The future is BRIGHT!

New canola technology developments from DuPont Pioneer

Marc Cartwright
Account Manager
NE N.Dakota / NW Minn.

Technological Advances . . . *Throughout the years*

1974:

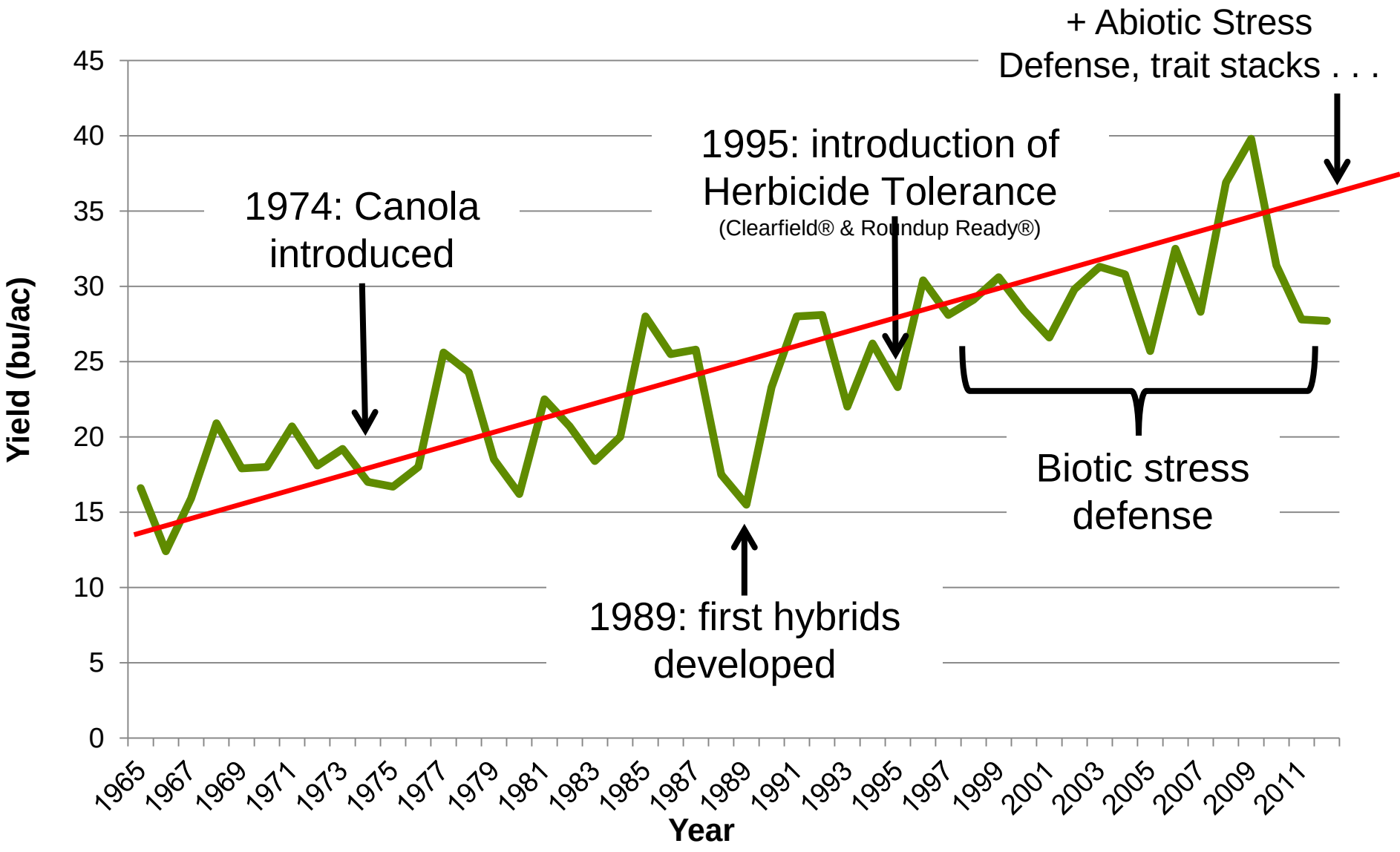
- "Tower" the first *B. napus* canola variety is released.
- Canola planted ~ 500,000ac
- Average yield ~ 17 bu/ac (850 lbs/ac)

2012:

- Hybrid and herbicide tolerant canola (99%) dominate the market.
- Canola planted ~ 21.2 million ac
- Average yield ~ 27.7 bu/ac (1,385 lbs/ac)

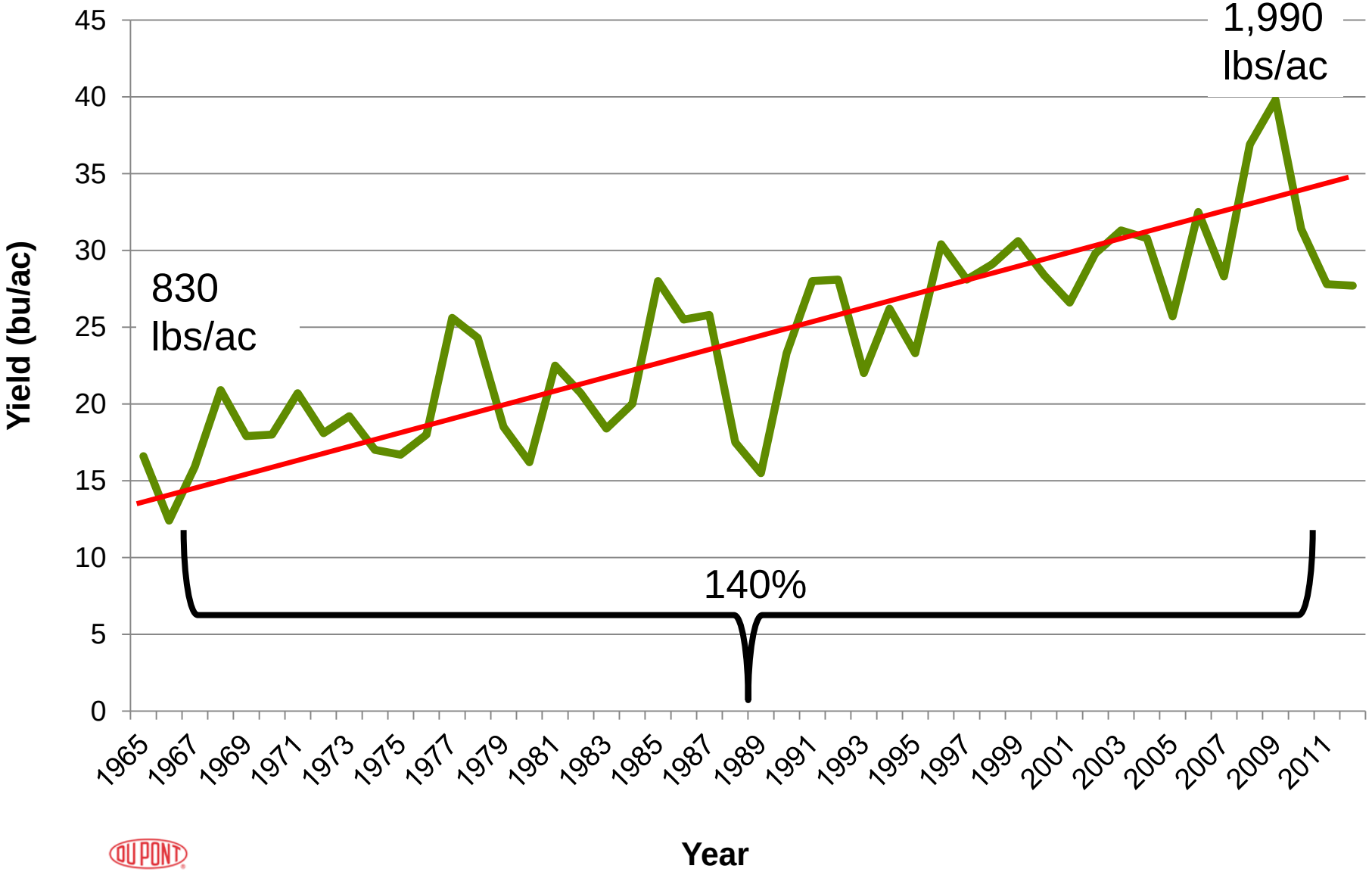
DUPONT PIONEER

1965-2012: Western Canada Average Rape / Canola Yield



Source: Statistics Canada; Agriculture and Agri-Food Canada; Manitoba Agriculture, Food and Rural Initiatives

1965-2012: Western Canada Average Rape/Canola Yield



Source: Statistics Canada; Agriculture and Agri-Food Canada; Manitoba Agriculture, Food and Rural Initiatives

DuPont Pioneer 2013 Canola Overview

- Canola GM Trait Development
  - Pioneer® brand Optimum® Gly herbicide tolerant Canola
  - Pioneer® brand canola with Liberty Link® trait
- Pioneer Protector® brand Sclerotinia & Clubroot
- Native Traits
- Increased R&D Investment into canola from Pioneer

Optimum(R) GLY herbicide tolerant canola

- De-Regulated in Canada and US (first developed GM trait from DuPont Pioneer)
- Trait selected and hybrid integration taking place; performance looks encouraging
- Increased crop safety – opportunity for greater weed control flexibility
- Pending all over-seas regulatory approvals -- on track for mid-decade launch

Pioneer® brand canola with the LibertyLink®

- Deregulated in US and Canada
- Hybrid development fully engaged; performance is very encouraging
- Field scale product testing and evaluation will take place in 2014
- Seed production risk taken to ensure good supply for mid-decade launch

“NEW” way to manage Sclerotinia (White Mold)

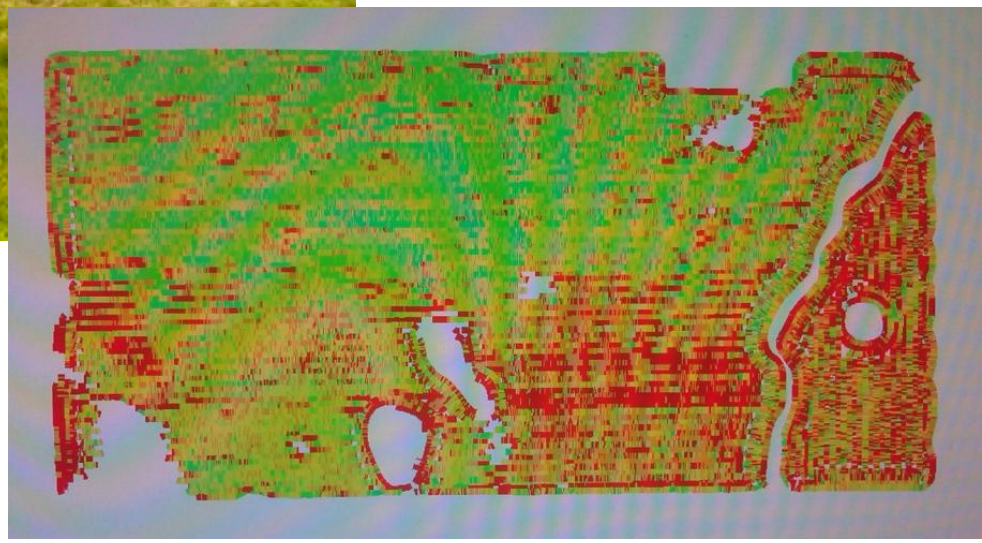
Stem Comparisons

45H31 - 55% infected

45S52 - 13% infected

Nanton, AB; August, 2012

- Both stem and leaf resistance
- Pioneer has a 15-20 year history into the research, breeding, and development of sclerotinia tolerant products!

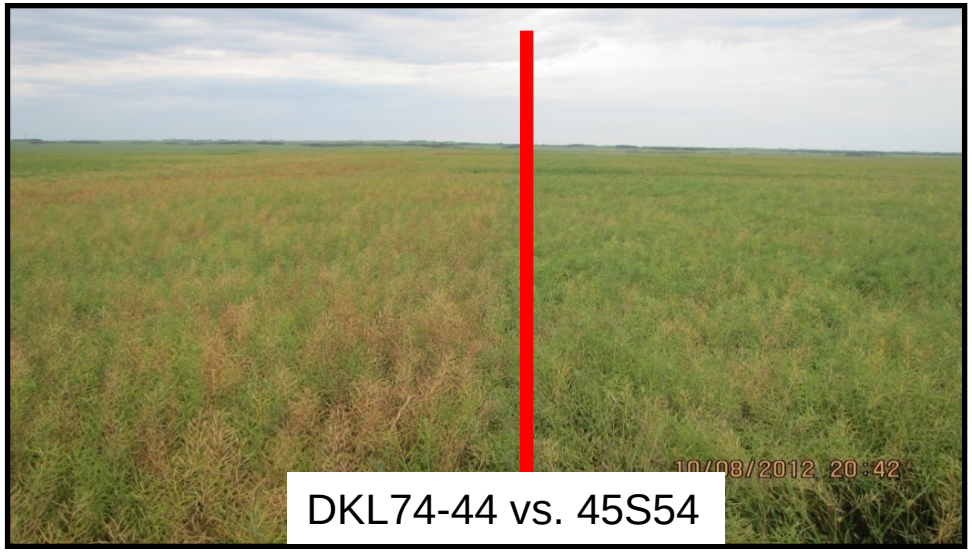


- 400 lbs/ac difference at harvest
- Seed Premium at $3-5 /ac

Recent Technological Advancements from DuPont Pioneer

PIONEER PROTECTOR® SCLEROTINIA

Pioneer® hyrbid 45S51 – *first commercial sclerotinia resistant hybrid (2009)*



DKL74-44 vs. 45S54

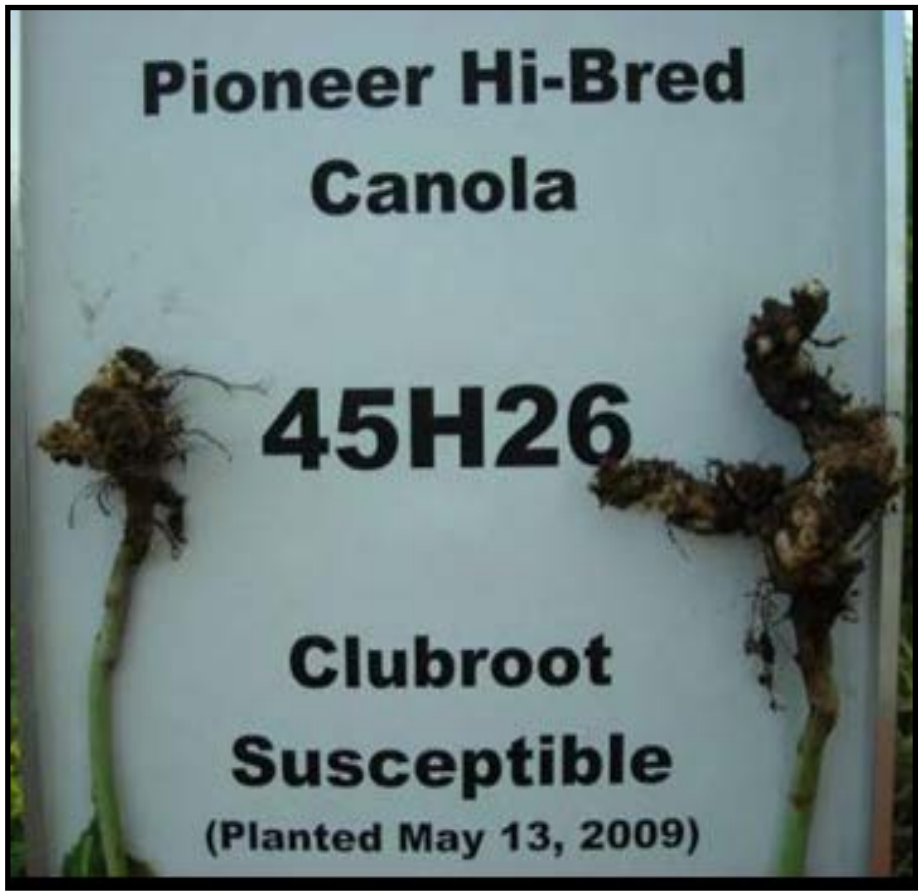
. . . Where do we go from here . . .

PIONEER PROTECTOR® CLUBROOT

Pioneer® hybrid 45H29

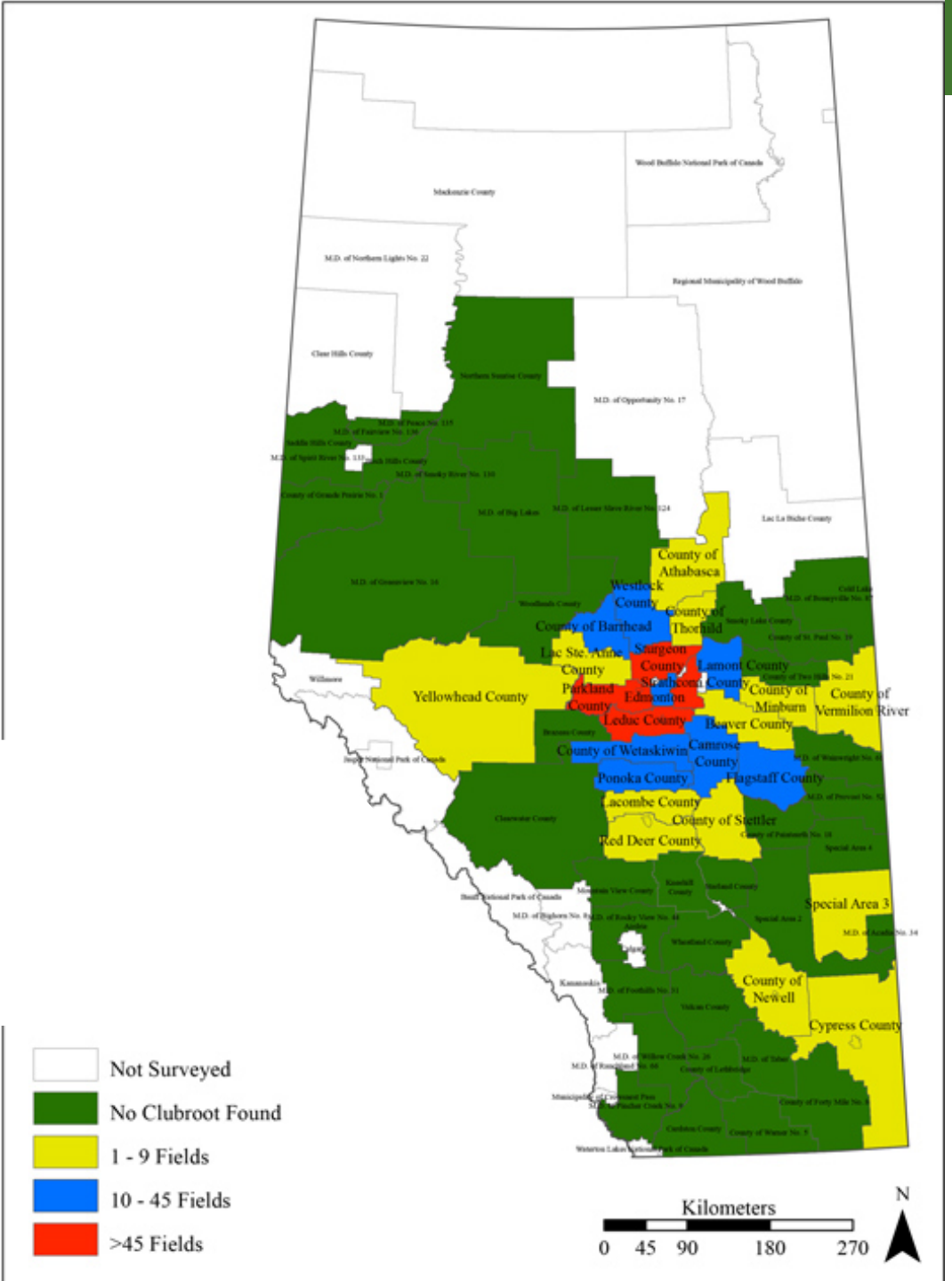
The *first* Clubroot Resistant Canola Hybrid (2009)

PIONEER PROTECTOR CLUBROOT



Pioneer® hybrid 45H29 – *first commercial clubroot resistant canola in the market*

DUPONT PIONEER



Clubroot is moving significantly in Alberta over the last 10 yrs (2003).

Some fields in Saskatchewan now confirmed and identified.

Manitoba infestation confirmed in two fields.

N.Dakota infestation confirmed in one field (2013).

Source: Cumulative Clubroot Infestations (2003-2012), University of Alberta, Alberta Government

Native Traits

- Future of plant breeding is in enhanced native trait expression
  - Molecular marker selection
  - Able to legally gain proprietary protection
  - Economically more feasible to bring to market
  - No regulatory hurdles/delays

Canola Research Targets for Native Traits:

- Shattering Tolerance
- Cold tolerance / stress tolerance
- Blackleg
- Drought Tolerance
- Nitrogen Use Efficiency
- Flea Beetle (GM)

- Trait Integration
- Stacks (CR/Sclero, Shatter/Sclero, etc.)

PIONEER PORTFOLIO: CANOLA TRAITS

Trait	Challenge Met	Grower Benefit	R&D Progress	Status
Sclerotinia Resistance (SCL1)	Global disease: Significant yield loss & fungicide use.	Reduce disease incidence & yield loss by 50-60% (moderate)		First to market in NA (2009), no competitive offering yet. Transfer of trait to other markets underway
★ Sclerotinia Resistance (SCL2)	Global disease: Significant yield loss & fungicide use.	Reduce disease incidence & yield loss by 75-80%, make fungicide use uneconomic.		Early pre-commercial, launch by 2015 in NA
Enhanced Blackleg Resistance ★	NA/EU/AU: Yield loss, reduced oil content.	Improved resistance & yield protection under a range of rotational scenarios		Advanced pre-commercial in all markets
Clubroot Resistance	NA/EU: Disease spreading, new races emerging. Substantial yield loss & risk.	Yield protection, reduced inoculum, normal rotations possible.		Commercial: North America Advanced Pre-commercial: EU
★ Reduced Shatter	Reduced yield loss, increased harvest flexibility	Increased harvest flexibility, reduced yield loss under adverse conditions.		Advanced development in North America
★ Optimum® GLY Canola	Weeds reduce grain & yield quality. Shifts in weeds can complicate rotations.	Superior option for broad spectrum post emergent weed control		Pre-commercial (pre-launch)
★ LibertyLink® Trait	Weeds reduce grain & yield quality. Shifts in weeds can complicate rotations.	Valuable rotational herbicide offering.		Pre-commercial (pre-launch)

- In Development
- Pre-commercial
- Commercial

In-Development: Abiotic Stress Defense ~ i.e. cold tolerance; trait stacks

©2012 PHII

Lethbridge, AB – Canola seed production facility and seed production research

Georgetown, ON – Worldwide canola breeding HQ and parent seed facility for Pioneer

Investment – Carman, MB

Thank You
Questions?

DUPONT
PIONEER

HERBICIDE TOLERANT TRAIT: Hybrids and varieties with the Roundup Ready® gene (RR) are tolerant to labeled rates of Roundup® branded herbicides. This technology allows for post-emergent applications of Roundup without crop injury or stress (see herbicide label). Labeled Roundup herbicide should only be used over the top of those hybrids and varieties that carry the Roundup Ready designation. **Hybrids and varieties with the CLEARFIELD® trait (CL)** are tolerant to labeled rates of Beyond®, Odyssey® or Absolute® herbicides. This technology allows for post-emergent applications of these herbicides without crop injury or stress (see herbicide label). Labeled herbicides should only be used over the top of those hybrids and varieties that contain the CLEARFIELD trait.

The unique Clearfield symbol and Clearfield® are registered trademarks of BASF.
Roundup Ready® and Roundup® are registered trademarks used under license from Monsanto Company.
Liberty®, LibertyLink® and the Water Droplet Design are trademarks of Bayer
All products are trademarks of their manufacturers.

The DuPont Oval Logo is a registered trademark of DuPont.
PIONEER® brand products are provided subject to the terms and conditions of purchase which are part of the labeling and purchase documents. ®, TM, SM Trademarks and service marks of Pioneer. © 2013 PHII.