Variability of rice yield responses to nutrients on farms in the central Philippines

J.F. Angus[1], C.A. Fazekas?de?St?Groth[1] and R.C. Tasic[2]

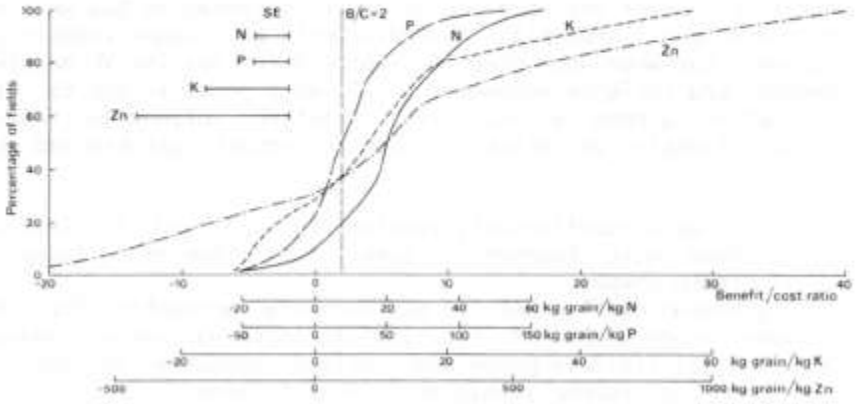
[1] CSIRO Division of Water and Land Resources, Canberra
[2] Philippine Ministry of Agriculture and Food, Antique

Experiments to test the yield response of rainfed lowland rice to inputs of N, P, K, and Zn were conducted on farms in the central Philippine province of Antique during 1984 and 1985 as part of a project supported by ACIAR. The prevailing cropping system consisted of one or two direct-seeded rice crops. The only inputs widely adopted by farmers were pre-emergence herbicide and urea at 40-70 kg N/ha; few farmers followed the nationally recommended 13 kg P/ha or 25 kg K./ha. This study sought to determine the reasons.

Methods

Factorial trials were established on rice fields on 46 farms during the first part of the 1985 growing season. None of the crops experienced water stress. The yield responses shown in the Figure refer to the following treatment comparisons:

N 0 v 35 kg N/ha as urea
P 0 v 13 kg P/ha as single super; both treatments supplied with 70 kg N/ha
K 0 v 25 kg K/ha as KCl; both treatments supplied with 70 kg N/ha
Zn 0 v 1 kg Zn/ha as zinc sulfate, both treatments supplied with 105 kg N/ha, 13 kg P/ha, and 25 kg K/ha (10 fields only)



Results and discussion

The yield responses to inputs are shown as the cumulative percentage of fields not exceeding specified benefit/cost ratios (B/C) at prevailing prices; a B/C > 2 is suggested as the level of profitability for the input to be attractive to farmers. The lines below the B/C abscissa are scaled so that each curve and its standard error (SE) refer to both the B/C ratio and the relevant physical response. The N curve shows that for 80% of fields the B/C > 2. For P, the B/C > 2 for 50% of fields and the returns were generally lower than for N. For K and Zn, the B/C > 2 for 607 of fields, many of which showed extremely large positive responses; 30% also showed negative responses.

The widespread adoption of N by farmers can be explained by the reliable yield response. The lack of use of P, K and Zn may be due to the less reliable yield responses. Attempts to explain the variability of response from soil tests and fertilizer history were unsuccessful. We suggest that, to help identify responsive fields in a landscape offering such large and unexplained variability, numerous strip-trials should be conducted to test for suspected deficiencies.