

## OUR PIPELINE

Delivering innovation to the farm is the focus of Monsanto's R&D platform. Through investments in breeding and biotechnology, we're working hard to deliver products that make farmers more productive and profitable. We invest more than \$2 million a day to discover and deliver innovative technologies that make a difference to farmers and the land they farm. Our research supports both the agronomic and value-added needs of our customers.

### Discovery

Our R&D research begins in our discovery engine. This work helps our researchers uncover the next frontier of plant improvements and technologies for our farmer customers. This research ensures that new product concepts are constantly feeding our crop portfolio. As projects graduate from our discovery engine, they are characterized by the benefits they ultimately can deliver to the farm including agronomic benefits and value-added benefits.

Our primary discovery areas include:

- Grain yield
- Grain quality
- Environmental stress tolerance
- Pest control
- Herbicide tolerance
- Disease resistance
- Lipid enhancements (increased oil, improved fatty-acid composition)
- Protein enhancements (improved amino-acid content)
- Carbohydrate enhancements
- Bioactive compounds

### Agronomic Benefits<sup>(1)</sup>

These products work to deliver in-seed benefits like herbicide tolerance, disease resistance, insect protection, and yield enhancements. Our research aims to increase productivity or reduce input costs, improve protection from insects and disease, or enable a plant to combat environmental stresses like drought.

### Value-Added Benefits<sup>(1)</sup>

These products work to support the growing food, feed and fuel demands of farmers' customers such as processors and consumers. Our research focuses on greater efficiency and benefits for animal feed processors, ethanol and biodiesel plants, as well as nutritional improvements in oil and dietary components.

### BREEDING

#### OVERVIEW

#### Delivering a Better Seed to the Farm

Monsanto breeders are constantly working to develop better seed offerings for farmers. Our breeding research spans both large-acre crops, like corn, cotton and soybeans, as well as fruits and vegetables. Today, we have more than 250 breeders conducting research at hundreds of locations around the world. Our researchers use both conventional and marker-assisted breeding technologies to unlock the yield potential of seeds.



### TRAIT PIPELINE

#### CROPS

#### Corn



#### Cotton



#### Oilseeds



#### Key

- Crops with agronomic benefits
- Crops with value-added benefits

Monsanto's High Impact Technologies (HITs) are identified in bold type in the product pipeline.

See page 22 for Notes 1, 2, 3 and 4 on the product pipeline.

CROPS

**Corn**



Our research in corn develops ways to increase and enhance yield, disease and insect tolerance, stalk and root strength, and kernel qualities — such as starch, oil and protein.

**Soybeans**



Our research in soybeans focuses on improving the value and global competitiveness — through yield, yield stability, disease tolerance, and improved oil and protein composition.

**Cotton**



Our research in cotton strives to develop and deliver value through yield, fiber quality and tolerance to environmental stress. Our work is aimed at supplying varieties that are competitive with the best the marketplace has to offer.

**Fruits and Vegetables**



Our Seminis breeders are working to improve products at both planting and harvest, by combating environmental factors that limit the plant's output, and by enhancing the product's end-market features — including appearance and quality. Our research focuses on developing new benefits for growers and consumers.

PHASE I	PHASE II	PHASE III	PHASE IV
<ul style="list-style-type: none"> <li>■ <i>YieldGard</i> Rootworm III</li> <li>■ Second-generation drought-tolerant corn</li> <li>■ Nitrogen utilization corn</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>Drought-tolerant corn</b></li> <li>■ Higher-yielding corn</li> </ul>	<ul style="list-style-type: none"> <li>■ <i>SmartStax</i> corn</li> </ul>	<ul style="list-style-type: none"> <li>■ <i>YieldGard</i> VT PRO</li> <li>■ Extrax corn processing system<sup>(4)</sup></li> </ul>
<ul style="list-style-type: none"> <li>■ Drought-tolerant cotton</li> <li>■ Dicamba-tolerant cotton</li> <li>■ Cotton Lygus control</li> </ul>	<ul style="list-style-type: none"> <li>■ <i>Bollgard</i> III</li> </ul>		
<ul style="list-style-type: none"> <li>■ Soybean nematode-resistance</li> </ul>	<ul style="list-style-type: none"> <li>■ Dicamba-tolerant soybeans</li> <li>■ Insect-protected soybeans</li> <li>■ Higher-yielding soybeans</li> <li>■ <i>Roundup RReady2Yield</i> canola</li> <li>■ High stearate soybeans</li> <li>■ <b><i>Vistive</i> III low lin — mid oleic — low sat soybeans</b></li> </ul>	<ul style="list-style-type: none"> <li>■ <i>Vistive</i> II low lin — mid oleic soybeans</li> <li>■ Omega-3 soybeans</li> <li>■ High-oil soybeans</li> </ul>	<ul style="list-style-type: none"> <li>■ <b><i>Roundup RReady2Yield</i> soybeans</b></li> <li>■ Improved-protein soybeans</li> </ul>
<p><b>Proof of Concept</b>  <b>Key activities:</b></p> <ul style="list-style-type: none"> <li>● Gene optimization</li> <li>● Crop transformation</li> </ul> <p><b>Average duration<sup>(2)</sup></b>            12 to 24 months</p> <p><b>Average probability of success<sup>(3)</sup></b>            25 percent</p>	<p><b>Early Product Development</b>  <b>Key activities:</b></p> <ul style="list-style-type: none"> <li>● Trait development</li> <li>● Pre-regulatory data</li> <li>● Large-scale transformation</li> </ul> <p><b>Average duration<sup>(2)</sup></b>            12 to 24 months</p> <p><b>Average probability of success<sup>(3)</sup></b>            50 percent</p>	<p><b>Advanced Development</b>  <b>Key activities:</b></p> <ul style="list-style-type: none"> <li>● Trait integration</li> <li>● Field testing</li> <li>● Regulatory data generation</li> </ul> <p><b>Average duration<sup>(2)</sup></b>            12 to 24 months</p> <p><b>Average probability of success<sup>(3)</sup></b>            75 percent</p>	<p><b>Prelaunch</b>  <b>Key activities:</b></p> <ul style="list-style-type: none"> <li>● Regulatory submission</li> <li>● Seed bulk-up</li> <li>● Pre-marketing</li> </ul> <p><b>Average duration<sup>(2)</sup></b>            12 to 36 months</p> <p><b>Average probability of success<sup>(3)</sup></b>            90 percent</p>