



## Fertilizer Regulations in the United States and the Role of Slow- and Controlled-Release and Stabilized Fertilizers in Addressing Regional Environmental Concerns

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## Agricultural Outlook: Trends in Agriculture

- Global Population:
  - Global population will grow to over 9 billion by 2050
- Efficiency:
  - Global agriculture must double in the next 30 years
  - Most arable land in the world is already in use
  - Producers must focus on greater and more efficient production to meet demand
  - Risk of adverse effects of fertilizers on water and air quality
- Energy:
  - Agriculture to play a huge role in U.S. energy independence
  - Renewable biomass for energy, including biofuel production will drive agricultural expansion and R&D
  - Increased demand for fertilizers



## Fertilizer Regulations and Initiatives

- Federal Regulations and Standards
  - Role of USDA, EPA, and other agencies
  - Agriculture and Turf
- Regional Initiatives
  - Chesapeake Bay
  - Mississippi Basin/Gulf of Mexico
  - Great Lakes region
- State Initiatives

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## Federal Agriculture Issues – US Farm Bill

- Previous Farm Bill extended through Sept. 30, 2013
- Conflicts between the House (Southern) and the Senate (Midwest) versions continue to persist
- Conservation programs could be combined, from 23 programs to 13.
- EEF added in the report language
- A draft of new 5 year Farm Bill will begin to be written in the spring of 2013

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## Federal Conservation Programs - NRCS

- Natural Resources Conservation Service (NRCS) is a federal agency within USDA.
- NRCS is not a regulatory agency
- 1935 – Established as the Soil Conservation Service (SCS)
- 1994 – Renamed the Natural Resources Conservation Service (NRCS)
- NRCS is not a regulatory agency
- Producer technical and financial assistance in implementing conservation practices
- NRCS promotes **voluntary** Farm Bill programs

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## NRCS

- NRCS clients are private landowners (farmers/ ranchers)
- NRCS collaborates with:
  - State-based partners
  - Ag industry groups
- NRCS
  - Supportive of EEF technology
  - Practice-standard development opportunities based on research
- NRCS Voluntary Programs create opportunities for EEFs because of a focus on products that have the potential to reduce nutrient loadings in impaired water bodies.

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## Example: 590 Conservation Practice

- NRCS has approved 170 conservation practices that are designed to maintain or improve air, soil and/or water quality.
- The 590 practice (Nutrient Management) is revised every 4-5 years
- Federal NRCS sends model nutrient management planning requirements to NRCS state offices
- Local stakeholders collaborate with states to develop State and local 590 standards
- Conservation funds allocated to states and local conservation districts and dispersed by local offices.

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## 590 Continued

- Standard emphasizes a 4R approach
  - **Right fertilizer source** at the
  - **Right rate**, at the
  - **Right time** and in the
  - **Right place**
- The revised 590 standard recognizes emerging technologies such as:
  - Adaptive Nutrient Management
  - Enhanced Efficiency Fertilizers
  - Organic farming
  - Precision farming

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## EEF included in 590 Standard

- “Enhanced efficiency fertilizers, used in the state need to be defined by the Association of American Plant Food Control Officials (AAPFCO) and be accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.”

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## The Role of US EPA

- While NRCS is an agency promoting voluntary adoption of conservation practices, EPA (Environmental Protection Agency) is a regulatory enforcement agency
- Nutrient focus is on development and enforcement of TMDL standards (total maximum daily load).
- Have stated a goal of reducing nutrient use by 25%
- Have been sued by numerous environmental interest groups for alleged failure to enforce environmental quality

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## Urban Turf Fertilizer Restrictions

- In the U.S., fertilizer is not regulated at the federal level
- EPA established TMDL (total maximum daily load) for impaired watersheds
- State, county and local ordinances have begun to regulate nutrient applications, often with little or no scientific basis
- Example of Florida “blackouts”
- Many are specifying slow- and controlled-release and stabilized fertilizers in rules (enhanced-efficiency fertilizers)
  - Some have minimum requirements
  - Some allow rate exceptions for EEFs

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## Regional Fertilizer Initiatives

### Northeast Voluntary Turf Fertilizer Initiative (NEVTFI)

- States Involved: CT, MA, ME, NH, VT, RI
- Water quality issues are a big concern in the region.
- Solutions are frequently sought on a regional, not state, basis.

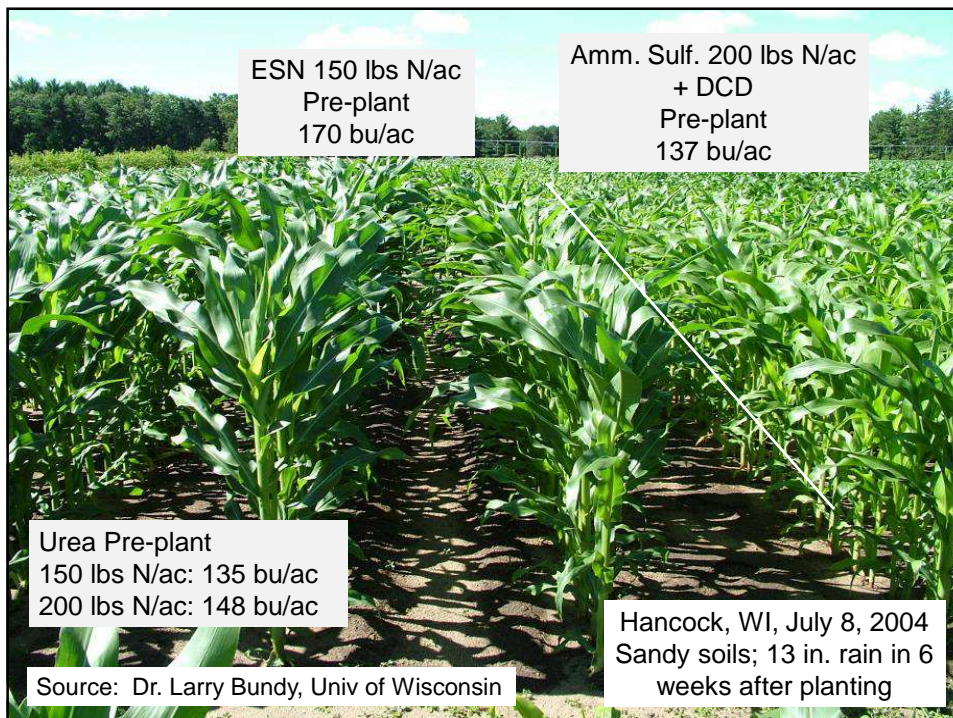
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## State Agriculture Concerns

- States determine environmental priorities
  - California going to restrictions versus incentives,
  - New Hampshire regulations
  - Washington DC, Sustainable DC Act
- Local NRCS offices are the connection to the producer
  - For AAT and other EEF producers: Education and awareness of our products is key
- Land Grant Universities
  - Provide input to the State Agronomist and Resource Conservationist

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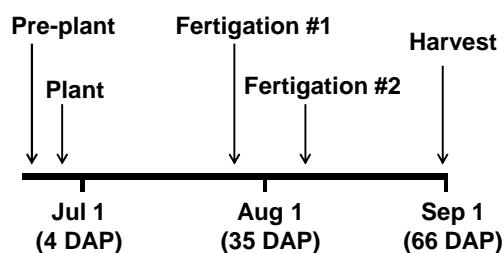


## Romaine Lettuce Trial (Salinas, CA)



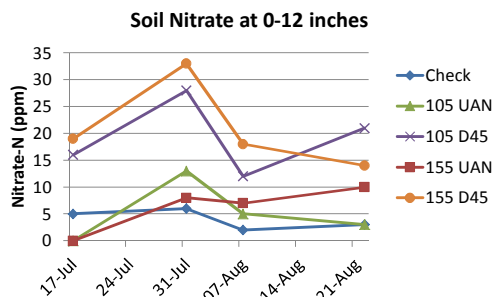
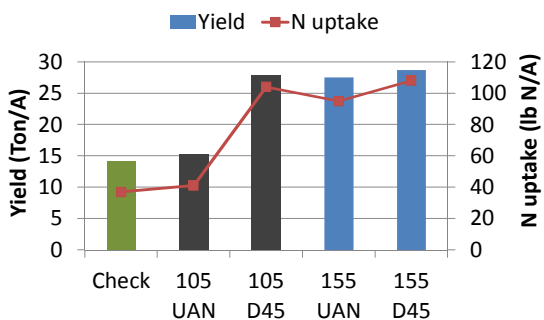
### Richard Smith, U. California Cooperative Extension

- Chualar loam Drip irrigation 40" beds
- Lettuce seeded Jun 27, Harvested Aug 29
- Pre-plant applications of D45 banded (2/row) on Jun 21
- Anti-Crustant (7-7-0) applied at planting (25 lb N/A)
- UAN32 fertigations via drip irrigation on Jul 27, Aug 8



UAN32 injections were controlled 15

## Romaine Lettuce (Salinas, CA)



- At 105 lb N/A, pp-D45 produced significantly higher yields and gave significantly higher N uptake than fertigated UAN32
- Root zone nitrate-N levels were significantly higher for D45 compared to fertigated UAN32
- If not in the crop, where did the UAN32 nitrogen go?
- Fertigation is not necessarily the best way to fertilize
- Unexpected or prolonged irrigation can lead to N loss
- PCU helps to buffer against irrigation-induced N loss



**STANDARD FERTIGATION**  
15.3/0.97

**DURATION AG® 45-DAY**  
27.9/1.78

Values are means in tons/A and lb/head (untrimmed)  
All plots 105 lb N/A (moderate rate)

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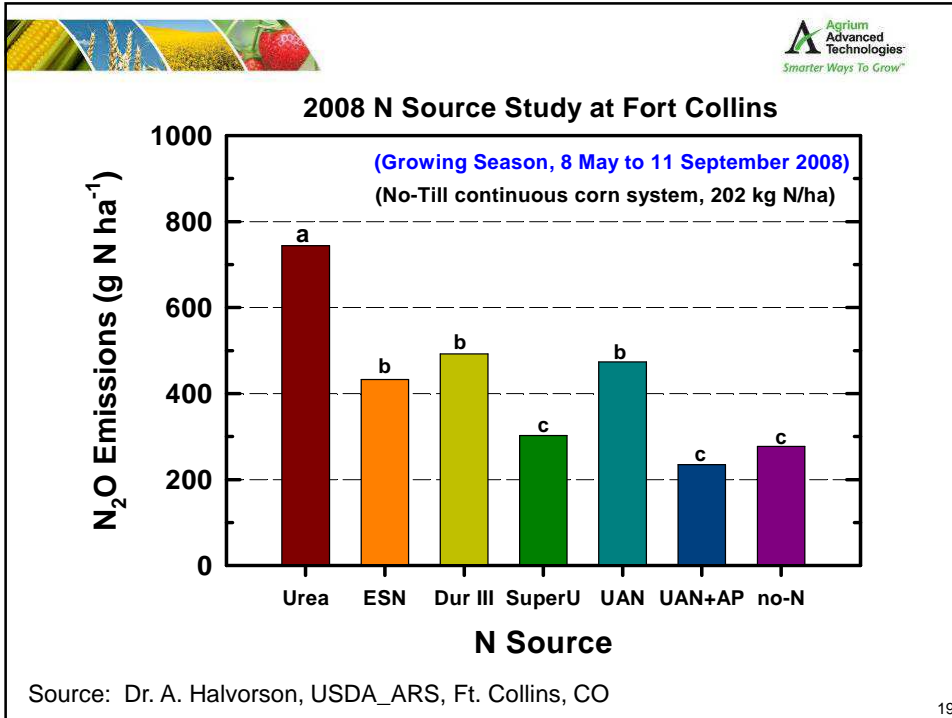
### N Management and N Leaching in Potatoes

“PCU significantly reduced leaching and tended to improved N recovery over soluble N applied in two applications and resulted in similar N recovery and nitrate leaching as soluble N applied in six applications.”

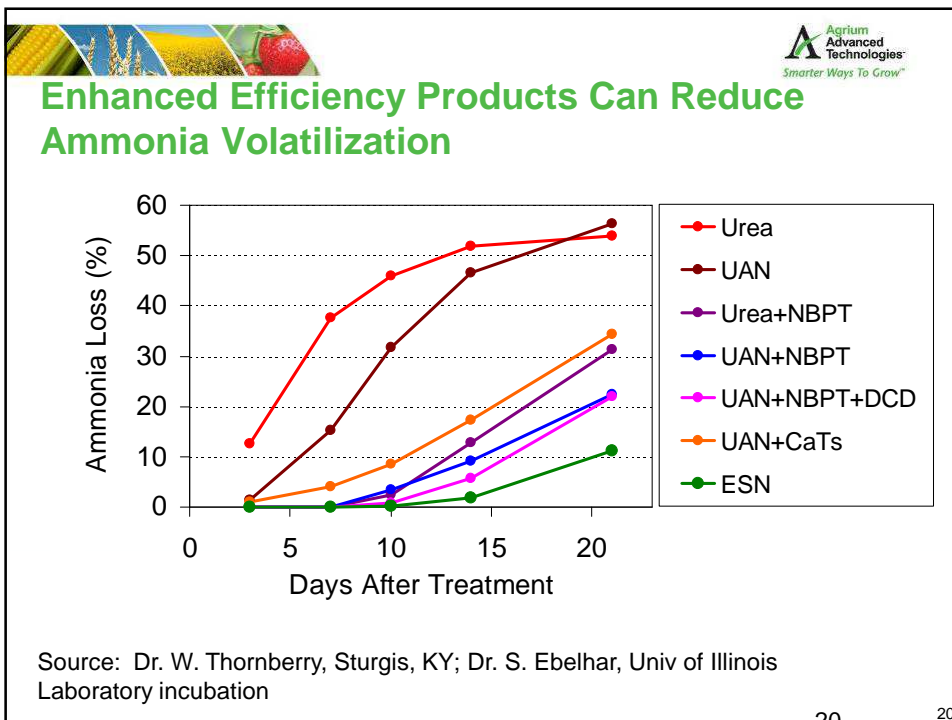
N rate (kg ha <sup>-1</sup> )	0 N control	Soluble N - E and PH	Emergence PCU	Soluble N fertigation - E and 5xPH	Preplant PCU	Planting PCU
0	16 (a)					
90		22 (abc)	21 (ab)			
180		21 (ab)	20 (a)			
270		32 (cd)	20 (a)			
360		43 (d)	35 (d)			
270*				20 (a)	32 (bcd)	20 (a)

Dr. C. Rosen, Univ of Minnesota

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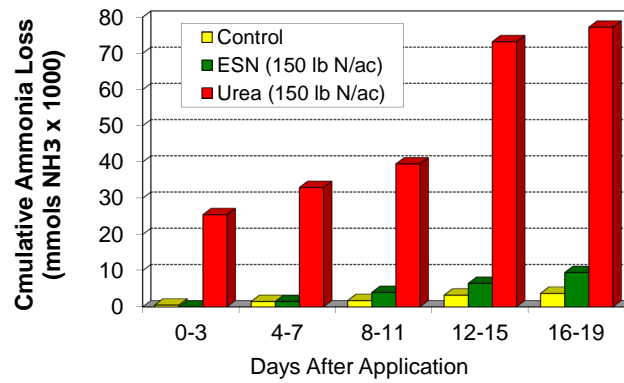


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## Nitrogen Source and Ammonia Volatilization



Field study; spring top-dress application on winter wheat  
Source: Dr. R Koenig, Washington State Univ, 2007

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Slow and controlled-release fertilizers can significantly decrease N losses to the environment when used in a system of best management practices implementing 4R principles.

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