experimental site seems to favor *Azolla* in two ways. First, fixation of soil phosphorus is negligible, which favors *Azolla* growth, because of low cation exchange capacity. Second, the soil's coarse texture causes rapid nitrogen loss, whereas *Azolla* releases nitrogen slowly. The results suggest that the effect of *Azolla* was more favorable than that of a basal and topdressing nitrogen treatment (which is ordinarily needed when chemical fertilizers are used).

Azotobacter inoculation on rice crop

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Seed or soil inoculation with *Azotobacter* is increasingly being used for higher crop production. Under certain ecological conditions, *Azotobacter* fixes atmospheric nitrogen and makes it available for plant growth. The yield performance of rice inoculated with *Azotobacter* was studied.

A field trial conducted from July to October 1976 used ADT 31; from November 1976 to February 1977 IR20 was used. The treatments were 1) 25:50:50 kg NPK/ha, 2) 25:50:50 kg NPK/ha + *Azotobacter* treatment, 3) 50:50:50 kg NPK/ha, 4) 50:50:50 kg NPK/ha + *Azotobacter* treatment, 5) 75:50:50 kg NPK/ha, 6) 75:50:50 kg NPK/ha +*Azotobacter* treatment, 7) 100:50:50 kg NPK/ha, 8) 100:50:50 kg NPK/ha + *Azotobacter* treatment, 9) *Azotobacter* treatment alone, and 10) the control (no nitrogen or *Azotobacter).* The paddy seed were treated at the rate of 600 g of *Azotobacter* culture/50 kg of seed, and the seedlings and soil were treated with 1.4 kg and 2.4 kg of *Azotobacter/ha.*

In the first trial, using ADT 31, the grain yield was significantly higher (5.6 t/ha) in the *Azotobacter* inoculation treatment with 75 kg N/ha. The *Azotobacter* application alone gave a yield of 5 t/ha, which is not statistically different from that of 25 kg N alone. During the pishanam season, the maximum grain yield, 5.2 t/ha, was recorded in the plots that received 100:50:50 kg NPK/ha with Azotobacter treatment. The results from both seasons show that *Azotobacter* inoculation will supplement 25 kg N/ha and thus reduce chemical fertilizer application by 25 kg N/ha.

Rice-based cropping systems

Relative abundance of five rice stem borer species on each crop of a triple-rice pattern in Iloilo, Philippines

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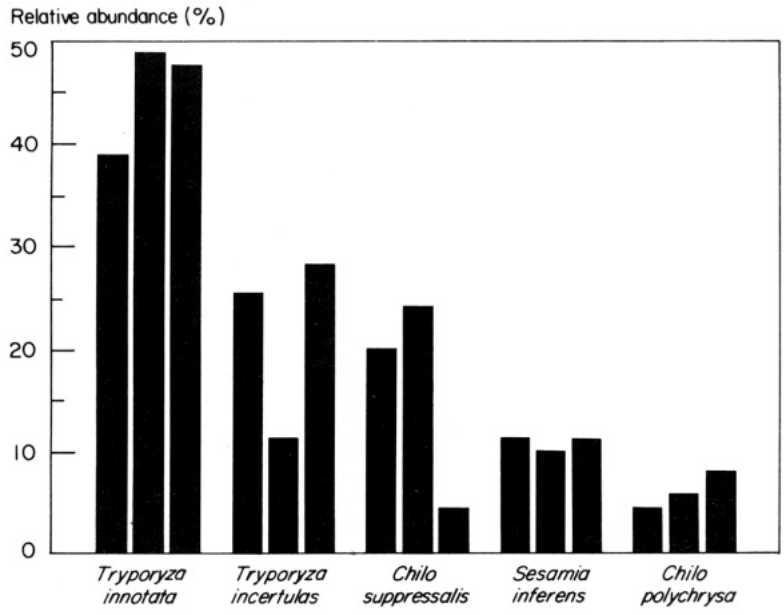
With supplemental irrigation, three rice crops are being grown in low-lying fields of Iloilo, a rainfed-lowland rice area. Stem borer populations for the crop year 1975–76were monitored on each crop (IR28) by dissecting deadhearts and whiteheads. Five species were recorded; the predominant species was the white stem borer *Tryporyza innotata* (see figure). The yellow stem borer *Typolyza incertulas,* second in abundance, was prominent on the first and third crops. The striped stem borer *Chilo suppressalis* was the third most abundant; its numbers declined, however, during the third rice crop. The pink stem borer *Sesamia inferens* was fourth most abundant and the dark-headed stem borer *Chilo polychrysa* was fifth. As current IR rice varieties are only moderately resistant to *C. suppressalis,* stem borer control in Iloilo will have to be based on insecticides.



Relative abundance of five stem borer species on each crop of a triple-rice pattern in Iloilo, Philippines, 1976.