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Seeds full of science

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 **BASF**

We create chemistry



Cotton is the **most widespread non-food crop** in the world.

Grown on around **30 million hectares**, with more than **25 million metric tons** produced.

Wide range of industrial uses, particularly in textile industry.

Farmers produce cotton worth around **\$50 billion** per year.

Two main markets for BASF are the **United States and Brazil.**

Farmers value BASF for their **premium, high-yielding cotton seeds.**



 **Seeds**
Genetic foundation
of the plant.

Traits 
Genetic characteristics
introduced into the
plant's DNA.

Seeds are the first and most critical investments for farmers.



Rising hurdles

Herbicide-resistant weeds are most troubling challenge for cotton farmers in the United States and Brazil.

The challenge

Create a new cotton seed solution to manage herbicide resistant weeds in a more flexible way.

Preserve existing genetic performance of cotton seeds.

Our approach

Develop novel herbicide-tolerant trait and combine it with BASF's existing genetics.



Create cotton plants **tolerant to HPPD-inhibiting (HPPDi) herbicides**.

Leveraged advanced **protein engineering** to modify an HPPD protein to **reduce the binding affinity** of HPPDi.

Successfully **identified and optimized a HPPDi-tolerant enzyme** to test in plants.

**Hydroxy-phenylpyruvate dioxygenase, a plant enzyme essential for photosynthesis and oxidative damage protection.*

Research



HPPDi
Herbicide



HPPD
Enzyme



Lab facility
Ghent, Belgium

HPPDi sensitive
plant



Sensitive enzyme



No photosynthesis

HPPDi tolerant
plant



Tolerant enzyme

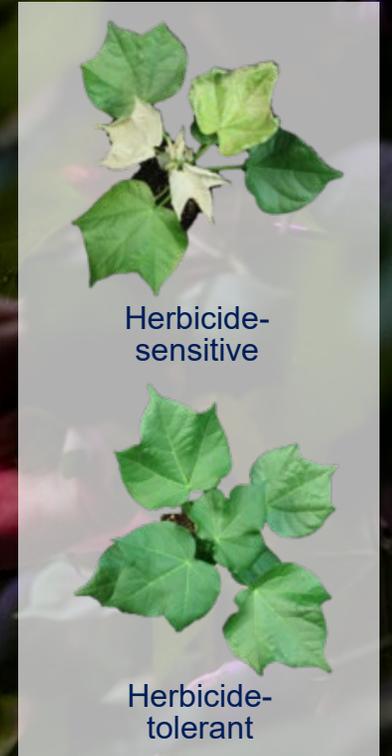


Photosynthesis

Created and screened more than 1000 plants – so called “events” – in the greenhouse and field:

- ✓ HPPDi tolerance
- ✓ Plant health and yield
- ✓ Agronomic performance

Evaluated and selected best events that consistently outperformed all criteria.



Research

Development



Expanded testing over multiple seasons and locations to **select one elite event***.

Combined elite event to **stack with other commercial traits and seed genetics** through advanced breeding.

Navigated through complex global regulatory landscape to **demonstrate food, feed, and environmental safety**.



Research

Development

Commercialization



**Elite event = Event/plant that is superior to all other events/plants.*

The most comprehensive and flexible weed management system for cotton.



This information is provided for educational purposes only and is not intended to promote the sale of these products. Any sale of these products after registration is obtained shall be based solely on the EPA approved product label, and any claims regarding product safety and efficacy shall be addressed solely by the label. Always read and follow label recommendations.



First and only quad-stack herbicide trait package for weed control¹.

Enables **use of HPPDi herbicides**².

Available with existing insect control trait technology.

Bred into genetics of **FiberMax®** and **Stoneville®**.

¹ HPPDi, Glufosinate, Glyphosate, Dicamba

² Alite® ISO; not yet registered for use by the U.S. EPA

First-of-its-kind herbicide tolerant technology for grass control³.

Enables **use of HPPDi herbicide**⁴.

Available with existing insect control trait technology.

Bred into genetics of **FiberMax®**.



³ HPPDi, Glufosinate, Glyphosate

⁴ Durance S®

The most comprehensive and flexible weed management system for cotton.

A stylized map of North and South America. The United States and Mexico are highlighted in a light blue color, with the text "Axant® Flex" and "Herbicide Trait Technology" overlaid. South America is highlighted in a darker blue color, with the text "Seletio®" and "Herbicide Trait Technology" overlaid.

Axant® Flex
Herbicide Trait Technology

Seletio®
Herbicide Trait Technology

Additional weed management option for more flexibility.

Helps reduce weed herbicide-resistance risks.

Protects yield potential and fiber quality.

Seeds full of science

1 Innovation begins with the farmer.

2 The most efficient R&D engine in agriculture delivers.

3 One global team committed to the love of farming.





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