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ZAMORANO

Socio-Economic Considerations of Genetically-Modified Maize Adoption: The Case of Honduras

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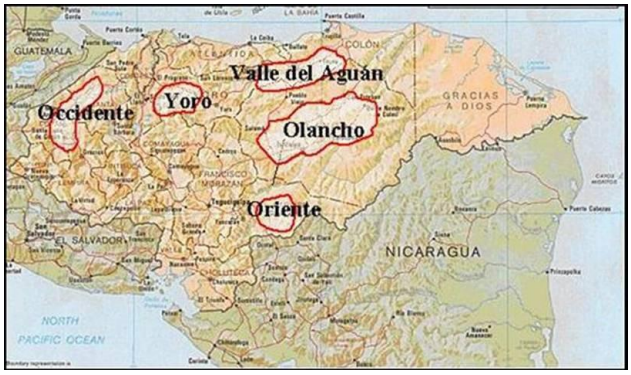
Country Context

Honduras is one of the poorest countries in Latin America and the Caribbean, with an estimated per capita income of US$1,190. Nearly half of Hondurans live on less than two dollars a day, with 21 percent under one dollar a day. Poverty and inequality have persisted for decades. Small-scale, subsistence-oriented farmers cultivate alongside modern, large-scale producers in a dual agricultural economy.



Major maize-producing areas in Honduras. Source: Sanders, Trabanino, and Falck Zepeda, 2008

Maize is a food staple, and many farmers rely on it directly for subsistence. The average national yield of 1.6 tons/hectare is one of the lowest in Latin America. Low yields result from a combination of factors, including farming on hillsides and poor soil fertility. Damage from lepidopteran insects can also cause significant economic losses, especially among smallholders. Smallholders have limited access to chemicals to control pests, knowledge, technology, and credit, which constrains their ability to assess and treat pest damage. Insect-resistant (IR), genetically modified (GM) maize is an alternative to chemical control.

Honduras became the first country in Central America to approve GM crops for commercialization in 2002, and it has signed but not ratified the Cartagena Protocol on Biosafety. Estimates indicate that 320 producers planted IR maize in 2007 on 3,000 hectares, two-thirds with Bt maize and one-third with stacked Bt/Roundup-Ready (RR) maize. Bt maize expresses the bacterial Bt toxin, which is poisonous to insect pests, and RR maize is resistant to the herbicide Roundup.

Research Questions

Since Honduras is in the early stages of GM maize diffusion, basic knowledge is needed about how the technology performs for farmers and which institutional issues will affect its impact. The research team is testing the following hypotheses:

- Pest damage is less, fewer pesticide applications are needed, and yields are higher with GM as compared to non-GM maize;
- Farmers apply sound management practices to exploit these advantages;
- Adoption rates and impact do not depend on farm size; and
- A large network of suppliers and other supporting institutions promotes the use of GM maize.

Methods

To test these hypotheses accurately, it is important to establish the counterfactual—what would have happened had GM maize not been introduced. To assess benefits, the team is comparing GM maize hybrids, isogenic maize hybrids, and an improved variety on-station and on farms. In one activity, yields, parasitism,

and pest damage are compared in a controlled experiment at Zamorano University. In the second, the effectiveness of damage control is evaluated on large- and medium-scale farms in two departments with high rates of maize production (Comayagua and Olancho). Techniques for sampling target and non-target insects include visual observations and state-of-the-art techniques developed and validated by scientists at Zamorano University (see photo).

Pitfall traps filled with preserving liquid in an experiment site. Source: © Batallas Huacón, 2007

Currently, only medium- and large-scale farmers grow GM maize in Honduras. The team conducted participatory research with smallholders (farming under 2 ha) to gain a sense of how they would manage GM maize. They were assisted by technicians only when measuring productivity, pest infestation, net income, and acceptability.

Farm surveys were conducted with a random sample of farmers in three major maize-producing regions (Olancho, Comayagua, and Oriente—see map above) to identify the determinants of adoption and assess the impacts of adoption. Three survey instruments were designed to collect information from 67 GM growers and 47 non-GM growers during planting, growing, and harvesting. Although the sample is small in absolute terms, the sampling fraction (21 percent) indicates that it is highly representative.

Preliminary Observations

Agronomic and biophysical aspects must be carefully considered when evaluating socio-economic impacts of GM crops that abate damage. More than one approach may be necessary to validate findings. The institutional context has probably contributed to lower rates of GM maize adoption. So far, smallholders farming under 2 ha have not adopted GM maize. Knowledge about the management of GM maize is limited among adopters, who have made few changes in their practices after adopting. Lack of access to financial services and information restricts farmers' investments in GM maize.

Group evaluations of the GM and conventional maize varieties

See also: Batallas Huacon, R. E. 2007. "Comportamiento de plagas insectiles en maíz con eventos transgénicos (proteina Cry1Ab y resistencia a glifosato) en Zamorano, Honduras. Tesis de Ingeniero Agrónomo en el grado académico de Licenciatura, Carrera de Ciencia y Producción Agropecuaria, Escuela Agrícola Panamericana, Zamorano, Honduras.

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