

**Michigan Potato Industry Commission Competitive Grants Proposal (FY-10)**

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**Project Title:** Delayed Release Nitrogen Effect on Potato Yield and Vine Kill  
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**Background:**

Nitrogen fertilizer is one of the most costly inputs in potato production and the most important input for maximizing potato yield. The effect of nitrogen on potato yield is an important area of research as newer fertilizers, such as delayed release nitrogen, are developed, and the recent fluctuations in the fertilizer market require continued evaluation of nitrogen recommendations. Delayed release products reportedly reduce early season nitrogen losses and delay the release of nitrogen until it is needed by the crop. Delayed release nitrogen may also have the additional benefit of increasing the competitiveness of potato with weeds that plague Michigan producers.

Nitrogen release timing is an important concern in potato production. Little research has been conducted investigating the effect of timing on vine growth and potato yield, and understanding how delayed release nitrogen applications at planting, first cultivation, and hilling influence vine vigor in potato and efficacy of vine kill products are important management concerns. Several questions are raised, specifically: How does the nitrogen source (i.e. delayed release vs. traditional fertilizer) and application timing affect potato yield? Will the use of a delayed nitrogen product such as ESN provide more available nitrogen for potato at crucial growth periods? How does the use of delayed release nitrogen affect vine kill achieved with commonly used products?

**Objectives:**

- 1) Determine the effect of delayed release and traditional nitrogen fertilizer on potato yield.
- 2) Determine if delayed release-based fertility programs increase vine vigor and affect vine kill.
- 3) Investigate the impact of these products on economic return.

**Materials and Methods:**

Tubers will be planted in early May at the Montcalm Research Farm at a 10-inch spacing in rows 34-inches apart. Treatments will consist of either delayed release nitrogen (DRN) or 28% nitrogen urea-ammonium nitrate solution applied at a rate of 60 lbs/A at planting, first cultivation, and hilling followed by 100 lbs N (urea)/A surface applied in late July for a total of 12 treatments (Table 1). Each treatment will be replicated four times. Irrigation and other potato crop management practices utilized will closely mirror practices followed by seed producers. Vine kill treatments evaluated will be Reglone followed by Reglone, Rely plus ammonium sulfate (AMS), and a control treatment (no vine kill). Irrigation and other potato management practices will closely mirror practices followed by seed producers.

Vine kill will be evaluated by visually assessing potato desiccation and vine kill for 4 weeks after treatment. Potato tubers will be harvested and graded while determining pick-outs and internal defects. Tuber numbers for each group and weights (CWT) will be taken. Data will be presented as total yield per unit planted and marketable yield per unit planted. Data will be

analyzed using ANOVA and treatments separated using mean separation with Fisher's Protected LSD. We would like to conduct this research for two years, in order to evaluate treatments under two different environmental conditions.

*Table 1. Treatments for nitrogen product effects on vine kill.*

<b>No Vine Kill</b>			
<b>Timing of Nitrogen Product (lbs N)</b>			
<b>Planting</b>	<b>1<sup>st</sup> Cultivation</b>	<b>Hilling</b>	<b>Late July</b>
1) 60 lbs DRN	60 lbs 28% combo	60 lbs 28% combo	100 lbs N (urea)
2) 60 lbs 28% combo	60 lbs DRN	60 lbs 28% combo	100 lbs N (urea)
3) 60 lbs 28% combo	60 lbs 28% combo	60 lbs DRN	100 lbs N (urea)
4) 60 lbs 28% combo	60 lbs 28% combo	60 lbs 28% combo	100 lbs N (urea)
<b>Reglone fb Reglone</b>			
<b>Timing of Nitrogen Product (lbs N)</b>			
<b>Planting</b>	<b>1<sup>st</sup> Cultivation</b>	<b>Hilling</b>	<b>Late July</b>
5) 60 lbs DRN	60 lbs 28% combo	60 lbs 28% combo	100 lbs N (urea)
6) 60 lbs 28% combo	60 lbs DRN	60 lbs 28% combo	100 lbs N (urea)
7) 60 lbs 28% combo	60 lbs 28% combo	60 lbs DRN	100 lbs N (urea)
8) 60 lbs 28% combo	60 lbs 28% combo	60 lbs 28% combo	100 lbs N (urea)
<b>Rely plus AMS</b>			
<b>Timing of Nitrogen Product (lbs N)</b>			
<b>Planting</b>	<b>1<sup>st</sup> Cultivation</b>	<b>Hilling</b>	<b>Late July</b>
9) 60 lbs DRN	60 lbs 28% combo	60 lbs 28% combo	100 lbs N (urea)
10) 60 lbs 28% combo	60 lbs DRN	60 lbs 28% combo	100 lbs N (urea)
11) 60 lbs 28% combo	60 lbs 28% combo	60 lbs DRN	100 lbs N (urea)
12) 60 lbs 28% combo	60 lbs 28% combo	60 lbs 28% combo	100 lbs N (urea)

\* AMS, Ammonium Sulfate; DRN, Delayed Release Nitrogen.

**Outcomes:**

Results of this research will be important to the Michigan potato industry. From this research, fertilizer and vine kill recommendations will be extended to growers. This information will be reported to the Michigan Potato Industry Commission, county Extension agents, private agricultural consultants, and to the academic community.

**Budget (see attached):**

**Materials Needed:** We are asking that the seed industry supply Snowden seed for the study.

**Budget Justification:**

Undergraduate Students: Based at \$12.00/hr.

Materials and Supplies: Supplies needed to conduct the research.

Travel: Several trips will be needed to and from the Montcalm Research Farm to conduct this research.

Publication (Year 2 only): We would like to publish the results of this trial in a peer-reviewed scientific journal.

**PROJECT BUDGET**

<b>Budget Item</b>	<b>FY-10</b>	<b>FY-11</b>
(A.) Personal Wages		
(A1.) Research Associates		
(A2.) Graduate Students	5,000	5,000
(A3.) Technical, Shop & Other		
(A4.) Secretarial & Clerical		
(A5.) Undergraduate Students	1,000	1,000
<b>(B.) Total Personal Costs</b>	<b>6,000</b>	<b>6,000</b>
<b>(C.) Equipment Cost</b> (Attach Explanation)		
<b>(D.) Materials &amp; Supplies</b>	<b>1,500</b>	<b>1,000</b>
<b>(E.) Travel</b>	<b>2,000</b>	<b>2,000</b>
<b>(F.) Publication</b>		<b>500</b>
<b>H. Other Costs (Attach explanation, list of items and individual costs.)</b>		
<b>TOTAL:</b>	<b>9,500</b>	<b>9,500</b>