Iowa Producers' Adoption of Bio-Engineered Varieties: Lessons for California

by Corinne Alexander, Jorge Fernandez-Cornejo and Rachael E. Goodhue

The rapid emergence of genetic engineering and associated techniques, popularly referred to as biotechnology, has led to much public debate over the value and safety of these technologies, particularly in food production. This debate resonates in California, home to consumers, food producers and biotechnology innovators. While useful bio-engineered traits are still largely unavailable for major California crops, we attempt to identify the factors likely to influence the use of such traits by California producers, when they do become available, by examining the decisions of Iowa corn and soybean producers, who already have access to a number of specialized traits. The two most commonly planted genetically modified (GM) crops are Roundup Ready soybeans which is resistant to the Roundup herbicide, giving producers access to an inexpensive, effective, broad spectrum herbicide, and Bt corn, which is genetically modified to produce an insecticidal protein that kills the European corn borer, providing more complete protection than chemical insecticides.

As part of an ongoing project on understanding corn producers' adoption of hybrids with specialized quality traits and specialized production traits, we conducted interviews, focus groups and a survey with Iowa corn producers during 1999 - 2000 in cooperation with the Iowa Farm Bureau Federation. We conducted seven interviews and one focus group with producers in south central Iowa and two focus groups with producers in north central Iowa. We also conducted a survey of 1,000 Iowa Farm Bureau members, and received 389 usable responses.

One purpose of this work was to gain a sense of the forces affecting spring 2000 planting decisions. In our discussions we found three factors that appeared to especially influence planting decisions in 2000: first, low grain prices and other financial difficulties in the farm sector; second, previous experiences with specialized traits, such as Bt corn; and third, anticipated market opportunities. Planting decisions appear to vary by area and crop. For output traits, farmers in the different areas have different marketing opportunities for specialty crops, such as food grade corn and tofu soybeans. For input traits, different areas have different expected yields, which affects the benefit of Bt corn, among other traits.

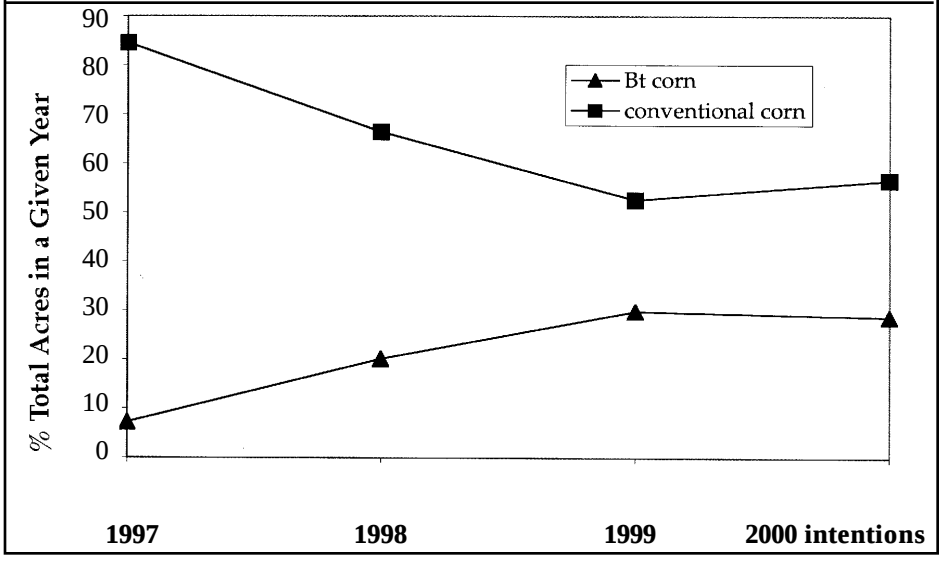
Previous Experience with Specialized Traits

Producers' previous experience with specialized traits played an important role in their plans for 2000. These experiences varied by trait and, to some extent, by area.

Roundup Ready soybeans appear to be the most widely used, most successful product. In our southern Iowa focus group, all participants planted 100 percent Roundup Ready soybeans in 1999. While this was the highest rate of use, producers in other areas also utilized Roundup Ready soybeans extensively.

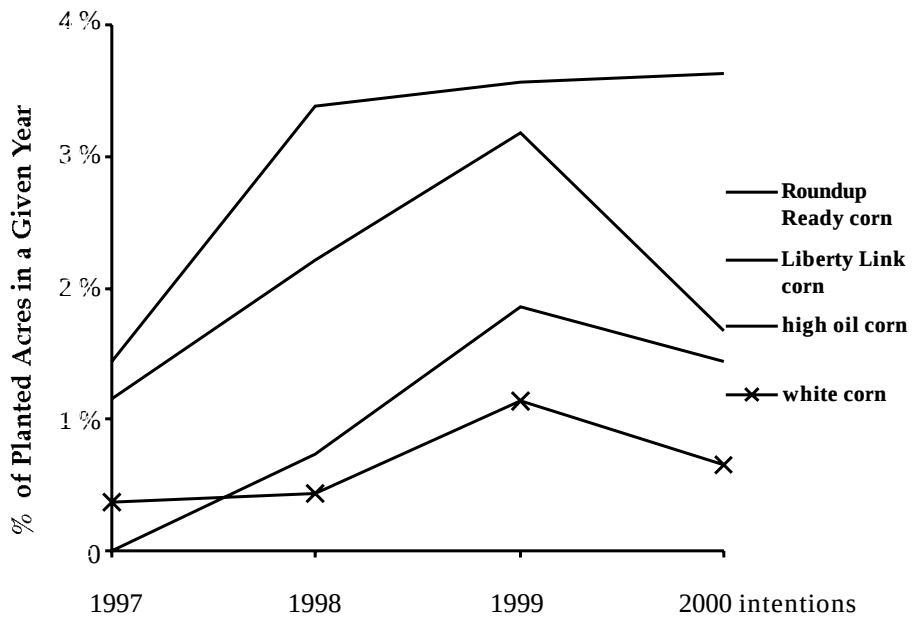
GMO's—*continued on page 6*

Figure 1. Percent of Total Acreage Planted to Bt Corn and Conventional Corn: 1997 - 2000 Planting Intentions



GMO's—*continued from page 5*

Figure 2. Percent of Total Corn Acreage in Herbicide Tolerant Corn and Specialized Corn: 1997 - 2000 Planting Intentions



Very few producers anticipated reducing their use of Roundup Ready soybeans for 2000. A number of reasons for its popularity were offered, most of which centered on the relative cheapness, the simplicity of the weed management program and the effectiveness of the weed control.

"I plant 100% Roundup beans. That's got to be the best program out there."

"Well, the cost is a big thing, too. It's simple, so simple."

"Look at if from the safety standpoint of the producer. We're either spraying Roundup, which is not nearly as lethal as a lot of the other chemicals…and once Roundup hits the ground, it's done. So, from the safety standpoint, it's a win-win situation for everyone."

Producers had a mixed experience with Bt corn. For some it performed very well and was their best corn. For others, it was consistently their worst performing corn.

"I had some Bt this year. It was my best corn."

"I like to plant an early corn and it doesn't stand up well, but the Bt of the same variety stands up well."

"'97 and '98, both years there was a lot of stalk rot in the Bt corn. It didn't matter what company or what the number was."

In general, focus group participants viewed Bt corn as insurance against corn borers. Corn borer infestations have been light the past two years, so many feel that planting Bt has not paid off. Others still view it as a reasonably cheap option. Some people are planning to reduce the percentage of Bt corn planted, in part due to the lack of a perceived benefit, in part due to the higher seed expense and in some cases in part due to concern over finding buyers. Other farmers in southern Iowa said that they were reducing their Bt acreage because the most promising new hybrids didn't contain the gene.

"Ever since the Bt technology, it's just taken the worry out of it. I think it's very cheap insurance."

"We're in a low pressure time and it came right after [Bt] was introduced. For the first two years, everybody wanted it. You can make a case for it but just barely and last year was worse."

"I reduced [my acreage in Bt because] I don't think it's paying its way as far as the corn borer part of it."

Overall, our focus group findings did not establish a distinct trend regarding the use of GM seed. For corn, most intend to continue using genetically modified organisms (GMO's) unless a premium emerges for non-GMO's. For soybeans, very few plan to reduce their use of GMO's. Even so, some plan to delay their final seed decision, in order to see the effects of the GMO controversy. Unless there is a significant development before planting season, the net effect on hybrid choices and acreage allocation is likely to be relatively small.

"I purchased all non-Bt because I figured if I wanted Bt, I could always get it later. But the non-Bt, I thought might be kind of scarce."

"I'd like to see if they're going to pay a premium for this non-GMO."

Farmers' adoption of output traits varied by area, based on market opportunities. Farmers in our northern Iowa focus groups either never planted specialized corn or no longer do so, since transportation costs are too high to allow them to compete with central Iowa farmers. Some do plant specialized soybeans, including tofu beans and seed beans. Farmers in our southern Iowa group had more experience with specialty traits. They noted that specialty premiums tended to decline over time, and specifically cited high oil corn and white corn as examples.

"[High oil] kind of varies from year to year, I think, on how you contract. Contracts are really spotty. Same way on the white corn."

"Everybody talks about added value and the added value erodes after the first season. It's been that way, it's a proven track record. They've trained us to believe that added value will not persist, so why would everybody think added value is great?"

Low Commodity Prices

Producers said that they were very concerned about low commodity prices and financial difficulties for the 2000 production year. Particularly in the southern Iowa focus group, low prices were significantly altering farmers' production decisions for 2000 relative to 1999. For instance, one farmer plans to keep his variable input costs below $50 / acre.

"If we grow as good a crop next year as we have the last two years nationwide, it will go from a serious problem to a critical problem and we'll be back into headaches similar to what we experienced in '84 to '86."

"I really think it's going to be worse [than '84 to '86] because the inputs are so much higher than they were back then. The only difference that's in our court is that the interest rates are low."

"If it weren't for these government checks, we'd be gone now."

Lessons for California

Clearly, there are significant differences between the producers we examined and most California producers. Government commodity programs are far more significant to Iowa producers than to California producers. Iowa producers have a smaller number of viable alternative crops. On the other hand, there are common factors. California has also suffered from low prices for major commodities in recent years. Producers' acreage allocation decisions are strongly influenced by market opportunities for different crops. Due to the importance of microclimate considerations, California producers are likely to weigh previous experience with a given crop even more heavily than Iowa producers.

Overall, California producers will weigh the costs and benefits of producing GM crops in a similar fashion. As in Iowa, economic conditions in the agricultural sector and previous experience with specialized traits will likely play an important role. Relative to Iowa, however, market opportunities likely will dominate these factors for California producers. Relative to midwestern producers, California producers generally have much closer contact with the buyers and ultimate users of their crops. This should facilitate pre-planting coordination and reduce uncertainty. Producers already customize production based on buyer requirements. These factors, coupled with the later introduction of GM varieties into California agriculture, suggest that California producers' adoption or non-adoption of GM varieties will be in response to customer demand. If buyers are unwilling to purchase GM varieties, producers are unlikely to plant them.

Corinne Alexander, is a Ph.D. candidate in the Department of Agricultural and Resource Economics at UC Davis. Her interests include the role of information and risk in producer decisions, industrial organization and agricultural contracts. Corinne can be reached by e-mail at: corinne@primal.ucdavis.edu, or by telephone at (530)752-6770. Jorge Fernandez-Cornejo is an economist at the Resource Economics Division of the Economic Research Service, USDA. His areas of interest include pest management, technology adoption and agricultural biotechnology. He can be contacted by e-mail at:jorgef@ers.usda.gov or by phone at: (202)694-5537. Rachael E. Goodhue is an assistant professor in the ARE department at UC Davis with interests in agricultural marketing and organization; environmental, natural resource and agricultural policy and regulation; property rights and natural resources; biotechnology; market learning; and industrial organization. Rachael can be reached by e-mail at: goodhue@primal.ucdavis.edu, or by telephone at (530)754-7812.