

# RESEARCH WITH IMPACT

## THE CHALLENGE:

The preferred method for making fertilizer recommendations is to analyze soils to determine if an adequate nutrient supply exists to support healthy crop growth. However, most farmers in India, even if they have access to soil test information, lack knowledge about managing nutrients within their highly nutrient demanding cereal systems. They often rely on best guesses or generalized official fertilizer recommendations made by respective state government agencies.

Maize is a very important food crop in India. It is grown on nearly 9 million ha. Average maize productivity in India hovers around 2.5 t/ha, but with proper nutrition and management, maize yields can commonly exceed 5 to 8 t/ha. Unbalanced and inadequate fertilizer use continues to be a major constraint to high yielding maize crops. Current official state fertilizer recommendations generally provide less than optimal results, fail to account for the nutritional demands of new maize hybrids, and cannot be easily adjusted across individual farmer fields.

Farmers increasingly need science-based information on the role of balanced plant nutrition to optimize profitability and minimize environmental impact.

## THE RESEARCH SOLUTION:

The IPNI South Asia Program developed and adapted Nutrient Expert® (NE), a decision support software system that provides fertilizer recommendations, for individual maize farmers. Nutrient Expert is based upon the principles of 4R Nutrient Stewardship that support the use of the right source of nutrient, applied at the right rate, in the right place, and at the right time to meet crop needs.

Over 500 on-farm trials were conducted in India's major maize-growing states to demonstrate the advantages of using site-specific fertilizer recommendations compared to the common farmer fertilization practices (FFP) and generalized state recommendations (SR).



## Nutrient Expert®: Making Better Fertilizer Use Decisions

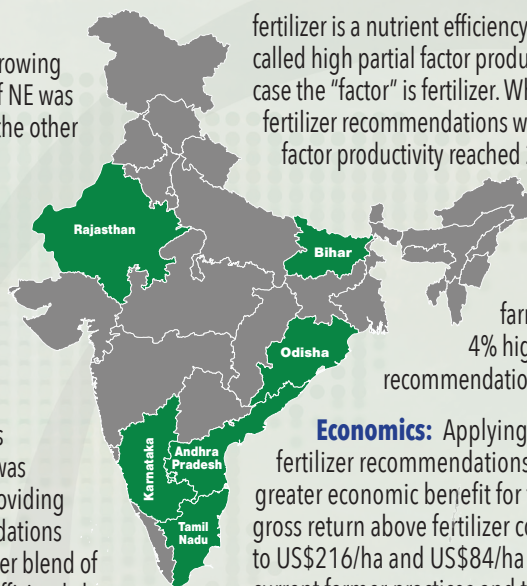
### THE RESULTS:

Across all of the maize-growing sites, the performance of NE was consistently superior to the other alternatives.

**Yield:** Maize grain yield was consistently higher using NE than current farmer practices (25% more yield) or the state recommendations (8% increased yield). This increased grain harvest was primarily achieved by providing field-specific recommendations that account for the proper blend of nutrients utilized more efficiently by the crop.

**Nutrient Efficiency:** Producing the maximum amount of grain for each added unit of

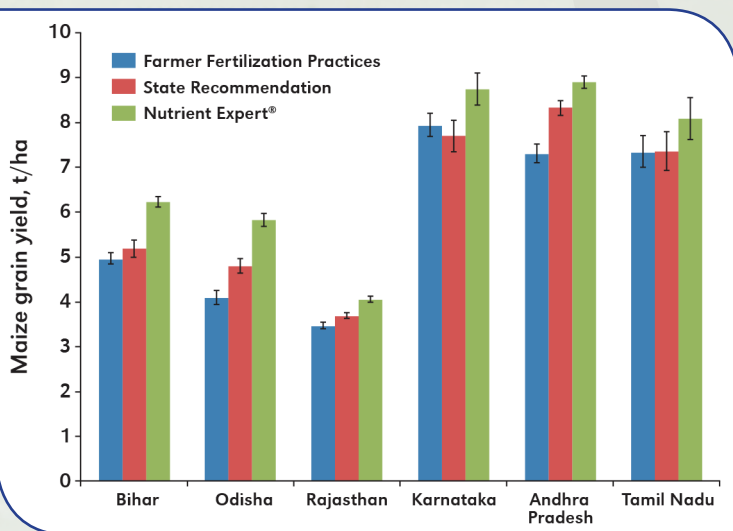
fertilizer is a nutrient efficiency goal for farmers called high partial factor productivity. In this case the "factor" is fertilizer. When NE-based fertilizer recommendations were used, partial factor productivity reached 26 kg of grain/kg nutrient applied. This was 17% higher than current farmer practices and 4% higher than the state recommendations.



**Economics:** Applying NE-based fertilizer recommendations resulted in greater economic benefit for farmers (i.e., gross return above fertilizer cost), amounting to US\$216/ha and US\$84/ha more than current farmer practices and the state recommendation, respectively.

More efficient use of nutrients typically translates into gains in environmental stewardship, but these additional benefits were not analyzed in this large, farmer-led study.

This successful project has resulted in the training of more than 3,000 farm extension agents, which provides maize farmers with greater capacity to improve nutrient management within their fields. Improved yields translate directly into greater food security and family farm income.



Using Nutrient Expert® to make 4R-based fertilizer recommendations consistently improves yields across many maize-growing states of India, compared with current farmer practices and generalized state recommendations.



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