting N rate recommendations using BVNC or PSNT is more profitable (ave. \$19/ha) than not making these adjustments.
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