Crop Innovation & Business Conference

Stefan Schwarz| April 2019

SEEDING
THE FUTURE
SINCE 1856

KWS

KWS at a Glance

Our success story began over 160 years ago

1856
Founded as „Klein Wanzlebener Saat-zucht“ (sugarbeet)

1885
Transformation into a stock corporation

1900
Leading global player in sugarbeet seed

1920
Inclusion of cereals and potato breeding

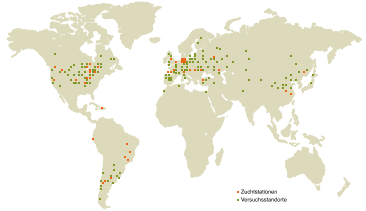
1945
New start in Einbeck

1955
Inclusion of corn breeding

1973
Entry into the biotechnology field

2000-2015
Selected start-ups and takeovers

TODAY



Leading global player in plant breeding, operating in 70 countries

Today we rank among the top 5 corporations for plant breeding (KWS fiscal year 2017/2018)

NET SALES in € million	**COUNTRIES** globally	**EMPLOYEES** globally	**R&D INTENSITY** as % of net sales	**YIELD PROGRESS IN EARNINGS** crops Ø p.a. in %
1,068	**70**	**5,147**	**18.5**	**1-2**

Ranking

by sales with agricultural crops

Global

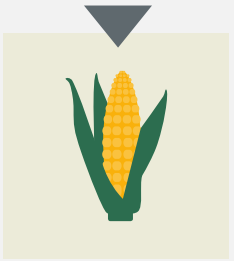
1. Bayer
2. Corteva
3. Syngenta
4. KWS
5. BASF

Europe

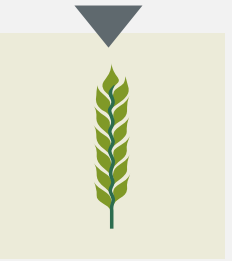
1. Bayer
2. Corteva
3. KWS
4. Syngenta
5. Vilmorin

Focus on seed for:

Sugarbeet



Corn



Cereals

We are seed-specialists for sugar beets, corn, cereals and other agriculture crops.

At KWS we think in generations, set ourselves long-term goals and thus strive for sustainable success.

Challenges for Agriculture

Efficient agriculture needs to rise to the challenges of high-yield harvests

Population growth: demand for food is expected to rise by 60% by 2050

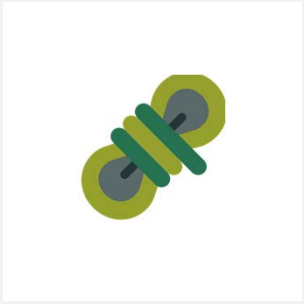
Shrinking of per-capita acreage: growing population in conjunction with stagnating acreage

Climate change: changes in abiotic stress require new variety properties

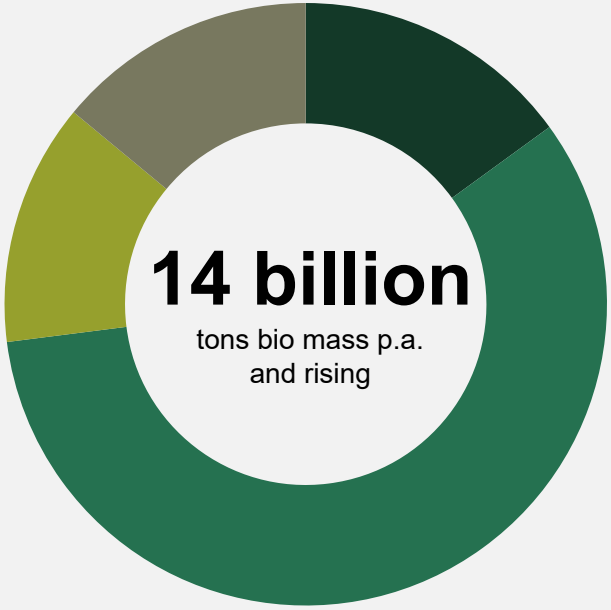
Yield loss: 52% due to insects, herbicides, fungal deseases and storage damage

Limited resources: water, fertilizer and plant protection

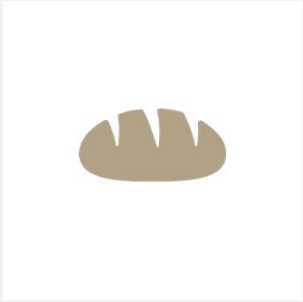
With rising food demand the rivalry between bio-based resources increases



FIBER
14%



FOOD
15%



FUEL
13%

FODDER
58%

Source: Bioökonomierat (2015)

Innovations for Agriculture

We develop high yielding and ressource-efficient varieties for sustainable agriculture

Safe yields

Securing yield stability and yield improvements for sustainable supply

Resource efficiency

Reducing consumption of water, fertilizer and chemical plant protection

Increased nutrient content

Optimization of energy and nutrient content for more efficient use of acreage

Diversification

Securing sustainability through organic seeds and catch crop portfolio

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Hybrid rye

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Catch Crops

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Catch Crops

CONVISO® SMART

The CONVISO® SMART system innovates the way to control weeds in sugarbeet. The two components of the system make it possible:

- **SMART KWS seed**: sugarbeet hybrids developed by KWS carrying the specific **tolerance to the ALS-inhibitor** based herbicide CONVISO® ONE
- **CONVISO® ONE:** broadleaf- and grass weed herbicide developed by **Bayer** based on active ingredients from the **ALS-inhibitor** class

CONVISO® SMART

The benefits

- **Unique Control** - CONVISO® SMART offers a unique weed control performance combined with best crop safety.
- Convincing **Convenience** - CONVISO® SMART offers higher flexibility in weed control combined with less applications needed (one to two instead of three to four).
- **Higher Productivity** - CONVISO® SMART offers best crop safety - no impact on crop development.

Basics of CONVISO® SMART

- Out of 1.5 billion individuals one single herbicide tolerant individual was naturally found, which formed the basis for the development of the new system.

ALS tolerant hybrid

susceptible standard hybrid

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Hybrid rye

Catch Crops

Rye – a multifunctional hybrid cereal

Human Nutrition

Feed grain (pigs)

Biogas

Rye – a multifunctional hybrid cereal

Agronomic advantages of hybrid rye

- Extreme winter hardiness and frost resistance
- Drought tolerance – ideal for sandy soils
- Less nitrogen, water and crop protection compared to wheat
- Extends crop rotation
- Very high take-all disease tolerance – ideal as a second cereal
- Minimal ergot risk – via PollenPlus®

Innovative trait component

By using rye in feeding, we contribute to animal welfare and animal health

Unique characteristics of rye grain in pig feeding

- **Higher lysine:protein ration** in comparison to other cereals
- Low Glycemic Index (GI) and **high satiety**
- **Decreased gut ulceration** due to high dietary fibre %
- Increased **welfare** + occupation + **reduced stress**/boredom

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Herbicide Tolerance

Hybrid rye

Catch Crops

Catch crops are an integral part of sustainable faming

Catch crops are fast growing crops that are grown between planting of the main crops (also between rows)

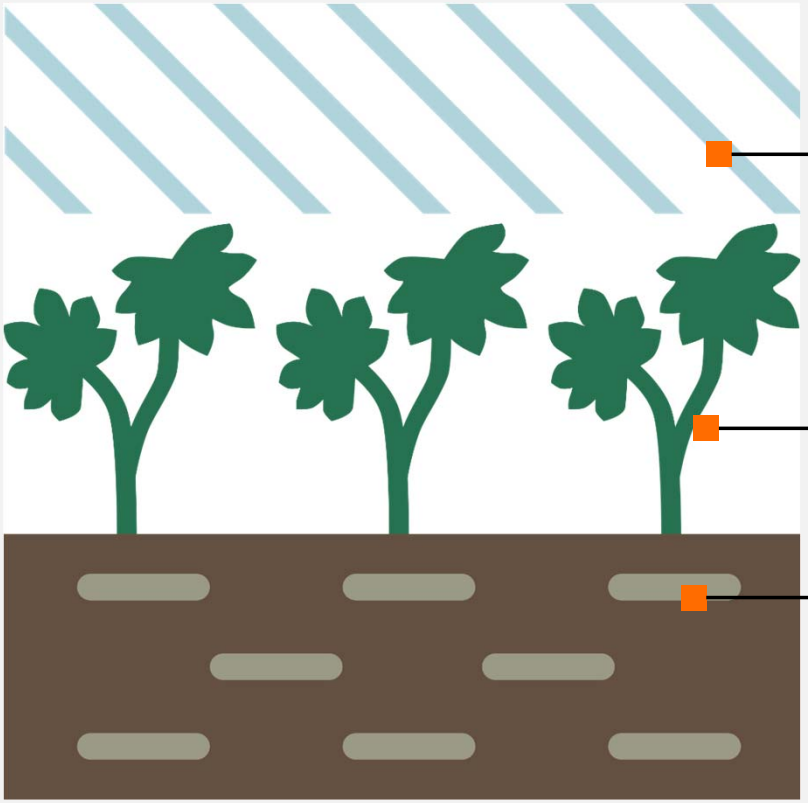
Example types of catch crops

- White mustard
- Oil radish
- Phacelia
- India Buckwheat
- Oats
- Winter wild turnip

Breeding goals

- Fast soil cover,
- Strong youth development,
- High weed suppressing plant density
- Late blooming formation (except if catch crops are used as bee pasture)

Catch crops are one of farming’s best tools and provide many different environmental benefits



Prevent soil erosion

Slow down rain velocity/impact of rain on earth, anchor soil in place, and increase soil porosity.

Avoid weeds and pests

Compete with weeds to stop them from spreading; lure pests away (trap crops).

Improve soil

Increase soil fertility and quality by increasing soil organic matter.

We develop high yielding and ressource-efficient varieties for sustainable agriculture

Three examples of innovations geared towards sustainable farming

Resource efficiency
Reducing consumption of water, fertilizer and chemical plant protection

Herbicide Tolerance

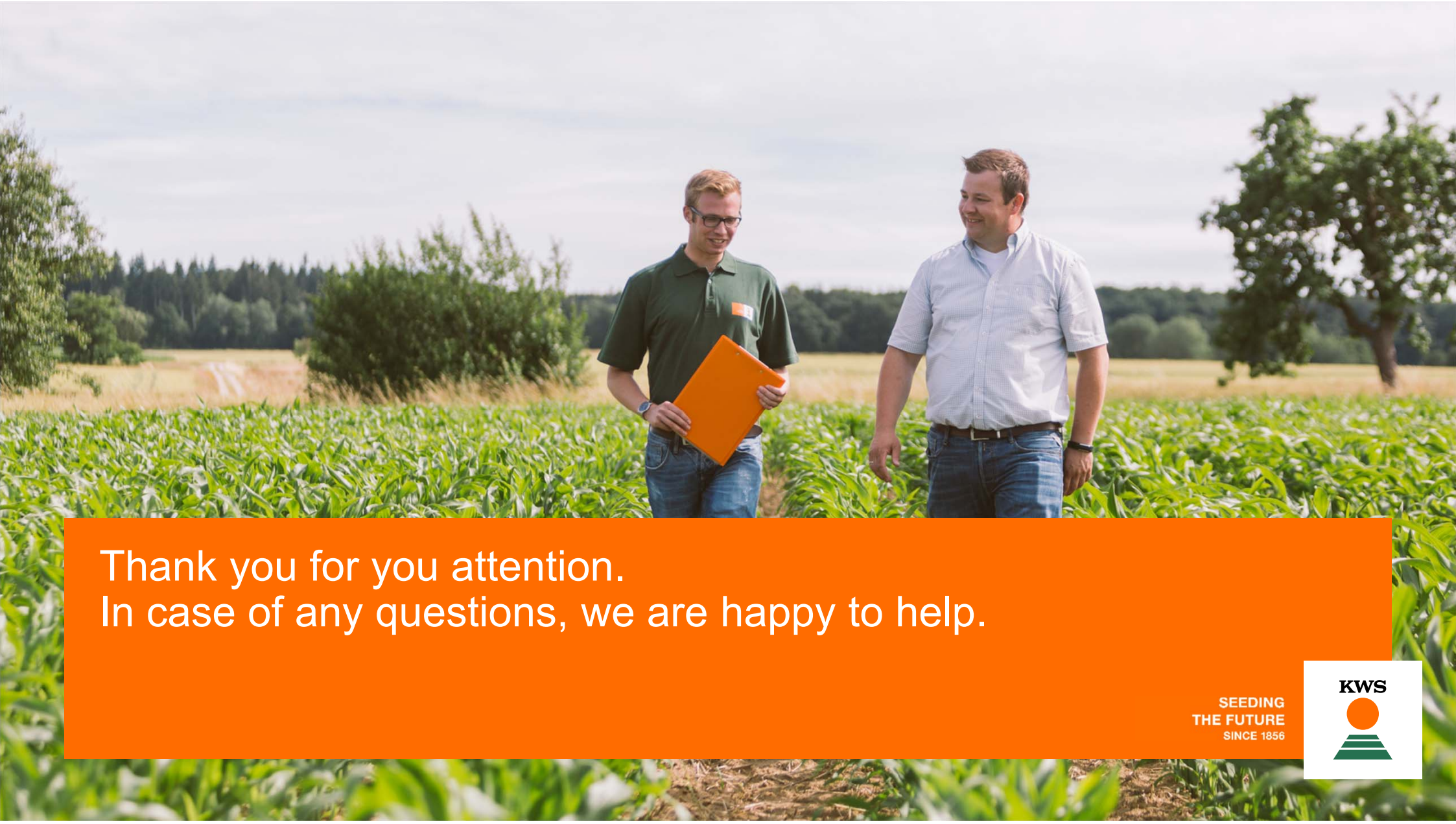
Increased nutrient content
Optimization of energy and nutrient content for more efficient use of acreage

Hybrid rye

Diversification
Securing sustainability through organic seeds and catch crop portfolio

Catch Crops

- Focus on **customer value**
- Developed in **collaboration** with partners
- Requiring high investments and hence relying on **innovation-friendly environment**



Thank you for you attention.
In case of any questions, we are happy to help.

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