

IPNI REGIONAL REVIEW

Latin America- Southern Cone



TACTICAL PLAN highlights & priorities



IPNI

Key Regional Issues

- **Agriculture** is an important economic driver for regional economies.
- **Increasing global demand for oil seeds and cereals** has prompted an expansion of the cultivated area, and resulted in major soil management and crop production challenges throughout the region.
- **Accelerated soil degradation** impacts chemical, physical, and biological conditions because of negative nutrient balances, and monocropping (continuous soybean). The cultivation of marginal lands results in wind and water erosion, soil compaction, soil organic matter depletion, and nutrient loss.
- There is wide use of **no-tillage cultivation**, with adoption ranging from 60 to 90%.
- Increasing acknowledgement of **the importance of plant nutrition for sustainable crop production** and the need for adequate nutrient balances for high-yielding systems.
- At least half of total **cropped land is farmed under annual leases**, impacting short and long-term fertilizer decisions.
- A low **"fertilization culture"** still exists in the main agricultural areas of Bolivia and to a lesser extent in Argentina.
- **Erratic and variable support to farmers** from public research and extension institutions.

4R Stewardship

IPNI has developed networks of fertilization experiments documenting nutrient deficiencies in southern Santa Fe (Argentina), northern Cordoba (Argentina), and eastern Santa Cruz de la Sierra (Bolivia) working with farmer organizations such as CREA.

Fertilization experiments with the *Universidad de la República* supported the development of improved potassium fertilizer recommendations in Uruguay.

Nutrient Education

IPNI successfully partners with research organizations, educational institutions, private companies and farmer associations, in developing technical meetings and publications to improve nutrient management across the region.

Continuous update of the regional website and quarterly publication of the IPNI newsletter: *Informaciones Agronómicas de Hispanoamérica*, which disseminates the message of 4R Nutrient Stewardship across the region.

Improved Fertilizer Recommendations

Soil test calibration is being updated and compiled to contribute to the adoption of better fertilizer recommendations by farmers and consultants.

Closing Yield Gaps

4R nutrient management needs better adoption into current soil/crop management practices to reduce existing crop yield gaps. Current yield gaps (attainable vs. current yields under dryland) are estimated at 30 to 40% for maize, wheat, and soybean in Argentina.

Enhancing Sustainability

Negative nutrient balances in cropland pose a challenge for long-term agronomic sustainability. There is lack of research-based information on pathways of nutrient losses to the environment and techniques for minimizing these losses.



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examples of IMPLEMENTING THE TACTICAL GOALS

4R Nutrient Stewardship:

Use of balanced fertilization has resulted in positive responses in crop production and farm profitability in regions with low historic fertilizer use such as southern Santa Fe and southeastern Cordoba (Argentina), and eastern Santa Cruz (Bolivia).

Balanced fertilization with N, P, and S has shown to improve soil chemical and biological properties after 12 years in the Nutrition Network CREA Southern Santa Fe. IPNI co-authored a peer-reviewed paper on "Long-term phosphorus fertilization of wheat, soybean, and maize on Mollisols: Soil test trends, critical levels, and balances" (Eur. J. Agron. 2018, 96:87-95).

Potassium fertilization studies in Uruguay have redefined soil test critical levels where crops will be expected to respond to potash additions. Technical articles, brochures, peer-review publications, and meetings have been used to disseminate the results of these studies.

Nutrient Education:

IPNI co-published (with INTA) the book "Soil Fertility and Crop Fertilization", a 904-page publication providing state of the art information on nutrient dynamics and fertilizer management, with emphasis on regional agricultural conditions.

The biennial Fertility Symposium co-organized with Fertilizar AC at Rosario (Argentina), gathers 900 leading agronomists to discuss the latest research results and to review how to implement 4R Nutrient Stewardship in the Pampas region.



Improved Recommendations:

Review of research done in the last 20 years has allowed improved calibration of soil tests for P in maize and soybean and of N in maize for more precise fertilization.

Closing Yield Gaps:

Activities on the IPNI Working Group on Global Maize and Soybean Systems contribute to a better understanding of the interactions between enhanced crop and nutrient management to further boost grain yields. Outcomes have been widely presented in meetings, articles, and peer-reviewed papers.

Enhancing Sustainability:

Updated regional nutrient balances have been developed and used for discussions with farmer and industry associations, and government agencies, especially in Argentina and Bolivia.

IPNI co-authored a peer-reviewed technical analysis on "Soil Quality Impacts of Current South American Agricultural Practices" (Sustainability, 2015, 7:2213-2242).

The IPNI Global Maize and the Soybean Systems projects contribute fundamental information on greenhouse gas emissions from maize in Argentina and the contribution of biological N fixation in soybean production for farmers and policy makers.

EXAMPLES OF IPNI IMPACT

Finding Sustainable Fertilizer Use on the Pampas

The Challenge

Information on nutrient management in this central Pampas region has not been updated for many years. Most of the previous research has fallen behind and the long-term effects of nutrient management in the currently recommended crop rotations has not been studied at all.

The Solution

The Regional Consortium of Agricultural Experimentation (CREA) in Southern Santa Fe is an important on-farm research partner for IPNI. Nearly 20 years of development into a network of on-farm trials has spread to influence nearly 3.5 million ha. Initial objectives included: finding direct and residual

responses to N, P, S, and micronutrients; evaluating diagnostic methodologies; and identifying attainable yields.

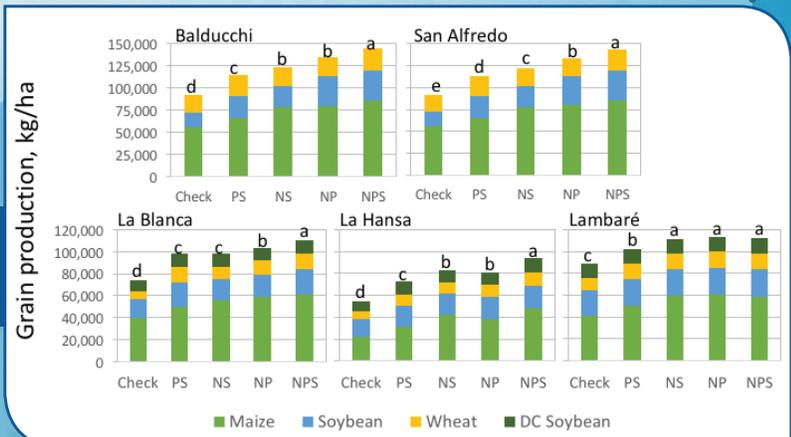
The Results

The Network has helped our understanding of the effects of fertilization on the sustainability of the main grain cropping systems of the central Pampas region.

NPS fertilization has provided for:

- higher, more stable yields, improved crop water use efficiency, increased gross margins, organic C, and microbial activity.

The Network outreach has been extensive through field days, seminars, presentations, scientific journals, technical papers, and the national press.



▶ Long-term teamwork between producers, consultants, and researchers from CREA-SSF, IPNI, ASP, University of Rosario, University of Buenos Aires, and INTA have found increased cumulative grain production of 27 to 102% depending on initial soil fertility at the site.



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