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INTERNATIONAL SERVICE FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS

EXECUTIVE SUMMARY

PREVIEW

Global Status of Commercialized Biotech/GM Crops: 2004

by

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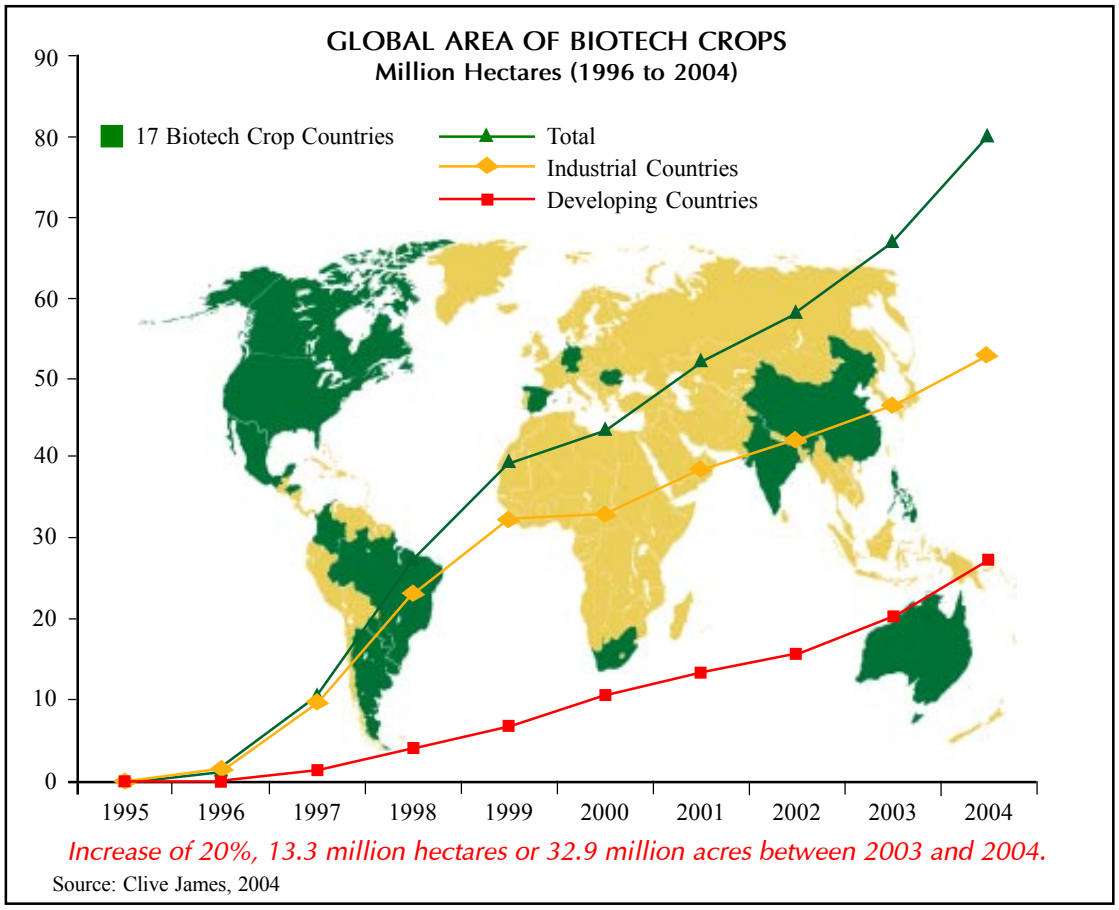
Chair, ISAAA Board of Directors



Increase of 20%, 13.3 million hectares or 32.9 million acres between 2003 and 2004.

Source: Clive James, 2004

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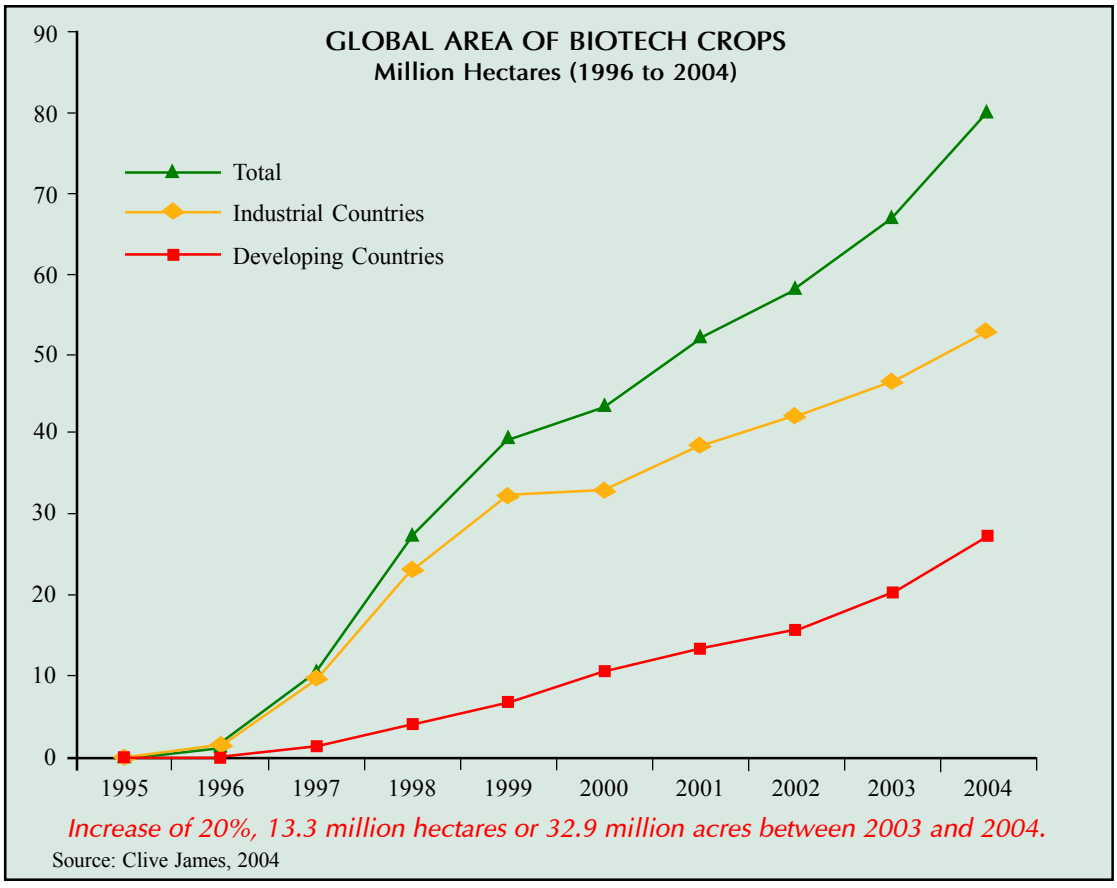
GLOBAL STATUS OF COMMERCIALIZED BIOTECH/GM CROPS: 2004

Global Status of Biotech Crops in 2004

- 2004 is the penultimate year of the first decade of the commercialization of genetically modified (GM) or transgenic crops, now often called biotech crops, as referred to consistently in this Brief. In 2004, the global area of biotech crops continued to grow for the ninth consecutive year at a sustained double-digit growth rate of 20%, compared with 15% in 2003. The estimated global area of approved biotech crops for 2004 was 81.0 million hectares, equivalent to 200 million acres, up from 67.7 million hectares or 167 million acres in 2003. Biotech crops were grown by approximately 8.25 million farmers in 17 countries in 2004, up from 7 million farmers in 18 countries in 2003. Notably, 90% of the beneficiary farmers were resource-poor farmers from developing countries, whose increased incomes from biotech crops contributed to the alleviation of poverty. The increase in biotech crop area between 2003 and 2004, of 13.3 million hectares or 32.9 million acres, is the second highest on record. In 2004, there were fourteen biotech mega-countries (compared with ten in 2003), growing 50,000 hectares or more, 9 developing countries and 5 industrial countries; they were, in order of hectarage, USA, Argentina, Canada, Brazil, China, Paraguay, India, South Africa, Uruguay, Australia, Romania, Mexico, Spain and the Philippines. During the period 1996-2004, the accumulated global biotech crop area was 385 million hectares or 951 million acres, equivalent to 40% of the total land area of the USA or China, or 15 times the total land area of the UK. The continuing rapid adoption of biotech crops reflects the substantial improvements in productivity, the environment, economics, health and social benefits realized by both large and small farmers, consumers and society in both industrial and developing countries.



- During the nine-year period 1996 to 2004, global area of biotech crops increased more than 47 fold, from 1.7 million hectares in 1996 to 81.0 million hectares in 2004, with an increasing proportion grown by developing countries. More than one-third (34%) of the global biotech crop area of 81 million hectares in 2004, equivalent to 27.6 million hectares, was grown in developing countries where growth continued to be strong. It is noteworthy that the absolute growth in biotech crop area between 2003 and 2004 was, for the first time, higher for developing countries (7.2 million hectares) than for industrial countries (6.1 million hectares), with the percentage growth almost three times as high (35%) in the developing countries of the South, compared with the industrial countries of the North (13%). The increased hectarage and impact of the five principal developing countries* (China, India, Argentina, Brazil and South Africa) growing biotech crops is an important trend with implications for the future adoption and acceptance of biotech crops worldwide; see full Brief for biotech crop overviews for each of the five countries. In 2004, the number of developing countries growing biotech crops (11) was almost double the number of industrial countries (6) adopting biotech crops.

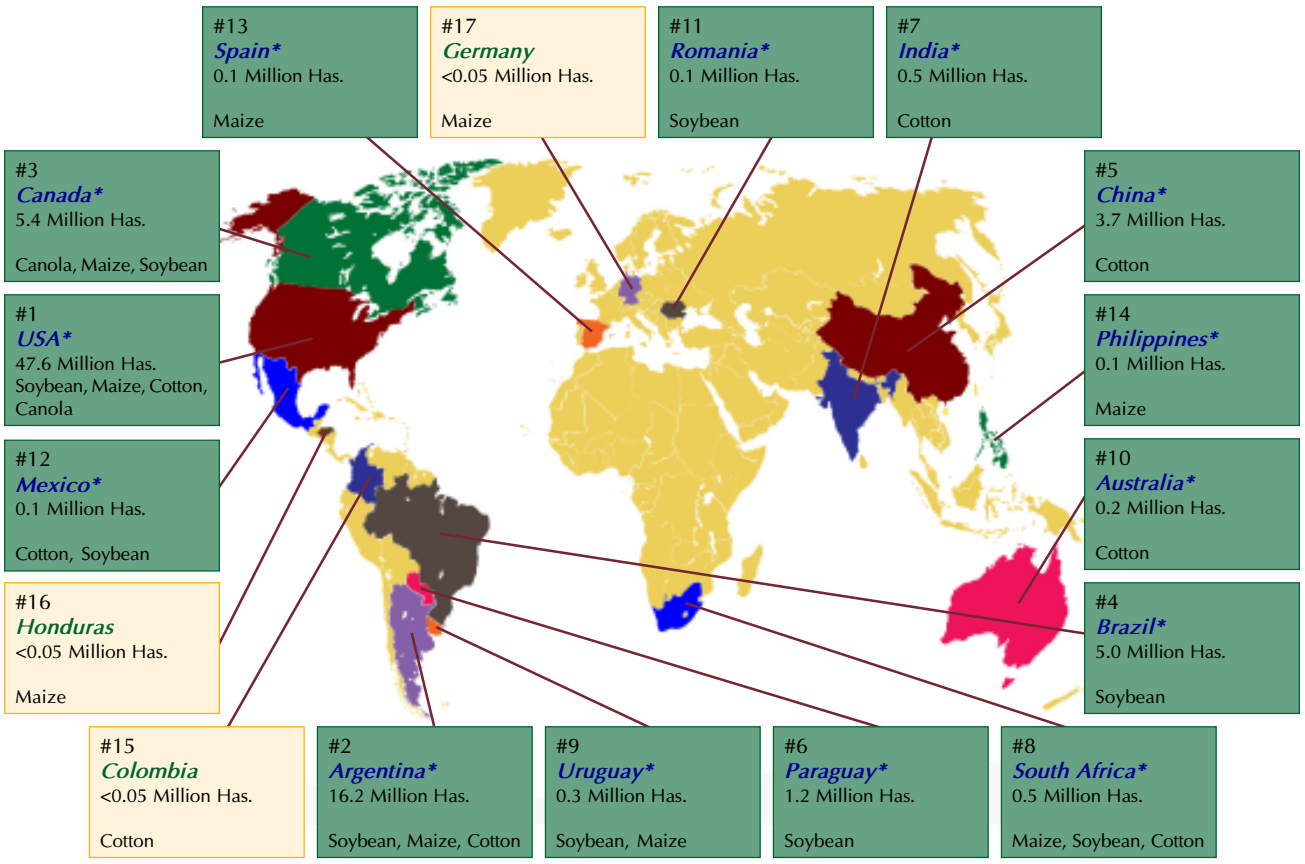
Biotech Crop Area by Country, Crop and Trait

- Countries that grow 50,000 hectares, or more, of biotech crops are classified as biotech mega-countries. In 2004, there were 14 mega-countries, compared with 10 in 2003, with Paraguay, Spain, Mexico and the Philippines joining the mega-country group for the first time in 2004. This 40% increase in the number of mega-countries reflects a more balanced and stabilized participation of a broader group of countries adopting biotech crops. The 14 mega-countries, in descending order of hectarage of biotech crops, were: USA with 47.6 million hectares (59% of global total), followed by Argentina with 16.2 million hectares (20%), Canada 5.4 million hectares (6%), Brazil 5.0 million hectares (6%), China 3.7 million hectares (5%), Paraguay with 1.2 million hectares (2%) reporting biotech crops for the first time in 2004, India 0.5 million hectares ((1%), South Africa 0.5 million hectares (1%), Uruguay 0.3 million hectares (<1%), Australia 0.2 million hectares (<1%), Romania 0.1 million hectares (<1%), Mexico 0.1 million hectares (<1%), Spain 0.1 million hectares (<1%), and the Philippines 0.1 million hectares (<1%).

- Based on annual percentage growth in area, of the eight leading biotech crop countries, India had the highest percentage year-on-year growth in 2004 with an increase of 400% in Bt cotton area over 2003, followed by Uruguay (200%), Australia (100%), Brazil (66%), China (32%), South Africa (25%), Canada (23%) Argentina (17%) and the USA at 11%. In 2004, India increased its area of approved Bt cotton, introduced only two years ago, from approximately 100,000 hectares in 2003 to 500,000 hectares in 2004 when approximately 300,000 small farmers

** Highlighted in this Executive Summary in 5 boxes with photos*

Biotech Crop Countries and Mega-Countries*, 2004



*14 biotech mega-countries growing 50,000 hectares, or more, of biotech crops.

Source: Clive James, 2004

benefited from Bt cotton. Whereas growth in Uruguay in 2004 was accentuated by a conservative 2003 adoption rate, biotech soybean now occupies >99 % of the total soybean area in Uruguay, plus a significant increase in biotech maize taking the total biotech crop area above 300,000 hectares. After suffering severe drought for the last two years, Australia increased its total cotton plantings to about 310,000 hectares of which 80%, equivalent to 250,000 hectares, were planted with biotech cotton in 2004. Brazil increased its biotech soybean area by two-thirds from 3 million hectares in 2003 to a projected conservative 5 million hectares in 2004, with another significant increase likely in 2005. China increased its Bt cotton area for the seventh consecutive year; an increase of one-third from 2.8 million hectares in 2003 to 3.7 million hectares in 2004, equivalent to 66% of the total cotton area of 5.6 million hectares in 2004, the largest national cotton hectarage planted in China since the introduction of Bt cotton in 1997. South Africa reported a 25% increase in its combined area of biotech maize, soybean and cotton to

CHINA Biotech Cotton

Population : 1,300m (1.3 billion)
% employed in agriculture : 50%
Agriculture as % of GDP : 15%
Area under biotech crops : 3.7 million hectares

Crop	National Hectarage '000 ha	Biotech Hectarage '000 ha	Biotech % of Total Area Planted
Cotton	5,600	3,700	66

0.5 million hectares in 2004; growth continued in both white maize used for food, and yellow maize used for feed, as well as strong growth in biotech soybean, up from 35% adoption in 2003 to 50% in 2004, whilst Bt cotton has stabilized at about 85% adoption. Canada increased its combined area of biotech canola, maize and soybean by 23% with a total of 5.4 million hectares with 77% of its canola hectarage planted to biotech varieties. The adoption of herbicide tolerant soybeans in Argentina, which was close to 100% in 2003, continued to climb in 2004 as total plantings of soybean increased, which along with biotech maize and cotton reached an all time high of 16.2 million hectares of biotech crops. In the USA, there was an estimated net gain of 11% of biotech crops in 2004, as a result of significant increases in the area of biotech maize, followed by biotech soybean, with modest growth in biotech cotton which started to peak in the USA in 2004 as adoption approached 80%. In 2004, for the first time, Paraguay reported 1.2 million hectares of biotech soybean, equivalent to 60% of its national soybean hectarage of 2 million hectares. Spain, the only EU country to grow a significant hectarage of a commercial biotech crop, increased its Bt maize area by over 80% from 32,000 hectares in 2003 to 58,000 hectares in 2004, equivalent to 12% of the national maize crop. In Eastern Europe, Romania, which is a biotech mega-country, growing more than 50,000 hectares of biotech soybean, also reported significant growth. Bulgaria and Indonesia did not report biotech maize and cotton, respectively in 2004 due to expiry of permits. Two countries, Mexico and the Philippines which attained the status of biotech mega-countries for the first time in 2004 reported 75,000 hectares and 52,000 hectares of biotech crops, respectively for 2004. Other countries that have only recently introduced biotech crops, such as Colombia and Honduras reported modest growth, whilst Germany planted a token hectarage of Bt maize.

- Globally, in 2004, growth continued in all four commercialized biotech crops. Biotech soybean occupied 48.4 million hectares (60% of global biotech area), up from 41.4 million hectares in 2003. Biotech maize was planted on 19.3 million hectares (23% of global biotech crop area), up substantially from 15.5 million hectares in 2003, co-sharing the highest growth rate with cotton at 25% - this follows a 25% growth rate in biotech maize in 2003 and 27% in 2002. Biotech maize is projected to have the highest percentage growth rate for the near term as maize demand increases and as more beneficial traits become available and approved. Biotech

cotton was grown on 9.0 million hectares (11% of global biotech area) compared with 7.2 million hectares in 2003. Bt cotton is expected to continue to grow in 2005 and beyond, as India and China continue to increase their hectarage and new countries introduce the crop for the first time. Biotech canola occupied 4.3 million hectares (6% of global biotech area), up from 3.6 million hectares in 2003. In 2004, 5% of the 1.5 billion hectares of all global cultivable crop land was occupied by biotech crops.

INDIA Biotech Cotton

PABLO BARTHOLOMEW

Population	:	1,000m (1 billion)
% employed in agriculture	:	67%
Agriculture as % of GDP	:	23%
Area under biotech crops	:	500,000 hectares

Crop	National Hectarage '000 ha	Biotech Hectarage '000 ha	Biotech % of Total Area Planted
Cotton	9,000	500	6

- During the nine-year period 1996 to 2004, herbicide tolerance has consistently been the dominant trait followed by insect resistance. In 2004, herbicide tolerance, deployed in soybean, maize, canola and cotton occupied 72% or 58.6 million hectares of the global biotech 81.0 million hectares, with 15.6 million hectares (19%) planted to Bt crops. Stacked genes for herbicide tolerance and insect resistance, deployed in both cotton and maize continued to grow, occupying 9% or 6.8 million hectares, up from 5.8 million hectares in 2004. The two dominant biotech crop/trait combinations in 2004 were: herbicide tolerant soybean occupying 48.4 million hectares or 60% of the global biotech area and grown in nine countries; and Bt maize, occupying 11.2 million hectares, equivalent to 14% of global biotech area and also grown in nine countries. Whereas the largest increase in Bt maize was in the USA, growth was witnessed in all other eight countries growing Bt maize. Notably, South Africa grew 155,000 hectares of Bt white maize for food in 2004, a substantial 25 fold increase from when it was first introduced in 2001. Bt/herbicide tolerant maize and cotton both increased substantially, reflecting a continuing trend for stacked genes to occupy an increasing area planted to biotech crops on a global basis.

- Another way to provide a global perspective of the adoption of biotech crops is to express the global adoption rates for the four principal biotech crops as a percentage of their respective global areas. In 2004, 56% of the 86 million hectares of soybean planted globally were biotech - up from 55% in 2003. Twenty-eight percent of the 32 million hectares of cotton were biotech crops, up from 21% last year. The area planted to biotech canola in 2004 was 19% of 23 million hectares, up from 16% in 2003. Finally, of the 140 million hectares of maize grown globally, 14% was biotech in 2004 equivalent to 19.3 million hectares, up from 11% or 15.5 million hectares in 2003. If the global areas (conventional and biotech) of these four principal biotech crops are aggregated, the total area is 284 million hectares of which 29% was biotech in 2004, up from 25% in 2003. Thus, close to 30% of the aggregate area of the four crops,

totaling over one quarter billion hectares is now biotech. The biggest increase in 2004 was a 7.0 million hectares increase in biotech soybean equivalent to a 17% year-on-year growth, followed by a 3.8 million hectare increase in biotech maize equivalent to a substantial 25% year-on-year growth, which follows a 25% year-on-year growth in 2003.

The Global Value of the Biotech Crop Market

- In 2004, the global market value of biotech crops, forecasted by Cropnosis, was $4.70 billion representing 15% of the $32.5 billion global crop protection market in 2003 and 16% of the $30 billion global commercial seed market. The market value of the global biotech crop market is based on the sale price of biotech seed plus any technology fees that apply. The accumulated global value for the nine year period 1996 to 2004, since biotech crops were first commercialized in 1996, is $24 billion. The global value of the biotech crop market is projected at more than $5 billion for 2005.

Benefits from Biotech Crops

- The experience of the first nine years, 1996 to 2004, during which a cumulative total of over 385 million hectares (951 million acres, equivalent to 40% of the total land area of the USA or China) of biotech crops were planted globally in 22 countries, has met the expectations of millions of large and small farmers in both industrial and developing countries. Biotech crops are also delivering benefits to consumers and society at large, through more affordable food, feed and fiber that require less pesticides and hence a more sustainable environment. The global value of total crop production from biotech crops in 2003 was estimated at $44 billion. Net economic benefits to producers from biotech crops in the USA in 2003 were estimated at $1.9 billion whilst gains in Argentina for the 2001/02 season were $1.7 billion. China has projected potential gains of $5 billion in 2010, $1 billion from Bt cotton and $4

ARGENTINA Biotech Soybean

POPULATION:
38m

% EMPLOYED IN AGRICULTURE
1%

AGRICULTURE AS % OF GDP
11%

AREA UNDER BIOTECH CROPS
16.2 million hectares

Crop	National Hectarage '000 ha	Biotech Hectarage '000 ha	Biotech % of Total Area Planted
Soybean	14,750	14,500	98
Maize	3,000	1,700	55
Cotton	100-125 ha	25	20-25%

billion from Bt rice, expected to be approved in the near term. A global study by Australian economists, on biotech grains, oil seeds, fruit and vegetables, projects a global potential gain of $210 billion by 2015; the projection is based on full adoption with 10% productivity gains in high and middle income countries, and 20% in low income countries. The 2004 data are consistent with previous experience confirming that commercialized biotech crops continue to deliver significant economic, environmental, health and social benefits to both small and large farmers in developing and industrial countries. The number of farmers benefiting from biotech crops continued to grow to reach 8.25 million in 2004, up from 7 million in 2003. Notably, 90% of these 8.25 million farmers benefiting from biotech crops in 2004, were resource-poor farmers planting Bt cotton, whose increased incomes have contributed to the alleviation of poverty. These included 7 million resource-poor farmers in all the cotton growing provinces of China, an estimated 300,000 small farmers in India, and subsistence farmers in the Makhathini Flats in KwaZulu Natal province in South Africa, and in the other eight developing countries where biotech crops were planted in 2004.

BRAZIL Biotech Soybean

Population : 175m
% employed in agriculture : 21%
Agriculture as % of GDP : 9%
Area under biotech crops : 5 million hectares

Crop	National Hectarage '000 ha	Biotech Hectarage '000 ha	Biotech % of Total Area Planted
Soybean	23,000	5,000	22

Future Prospects

- 2004 is the penultimate year of the first decade of the commercialization of biotech crops during which double-digit growth in global hectarage of biotech crops has been achieved every single year; this is an unwavering and resolute vote of confidence in the technology from the 25 million farmers, who are masters in risk aversion, and have consistently chosen to plant an increasing hectarage of biotech crops year, after year, after year. The 10th anniversary in 2005, will be a just cause for celebration worldwide by farmers, the international scientific and development community, global society, and the peoples in developing and industrial countries on all six continents that have benefited significantly from the technology, particularly the humanitarian contribution to the alleviation of poverty, malnutrition and hunger in the countries of Asia, Africa and Latin America. On a global basis, there is cause for cautious optimism with the global area and the number of farmers planting biotech crops expected to continue to grow

in 2005 and beyond. In the established industrial country markets of the USA and Canada, growth will continue with the introduction of new traits; for example, the significant biotech hectarage planted in 2004 in North America to MON 863 for corn rootworm control (approximately 700,000 hectares of the single/stacked product) and TC 1507 for broader lepidopteran control (approximately 1.2 million hectares). The global number and proportion of small farmers from developing countries growing biotech crops is expected to increase significantly to meet their food/feed crop requirements and meat demands of their burgeoning and more affluent populations. A similar trend may also apply to the poorer and more agriculturally based countries of Eastern Europe which have recently joined the EU, and those expected to join in 2007 and beyond. Finally, there were signs of progress in the European Union in 2004 with the EU Commission approving, for import, two events in biotech maize (Bt11 and NK603) for food and feed use, thus signaling the end of the 1998 moratorium. The Commission also approved 17 maize varieties, with insect resistance conferred by MON 810, making it the first biotech crop to be approved for planting in all 25 EU countries. The use of MON 810 maize, in conjunction with practical and equitable co-existence policies, opens up new opportunities for EU member countries to benefit from the commercialization of biotech maize, which Spain has successfully deployed since 1998. Taking all factors into account, the outlook for 2010 points to continued growth in the global hectarage of biotech crops, up to 150 million hectares, with up to 15 million farmers growing crops in up to 30 countries.

The Potential Impact of the Lead Developing Countries on Global Acceptance of Biotech Crops

- Of the 11 developing countries that have already approved and adopted biotech crops to meet their own food, feed and fiber needs and/or to optimize exports, there are five lead countries that will exert leadership and have a significant impact on future adoption and acceptance of biotech crops globally, because of their significant role in biotech crops and generally in world affairs. These five countries are China and India in Asia, Brazil and Argentina in Latin America, and South Africa on the continent of Africa. Collectively, they planted approximately 26 million hectares of biotech crops in 2004, (equivalent to approximately one-third of global biotech hectarage) to meet the needs of their combined populations of 2.6 billion (approximately 40% of global population) which generated an aggregated agricultural GDP of almost $370 billion and provided a livelihood for 1.3 billion of their people. Of the five principal biotech developing countries, China is likely to be the most influential, and what China is to Asia, Brazil is to Latin America, and South Africa is to the continent of Africa. There is little doubt that China intends to be one of the world leaders in biotechnology since Chinese policymakers have concluded that there are unacceptable risks of being dependent on imported technologies for food, feed and fiber security.

- The sharing of the significant body of knowledge and experience that has been accumulated on biotech crops in developing countries, since their commercialization in 1996, is an essential

ingredient for a transparent, and knowledge-based discussion by an informed global society about the potential humanitarian and material benefits that biotech crops offer developing countries. The five lead biotech crop countries from the South, China, India, Argentina, Brazil and South Africa, offer a unique experience from developing countries in all three continents of the South – Asia, Latin America and Africa. The collective experience and voice of these five key countries represent a coalition of influential opinion from the South re biotech crops that will also influence acceptance of biotech crops globally. In the near term, the one single event that is likely to have the greatest impact is the approval and adoption of Bt rice in China, which is considered to be likely in the near term, probably in 2005. The adoption of biotech rice by China, not only involves the most important food crop in the world but the culture of Asia. It will provide the stimulus that will have a major impact on the acceptance of biotech rice in Asia and, more generally, on the acceptance of biotech food, feed and fiber crops worldwide. Adoption of biotech rice will contribute to a global momentum that will herald a new chapter in the debate on the acceptance of biotech crops which will be increasingly influenced by countries in the South, where the new technology can contribute the biggest benefits and where the humanitarian needs are greatest – a contribution to the alleviation of malnutrition, hunger and poverty. Global society has pledged to reduce poverty by half by 2015, and if it is to maintain credibility, it must practice what it preaches and deliver what it promises. Reducing poverty by half by 2015 is an imperative moral obligation and is one of the most formidable challenges facing the world today, to which biotech crops can make a vital contribution. It is appropriate that it is the countries of the South, led by China, India, Argentina, Brazil and South Africa, which are exerting increasing leadership in the adoption of biotech crops and have the courage to address issues that will determine their own survival and destiny, at a time when some segments of global society are still engaged in an ongoing debate on biotech crops that has resulted in paralysis through over-analysis.

SOUTH AFRICA Biotech Maize

HANS LOMBARD, PUBLIC RELATIONS

POPULATION:
44m

% EMPLOYED IN AGRICULTURE:
11%

AGRICULTURE AS % OF GDP:
4%

AREA UNDER BIOTECH CROPS:
500,000 hectares

Crop	National Hectarage '000 ha	Biotech Hectarage '000 ha	Biotech % of Total Area Planted
Maize	2,600	400	15
Soybean	140	70	50%
Cotton	35-40	30	85%

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