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Researchers combat slowing yields with targeted fertilizer applications

MADISON, WI, DECEMBER 10, 2007— Scientists at Punjab [Agricultural](#) University, the International Rice Research Institute, and Virginia Tech have been successful in increasing average rice yields in northwest India using site-specific nutrient management strategies.

The Punjab province, which accounts for 10 percent of the Indian rice production, is currently witnessing a slower rice grain yield growth rate as compared to the yield growth rate during the [green revolution](#) phase (1960-1986). To meet the expected food demand in the next 30 years, rough estimates for India suggest the need to increase average farm productivity of the system, which is currently at 45 to 60% of the attainable yield potential, to 70 to 80% of the attainable potential.

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The researchers hypothesized that decreased nutrient supply capacity of soil and improper nutrient management approaches were key factors in the slower growth rate. By analyzing the existing soil nutrient composition and applying site-specific nutrient management (SSNM) the scientists were able to increase average rice grain yields by 17 percent compared with current farmers' fertilizer practice. Similarly, profits rose about 14 percent using SSNM.

Over a two year period the scientists applied calculated amounts of nutrients at 56 sites in six key irrigated rice-wheat regions to evaluate the effectiveness of SSNM in increasing yield growth

rates. Using the 'Quantitative Evaluation of the Fertility of Tropical Soils (QUEFTS)' model, which predicts crop yields from chemical soil characteristics, the scientists refined their nutrient applications and schedules on a site-specific basis.

In addition to yield and profit increases, improved timing of fertilizer applications led to a measured 13 to 15 percent increases in plant accumulations of [nitrogen](#), phosphorous and potassium.

While further yield increases are likely to occur in small, incremental steps that involve gradual buildup of soil fertility and fine-tuning of crop management, the authors conclude that the agronomic and [economic](#) successes of SSNM are due to its site-specific and dynamic nature which take soil variability into account. They suggest that the major challenges for SSNM will be to reduce the complexity of the technology as it is disseminated to farmers and to combat environmental [pollution](#) stemming from nutrient leaching and runoff from rice fields.

"Site-specific nutrient management, as defined in our study, has potential for improving yields, profit, and nitrogen use efficiency in irrigated, transplanted rice," explained the study's author Harmandeep Singh Khurana.

"Future research needs to build on the present SSNM approach to develop a more practical approach for achieving similar benefits across large areas without farm-specific modeling and with minimum crop monitoring."

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