AUGUST 2002
ISSUE 76

AgBiotech
INFOSOURCE

PUBLISHED BY SABIC: SASKATCHEWAN AGRICULTURAL BIOTECHNOLOGY INFORMATION CENTRE
A SERVICE OF AG-WEST BIOTECH INC.

GM crops and the bottom line

One of the criticisms of biotechnology is that it delivers benefits only to the companies that produce genetically modified (GM) seed and the pesticides used with them.

Farmers, also benefit from the technology, judging by the way they have embraced it. Since their introduction in the mid-1990s, GM crops have become the most rapidly embraced agricultural technology in North America. According to estimates, about 70 per cent of Canadian canola, 35 per cent of corn and 30 per cent of soybeans are now genetically modified. South of the border, about 75 per cent of the American soybean crop is now GM, along with 70 per cent of cotton and 30 per cent of field corn.

According to the International Service for the Acquisition of Agri-biotech Applications, GM crops worldwide surpassed an important milestone of 50 million hectares in 2001. These crops were planted on 52.6 million hectares by 5.5 million farmers in 13 different countries - a 19 per cent increase from the previous year.

Profit at the farm gate

By far, the two most common traits that have been engineered into crop plants are herbicide resistance and insect resistance. Have these innovations made it easier for farmers to make a living?

A 2000 study by the Canola Council of Canada compared GM canola with conventional varieties to find the answer to this question. The study factored in the cost of seed, fertilizer, and herbicides. The cost of technology use agreements (TUA) that govern the use of some transgenic varieties was also considered.

In the study, transgenic varieties yielded slightly better, and had lower dockage than conventional varieties. Dockage is when the price is lowered due to weed seeds or other undesirable debris in a grain shipment.

Conventional canola also needed more pesticide and more tillage. Pesticide costs alone were about 40 per cent higher than for GM varieties. Canadian farmers growing these GM varieties eliminated six million kilograms (13.2 million pounds) of pesticide by using the technology.

The bottom line for Canadian canola growers was another $26.24 per hectare ($10.62 per acre) in their pockets after expenses when GM varieties were grown.

A 2002 study by the National Centre for Food and Agricultural Policy in the United States gave similar results. In the U.S., GM crops have increased farm gate receipts by $3.9 billion (U.S. $2.5 billion) in the U.S. This number was based on 40 case studies covering 27 different crops. In some cases, the study's authors reported that biotechnology

offered the only effective way of combating crop pests and diseases.

Benefits for the consumer

So far, the best that GM crop manufacturers have been able to offer the consumer is that they are no better - and no worse - than conventional or organic crops. This may change, as new crops that deliver heart healthy oils, more nutrients, or better taste and freshness come to market. The most well known example is Golden Rice, which is genetically engineered to be a source of vitamin A. Vitamin A deficiency is a serious problem in the developing world, where it causes blindness in millions of children for whom rice is a staple part of their diet.

But what's in it for the consumer right now? While there are few direct advantages currently, there are indirect benefits.

Easing agriculture's impact

Crops like canola and soybean have been engineered to resist broad-spectrum herbicides like Roundup or Liberty. This means farmers can reduce the number of chemicals needed to control weeds. Also, these products are regarded as more environmentally benign than older products.

Broad-spectrum herbicide and herbicide-resistant crop combinations make it easier to practice zero-till or minimum-till farming. By seeding directly into the stubble of last year's crop, farmers can conserve soil moisture, prevent erosion, and reduce greenhouse gas emissions caused by cultivation.

Another technology builds insect resistance right into plants to allow them to fight off pests on their own. These crops use a gene from the soil bacterium, *Bacillus thuringiensis* (Bt), to manufacture their own built-in insecticide. Bt corn has proven very effective against European corn borer, a tough-to-control pest. These crops also reduce the amount of pesticides needed. This is particularly dramatic with Bt cotton, a crop that has in the past required heavy pesticide use to control insects. Using Bt varieties, farmers have been able to reduce or even eliminate pesticide spraying.

No silver bullet

Genetic modification, on its own, is not a "silver bullet." Farmers strive to be profitable while supplying us with high-quality, inexpensive, and abundant food choices. For them, GM crops are just one piece of the puzzle - another tool in the toolbox. Currently available GM varieties offer choices in terms of pest control that can

- reduce the number of pesticide applications required
- reduce the total amount of pesticide required
- use pesticide products with less toxicity to the applicator and lower impact on the environment

One farmer at a recent presentation to the National Agricultural Biotechnology Council went so far as to say that GM crops helped him to be a better husband and father because they saved him time.

As research continues, consumers will see more direct benefits in terms of added nutritional content to their foods and reduced processing of the commodities to produce consumer goods. Stay tuned!

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InfoSource is produced by Ag-West Biotech Inc. with funding provided by Saskatchewan Agriculture, Food and Rural Revitalization.