Effect of slow release fertilizers on potato production

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Oregon State University - Hermiston
Pandora’s Box

- Moral – increase availability and therefore decrease rate
- Been around for a long time
- Lots of different types
  - Nitrification/urease inhibitors
  - Slow release
  - Controlled release
Why worry?

• These materials can help prevent
  – Volatilization
  – Leaching (GWMA)
  – Denitrification

• Minimize N LOSS!

• No more ammonium nitrate
Fate of N Fertilizers

Volatilization

\[ \text{NH}_3 \leftrightarrow \text{NH}_4^+ \]

Denitrification

\[ \text{NH}_4^+ \rightarrow \text{NO}_3^- \]

Leaching

\[ \text{UAN} \rightarrow \text{NH}_4\text{NO}_3 \]

\[ \text{Urea} \]

\[ (\text{NH}_4)_2\text{SO}_4 \]
Ammonia loss in grass seed
Field 1, fall 2010

Applied 168 kg N/ha

- Urea
- UAN-sol 32
- CAN 27 (Yara)
- Agrotain

Days from application

Ammonia loss, %
Slow Release

• Requires microbial breakdown
  – Manure
  – Compost
  – Plant residues
  – Urea-Formaldehyde

• Release
  – Short to years
What is the goal?

N-Uptake, lb/a

TOTAL

TUBERS

31-Mar 20-May 9-Jul 28-Aug 17-Oct

OSU-HAREC
Advantages for potato grower

• Put all N on at planting and “forget about it”
  – Simpler

• Disadvantages
  – How do you interpret monitoring?
    • Especially soil
Have tried/worked with

- Agrotain
  - Urease inhibitor
- ESN
  - Plastic coated
- N-Fusion
  - Urea formaldehyde
- NSN
  - ?
- Duration
  - Plastic coated
- Super U
  - Urease inhibitor plus nitrification inhibitor
Idaho, 2006

Application rate (% of U of I recommendation) and timing

Average of two locations, 2006. Total N rate is 200 lbs/acre. Russett Burbank.
Split urea application is 50% of N at emergence & 50% in three applications in season
Source: B Hopkins, Univ of Idaho

OSU-HAREC
<table>
<thead>
<tr>
<th>Class</th>
<th>NSN</th>
<th>GP</th>
<th>ESN</th>
<th>GSP</th>
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<td>&lt;4 oz</td>
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<td>4-12 oz</td>
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<td>25</td>
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<td>45</td>
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<tr>
<td>Total</td>
<td>50</td>
<td>55</td>
<td>60</td>
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## Russet Norkotah Potatoes
### Hermiston, OR, 2007

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<th>Treatment</th>
<th>Total</th>
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<td>914abc</td>
<td>844abc</td>
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<td>80% ESN at planting</td>
<td>860c</td>
<td>784c</td>
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<td>100% ESN at emergence</td>
<td>874c</td>
<td>804bc</td>
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<td>100% N standard</td>
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# 2011 Russet Burbank

## Slowing release

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Legend:
- GSP
- AS + ESN
- AS+D120
- AS+D180

Yield categories:
- Less 4
- Culls
- 4-8
- 8-12
- 12
- US#1
- Total
2011 internals Russet Burbank

Internals

- GSP
- AS + ESN
- AS+D120
- AS+D180

Percent affected

Internals

- Int.I Brown Spot
- Hollow Heart
- Zebra Chip
- Total Internals
2011, Russet Burbank

- GSP
- AS+150ESN+80D120+40D180
- AS+100ESN+90D120+80D180
- AS+50ESN+120D120+100D180

Less 4 Culls 4-8 8-12 12 US#1 Total
2011 HAREC

Premiers
2011 Premiers, HAREC

Yield Components

- U30+ ESN150+D150
- U60+ESN150+D120
- U60+ESN200+D70
- U50+ESN140+D140
- GSP 350

Yield, t/a

Under 3 oz.  3-6 oz.  6-10 oz.  10-14 oz.  Over 14 oz.  Total Yield
Conclusions

• They work but can be difficult

• Yields are equal to or less than grower standard practice

• They can be expensive