



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada



AAFC Brandon Program Activities

Dr. Bill Legge

Brandon Research Centre, Brandon, MB

Canada

Introduction

- Two projects:
 - *Developing two-row malting barley varieties for western Canada*
 - *Up to 20% for two-row feed under new Barley Cluster?*
 - Improving Fusarium Head Blight (FHB) resistance in barley germplasm
- Breeding objectives
- New varieties
- Special quality related activities

Two-row Malting Barley Breeding Program



Breeding Objectives :

Agronomic Performance:

- wide adaptation
- **high stable yield (increased emphasis)**
- early maturity
- good lodging and shattering resistance
- plump, heavy kernels

Breeding Objectives :

Improved Disease Resistance:

- high priority
 - *fusarium head blight (FHB)*
 - *spot blotch*
 - *stem rust (increased emphasis on Ug99 race)*
 - *net blotch*
- lower priority
 - *scald*
 - *increasing interest in stripe rust*
 - *common root rot, smuts, BYD and Septoria*

Breeding Objectives :

Malting and Brewing Quality:

- develop a range of malting quality types for portfolio in collaboration with industry – **fairly narrow**
- emphasize
 - *resistance to hull peeling (barley and malt)*
 - *lower grain protein content*
 - *balanced soluble protein content*
 - *lower beta glucan content (routine screening in 2012)*
- increase malt extract slightly
- **improved pre-harvest sprouting resistance and viability**
- **reduced phytate content**

CURRENT VARIETIES



New Varieties Released to 2010:

- Norman - registered in 2009, joint with CDC / U. of Sask., & released to FP Genetics
 - *25-30% lower DON content than CDC Kendall*
 - FP Genetics has reported no industry interest to date.
- Major - registered in 2009 & released to Viterra
 - *9% higher yielding than AC Metcalfe with better agronomic traits & disease resistance*
 - *Similar to AC Metcalfe in malting quality*
 - Added to the 2013-14 recommended malting barley varieties list (CMBTC).

New Varieties Released To 2010 (cont'd):

- Cerevza - registered in 2010 & released to Mastin Seeds, Sundre, AB
 - *9% higher yielding than AC Metcalfe with better disease resistance especially to spot blotch*
 - Widely adapted to western Canada & *recommended in the Maritimes & Quebec as well*
 - *Higher malt extract than AC Metcalfe*
 - Limited market development to date.

New Varieties Released To 2010 (cont'd):

- Taylor (HB705) - registered in 2009 & released to Alliance Seed Corporation
 - *Two-row hulless barley variety with malting quality potential - one of the first of this type*
 - *6% higher extract than AC Metcalfe*
 - *Significantly lower DON levels*
 - Adoption by industry uncertain
 - Limited market development to date.

New Varieties Released Since 2010:

- AAC Synergy (TR09208) - registered in 2012 & released to Syngenta
 - *13% higher yielding than AC Metcalfe*
 - Better foliar disease resistance than AC Metcalfe
 - *Desirable malting quality with consistently higher malt extract and lower beta glucan and viscosity than AC Metcalfe with slightly lower grain protein content.*

New Varieties Released Since 2010 (cont'd):

- TR10214 – supported for registration recommendation by the PRCOB in 2013
 - *10% higher yielding than AC Metcalfe*
 - *Lower DON levels than AC Metcalfe – 35% lower over 14 site-years in Manitoba FHB nurseries*
 - *Acceptable malting quality similar to the checks*
 - No proposals were received – try again in 2014?
 - *Entered in provincial regional trials in 2013.*

2013 Coop & Collab Entries

- TR12225 – 2nd yr. Coop & 1st yr. Collab entry
 - *high yield, good disease resistance including somewhat lower DON, & promising malting quality profile.*
- 1st yr. Coop entries:
 - *TR13231 high yielding line with good disease resistance & malting quality*
 - *TR13232, TR13233 & TR13236 have lower DON*
 - *TR13235 may have low polyphenol content (i.e., proanthocyanidin) to reduce chill haze in beer*
 - *TR05290 one of its parents.*

Special quality-related activities

- Reduced phytate project – BMBRI funding
 - *Although results of project were positive, we did not make many crosses ahead of time due to uncertainty and limited resources*
 - *TR10218 low phytate line [BC₅ line with Newdale as recurrent parent & MC9813-13 source of 50% reducing gene] was not advanced in 2011*
 - *9 lines with TR10218 as a parent were advanced to replicated yield tests at Brandon in 2013*
 - *2 years away from entry in coop trials*
 - *5 populations under development & may reach yield tests in 2014?*

Special quality-related activities

- Lowering grain protein content
 - *Purchase of NIR instrument at Brandon has allowed us to screen F_5 to F_6 progeny rows for protein content, but not possible in 2011 & 2012 due to unfavourable growing conditions*
 - *Lines from numerous populations with low protein parents, such as Bentley and CDC Meredith, have been entering and evaluated in yield trials at Brandon*
 - *Most advanced could start entering the coop trials in 2014.*

Special quality-related activities

- Improving resistance to pre-harvest sprouting (PHS) and germination loss during storage
 - *RVA main selection tool being used as resources allow*
 - *Samples must be “damaged” to detect PHS resistance*
 - *137 entries with potential PHS resistance from crosses with CDC Reserve, CDC Cowboy, TR04377 & several Baudin/TR253 lines to be evaluated in various yield tests at Brandon in 2013*
 - *Some could be advanced to coop trials in 2014?*
 - *Industry acceptance of CDC Reserve may influence our efforts in this area.*

RVA Stirring Numbers - 2012 Advanced Yield Test

Entry	Brandon Early	Brandon Late	Wakaw
AC Metcalfe	160	38	11
CDC Meredith	157	89	21
AAC Synergy	153	75	29
BM0505-038	165	114	22
BM0505-048	162	164	8
BM0408-006	145	58	10
BM0506-005	161	144	33
BM0506-033	152	150	125
BM0506-141	158	150	109

RVA Values - 2012 Preliminary Yield Test 4

Entry	Pedigree	Stirring Number Brandon
AC Metcalfe		51
CDC Meredith		86
AAC Synergy		107
CDC Reserve		126
BM0747-026	CDC Reserve/AC Metcalfe	157
BM0747-037	CDC Reserve/AC Metcalfe	163
BM0747-046	CDC Reserve/AC Metcalfe	152
BM0749-005	CDC Reserve/Major	120
BM0749-006	CDC Reserve/Major	128

Special quality-related activities

- Ethanol assay (EA) project in collaboration with W. Buckley at Brandon
 - *Continuation of project previously funded by BMBRI*
 - *Determine the utility of EA for determining germination loss potential during storage in two-row malting barley and as a tool for routine screening in the breeding program*
 - *Manuscript in preparation*
 - *May complement RVA for measuring sprouting damage.*

On-Going Issues & Funding

- Cereal Quality Evaluation Lab, Cereal Research Centre (CRC), Winnipeg
 - *With closure of CRC not sure where lab will be located – to remain in Winnipeg?*
 - *Analyzes about 1,000 samples per year for the program*
 - *New auto analyzer allowed us to screen for beta glucan content on a routine basis for first time in 2012.*
- Funding for two-row malting barley program
 - *New Barley Cluster led by the Alberta Barley Commission to replace Barley DIAP with funding from WGRF, **BMBRI (new)** & AAFC*
 - *Has not been approved by AAFC yet.*

Summary & Conclusions

- Working hard to improve whole package to make new varieties attractive to producers & industry
 - *Malting quality is a key part but are limitations as to what we can screen for in terms of new traits*
 - *Increased focus on yield*
 - *Newdale common parent for Major, Cerveza, AAC Synergy & TR10214*
 - *Maintain disease resistance package while trying to improve FHB resistance & incorporate resistance to potential new threats like Ug99 stem rust or stripe rust.*
 - *Barley needs to be tougher, i.e., more stress tolerant?*



Canada