



INTERNATIONAL FOOD  
POLICY RESEARCH INSTITUTE  
*sustainable solutions for ending hunger and poverty*

IFPRI®

Supported by the CGIAR



ASOCIACION DE PRODUCTORES  
DE OLEAGINOSAS Y TRIGO

## Socio-Economic Considerations of Genetically Modified Soybean Adoption: The Case of Bolivia

By Rodrigo Paz, Jaime Hernández, Willy Fernández, Patricia Zambrano, and Melinda Smale

### Country Context

The only genetically modified (GM) crop that has been approved for production or human consumption in Bolivia is Roundup Ready (RR) soybean, which is resistant to the herbicide Roundup. The first approved crop was planted in 2005, but farmers had already introduced RR soybeans from Brazil through family networks. The Association of Oil Seed and Wheat Producers (ANAPO) in Bolivia estimates that by the 2007-8 season, approximately 60 to 70 percent of the total production of soybeans will be RR. Although there are no official figures of how much of this production comes from small-scale farmers, it appears that Bolivia is one of the few countries in Latin America where there are a significant number of small-scale soybean producers.



Major soybean-producing area in Bolivia. Source: Paz 2008

Soybean production started to expand in Bolivia in the early 1980s. Nowadays, soybeans contribute to 4.6 percent of GDP and 10 percent of total exports. Most of the production is exported to the Andean region. As part of the Bolivarian Alternative for the Americas (ALBA), the government of Bolivia has created a US\$25 million program to promote the production of conventional soybeans among medium and small-scale producers. It is expected that this program, if successfully applied, will create incentives among farmers to produce less RR soybean.

Local, private input dealers and producer organizations are currently the source of approximately 21 herbicide tolerant (HT) soybean varieties. Ninety-seven percent of soybean production takes place in Santa Cruz, where most of the producers are small-scale farmers, although the vast majority of production comes from large-scale farms. Since soybean production is a fully mechanized, extensive farming system, a smallholder in this context is any farmer that plants fewer than 50 hectares. The characteristics of small-scale soybean farmers are not known, as no information is systematically collected on their numbers or the distribution of their landholding size.

This project targets small-scale farmers and is identifying the economic and social impacts of using RR soybeans. The research focuses on the Cuatro Cañadas region of Santa Cruz, where there is a significant number of small-scale farmers. ANAPO is interested in developing a better understanding of the impacts of RR soybeans, which will help guide its policy stance on the use of RR soybeans, particularly by small-scale farmers.

## Research Questions

Previous studies on the farm impacts of HT soybeans in the US (Fernandez Cornejo et al. 2002) and Argentina (Qaim and Traxler 2005, Penna and Lema 2003) led the team to hypothesize that use of HT soybeans 1) reduces herbicide costs, 2) increases glyphosate applications compared to other types of herbicide, and 3) enables farm families to reallocate their time to other income-earning activities or leisure. In Bolivia, where farmers introduced HT soybean seed through their own informal networks, the team is also testing the hypothesis that the sources of seed and seed-related information differ for HT and non-HT soybean. Another area of concern is whether additional land has been cleared for soybean cultivation as a consequence of HT soybean use, which has environmental implications.

## Methods

Sampling was challenging because there are no official data regarding the number of small-scale soybean producers in Cuatro Cañadas, Santa Cruz. Detailed on-site work was required to determine first, the number of families by community, and second, the number of small-scale farmers.



Source: Paz 2008

The main analytical methods applied in this case study include:

- Stochastic partial budgeting to take into account *variability* in economic returns to farmers. To succeed, a technology needs to generate consistent benefits over cropping seasons.
- Social network analysis to depict the way seed and seed-related information travel from one farmer to another. To diffuse broadly, the most widely used technologies are often promoted through farmer-to-farmer exchange and emulation. Farmers listen primarily to other farmers.
- Econometric analysis using instrumental variables regression to separate the impact of the technology itself from the impacts of other variables that help determine adoption. For example, it is often the case that farmers who adopt first are more efficient or have more access to capital and information. Thus, the observed difference in economic benefits between these adopters and non-adopters is biased. Instrumental variables regression is one way to remove bias.

## Initial Observations

Random sampling of communities and farmers is more difficult for GM crops than for other agricultural technologies, leading to biases in estimates of economic benefits. In the case of Cuatro Cañadas, it was not possible to obtain consent from all community leaders to implement surveys about RR soybean, in part because the national government is opposed to GM crops. The social and cultural heterogeneity of communities in Bolivia poses additional challenges for social and economic analysis. Additionally, poor weather conditions over the past two years have also made it difficult to conduct field research and have underscored why data collected in any one year are not likely to be representative of the conditions faced by farmers over several cropping seasons.

### Contact:

Jaime Hernández: uesanapo@cotas.com.bo  
Asociación de Productores de Oleaginosas y Trigo  
Av Oviedo Barbery y Esq. Jaime Mendoza (Barrio  
Abaroa) Casa 2305  
Santa Cruz, Bolivia  
+591 (3) 342-3030

Patricia Zambrano: p.zambrano@cgiar.org  
International Food Policy Research Institute  
2033 K St., NW  
Washington, DC 20006 USA  
+1 202 862-5600  
www.ifpri.org