



IPNI

INTERNATIONAL
PLANT NUTRITION
INSTITUTE

TACTICAL PLAN

Nitrogen

IPNI Nitrogen Program Tactical Plan

Nitrogen inputs must be kept in balance with other essential nutrients to achieve optimum plant nutrition. Proper nutrient balance is essential for meeting yield goals, closing existing attainable yield gaps, improving and maintaining soil fertility, and sustaining healthy soil conditions, all while protecting water and air quality.

To address N-related issues and concerns, there is a need to expand the science of efficient and effective N management. While it is important to get as much of the applied N into the crop and retained in the soil as practically and economically possible, it is critical to avoid any risks of crop yield reductions or limits to achieving attainable yield goals. 4R Nutrient Stewardship is fundamental to these two objectives.

Need 1: 4R Nutrient Stewardship must become globally adopted as the scientific basis for sustainable crop nutrition.

IPNI Response:

- Remain current with emerging knowledge on nutrient stewardship for major cropping systems and maintain close relationships with leading scientists.

Need 2: Nutrient education is inadequate for current and future agronomists.

IPNI Response:

- Examine fertilizer stewardship impacts on hypoxia using current N and P concentration and delivery data to update the state of knowledge on higher crop yields and N and P harvest removal.
- Provide local information and solutions on the link between nutrient management and groundwater nitrate.
- Work with key researchers to publish articles in *Better Crops* addressing key issues related to N use and sustainability.
- Develop educational materials that improve understanding of N cycle and the magnitude of loss pathways and N “pools”.

Need 3: Better fertilizer recommendations are needed to boost productivity, economic returns, and environmental stewardship.

IPNI Response:

- Support development of decision support systems that account for weather to improve nutrient use efficiency, particularly that of N.
- Coordinate with IPNI directors to explain and demonstrate how Stanford’s original concepts influence current N recommendations.
- Assist in creating a database and protocols for conducting N rate trials.



Need 4: Yield gaps must be identified and closed to provide a sustainable food supply.

IPNI Response:

- Support IPNI activities on improving N use efficiency in high-yield cropping systems.

Need 5: Agricultural sustainability is only maintained by proper nutrient management.

IPNI Response:

- Work with global initiatives focused on N impacts on the environment with the objective of incorporating 4R Nutrient Stewardship into the discussions and products.
- Work with industry partners to summarize major fertilizer N sources and trends in the U.S. Identify social, economic and environmental metrics of fertilizer use at field to national scales.
- Work with the fertilizer industry and sustainability groups to improve the understanding and acceptance of sustainability concepts.
- Meet with individual scientists to get current 4R science adequately recognized in climate change models, especially COMET FARM.
- Glean data from the scientific literature to establish the current apparent N recovery efficiency values for major cereal crops: corn, wheat, rice.



Sustainability is the operative word. Agriculture is being called upon to document improvements in its nutrient use and management to defend its sustainability claims and to chart progress toward a more desirable condition. It will be necessary for the industry to support the research, education, outreach and implementation of better N management practices (BMPs) to reach agricultural and environmental goals. New partnerships and cooperation will be fundamental to demonstrating N management success by implementing 4R-based principles.

IPNI is expanding and intensifying our interactions and influence with:

- 1) sustainability organizations and alliances whose aim is to establish national and international prominence and public policies on appropriate fertilizer N use, and
- 2) leaders within professional societies and global science bodies that engage innovative scientists whose work intersects with 4R N management.

IPNI approaches these challenges and needs by:

- Creating a mindset for collaboration among and between agricultural and environmental N scientists, to ensure that the top priority is a focus on 4R-based increases in crop yields, crop recovery of applied N, and soil fertility.
- Assisting in establishing and tracking select fertilizer N performance indicators that reflect changes in agronomic and environmental outcomes.
- Providing educational materials that reflect the most current N management science.
- Expanding government agency and non-profit-organization adoption of the 4R Nutrient Stewardship principles as central and necessary components of crop and soil productivity and sustainability.
- Informing and educating scientific staff and administration about key environmental N issues, to equip and empower IPNI with greater agility and science knowledge to proactively confront the issues.

IPNI develops and promotes scientific information for the responsible management of plant nutrition for the benefit of the human family.



Nitrogen Program (Global)

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