Agricultural Biotechnology Market Status

Fall 1999 Harvest/
Year 2000 Biotechnology
Market Factors

Key Points

- **There's a Market for Biotech Crops**
- **Biotech Crops are Regulated and Safe**
- **Biotech Crops add Value**

There's a Market for Biotech Crops

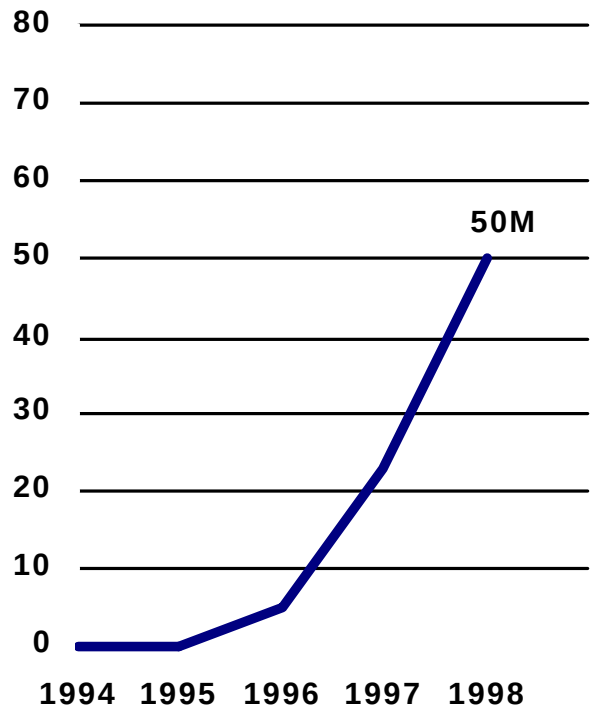
Rapid Adoption of Biotech Crops

Global Area of Major Biotech Crops
in Millions of Acres

Crop	1996	1997	1998
Soybean	1.3	12.2	35.5
Corn	.7	7.8	20.3
Cotton	1.9	3.4	6.2
Canola	.3	2.9	5.9
Potato	<.1	<.1	<.1

U.S. 1999 Projected Biotech Acres: 70+ million

U.S. Biotech Crops
in Millions of Acres



SOURCE: Clive James I.S.A.A., 1998

There's a Market for Biotech Crops

- 27% of 1999 U.S. corn acreage planted with biotech seed products
- 54% of 1999 U.S. soybean acreage planted with biotech seed products
- Multiple international markets planting biotech seed products

Sources: NCGA/ASA

There's a Market for Biotech Crops

- Strong Support Base in U.S.
  - U.S. Government
  - Grower industry
  - Biotech/Seed industry
  - Feed industry
  - Food industry

Food/Feed Industry Support

- **National Food Processors Association**

"Modern food biotechnology is extremely important in devising new ways to increase food production, improve nutrient content, and provide foods with better processing and storage characteristics," **Dr. Jeff Barach, Vice President Special Projects for NFPA**

- **National Chicken Council**

"A sudden and dramatic refusal to utilize biotech feed ingredients could have a disastrous economic effect on the family farmers who have chosen to plant biotech crops.Chicken companies have no interest in plunging the farm economy into greater crisis."

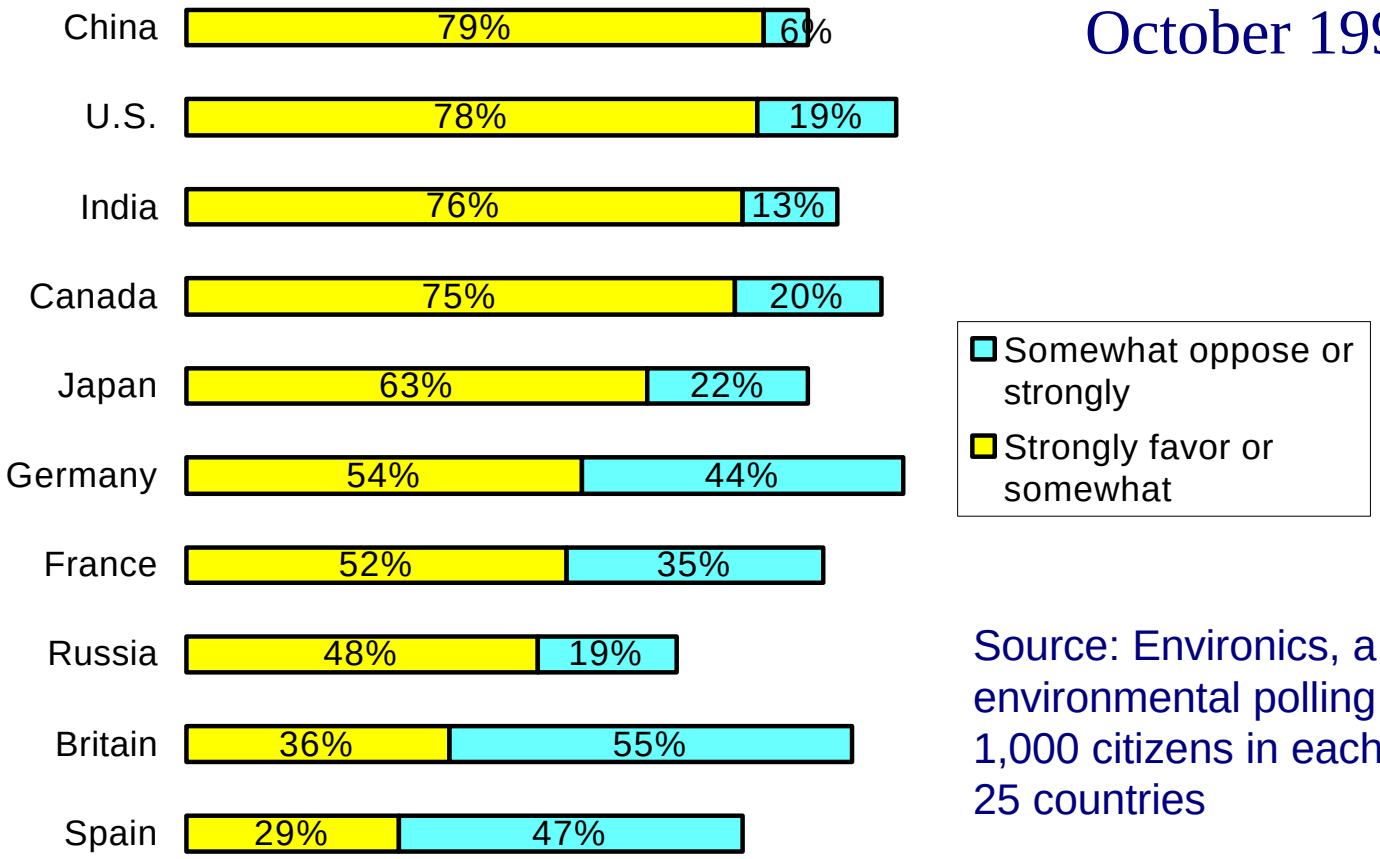
Statement from NCC Board of Directors, October 6, 1999

Factors Influencing Biotech Acceptance: Europe vs. US

	US	Europe
Government Structure	National, Science-based Regulatory System: FDA, EPA, USDA	No FDA-type agency 15 countries - different cultures
Credible Sources on Food Safety	Health professionals, scientists, FDA (AMA, ADA support biotechnology)	Environmental Activists Governments have low credibility
Media	Fairly balanced	Competitive, tabloid-like dailies
Technology	Optimistic, more accepting	Conservative

Global Consumer Poll on Ag Biotechnology

Do you favor or oppose the use of biotechnology to grow pest-resistant crops that require less farm chemicals?



October 1999

Source: Environics, a public environmental polling firm
1,000 citizens in each of 25 countries

Not Shown: Neutral, Don't Know

Trivia: Who said this?

"This corn is going to kill agriculture."

- French Farmers about hybrid corn introduction in France in 1950
- Hybrid corn lagged US adoption by 20 years

There's a Market for Biotech Crops

Non-biotech specialty markets are small.

Sparks surveyed 100 elevators mid-September 1999:

- Only 10% of elevators segregating non-biotech grain
- Very few elevators are paying growers premiums for non-biotech corn & soybeans
  - 1% of elevators for corn
  - 3% of elevators for soy
- 100% accept biotech corn approved for export and 99% accept approved biotech soybeans
- No elevators surveyed were discounting or docking for biotech corn or soybeans

There's a Market for Biotech Crops

Market Indicators for 2000:

Non-biotech specialty markets will remain small.

- Potential demand for non-biotech soybeans in Japan estimated to be less than 1% of the total U.S. soybean production.*
- Traders and association sources indicate little willingness from European customers to pay a premium for non-biotech soybeans and corn.

*Based on estimates by soybean traders and ASA figures

There's a Market for Biotech Crops

Market Indicators for 2000:

- Majority of corn & soybeans again handled as commodities with biotech and non-biotech grain commingled.
- Roundup Ready soybeans and YieldGard corn fully approved for import in Europe and Japan -- NO indication of change
- US ag industry, grain handlers and government strongly supportive of biotechnology crops
- Majority of food/feed from soy and corn used in U.S.
  - » Over 70% of corn
  - » Over 50% of soybeans

US Ag Industry Supportive of Biotech

No grain companies have suggested growers move away from biotechnology

- ***"G. Allen Andreas (ADM chairman) promised that ADM would continue to handle genetically modified products…' ADM is the leader in this field and we fully expect these new products to play an increasingly important role at ADM over the coming years,' he said."*** At ADM annual meeting; reported in Decatur, Il. Herald and Review Oct. 21, 1999
- ***"Cargill, Inc… reiterated yesterday that it hasn't any plans to require that farmers segregate the crops it buys from them on the open market."*** *Wall Street Journal*, September 2, 1999.

Grower Association Positions

- *"ASA advises soybean growers to closely calculate the additional costs, as well as any potential liabilities, they may incur in certifying the delivering of non-biotech varieties. Knowing these additional costs and any potential liabilities is an important factor to be used by individual growers as they evaluate the adequacy of marketplace premiums."* American Soybean Association statement, September 3, 1999.

- *"If ADM and their processor customers are serious about segregating conventional and genetically enhanced grain, then they should be willing to pay incentives to growers and elevators in order to get it."* **National Corn Growers Association statement, September 1, 1999.**

There's a Market for Biotech Crops

- Before considering a switch to non-biotech crops, keep in mind the following:
  - Be sure to secure an up-front agreement or contract for premiums.
  - Evaluate the lost value from the economic benefits of Roundup Ready® soybeans and YieldGard® corn.
  - Account for the requirements to deliver premium non-biotech crops, (i.e. segregation costs, certification and testing, etc.)

Biotech Crops are Safe

Biotech Crops are Safe

In the United States...

- USDA: Regulates the plant.
- FDA: Regulates food and feed safety.
- EPA: Regulates plant protection products and traits.

FDA Regulates Food, Feed Safety

- *"From the standpoint of the Food and Drug Administration, the important thing for consumers to know about these new foods is that they will be every bit as safe as the foods now on store shelves. All foods, whether traditionally bred or genetically engineered, must meet the provisions of the Federal Food, Drug, and Cosmetic Act."*
  - **FDA Consumer magazine article: "Genetic Engineering Fast Forwarding to the Future Foods."** Published April 1995 and revised February 1998.

Worldwide Regulatory Biotechnology Approvals

34+ approvals in the United States

30+ approvals in Canada

20+ approvals in Japan

12 approvals in the European Union

3 approvals in Mexico

3 approvals in Argentina

3 approvals in Australia

1 approval in Brazil*

1 approval in **CIS**

Biotech Crops are Safe

- **Roundup Ready soybeans** and **YieldGard corn *have worldwide export approval*.**
  - Including Europe, Japan, Argentina and Canada
  - These products can enter commodity markets for import by other countries.

Biotech Crops are Safe

- **Roundup Ready corn has gone through rigorous testing to achieve full regulatory clearance in the United States and Canada**
  - Safe for food and feed consumption.
  - Nutritionally and compositionally equivalent to conventional corn
- **Because Roundup Ready corn is still awaiting import approval in the EU, it must be channeled to domestic markets.**

Biotech Crops are Safe

- Studies demonstrated the safety of biotech corn and soy products - validated by national and international regulatory systems:
  - → The safety of the newly introduced protein(s).
  - → The genetic modification has not changed the food, feed or environmental safety of corn/soy plants.

General Safety Assessment Approach

Goal: new varieties / food must be as safe as today's varieties / foods

Multi-disciplinary approach: agronomic and quality characteristics, genetic, biochemical, nutritional analyses

Food Safety

- **Nutritional and toxicological equivalence (substantial equivalence) to commercial varieties**
  - key nutrients
  - key anti-nutrients / toxicants
  - new trait(s) / component(s)
  - intended uses / consumption
- **Safety of the expressed protein(s)**
  - identity
  - structure / function
  - dietary exposure / nutrition
  - digestibility / toxicity
  - source / allergenicity (ILSI/IFBC)

Environmental Impact Assessment

- Weediness
- Susceptibility to insects and disease
- Potential impact on non-target organisms
- Outcrossing and its potential impact
- Special consideration for centers of origin
- Resistance management

Biotechnology and Food Safety, FAO Food and Nutrition Paper 61, 1996
Report of a Joint FAO/WHO Expert Consultation

Biotech Crops are Safe

- Beyond the safety determination, many comprehensive feed performance studies have confirmed that biotech corn and soy products are nutritionally equivalent and perform comparably to conventional varieties of livestock feed.