nutrient stewardship

Fluid Fertilizers: Agronomic Opportunities for Crop Production

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The Andersons

Fluid Fertilizers:
Why the use of Fluids fits so well for the Future of Agricultural Production

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Current Situation: Agriculture is Being Challenged…

- Population growth will continue to increase putting demands on production efficiency.
- We are under increased scrutiny related to land and resource management.

Current Situation: Agriculture is Being Challenged…

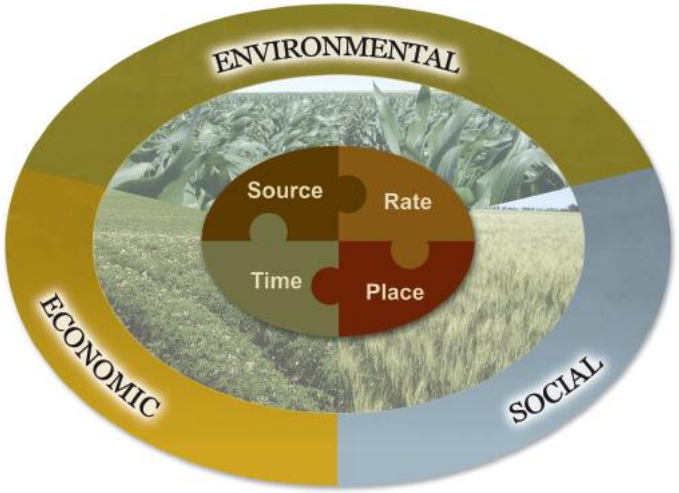
- Increased Scrutiny of Land and Resource Management
  - Negative headlines effecting public opinion.
  - EPA pursuing rulemaking affecting agriculture.
    - Numeric Nutrient Criteria in Florida.
  - Environmental organizations litigating to force regulatory action.
    - EPA being sued for not implementing the Numeric Nutrient Criteria to the liking of environmental groups such as the Sierra Club.

Essential Goal of Agriculture

- We MUST simultaneously improve productivity & efficiency
  - Increasing societal demands for food, fuel & fiber.
  - Global financial stress.
  - Growing concerns on impact to air and water quality.
- If we have Efficiency without Productivity
  - Increases pressure to use marginal lands.
- If we have Productivity without Efficiency
  - Squanders resources & increases environmental impact.

4R Nutrient Stewardship

- Improve agricultural production while contributing to social well being and minimizing environmental impacts (benefits water and air quality).



- 4R represents the use of fertilizer Best Management Practices to ensure:
  - the right source (at the right pH)
  - at the right rate
  - at the right time
  - in the right place

4R Nutrient Stewardship

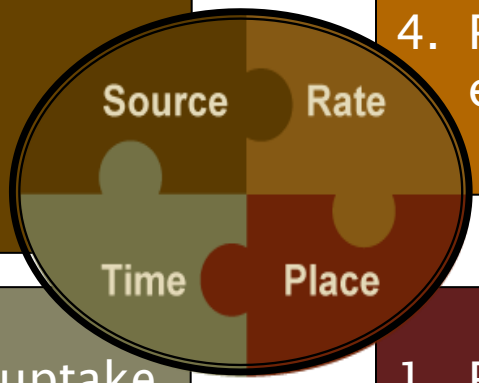
- Matches nutrient supply with crop requirements to minimize nutrient losses from fields.
- BMP's effecting fertilizer Source, Rate, Time, & Place are Site Specific.
  - Practices chosen for a given field are dependent on soil, climate, and management conditions, crop selection, and other site specific factors.

4R Framework

nutrient stewardship

1. Supply in plant available forms
2. Suit soil properties
3. Recognize synergisms among elements
4. Blend compatibility
5. pH considerations

1. Appropriately assess soil nutrient supply
2. Assess all available indigenous nutrient sources
3. Assess plant demand
4. Predict fertilizer use efficiency



1. Assess timing of crop uptake
2. Assess dynamics of soil nutrient supply
3. Recognize timing of weather factors
4. Evaluate logistics of operations

1. Recognize root-soil dynamics
2. Manage spatial variability
3. Fit needs of tillage system
4. Limit potential off-field transport

Example Fertilizer BMPs

- Source:
  - Select appropriate fertilizer nutrient source, consider fertilizer form, consider enhanced efficiency fertilizers.
- Rate:
  - Grid or zone soil testing for rates, nutrient budgeting to plan management and application, plant tissues testing address spatial variability; in season methods for in season decisions.
- Time:
  - Follow recommended times for nutrient applications, split apps to improve uptake, enhanced efficiency fertilizers.
- Place:
  - Utilize application methods that limit losses, incorporate fertilizers, couple apps. with appropriate soil conservation.

Nutrient Use Efficiency Technologies to be Considered

- Fertilizer Technology & Additives
  - Slow and controlled release fertilizers
  - Nitrification and urease inhibitors
  - Enhanced efficiency nutrient additives
- Cultural Practices
  - Incorporation or injection
  - Timing and number of applications
    - Light & frequent applications
  - Coordinate applications with optimum crop nutrient uptake
- Analytical Practices
  - Soil nitrate and organic N testing
  - Tissue testing, chlorophyll meters, and spectral analysis technologies

Communicating with Stakeholders

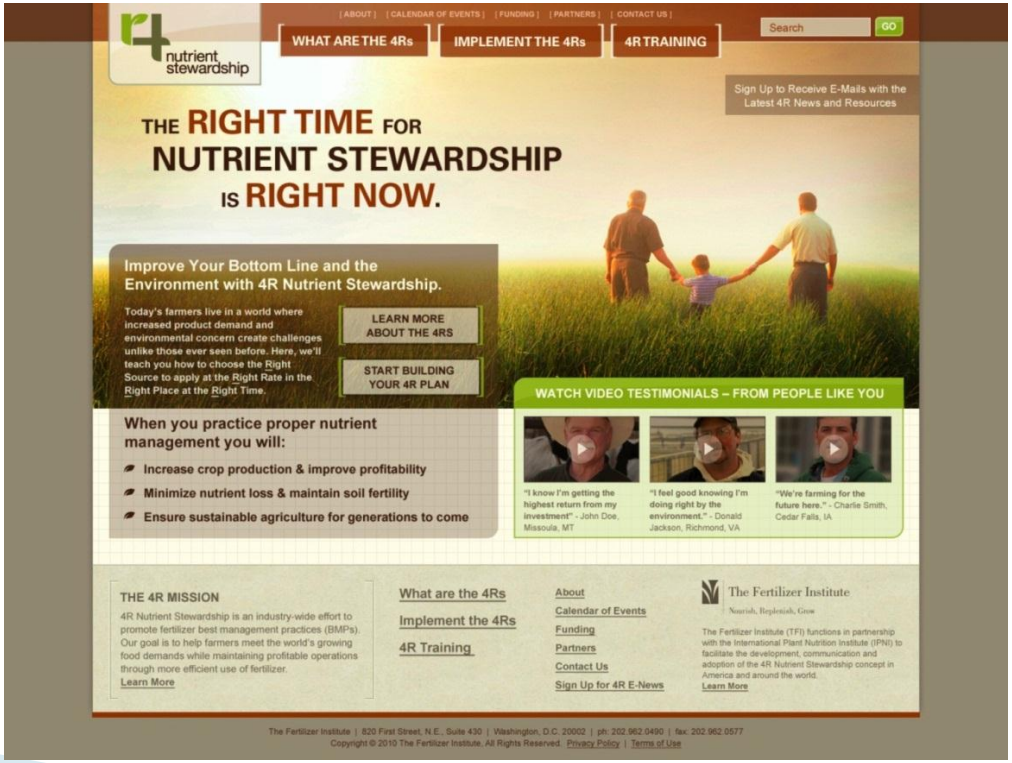
- Agriculture needs to understand its role in sustainability.
- Policy makers and the public need to understand agriculture's role in sustainability.
- Need a means to communicate how nutrient management contributes to sustainability.

4R Website

www.NutrientStewardship.org

Provides:

- Articles regarding fertilizer best management practices.
- Information about partner products and service that supplement 4R.
- Information about 4R supporters.



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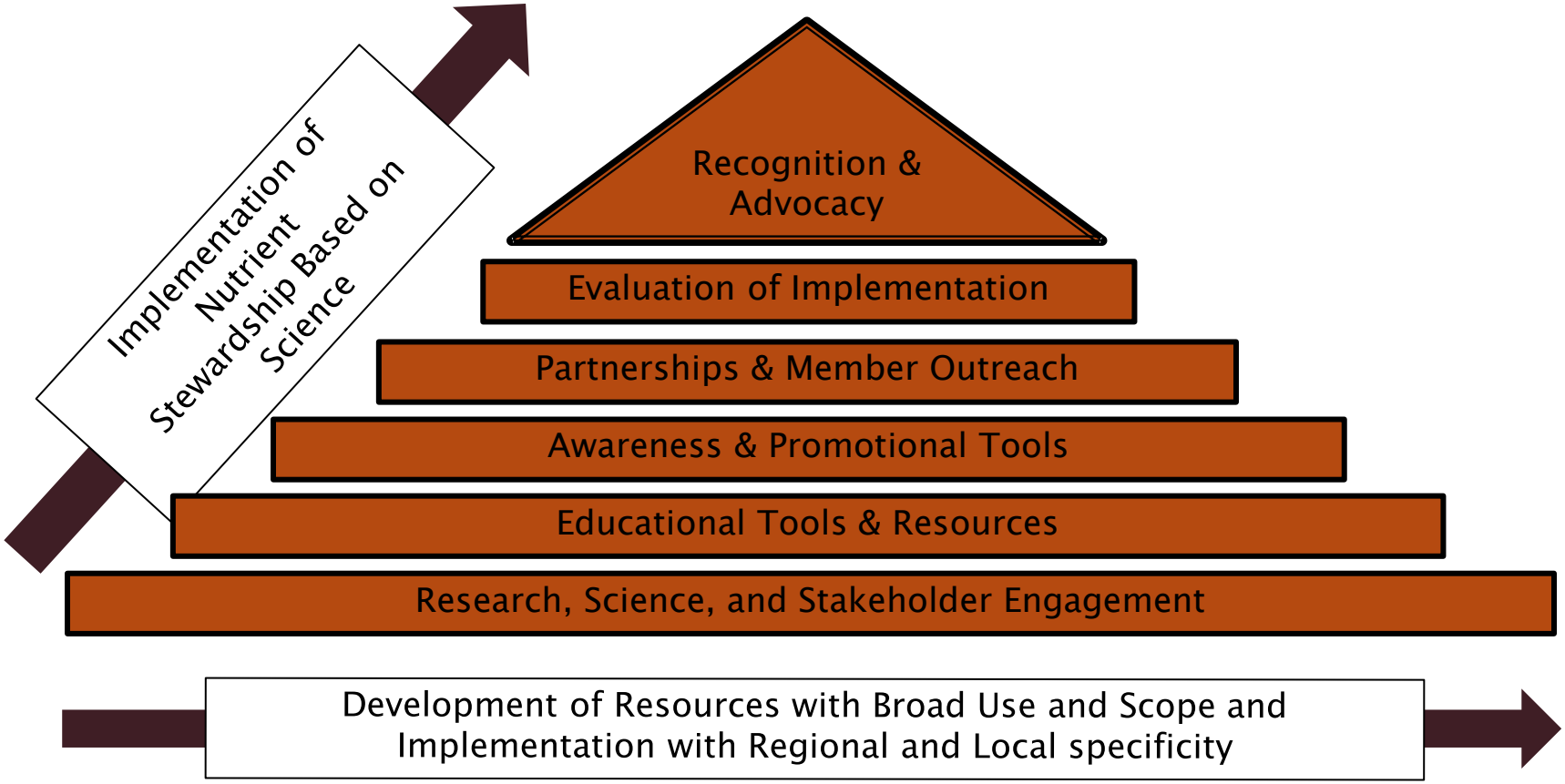
Industry Efforts



Goals:

- Establish 4Rs as recognizable strategy for economic, social, and environmental sustainability.
- Expand the implementation of 4Rs by service providers on the farm.
- Increase awareness of these efforts to the public and policy developers worldwide.

4R Nutrient Stewardship Implementation Challenges

- Skepticism – “It’s just a PR campaign”
- Paradigm shift – from pounds on the ground to nutrient use efficiency
- Research support
- Retailer adoption
- Grower acceptance

Coordinated Effort

INTERNATIONAL
PLANT NUTRITION
INSTITUTE

The
Fertilizer Institute
Nourish, Replenish, Grow

Retailer's Implementation

- Direct Communications Plan
  - Internal Training
  - Grower Communications
  - Public Communications
- Opportunities to speak to groups like this.
- Inclusion of 4R logo in key areas
  - Trailers, Tanks & Application Equipment
  - Salesmen's Vehicles
- Phased into Business Plan
  - Cannot be a "Marketing" gimmick
  - Should become part of how the retailer goes about its business

Andersons Southern Region Implementation Examples

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Fluid Fertilizer Foundation

Thank You

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