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Case Study 7.4-3 Decision tool improves grain yield, profitability and efficiency for wheat in China.

A dynamic and robust nutrient management approach is essential to increase yields and optimize profits for smallholder farmers in intensified cropping systems.

A new fertilizer recommendation method, Nutrient Expert® (NE), based on yield response and agronomic efficiency (AE) for wheat, was tested in North China from 2011 to 2012, using N omission plots. NE is a nutrient decision support system which requires information that can be easily provided by the farmer or local crop expert, and will give guidelines on fertilizer management that are tailored to the specific field and locally- available fertilizer sources.

Results from on-farm trials (**Table 1**) indicated NE plots increased net profit with lower fertilizer N and P rates as compared with farmers practice (FP), and obtained yields comparable to those obtained with soil test fertilizer recommendation (STB) and FP. NE saved N fertilizer use by 41% and 30% compared to FP and STB, respectively. Moreover, NE improved AE for N and its recovery efficiency (RE) significantly as compared with FP and STB.

This improvement in yield, profitability and efficiency with NE could be attributed to the balanced application of the right fertilizer application rate of N, P and K nutrients based on location-specific crop requirements that take into account yield potential and soil indigenous supply, and the right place for fertilizer application (band application in contrast to broadcasting in FP and STB).

Table 1. Nutrient Expert on grain yield (GY), gross return above fertilizer cost (GRF) and N use efficiency in North China from 2011 to 2012*

Treatment	n	GY*, t/ha	N	P_2O_5	K_2O	GRF#, US$/ha	AE, kg/kg	RE, %
			— kg/ha —					
Farmer practice	217	7.8 a	272	114	53	2,290	4.7	18
Soil test-based	139	8.2 a	230	109	77	2,460	6.0	23
Nutrient Expert®	218	7.9 a	160	79	73	2,420	7.6	28

*Data are averaged across two years. Means followed by the same letter do not differ from each other (p = 0.05).

#Prices used in calculation of GRF were the actual prices at the time of experiment. Fertilizer prices ranged from US$0.66 to 0.82/kg N, US$0.79 to 1.02/kg P_2O_5 and US$0.82 to 1.20/kg K_2O. Wheat prices ranged from US$0.31 to 0.36/kg.

Reference

Chuan, L.M. et al. 2013. Field Crops Research, 140:1-8.

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