

# Life after CORE

Jean-Luc Jannink, Dave Matthews, Vic Blake, Clay  
Birkett, James Clohessy, Yung-Fen Huang, Nick Tinker  
USDA-ARS and Cornell University, Ithaca, NY  
Agriculture and Agri-food Canada, Ottawa, CA  
AOWC, Ottawa, Canada 14 July 2014

On this 225<sup>th</sup> anniversary of the  
French Revolution...

Let them each oat cakes!



Oat workers unite!

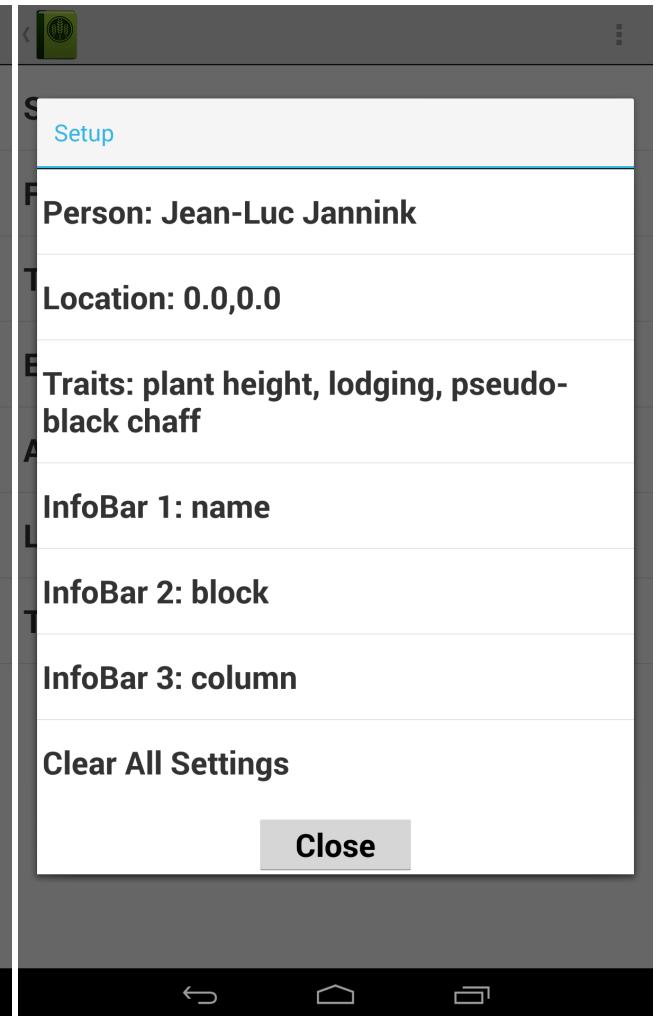
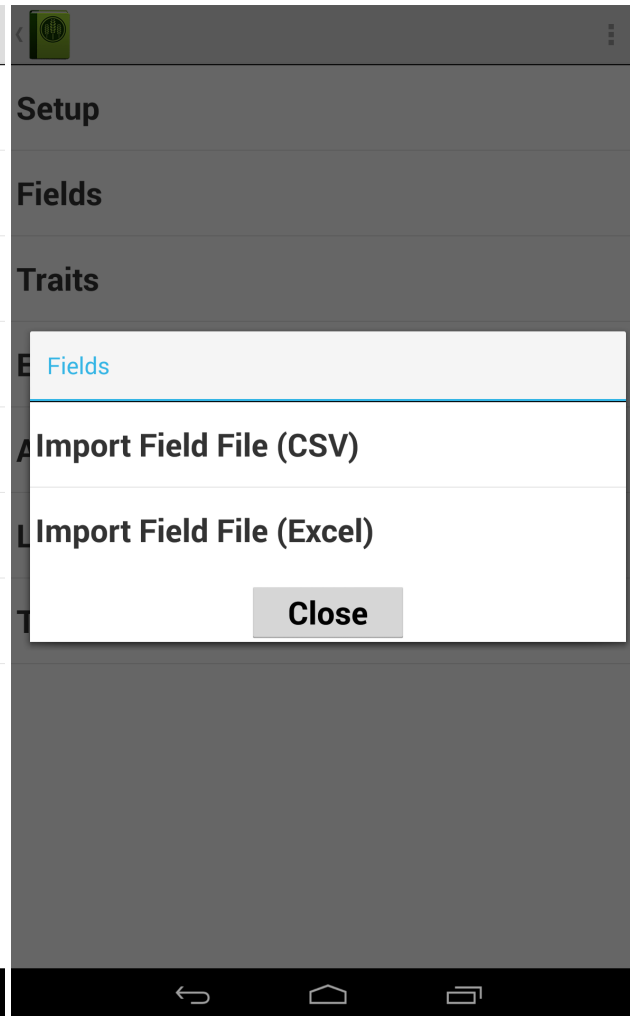
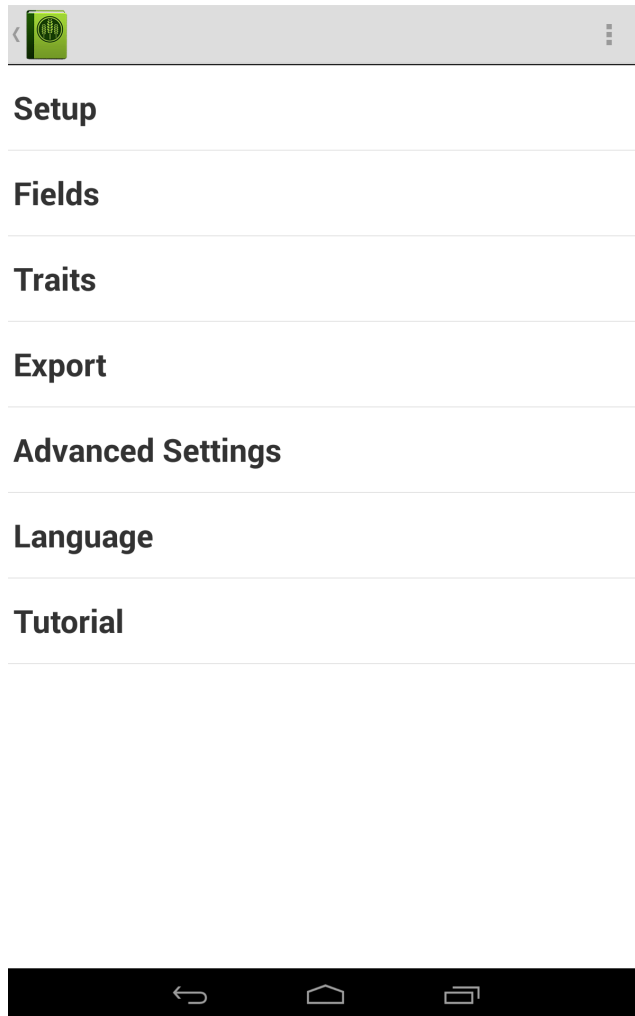
# Sharing oat data

- Somewhat blinkered view
  - Benefits of breeding information technology
- Expanded view
  - Benefits of sharing data, results, and tools in the community
- Road map
  - Oat Global
  - GrainGenes
  - T3/Oat

# Blinkered view of blinkered view

- Demo of some T3 features
  - Experimental design
  - Android Field Book information capture
  - Upload back to T3
  - Visualization of comparison of trials
  - 3D clustering of lines

# Android Field Book operations



# Android Field Book data collection

The image displays three sequential screenshots of the Android Field Book app interface for data collection. Each screenshot shows the same header with a search icon, 'SEARCH', and 'RESOURCES'. The main content area is divided into three panels, each for a different trait.

**Panel 1: plant height**  
name: LASSIK  
block: 1  
column: 1  
Trait Details: Distance from the soil to tip of spike excluding awns  
range: 1  
plot: 1001  
Current Value: [Empty input field]  
A numeric keypad is visible at the bottom of this panel.

**Panel 2: lodging**  
name: LASSIK  
block: 1  
column: 1  
Trait Details: Measurement of percentage of plants that lodged.  
range: 1  
plot: 1001  
Current Value: 26%  
A blue slider bar is positioned above the 'Clear' button.

**Panel 3: pseudo-black chaff**  
name: LASSIK  
block: 1  
column: 1  
Trait Details: Brown to black discoloration of the glume  
range: 1  
plot: 1001  
Current Value: TRUE (displayed in a green circle)  
A 'Clear' button is located below the green circle.

At the bottom of the image, there are three identical Android navigation bars, each containing a back arrow, a home icon, and a recent apps icon.

# T3/Oat

← → ↻ 🏠 triticeaetoolbox.org/oat/ 🔍 ☆ 📍 📧 📄 ☰

📁 Apps 📁 com 📁 Ithaca 📁 Google 📁 Code 📁 Journals 📁 Cornell 📁 USDA 📁 Data 📁 TCAP 📁 Cassava 📁 Mendeley 📁 Curso GWS 📁 Imported From Firef... 📁 Other Bookmarks

Contact Us

## T3/Oat

Home Select Analyze Download Manage About T3

### Quick Links

[Login/Register](#)

Current selections:

[Lines](#): 0

[Markers](#): All

[Traits](#): 0

[Trials](#): 0

### What's New

28 Jan 2014

Created, ready for some data.

27 Feb 2014

Winnipeg 1994-2007 UMO PN trials

## Home: T3/Oat

### Welcome to T3/Oat!

T3/Oat is the repository of oat phenotype and genotype data for the Global Oat Genetics Database, a project initiated in January 2014 by

- Gabe Gusmini (PepsiCo)
- Joe Lutz (General Mills)
- Bruce Roskens (Grain Millers)
- Nicholas Tinker (AAFC)
- Kay Simmons, Jack Okamuro, Jose Costa, Jean-Luc Jannink, and Gerard Lazo (USDA-ARS)

For more information see the [Oat Global](#) website.

T3/Oat is built using the database schema and software developed for [The Triticeae Toolbox](#) (T3). T3 is the web portal for wheat and barley data generated by the [Triticeae Coordinated Agricultural Project](#) (T-CAP), funded by the National Institute for Food and Agriculture ([NIFA](#)) of the US Department of Agriculture ([USDA](#)). [More...](#)

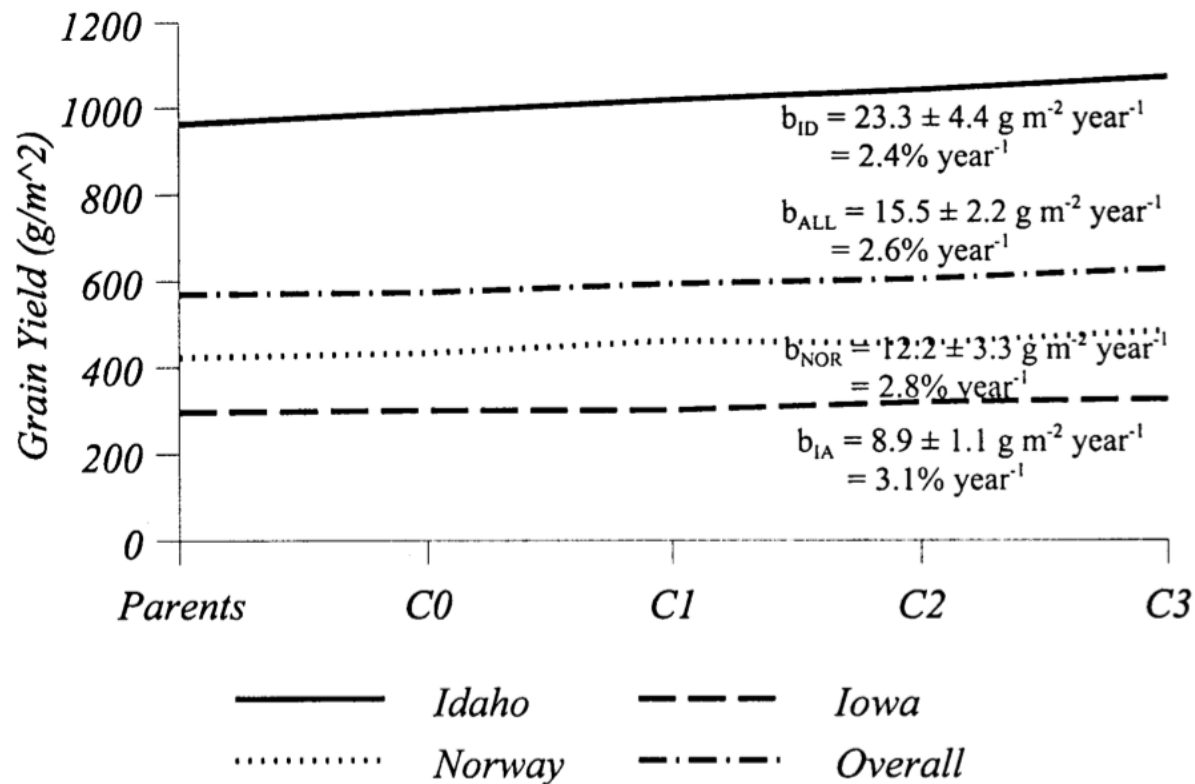
**Participants:** The templates and instructions for data submission are [here](#). If your data are not totally public, please check the [Data Usage Policy](#).

[Data submission](#)

# Ames / Aberdeen / Ås

## Recurrent selection in oat for adaptation to diverse environments

J.B. Holland<sup>1,2</sup>, Å. Bjørnstad<sup>3</sup>, K.J. Frey<sup>1</sup>, M. Gullord<sup>4</sup>, D.M. Wesenberg<sup>5</sup> & T. Buraas<sup>4</sup>





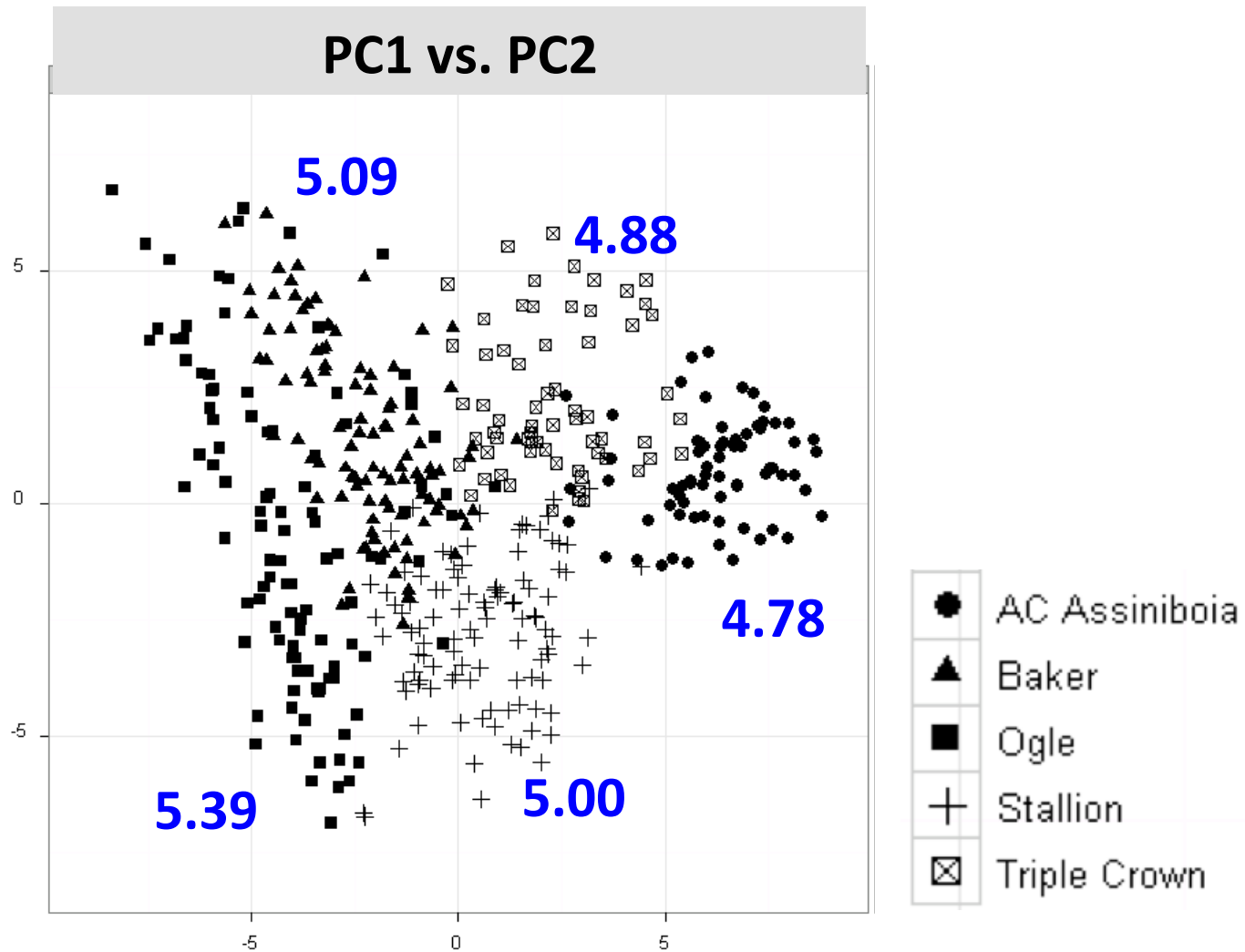
## *Mea culpa*

- Further cycles of selection were performed on the AAA experiment
- When I arrived in Ames, I handled data management poorly
- The results are lost to science (not to mention the oat improvement world)

# Analysis of 1996 to 2007 UOPN

- Lines from UOPN and QUON with BG
- Seed from everyone: THANK YOU
- 470 DNA samples sent to Diversity Arrays
  - Marker scores on 446
- ~ 2300 BG records; 129 (!) env.; 10 years
- Scored 1295 named DArT markers

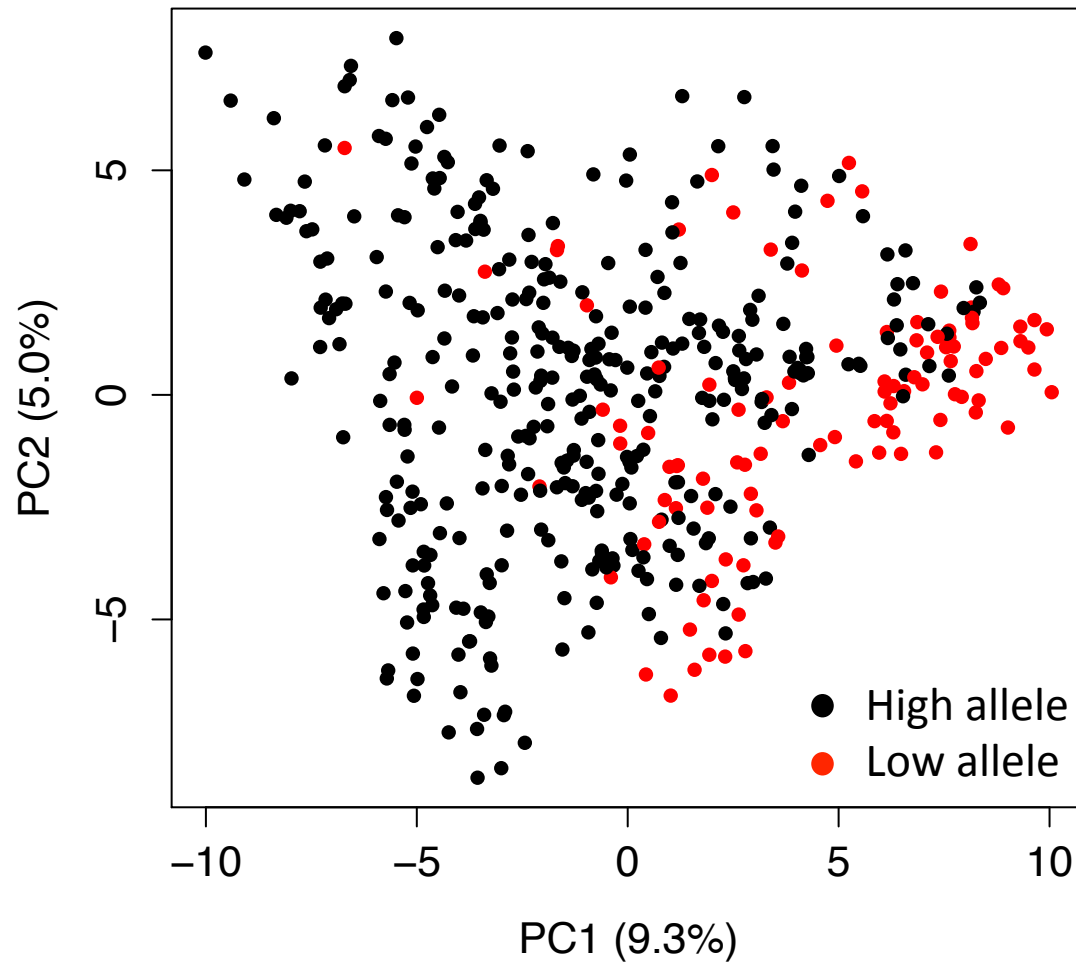
# Structure in elite N.A. oat



# Final list of candidates

- oPt.0133
  - Homolog close to *Cs/F*
  - Detected in NPGS panel, not in Elite panel
- oPt.12074
  - Homolog close to *CesA2*
  - 12 cM from *cdo484A* of De Koeyer et al. 2004
- oPt.12985
  - < 1 cM from *cdo346A* of Kianian et al. 2001
  - Identified in all analyses of elite panel
  - 3 g / kg difference between homozygotes

# oPt.12985 in elite populations



# Re-imagining the UOPN

- 11 Agronomic traits and 3 diseases

UOPN as currently practiced

	UEOPN		UMOPN	
	Locs	Entries	Locs	Entries
1996	12	31	20	35
2004	11	29	17	32
2013	8	28	17	36

UOPN unreplicated and with 4 locs / entry

	UEOPN		UMOPN	
	Locs	Entries	Locs	Entries
2013	8	<b>168</b>	17	<b>432</b>

# The pitch

- These collaborative analyses are informative
- Information management is an obstacle
- Remove that obstacle to dissect new traits every year
- **Aim to leVErage noN-oAt efforts**
- **cOllAboraTe**

# Road map to collaboration

- Oat Global
- GrainGenes
- T3/Oat



# Oat Global

## Global Oat Genetics Database

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### March 11<sup>th</sup>, 2014 Conference Call

#### Attendees

- Catherine Howarth (cnh@aber.ac.uk)
- Gabe Gusmini (gabe.gusmini@pepsico.com)
- Gerard Lazo (gerard.lazo@ars.usda.gov)
- Jean-Luc Jannink (jeanluc.work@gmail.com)
- Tinker, Nicholas (Nick.Tinker@AGR.GC.CA)

#### Minutes

#### Project Structure

Updated committees as follows:

- Steering Committee: Jack Okamuro (USDA-ARS), Gabe Gusmini (PepsiCo), Joe Lutz (General Mills), Bruce Roskens (Grain Millers), **to be designated (POGA)**, Nicholas Tinker (AAFC), Catherine Howarth (European Oat Community), **Pamela Zwer (Austral-Asian Oat Community)**.
- Project Committee: Jean-Luc Jannink (TCAP), Gerard Lazo (GrainGenes), Dave Matthews.



## Navigation

- [Calendar](#)
- ▶ [Forums](#)

## User login

Username \*

Password \*

- [Create new account](#)
- [Request new password](#)

[Log in](#)

[Home](#) » [About OG](#)

## About OG

In recent years there has been a tremendous growth in datasets of *Avena* genomic, phenotypic, and breeding information as a result of cooperative public/private research activities from the oat breeding and genetics community. The Collaborative Oat Research Enterprise (CORE) was a major initiative in North America resulting in the establishment of a genomic platform for oats. The USDA-ARS GrainGenes project has tracked some of these advances in oat research. Meanwhile, multiple initiatives and research projects have developed additional datasets in North America and Europe. These datasets are currently housed in different databases and access by the broad community is challenging; this Oat Global site attempts to relate topics important to oat research.

### Vision

By the end of 2014 the oat breeding and genetics community and the oat millers and growers will be able to share genotypic, metabolic, and phenotypic data in a shared global database. Every user will be able to contribute and access data from genetic studies, breeding populations, and field trials of oat varieties from all regions and public and private researchers.

This tool will enable open sharing of raw data supporting scientific publications, variety releases, and coordinated or individual trialing efforts. The outcome will be a networked and unified community that builds knowledge exponentially by rapidly embracing the "era of big data" and the most modern computational techniques.

### Initiative

**Oat Global** is a project organized in January 2014 by

- Gabe Gusmini (PepsiCo)
- Joe Lutz (General Mills)
- Bruce Roskens (Grain Millers)
- Nicholas Tinker (AAFC)

with participation of USDA-ARS and consultation with public and private oat breeders in Canada and the US.

« **July** »

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
<a href="#">13</a>	<a href="#">14</a>	<a href="#">15</a>	<a href="#">16</a>	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

- [American Oat Workers Conference](#)  
07/13/2014 to 07/16/2014
- [Plant & Animal Genome XXIII](#)  
01/10/2015 to 01/14/2015



**Oat Global**

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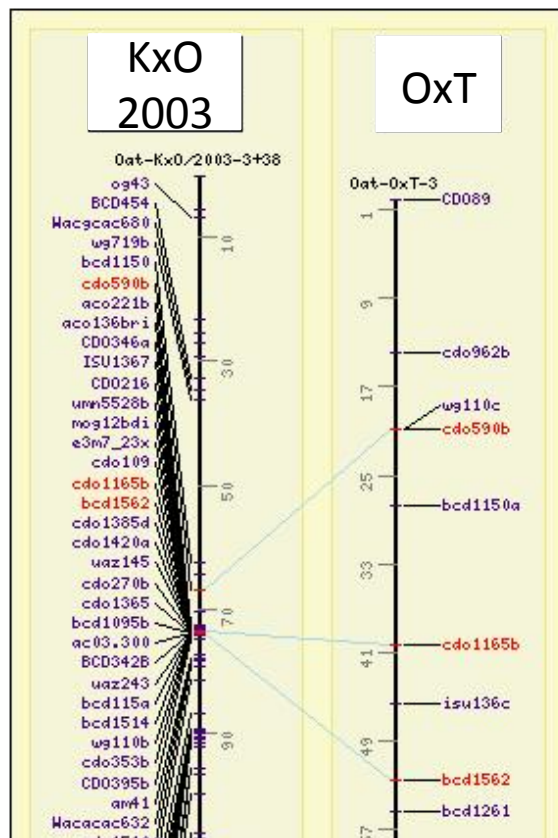
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		1	2	3	4	5
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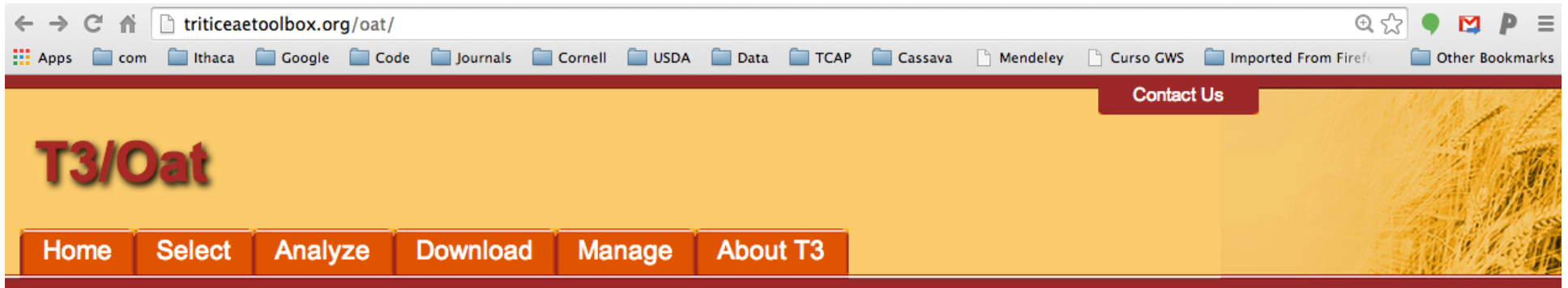
# GrainGenes



- Avena is still very much a part of GrainGenes
- A new scientist will be hired to lead GG
- The GG Liaison Committee is re-invigorated
- USDA-ARS has recognized the importance of GG with \$\$



# T3/Oat



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📁 Apps 📁 com 📁 Ithaca 📁 Google 📁 Code 📁 Journals 📁 Cornell 📁 USDA 📁 Data 📁 TCAP 📁 Cassava 📁 Mendeley 📁 Curso GWS 📁 Imported From Firef... 📁 Other Bookmarks

**T3/Oat** [Contact Us](#)

[Home](#) [Select](#) [Analyze](#) [Download](#) [Manage](#) [About T3](#)

## Quick Links

[Login/Register](#)

**Current selections:**

[Lines](#): 0

[Markers](#): All

[Traits](#): 0

[Trials](#): 0

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[Data submission](#)

**Data submission**

# Data going into T3/Oat

## CORE

Location	Panel	Year	Agronomic	Disease
Aberdeen, ID	AFRI109	2010	yes	na
		2011	yes	na
	Spring	2010	yes	na
		2011	yes	na
	Winter	2010	yes	na
		2011	yes	na
Aberystwyth, UK	AFRI109	2010	yes	yes
		2011	yes	yes
	Spring	2010	yes	yes
		2011	yes	yes
	Winter	2010	na	na
		2011	na	na
Baton-Rouge, LA	AFRI109	2010	na	na
		2011	na	yes
	Spring	2010	na	na
		2011	na	yes
	Winter	2010	na	na
		2011	na	yes
Castroville, TX	AFRI109	2010	na	yes
		2011	na	yes
	Spring	2010	na	yes
		2011	na	yes
	Winter	2010	na	yes
		2011	na	na
Fargo, ND	AFRI109	2010	yes	yes
		2011	yes	yes
	Spring	2010	yes	yes
		2011	yes	yes
	Winter	2010	yes	yes
		2011	yes	yes
Urbana, IL	AFRI109	2010	na	yes
		2011	na	yes
	Spring	2010	na	yes
		2011	na	yes
	Winter	2010	na	yes
		2011	na	yes
West Lafayette, IN	AFRI109	2010	na	yes
		2011	na	na
	Spring	2010	na	yes
		2011	na	na
	Winter	2010	na	na
		2011	na	na

## Uniform Early and Midseason Oat Performance

Data from the State Agricultural Experiment Stations and USDA-ARS.  
Contributed by Richard Halstead, University of Minnesota.

- 2013: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2012: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2011: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2010: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2009: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2008: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2007: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2006: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2005: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2004: [UE-OPN](#) | [UM-OPN](#) | [.xls versions](#)
- 2003 | [.xls versions](#)
- 2002 | [.xls versions](#)
- 2001 | [.xls versions](#)
- 2000 | [.xls versions](#)
- 1999 | [.xls versions](#)
- 1998 | [.xls versions](#)
- 1997 | [.xls versions](#)
- 1996 | [.xls versions](#)

[Spring oat cultivar releases](#) from these nurseries, from Howard Rines



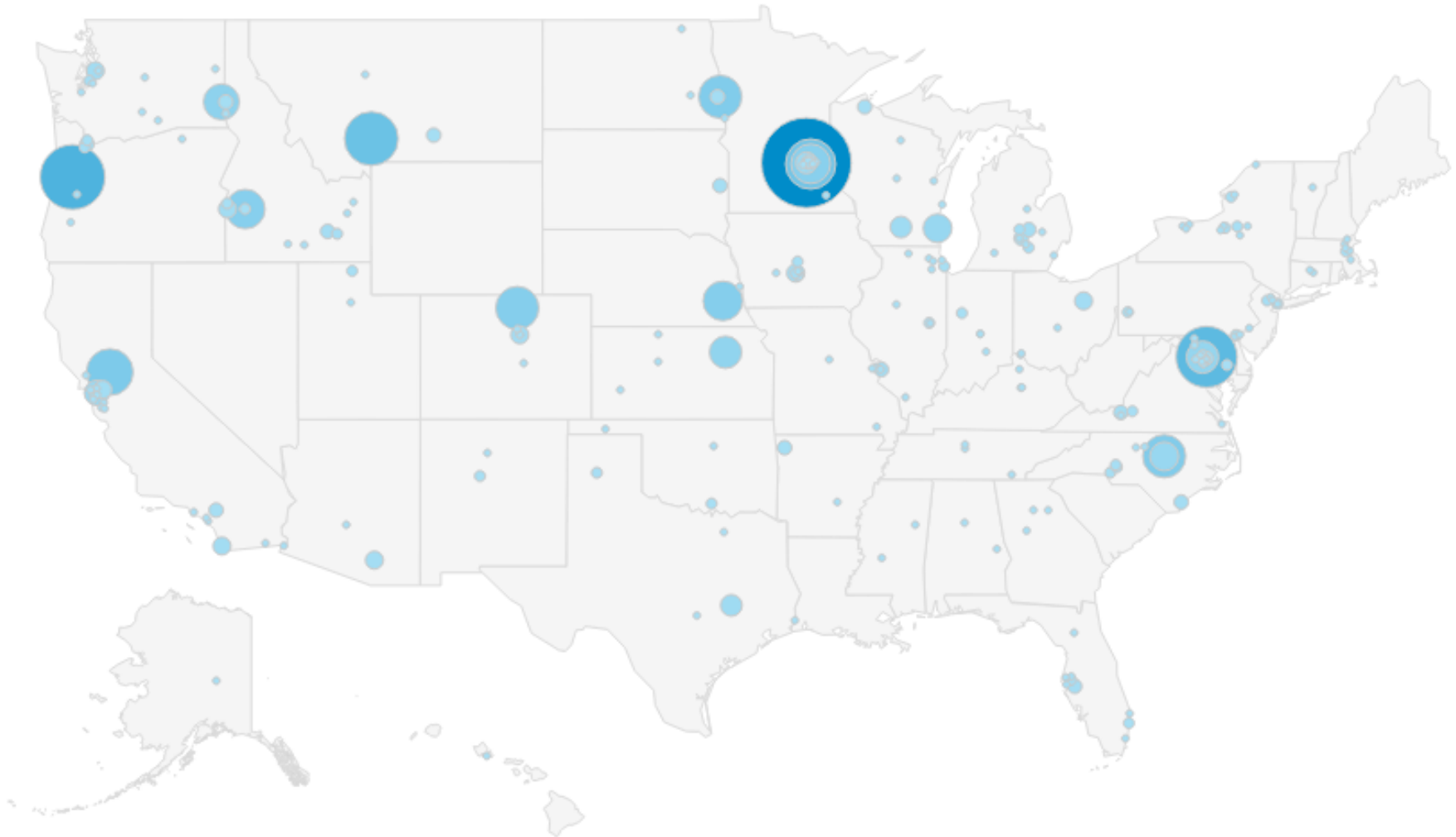


# Oat data curator

- Upload all CORE data (markers, traits, pedigrees)
- Coordinate with UOPN to upload evaluations annually
- Work with breeders to train, identify needed functions and facilitate data sharing
- Assist in providing data to Oat Global

**Thanks NAMA and POGA!**

# Role for the global breeding community



1  522

# Role for the global research community

- If granting agencies require it, T3/Oat provides a mechanism to make your data public
- Please devote a healthy budget proportion to your information technology budget:
- T3/Oat can be a focus of method sharing as well as data sharing: it's all open source

# POOL

Français



## Pedigrees of Oat Lines (POOL): Details of entry 98

[ [Home](#) ] [ [About](#) ] [ [Submit or update data](#) ] [ [Statistics](#) ]

Search	<input type="text" value="Enter new search term"/>
Restrict search to:	<input type="text" value="Any names that match"/>
Matching criterion:	<input type="text" value="Match anywhere"/>

**Results of query (click on links for details):**  
 (Database content may appear in the originating language)

Preferred Name	<b>AC Antoine</b> ( <a href="#">Ref</a> )
Entry	<b>98</b>
Gene Bank Links	
Other Name(s)	OA971-2 ( <a href="#">Ref</a> ); OT902 ( <a href="#">Ref</a> ); 05429-28 ( <a href="#">Ref</a> ); TM28 ( <a href="#">Ref</a> ); Antoine ( <a href="#">Ref</a> )
Last Update	2008-Nov-28
Species	<i>Avena sativa</i> L.
Cross Date	1989
Origin	AAFC Ottawa, Canada

1	2	3
	<a href="#">Terra</a>	<a href="#">unnamed_5182</a>
<a href="#">OA971</a>		<a href="#">Random</a>
	<a href="#">Marion (Canada)</a>	<a href="#">Q.O.130.4</a>
		<a href="#">Q.O.51.27</a>
	<a href="#">Terra</a>	<a href="#">unnamed_5182</a>
<a href="#">OA971</a>		<a href="#">Random</a>
	<a href="#">Marion (Canada)</a>	<a href="#">Q.O.130.4</a>
		<a href="#">Q.O.51.27</a>

[http://floresta.eead.csic.es/  
barleymap/](http://floresta.eead.csic.es/barleymap/)

Marker	chr	cM	base pairs	Gene	bp	Description
i_12_30762	1	47.95	<u>126351040</u>	<u>MLOC_64860.1</u>	<u>126351040</u>	-
				<u>MLOC_64861.2</u>	<u>126351040</u>	ATPase assembly factor ATP10, mitochondria
				<u>AK354664</u>	<u>126834640</u>	Nucleotide-sugar transporter
				<u>MLOC_67628.1</u>	<u>126834640</u>	Haem peroxidase, plant/fungal/bacterial
				<u>MLOC_68919.1</u>	<u>126834640</u>	Haem peroxidase, plant/fungal/bacterial;Plant peroxidase;Peroxidase, active site;Peroxidases heam-ligand binding site
				<u>AK364432</u>	<u>127820440</u>	F-box domain, cyclin-like

# Take homes

- Smart use of shared resources can increase their value for understanding and improving oat
- Oat Global, GrainGenes, and T3/Oat intend to be focal points that can seed collaboration
- Let the conversations begin!