Breakout Session Seeds & Traits

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In H1 2019, seeds & traits accounted for around one quarter of the sales of BASF Agricultural Solutions.

### H1 2019 sales by indication and sector

- **€4,445 million**
- **23% Seeds & traits**
- **28% Fungicides**
- **9% Insecticides**
- **34% Herbicides**

**Indications:**
- Canola
- Cotton
- Vegetables
- Soybean
Canola – heart-healthy oil crop low in saturated fatty acids

- Developed in the early 1970’s
- ~24 million acres in North America, primarily for food used in frying and cooking
- ~17 million acres in Europe primarily used for biodiesel
- The meal is a high-protein feed for animals
- Canada exports over 90% of its canola production to the U.S., China, Japan and Mexico
- The canola industry generates ~€17 billion in value for the Canadian economy each year

1 Source: Canola Council of Canada report 2017
InVigor® is a brand promise of new (revolution) and improved (evolution) products with exceptional performance

**Revolution:** Technologies and advanced breeding capabilities

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<th>Herbicide tolerance</th>
<th>Hybridization</th>
<th>Pod shatter</th>
<th>InVigor® Health</th>
<th>InVigor® RATE</th>
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**Evolution:** Strong track record of product commercialization with exceptional performance

2019 Offerings
InVigor® segment-leading canola seed business

2018 Canadian canola seed, segment share

- Peer 1: 11%
- Peer 2: 17%
- Others: 14%
- InVigor: 58%
- Total acres: 22.4 million

Source: AGDATA Inc.

2018 U.S. canola seed, segment share

- Peer 1: 11%
- Peer 2: 6%
- Others: 9%
- InVigor: 74%
- Total acres: 1.8 million

Source: AGDATA Inc.
The continuum of the seeds business

- Breeding and research
- Innovative technology
- Effective operations
- Sales and marketing

Continued investment in breeding and research plus the operational and strategic interconnection and interdependency is the most important principle for a successful seed business.
Canola production: High-performance seeds benefitting from BASF’s leading crop protection products

BASF solutions for canola in Canada
Canola market drivers – impact of pod shatter reduction

**InVigor® hybrids with pod shatter reduction technology**

- 2015: 12% Pod shatter, 88% All other InVigor® hybrids
- 2016: 20% Pod shatter, 80% All other InVigor® hybrids
- 2017: 38% Pod shatter, 62% All other InVigor® hybrids
- 2018: 60% Pod shatter, 40% All other InVigor® hybrids

**Pod shatter customers’ Twitter testimonials**

- Straight cut over half the canola this year and couldn’t be happier
  #SellTheSwather
- First time straight cutting. Might have to
  #SellTheSwather
- 4-5 bu better on straight cut vs. swath. Time to
  #SellTheSwather
- Straight cutting some canola drown outs. I’m hooked
  #SellTheSwather ;)

- Canola pods naturally shatter upon ripening, thus causing seed losses and reduction of yield
- Growers need to cut the canola (swath) prior to full maturity to limit losses, but seeds are not fully mature and some losses still occur
- Shatter tolerance is a revolutionary feature bread into InVigor® hybrids which prevents premature shatter and yield loss
- Growers can leave the plants until full maturity and directly harvest without the intermediate swathing step
- Benefits: Saves time, eliminates cutting costs, greater yields, more oil content, harvest flexibility
Revolution: Technologies and advanced breeding capabilities

**InVigor® RATE**
Optimizing yield, agronomic consistency and performance selling by seed count

- Address growers’ desire for ease-of-use and precision seeding concepts
- Increase accuracy in forecasting sales when growers are seeding by targeted plant population
- Further improve InVigor® brand image through a higher-performing product
- Demonstrate innovation leadership

**InVigor® Health**
Canola oil with no trans-fatty acids and low saturates

- Utilize existing infrastructure to increase customer reach and segment penetration
- Leverage existing infrastructure to supply inventory needs
- Capitalize on top-quality germplasm base
- Access to high omega-9 canola trait
- Cross-license agreement with Cargill

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**Improved agronomy strategy**

**Specialty-oil canola strategy**
InVigor® – key takeaways

# Seed is one of the first decisions a grower makes

# Proximity to our customers means direct accountability – Keep promises and commitments

# Yield is a priority

# Quality is everything – Protect the brand promise

# Seed is a unique emotional and scientific decision

# Growers trust InVigor® on more acres than any other canola hybrid in North America
Vegetable seeds

Dr. Andreas Sewing
Vice President
Research & Development
Vegetable Seeds
Vegetables as healthy choice for people and planet

Benefits to society
Scientific evidence supporting health benefits of fruit and vegetables

Convenience and eating as experience
Fostering healthy eating with flavorful vegetables and convenient formats

Sustainable solutions
Closed growing systems optimizing resource use and enabling production close to consumer
Global vegetable seeds market

Vegetable seeds market by product 2018

%  
- Tomato: 15%  
- Pepper: 10%  
- Onion: 7%  
- Cucumber: 6%  
- Lettuce: 4%  
- Watermelon: 4%  
- Melon: 4%  
- Carrot: 4%  
- Others: 46%

Source: AgbioInvestor; BASF estimate

Vegetable seeds market  

million €  

€5.1 billion

CAGR ~4%

2018  
2025  
2030
Vegetable market specifics

- Exclusively non-GM products
- Focus on genetic solutions (for disease and pest control)
- Highly fragmented market
- Non-processed consumption
- Complex value chain
- Consumer exposure

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Row crops

Vegetables

Vegetables

- Exclusively non-GM products
- Focus on genetic solutions (for disease and pest control)
- Highly fragmented market
- Non-processed consumption
- Complex value chain
- Consumer exposure
Delivering solutions across the whole value chain

- Delivering solutions across the whole value chain
- Viral disease
- Bacterial disease
- Fungal disease
- Sucking pests
- Reducing input
- Heat set and tolerance
- Drought tolerance
- Earliness
- Harvest windows
- Advanced growing solutions
- Shelf life
- Transportability
- Oxidation
- Taste
- Convenience
- Nutritional value

Development of native traits and genetic solutions
New growing concepts
Our contribution: Offering convenience with Kisy® – easy to eat and staying relevant to the consumer

Changing our traditional understanding of yield

Kisy®
Our contribution: Delivering value to growers by combining genetics and growing technologies

“Traditional” growing system

High-wire growing system

Compact trait –
More output with less resources for high-tech cucumber growers

Trait results in open plant architecture, reduced leaves and compact growing habit requiring less space

- 20% more stems/plants per m² greenhouse
- Reduced labor for plant pruning
- Easier and automation amenable harvest
Our contribution: Adding value with new growing technologies

Indoor farming
- Reduction of product development timelines
- Seed production: more seed per m² and faster delivery times to customer

Hydroponics – soilless growing
- Closed systems maximizing yield
- Automated harvesting
- Working with growers to match genetics with growing technologies
Our contribution in the U.S. market: Sunions® – consumer solutions making the headlines

“VERY APEELING
Farmers have created a new kind of onion that won’t make you cry when you chop them up.”

The SUN, January 9, 2018

Integrated product development
Combining high throughput technologies and consumer taste panels