Investing to Deliver the Varieties That Farmers and Growers Need

UPOV Symposium on the Benefits of Plant Variety Protection for Farmers and Growers
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Outline

• Need for More Productivity on Farms
• Genetic Plant Breeding Solutions
  – Investments
  – Intellectual Property Protection
• Global View of DuPont Pioneer
• Integrated Approach to Satisfying Farmer-Customer Needs
  – Identifying the Needs of Farmer-Customers
  – Translating Farmer-Customer Needs to Breeding Goals
  – Evaluating New Potential Varieties
  – Quality Seed Production
  – Testing, Testing, Testing
  – Continual Learning About Farmer-Customer Needs and Product Performance
• Conclusions, Q&A, Discussion
In the Next 50 Years

- World population will double
- 2-3X increase in food production needed
- Reduce soil and ecosystem degradation
- Maximise effective use of available water and minimise contamination of natural waters
- Decrease net CO$_2$ emissions and other greenhouse gases
- Sustainable increase in agricultural productivity essential
- Genetic contributions from plant breeding critically important

US Maize Production (1865 – Present)
US Maize Production (1865 – Present)
Due to area cultivated?

US Maize Yields (1865 – Present)
Due to Genetic Gain and Improved Cultivation!
Genetic Gain from Plant Breeding
Pioneer US Maize Era Studies

\[ y = 0.0775x - 144.37 \]
\[ y = 0.1375x - 263.68 \]


- Linear (1930 -1989)
- Linear (1990-2007)

DuPont Agriculture Research Investment

Investment 2003 – 2011*

Millions of Dollars

- Research investments of business units within the Agriculture Segment are not reported individually

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Intellectual Property Protection

• **PVP**
  - Available globally
  - Essential level of protection
  - UPOV 91 balances multi-trait breeding with more specific trait improvement

• **Patents**
  - Essential to encourage longer-term, higher-risk R&PD
    For example:
    • Develop transgenics
    • Introduce genetic diversity from initially unadapted sources

• **Trade Secrets**

• **Contracts**

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**Pioneer Today - Global Resources, Local Impact**

Global resources to increase customer productivity and profitability

Employees — ~12,300
- Sales
- Production — >75 locations
- Research — >15 locations
A Huge Diversity of Farmer-Customers
The Goal: Very Satisfied Customers

Product Evaluation Zones – Corn

Local issues drive our local product development

Breeding and native trait development targeted through local evaluation zones

Native Traits in the N.A. Portfolio
- Drought Tolerance
- Gray Leaf Spot
- Northern Leaf Blight
- Goss’s Wilt
- Root Strength
- Brittle Stalk
- Head Smut
- Ear Molds (Fusarium, Gibberella, Diplodia)
- Rusts (Common/Southern)

Pioneer Integrated Maize Breeding System

Enabling Technologies
- Genotyping
- IM Systems
- Doubled Haploids

Generating and select new recombinants
Inbred

Better Hybrids – Quicker!

Goal: Increase the size of the Pioneer breeding program 10X over the next 5 years.
Customers Learning About Products: Viewing Plots

Meeting with Customers on Their Farms
IMPACT™ Testing Plots

Fitting Best Varieties into the Field
Variable Rate Seeding, Fertiliser Placement

**BottomLINE**

Pioneer’s partnership with growers is centered on our customers achieving their business goals. Both parties can benefit from understanding and applying VRS as a strategy to achieve optimal profitability, acre by acre.

Developed in partnership between:
Pioneer Hi-Bred and Dr. Matt Darr at Iowa State Univ.

Top Quality Seed Production and Delivery Management System

**Customer Feedback**

- Crop Genetics Research
  - Yield
  - Herbicide Sensitivity
  - Trait Purity
  - Overall Purity
  - Other documented characteristics
- Field Activities
  - Isolation
  - Identify Preservation
  - Field Inspection
  - Pollen Control
- Conditioning & Packaging
  - Physical Purity
  - Size
  - Plantability
  - Treatment
  - Moisture
- Laboratory Testing
  - Germination
  - Vigor
  - Varietal Purity
  - ELISA
  - PCR
- Market
  - Parent & Commercial Seed Production
  - Overall Purity
  - Other documented characteristics
Hybrid Seed Production

Hybrid Seed Corn “Plants”
Monitoring Seed Purity and Quality

Conclusions: Local Issues Drive Local Product Development (e.g., US Soybean Breeding)

NORTH & NORTHWEST
- Iron Chlorosis
- Phytophthora
- Cyst Nematode
- White Mold

WEST
- Phytophthora
- Iron Chlorosis
- Cyst Nematode
- Sudden Death Syndrome
- Charcoal Rot

SOUTHWEST
- Drought
- Cyst Nematode
- Sudden Death Syndrome
- Charcoal Rot

SOUTHEAST
- Cyst Nematode
- Phytophthora
- Root Knot Nematode
- Stem Canker
- Frogeye Leaf Spot
- Sudden Death Syndrome

EAST & NORTHEAST
- Phytophthora
- Cyst Nematode
- White Mold

CENTRAL
- Brown Stem Rot
- Phytophthora
- Cyst Nematode
- Sudden Death Syndrome
- White Mold
Conclusions: One Research Team

- Know the agronomic situation and needs of the farmer-customer
- Translate those needs into goals for the breeder
- Conduct most efficient and effective plant breeding
  - Well characterised genetic diversity, improved selection via genotyping and phenotyping
  - Rigorous testing of genetic basis of agronomics
- Performance trials on-farms key to determine if go commercial
- Excellence in seed production quality
- Excellence in agronomic advice services to farmer-customers
- Broad array of different commercial products
- Continuous feedback from farmer on variety performance
- Sales-Marketing-Breeders-Agronomists-Seed Production ONE TEAM
- And ONE TEAM with the farmer-customer

A Team Approach
Questions/Comments?

THANK YOU!