IMPACT OF FUTURE SEED TECHNOLOGY ON THE PESTICIDE INDUSTRY. Michael S. DeFelice, Senior Marketing Manager, Pioneer Hi-Bred International, Johnston, IA 50131.

Transgenic herbicide and insect resistance technology has already had a dramatic impact on the pesticide industry since the mid 1990s. Herbicide resistant corn, soybean, canola, and cotton accounted for 73%, or 49.7 million ha of the 67.6 million hectares of transgenic crops in the world in 2003 according to the International Service for the Acquisition of Agri-biotech Applications (ISAAA). Insect resistant *Bacillus thurigiensis* (Bt) crops accounted for 18%, or 12.2 million hectares of the 67.6 million hectares of global transgenic crops in 2003. The global market value of transgenic crops was estimated at $4.5 to $4.75 billion in 2003. The global rate of adoption of these technologies is expected to continue to increase dramatically according to the same report.

Insect resistant transgenic crops have often resulted in direct substitution for insecticides, and are expected to continue to do so in the future. This has had a negative impact on the size of the insecticide market. However, insecticides will still be needed to provide resistance management options, fill gaps in the spectrum of insects controlled, and provide control of insects in smaller market areas that are not addressed by transgenic options.

Herbicide resistant crops have only enabled the use of herbicides on crops that would not otherwise have the natural selectivity to allow their use, such as glyphosate on glyphosate tolerant crops. This has resulted in a shift in the herbicide active ingredients used on these crops, but has not eliminated or reduced (on an acreage basis) the use of herbicides. The use of transgenic resistant crops for herbicide modes-of-action other than glyphosate has been more limited to date. However, it is likely that opportunities for new herbicide modes-of-action and accompanying resistance transgenes will be developed in the future as the technology continues to mature. Some of the benefits of doing so include enabling commercialization of new herbicide modes-of-action to manage weed shifts and resistant weeds, introducing reduced rate herbicides, and developing herbicides with improved environmental and toxicology profiles.

Transgenic disease resistance is mainly still in the experimental stage with only a few limited applications in the marketplace such as virus resistant papaya. However, many public and private institutions are actively pursuing transgenic disease resistance research with the expectation of producing commercially valuable solutions in the future. Fungicide use will likely be reduced just as with insecticides when disease resistant genes are introduced. However, fungicides will also still be needed to provide resistance management options, to improve the spectrum of disease control, and to provide disease control in small markets as with insecticides.

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