IMPACT OF TRANSGENIC CANOLA on Growers, Industry and Environment

Western Canadian growers have rapidly adopted transgenic canola varieties since their introduction in 1995. In 2000, over 80% of growers chose transgenic varieties and planted them on approximately 55% of the 12 million canola acres. In 2004, 70% of the canola planted was transgenic.

The impact of the transgenic canola on growers and the industry has not been previously documented independently. To address this issue, the canola industry commissioned a study to qualify and quantify the agronomic and economic impacts of transgenic canola.

The study, "An Agronomic and Economic Assessment of Transgenic Canola", was conducted by Serecon Consulting and Koch Paul Associates with guidance from the Canola Council of Canada, growers from Alberta, Manitoba and Saskatchewan and several representatives of the canola and biotechnology industry.

How the study was done

The transgenic varieties included in this study were those developed using biotechnology and included RoundUp Ready (tolerant to the herbicide glyphosate), Liberty Link (tolerant to the herbicide Liberty) and the InVigor varieties (hybrids that are tolerant to the Liberty herbicide). The SMART varieties, now called Clearfield, were not included as they are not transgenic. Conventional varieties were all those that are not transgenic and are not part of a herbicide tolerant system. Six hundred and fifty growers in western Canada were surveyed on their attitudes, production practices and production costs. One half of the growers answered questions on their transgenic canola fields, while the other half answered questions on their conventional canola fields. In addition, 13 case studies were conducted with growers who grew both transgenic and conventional varieties and could provide detailed information on their production and costs from 1997-2000.

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Growers' reasons for growing transgenic canola

Weed management tops the list

Growers chose transgenic varieties for several reasons. The key benefit and motivator to adopting transgenics was more efficient weed control and ease of herbicide management in preventing weed resistance. Other reasons, related to weed management, included cleaning up their fields, reducing the number of passes to control weeds and perennial weed control. Transgenic growers reported that, due to the ability to control weeds in fields where they would not have grown canola, their rotations were more flexible. Some producers reported better yields, higher returns, the ability to reduce costs and generate more profit. Other reasons for choosing transgenic varieties were to reduce tillage, seed earlier, conserve moisture and to compare transgenic varieties to conventional canola on a trial basis.

Reasons growers choose transgenic:

- 50% - easier and better weed control in general
- 19% - better yield, better return, more profit
- 18% - for grassy weed control specifically
- 15% - for broadleaf weed control specifically
- 10% - reduce costs
- 9% - trial basis to compare to conventional varieties
- 7% - to clean up fields

Growers' reasons for not growing transgenic canola

Cost is the major concern

Growers mentioned a variety of reasons for not choosing transgenics. The most common were cost related, including the Technology Use Agreement (TUA) for RoundUp Ready varieties and the overall costs of the transgenic systems. Growers were also concerned with market access for their crop, weed resistance and health related issues.

Reasons growers do not choose transgenics:

- 19% - cost of the TUA
- 18% - overall cost
- 16% - concerned with market access
- 12% - no need to change
- 11% - concerned with weed resistance
- 9% - worried about health concerns

Weed management

Benefits in weed management

Over 80% of transgenic growers said that weed control was more effective and 59% said herbicide management to delay weed resistance was easier. In terms of managing volunteer canola, 76% of transgenic growers said it was the same or easier compared to conventional canola.

Yield dockage and grade

Yield is up and dockage down

On average, transgenic systems resulted in a 3 bu/ acre or 10% yield advantage over conventional varieties in 2000. Several factors that affect yield could be responsible for this increase, including: higher yielding varieties, early seeding and better weed control. Earlier seeding conserves soil moisture, produces more competitive plants and allows the crop to avoid high summer temperatures which are detrimental to flower and pod development.

Dockage was significantly reduced in the transgenic samples. Transgenic growers reported 3.87% dockage compared to conventional growers at 5.14%. This difference is largely attributed to more effective weed control. There was no difference in grade between the two systems.

Tillage and summerfallow

Less tillage and summerfallow benefits soil conservation

Growers use tillage to control weeds and prepare the soil for planting. Excessive tillage can cause soil structure changes, increase the susceptibility to soil erosion and reduce soil moisture.

Since the early 1990's, growers have been reducing their tillage operations for soil conservation benefits and the number of growers practicing direct-seeding or zero tillage has increased. Prior to the introduction of transgenic canola varieties, canola growers used tillage for weed control or incorporating herbicides prior to seeding a crop. With transgenic herbicide tolerant varieties, weed control can be done "in crop" allowing producers to direct-seed without pre-seeding tillage and thereby reaping soil conservation benefits. Transgenic growers are able to seed earlier in the spring, or in the fall, therefore realizing benefits from soil moisture.

The study showed that transgenic growers reduced the number of tillage operations compared to conventional growers. Half of transgenic growers practiced direct-seeding (50% transgenic compared to 35% conventional) and 26% said their use of conservation or no-till practices has increased due to planting transgenics. This equates to an additional 2.6 million acres of canola with fewer tillage operations.

Summerfallow is used by growers to conserve soil moisture. This can leave the soil exposed to erosion and cultivation for weed control can damage soil texture and reduce organic matter. Conventional growers are more likely to use summerfallow in their rotations (36% had summerfallow in 2000 compared to 18% of the transgenic growers).

Fuel consumption

Fuel savings of 31.2 million litres in one year

Overall, the transgenic growers used less fuel due to fewer field operations (tillage, harrowing, fertilizing, less summerfallow). Fuel saved by transgenic growers varied from 9.5 million litres in 1997 to 31.2 million litres in 2000. This equates to $13.1 million saved based on a June 2000 average farm fuel price of 42 cents/litre.

Fertilizer

Slight increase in fertilizer useage

Growers reported using slightly more fertilizer for transgenic canola. This translated into a higher cost ($1.72) compared to conventional. However, twice as many conventional growers used summerfallow in the year before their canola crop (18% of transgenics used summerfallow compared to 36% of conventional). As would be expected, fertilizer inputs for canola seeded on stubble were substantially higher for both systems, as compared to those areas that were previously in summerfallow and subsequently planted to canola.

Herbicides

Less herbicide used

Transgenic growers used less herbicide than conventional growers. The total amount of herbicide used (formulated product) from 1997 to 2000 was calculated using the grower reported herbicide applications and the acres of transgenic varieties grown. The total amount of herbicide reduction varies from 1500 tonnes in 1997 to 6000 tonnes in each of 1999 and 2000.

Herbicide costs for transgenic growers were 40% lower than for conventional growers, even though the average number of herbicide applications for the transgenic growers was slightly higher (2.13 applications) than the conventional growers (1.78 applications). This difference is largely due to more frequent glyphosate applications by the transgenic growers and increased cultivation to control weeds by the conventional growers. Conventional growers used more soil incorporated herbicides.

Impact on the industry

Increased grower revenue of $5.80/acre

Growers reported an average $5.80/acre increase in net return on their transgenic acres (revenue less all input costs, labour, etc.) compared to conventional acres in 2000. The economic model developed for the study calculated a $10.62 profit advantage (gross revenue less specific input costs considered in the analysis). Revenue was higher for transgenic growers due to a higher yield and less dockage. In addition, herbicide and tillage costs were lower while seed, fertilizer and the cost of the Technology Use Agreement was higher for transgenics. While conventional canola production had lower seed and fertilizer costs, the cost for herbicides, field operations, scouting and other services were higher.

The direct economic impact to growers of the adoption of transgenic canola from 1997 to 2000 is within the range of $144 and $249 million, varying between the farmer-based estimate and the value determined by the economic model.

Indirect value to the industry up to $215 million

When a technology like transgenic canola is adopted, it can impact the whole community (examples include- added investment in canola crushing capacity, impacts on local seed, herbicide and equipment industry investments and development, added shipping, handling, marketing, etc.) The total indirect impact for the 1997 to 2000 period is estimated to range between $58 and $215 million.

The total value to the industry, including both direct revenue to the growers and the indirect value, is up to $464 million, cumulative from 1997-2000.

Price of canola

Canola prices not closely related to canola production

Transgenic growers increased their acres of canola, resulting in increased canola production. The study looked at trends in canola prices and production from 1982 to 2000 to determine if Canadian production and price were related. No significant relationship was found. In addition, when canola was compared to other commodity prices and production, trends between commodities and prices were similar, with soybeans being the most similar to canola.

Long term impacts of transgenic canola on canola prices and export markets were not included in this study.

See the full report on the Canola Coucil of Canada website at:

www.canola-council.org/manual/gmo/gmo_main.htm

Reprinted May 2005

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