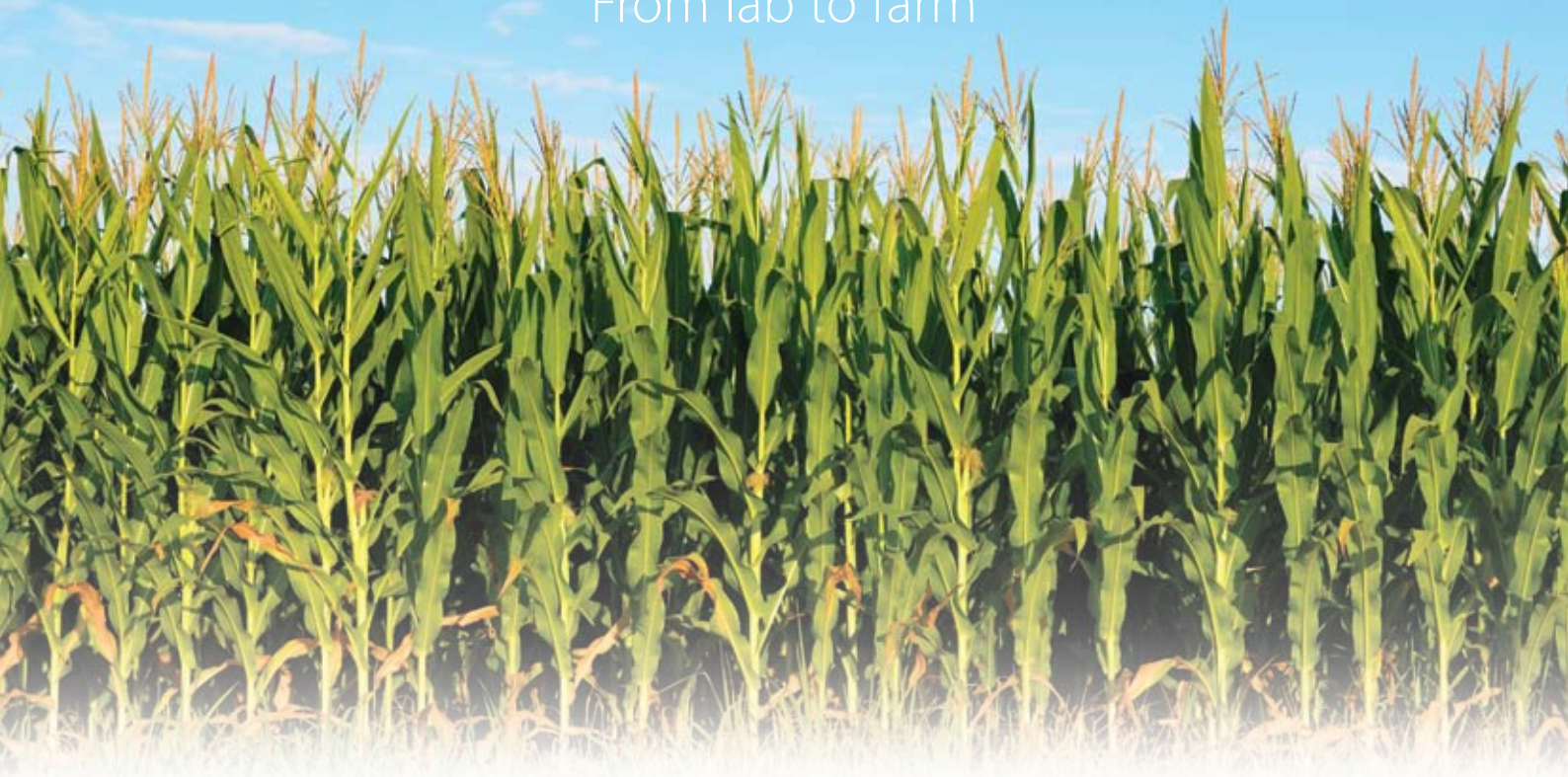


# Biotechnology Seeds

From lab to farm



Making better seed varieties has everything to do with better genes. These genes are the codes of instruction found in every living thing – codes that tell organisms to make substances for growth, survival and many other functions or traits. Plant biotechnology has enabled researchers to take beneficial genes from selected organisms and introduce them into plants, thus making better varieties. Some examples include biotechnology crops that are resistant to pests, more nutritious, or contribute to end products of other industries, such as biofuels.

**It's not easy.** Making biotechnology seeds available to farmers across the world involves a long, costly process. Product development from the gene discovery phase to seed commercialization takes about 10 years, costs roughly US\$100 million, and requires regulatory review and compliance at various stages. Tests during product development consider intended use of the product, plus ethical, environmental, food and feed safety implications.







**It's rewarding.** Despite the challenges, the plant science industry and a number of public research institutions continue producing better seeds through modern biotechnology – by far

the only viable technology for transferring desirable genes between unrelated organisms. Results deliver significant benefits to farmers and consumers. In the Asia-Pacific region, farmers are increasingly planting biotechnology crops on millions of hectares of land, year after year.

**It's a packaged deal.** The responsibility of biotechnology seed developers continues long after seeds have been distributed. They must ensure that national biosafety measures and other compliance requirements are observed. This is product stewardship: the responsible management of every product from development to commercialization and to product discontinuation.

**It's a bright future.** The future promises many new biotechnology crop varieties, with benefits for farmers, consumers and economies around the world. But first, every product will pass through many development phases, rigorous safety tests and strict regulatory review. That's what it takes to make better seeds through biotechnology. There are no short cuts. And stewardship is key to making it work.

## Biotechnology Stewardship across the Product Lifecycle

Phase		Activities
<b>Gene Discovery</b> 		<p><b>Gene identification.</b> Researchers screen for genes that could give crops beneficial traits – better growth, better nutrition, better byproducts, and more.</p> <p><b>Concept testing.</b> Seed companies study technical feasibility of the biotech product. Researchers examine the source of each gene and the potential for allergenicity and toxicity of any expressed proteins by comparing it to known allergens and toxins.</p>
<b>Plant Development</b> 	Early Gene Research	<p><b>Gene design.</b> The gene is packaged in a way that ‘works’ when introduced to a plant.</p> <p><b>Transformation.</b> The gene is inserted in a plant variety. Products are called transformed or transgenic plants.</p>
	Early Development	<p><b>Greenhouse trials.</b> Performance of transgenic plants is evaluated in greenhouse conditions. Top performer is selected.</p> <p><b>Field trials.</b> Performance of a transgenic plant is evaluated in open fields under strict regulatory compliance.</p>
	Advanced Development	<p><b>Variety development.</b> Transgenic plant is bred with superior varieties, producing seeds with a combination of desired traits.</p> <p><b>Regulatory data generation.</b> Evaluation data for scientific review of the biotechnology product is generated.</p>
	Regulatory Submission	<p><b>Data submission.</b> Test data for transgenic plants is submitted to various authorities.</p> <p><b>Review.</b> Regulators decide whether to approve biotechnology seeds for planting and other intended uses (e.g. food and feed).</p>
<b>Seed Production</b> 		<p><b>Ensuring quality.</b> Seed companies mass produce biotech seeds under stringent quality controls to maintain product quality, purity and integrity. Stewardship measures include isolation of seed production fields and seed quality tests.</p>
<b>Seed Marketing and Distribution</b> 		<p><b>Pre-marketing requirements.</b> Seed companies secure all appropriate regulatory authorizations.</p> <p><b>To market.</b> Once biotech seeds are authorized for sale, seed companies work with seed retailers, growers, processors, food retailers and consumers to promote responsible product marketing, distribution and use.</p>
<b>Crop Production</b> 		<p><b>Working with farmers.</b> The plant science industry is actively involved in farmer outreach to provide value to growers with biotech crops. It encourages the use of good agricultural practices for product performance and environmental sustainability. An example is Integrated Pest Management (IPM), a cost-effective and environmentally friendly method of controlling pest infestations.</p>
<b>Crop Utilization</b> 		<p><b>Engaging stakeholders.</b> Working with parties involved in the agricultural value chain such as those in the commodity food and feed channels, to support technology adoption and international trade. The industry works towards synchronous authorizations in trading countries and follow best seed quality practices.</p>
<b>Product Discontinuation</b> 		<p><b>Achieving transparency.</b> A normal and predictable end to the product life cycle includes removing or replacing older products from production and trade. Seed companies are committed to working with stakeholders and national governments to ensure transparency and predictability of programs for discontinued products. These include communication of discontinuation plans and application of appropriate quality management procedures.</p>

### About CropLife Asia:

CropLife Asia promotes the benefits and responsible use of crop protection and plant biotechnology products, as well as sound regulatory frameworks in support of sustainable agriculture in the Asia Pacific region. As a regional unit of CropLife International – a global federation of the plant science industry in 91 countries – CropLife Asia supports the work of 15 member associations and is led by member companies at the forefront of crop production research and development.

[www.croplifeasia.org](http://www.croplifeasia.org)

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