ADOPTION OF IMPROVED BEAN VARIETIES IN THE SEMIARID HIGHLANDS OF MEXICO

Horacio González-Ramírez
INIFAP. Carretera Durango-Mezquital Km. 4.5. Apdo. Postal 186. C.P. 34170. Durango, Dgo., México. Tel (618)826-0435. Fax (618)826-0433. E-mail: gonzal43@msu.edu.

Richard H. Bernsten
Michigan State University, 211E Agriculture Hall, East Lansing, MI 48824, U.S.A. Office Tel (517)355-3449; Fax (517)432-1800. E-mail: bernsten@msu.edu.

Common beans (*Phaseolus vulgaris* L.) are the second most important crop in Mexico after maize, both in terms of production and consumption. During the period 1990-2000, the total area planted to common beans averaged 2.2 million hectares, harvested area averaged 1.9 million hectares, yields averaged 632 kg/ha, and total production averaged 1.2 million mt.

Approximately 85% of the country’s bean crop is grown under rainfed conditions. In 2000, Chihuahua, Durango, and Zacatecas (located in the semiarid highlands of northern México)--the most important states growing beans under rainfed conditions--accounted for 62% of the total rainfed bean area (SAGAR, 2000).

During the 1990s, the National Research Institute for Forestry, Agriculture, and Livestock (INIFAP) released several improved bean varieties (e.g., Pinto Villa, Flor de Mayo M38, Pinto Mestizo, Pinto Bayacora, Negro Altiplano, and Negro Sahuatoba) that were developed for the rainfed conditions of Mexico’s semiarid highlands—characterized by low rainfall (less than 450 mm a year), low fertility soils, and agronomic problems associated with monocropping beans (Acosta et al., 1995a; Acosta et al., 1995b; Acosta et al., 2001a; Acosta et al., 2001b; Acosta et al., 2001c; Acosta et al., 2001d).

In 1996, as one component of the Alliance for the Countryside, the Mexican government started the Kilo per Kilo program with the objective of increasing yields by promoting technical change (under irrigated as well as rainfed conditions) through the substitution of modern varieties for traditional varieties of beans and other important crops. The program delivered seed of the improved varieties to farmers at a price equivalent to commercial grain. This significant reduction in price made improved seed very affordable to farmers.

The objective of this study was to: 1) estimate farmer adoption (at the aggregate level) of INIFAP’s improved bean varieties in the states of Chihuahua, Durango, and Zacatecas, 2) assess the impact of adoption on farmers’ yields, and 3) identify factors affecting the adoption of these varieties at the farm-level, using cross-sectional data obtained from farmer surveys conducted in 2001.

During the period 1997-2001, the share of the bean area planted to improved varieties averaged 71% in Chihuahua (Pinto Villa 56%, Pinto Mestizo 15%), 42% in Durango (Pinto Villa 38%, Pinto Mestizo 4%), and 8% in Zacatecas (Negro Zacatecas).

A statistical analysis of yields indicated that the yields of improved pintos were 20.6 percent higher than the yields of traditional pintos. However, for the other market classes (black and light-colored beans), there were no statistically significant differences (5% level) between the yields of improved and traditional varieties.

To identify factors associated with adoption of improved varieties, the farmers surveyed in the spring-summer 2001 season were divided into two groups: adopters and non-adopters.
Adopters accounted for 67 percent and non-adopters for 33 percent of the farmers surveyed in northern México. When comparing adopters versus non-adopters, statistical analysis indicated no significant differences in production costs, credit, tied-ridge ownership, off-farm employment, farm size, bean area, soil quality, and travel time to the nearest market. In addition, there were few significant differences in age, experience, education, land tenure, soil preparation method, planting dates, cultural practices, quantities and months of bean storage, and for farm location (distance to nearest city). The analysis of selling price by market class shows that in general, light color beans commanded the highest prices, followed by pintos and black beans. However, there were few significant differences between adopters and non-adopters regarding market prices.

The most important difference between adopters and non-adopters was participation/non-participation in the government's seed distribution program, Kilo per Kilo. In 2001, program participation explained adoption in 37% of the cases and non-participation in the program explained non-adoption in 43% of the cases, totaling 80% of the cases. The remaining 20% of the farmers were adopters who did not participate in the program in 2001, but they got seed of an improved variety directly or indirectly from the program in previous years.

The surveyed adopters were asked their perceptions regarding the advantages of improved varieties, compared to traditional varieties. Analysis of the data indicated that the most salient varietal characteristics that influenced farmers' decision to adopt improved varieties were better consumption quality, market acceptance, fewer days to maturity (which is related to drought resistance and frost evasion), and higher yields.

The study has important implications for extension services, research administrators, and government officers, regarding farmer adoption of improved bean varieties. Extension services need to provide farmers training on the appropriate management practices required to preserve seed quality from season-to-season, so the Kilo per Kilo program doesn't have to provide seed to the same farmers every year and thereby benefit more farmers. Research administrators need to continue to continue to give high priority to developing improved pinto varieties and greater priority to developing improved varieties in other market classes—especially black beans. Finally, given the highly positive impact of the Kilo per Kilo program on farmer adoption, the government need to continue to support this innovative initiative in order to insure that farmers continue to have access to newly-released improved varieties.

References: