

The Changing Climate of Oats: An international perspective

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Collaborative Oat Research Meeting

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Sponsored by the
North American Millers' Association
The link between grain and goodness.



COLLABORATIVE OAT RESEARCH ENTERPRISE



Agriculture and
Agri-Food Canada



Agriculture et
Agroalimentaire Canada



The Quaker International Oat Nursery

Objectives

- To support oat breeding programs that are not well developed or lack the technical expertise, facilities, manpower, or other resources to effectively operate independently.
- **To distribute improved and unique germplasm around the world so that yield, milling quality, disease resistance, and genetic diversity of oats are maximized in all participating oat breeding programs.**
- To evaluate advanced lines and provide useful data to the originating breeders about agronomic performance and effectiveness of disease resistance in diverse environments.



The Quaker International Oat Nursery

Nursery Composition

- **Pure lines for use as parents**
 - 100 per year of the best lines available from cooperators
 - Diverse program sources
 - Disease resistance
 - Quality and agronomic traits
- **Segregating Populations for selection and development of lines**
 - 150 per year
 - Crosses made by nursery coordinators
 - Combine desirable traits from diverse lines not normally available to individual breeders



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484 Pure Lines 2007 - 2010

101 FL	University of Florida and LSU AgCenter
83 MN	University of Minnesota
57 LA	LSU AgCenter and University of Florida
31 SD	South Dakota State University
27 UPF	University Paso Fundo – Brazil
20 UFRGS	University Federal Rio Grande de Sol - Brazil
20 NZ	New Zealand
18 OT, OA, LAO	Canada public programs
15 IL	University of Illinois
14 ND	North Dakota State University
12 BW	INTA – Barrow, Argentina
11 TX	Texas A& M University

Many other lines: Uniform Early and Midseason Regional Nurseries, Australia, Iowa State, Wisconsin, Chile, etc.



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2014 QION SOURCES

		BREEDER	NURSERY	Country / Source
F2	34	Steve Harrison	SEG POPS	Louisiana
F3	41	Steve Harrison	SEG POPS	Louisiana
F2	46	Ron Barnett / Ali	SEG POPS	Florida
F3	24	Ron Barnett / Ali	SEG POPS	Florida
F4	12	Ron Barnett / Ali	SEG POPS	Florida
PURE LINES	40	NA Spring Oat Breeders	UEOPN / UMOPN	Various
	12	Liz Zechner	Advanced Lines	Austria
	4	Steve Harrison	Advanced Silage	Louisiana
	14	Liliana Wehrhana	Advanced Lines	Argentina
	6	Monica Mathias	Advanced Lines	Chile
	20	Ron Barnett / Ali	Advanced Lines	Florida

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2012 QION SOURCES

		BREEDER	NURSERY	Country / Source
F3	49	Steve Harrison	SEG POPS	Louisiana
F3	13	Ron Barnett / Ali	SEG POPS	Florida
F4	52	Ron Barnett / Ali	SEG POPS	Florida
PURE LINES	36	NA Spring Oat Breeders	UEOPN / UMOPN	Various
	9	Steve Harrison	ADVANCED LINES	Louisiana
	20	Ron Barnett / Ali	ADVANCED LINES	Florida
	24	Keith Armstrong	ADVANCED LINES	New Zealand
	16	Luiz Federizzi / Marcello	ADVANCED LINES	Brazil

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Segregating Populations

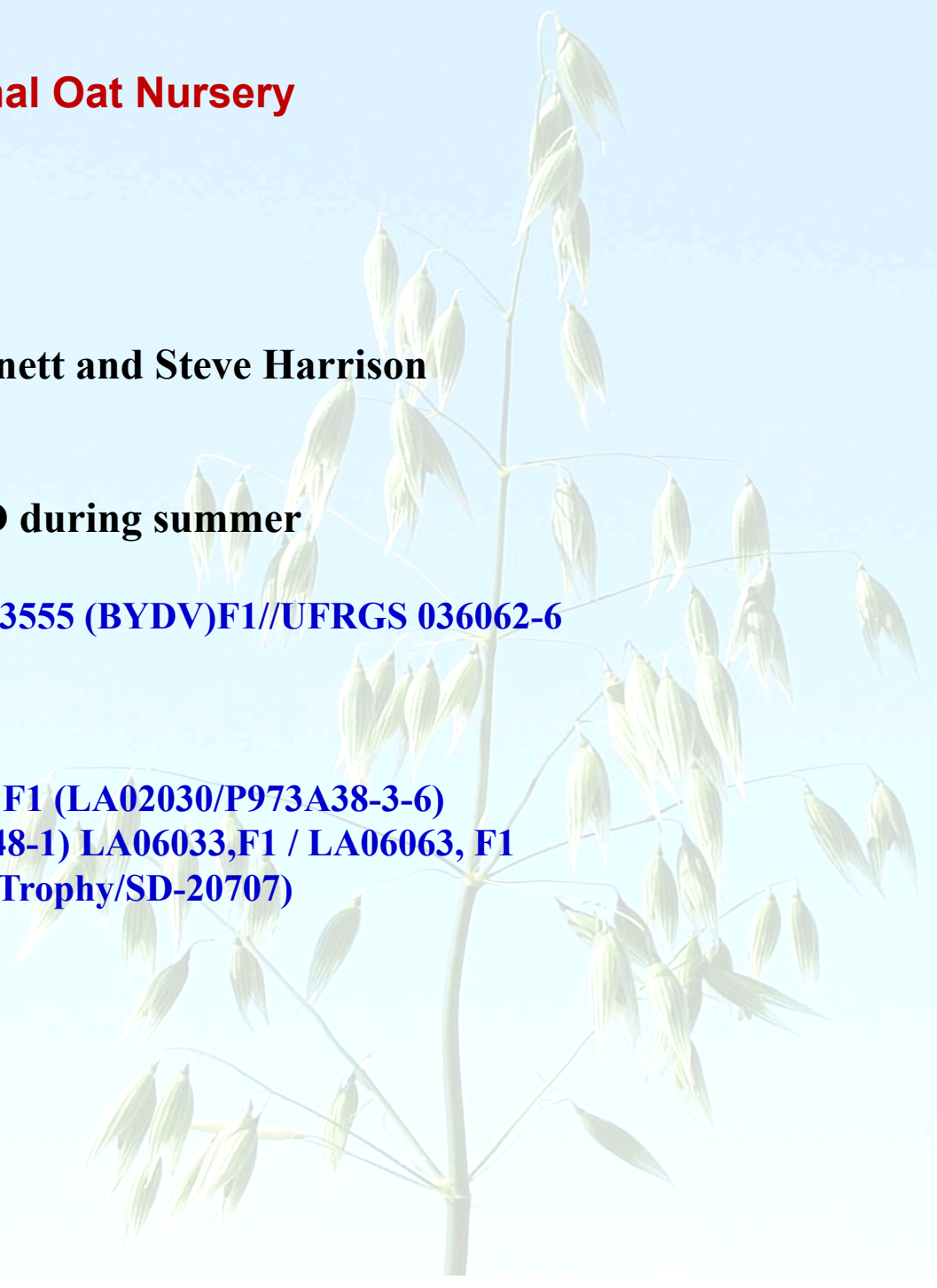
- **Crosses primarily made by Ron Barnett and Steve Harrison**
- **Targeted for specific environments**
- **Usually topcross / 3-ways**
- **F1 or F2 seed grown in Aberdeen, ID during summer**

FL07011 **FL06033 (Hzn 474/IL 3555 (BYDV)F1//UFRGS 036062-6**

FL0741 **Ave135 / P0216A1-1**

LA07061 **OA01042-8/LA06010, F1 (LA02030/P973A38-3-6)**

LA07053 **(Trophy/UFRGS046048-1) LA06033,F1 / LA06063, F1
(Trophy/SD-20707)**



The Quaker International Oat Nursery Partners

Locations and Cooperators:

Argentina (2)	Lilian Wehrhahne, Federico Moreya
Australia	Jim Hull, Robert Park
Brazil	Luiz Federizzi, Marcello Pacheco
Canada (3)	Jennifer Mitchell-Fetch, Jim Menzies, Weikai Yan, Aaron Beattie
Chile	Monica Mathias, Haroldo Salvo
Mexico	Eduardo Rangel
Morocco	Chaouki Alfaiz
New Zealand (2)	Keith Armstrong, Robert Johnson
South Africa	Ebon Von Well
Tunisia	Mohamed Chakroun
Turkey (2)	Zeki Mut, Sait ceri'
United Kingdom	Sandy Cowan
Uruguay	Federico Condon
US	Ron Barnett, Steve Harrison, Kathy Klos



The Quaker International Oat Nursery

Release Procedures

- **Established Protocols**
- **Protected IP**



South America Travels and Experiences







The most valuable/successful plant breeding programs have several traits in common. These include:

- 1. Maturity of the program**
- 2. Experience and continuity of the breeder**
- 3. Extensive germplasm base and exchange**
- 4. Widespread testing and collaboration**
- 5. Integration of scientists across disciplines in a team approach**
- 6. Adequate personnel, equipment, and \$\$ resources**
- 7. Willingness to embrace change**

Some of these attributes are very difficult to maintain in the current climate of reduced funding, rapidly changing focus on institutions, and the desire for instant results.



**Saturday, Dec 15, 2012.
Temuco Chile**

Mega Issues Impacting Public Plant Breeding:

(Roger Boerma – 2011 Southern Seedsmen's Assn)

-LACK OF PUBLIC FUNDING

-varietal development is a state or regional issue

- varietal development not major societal issue
- results in unfilled plant breeding positions

-AGING AGR. EXP. STN. INFRASTRUCTURE

-support scientists are not being maintained

- offsite testing stations are expensive
- new technologies require capital funds
- most commodity commission (grower) support does not provide overhead (IDC)

-STRUGGLE TO MAINTAIN SEED INFRASTRUCTURE

-crop improvement associations

-foundation seed organizations

-marketing public-developed cultivars

-LACK OF PRIORITIZATION IN AGR. EXP. STNS.

-many continue to address everything

-difficultly in working across state lines



The Biggest Challenges Facing Oat Breeders Also Include:

- **Few breeders / geneticists / pathologists**
- **Limited financial and industry support**
- **Few modern molecular technologies**
- **Diverse end uses and environments**
- **Lots of diseases**



SUNGRAINS BREEDERS



Jerry Johnson	Wheat Breeder	Univ of Georgia
Dan Bland	Wheat Breeder	Univ of Georgia
Paul Murphy	Wheat Breeder	NC State Univ
Ron Barnett	Oat/Trit Breeder	Univ of Florida
Ann Blount	Oat/Trit Breeder	Univ of Florida
Esten Mason	Wheat Breeder	Univ of Arkansas
Steve Harrison	Wheat/Oat Breeder	LSU AgCenter
Russell Sutton	Wheat Breeder	Texas A&M
Bryan Simoneaux	Oat Breeder	Texas A&M
Amir Ibrahim	Sungrains Breeder	Texas A&M

Not all oats are intended for milling and food use





Oats in the Southern US are used for:

- Grain for horses and other livestock
- Winter pasture
- Conservation tillage and cover crops
- Wildlife food plots

Southern US oats are not used for human food - milling

Our breeding programs target all of these end uses.

We are very aggressive and opportunistic in seeking out new uses and markets.

Oat Uses in the Southern US

- Forage for Livestock and Wildlife Grazing



Oats as Wildlife Food Plots



Considerations in Breeding Oats for Wildlife Foodplots

- **Forage Yield**
- **Seed Yield**
- **Quick Establishment and Weed Competition**
- **Persistence under Heavy Grazing**
- **Deer Preference**
- **Cold and Waterlogging Tolerance**
- **Broad Adaptation**
- **Hunter Appeal**

Oats as Winter Forage and Silage



**Things I have learned during
my international endeavors**



A wide, flat, sandy beach with a piece of driftwood in the center and a dark object on the right.

**Plant Breeders are
the rednecks of scientists,
and the scientists of rednecks**

A wide, flat, sandy beach with scattered debris and a piece of driftwood in the center. The sand is light-colored and shows some tracks and small indentations. In the center, there is a piece of dark, weathered driftwood. To the right, there is a dark, rounded object, possibly a piece of trash or a rock. The horizon is flat and extends to the top of the frame.

Most people are smarter than me



You can learn a lot from smart friends

Smart friends are good to have

A critical core of research scientists is essential. The only way to maintain this is oats is through international collaboration.

Oat breeders are good people. They obviously have forsaken personal gain for the public good.



Crown Rust is the Devil

Deon was right.



Oats is a really versatile crop

Ron Barnett taught me to be opportunistic

Keith Armstrong is another good example of finding oat niches



International Germplasm Sharing is Essential

Plant breeders are a lot more willing to share than administrators

Plant breeders see opportunity

Administrators see \$\$



Be prudent in how you incorporate international germplasm

You can ruin a good forage oat with crown rust resistance from Brazil or Minnesota. Cows don't care about B-glucan or milling percentage.




The oat community needs commitment, coordination, and funding to develop and apply technology to oat improvement.

Those tools need to be user friendly for breeders. Most oat breeders work in relative isolation. They do not have easy access to biometricians, molecular biologists, or even pathologists. Technology fails when those who need it most do not have the resources to utilize it efficiently.



**Millers and Food Product Producers
dream of having a proprietary magic oat
variety that will solve all of their problems**

**They make their living by producing a better product more
efficiently with the same varieties as everyone else uses.**

A photograph of a sandy beach with a piece of driftwood in the center. The text is overlaid on the image.

Good International Collaboration depends on trust and collegiality of the researchers. You have to believe the other scientist understands and respects your rights, and wants mutual benefit.

It really has little to do with MTAs or other signed agreements



Oats are truly a global crop.