

A complex data set:

- 7 malt parameters x 3 locations x 3 nitrogen rates x 5 varieties x 2 labs = 210 possible combinations

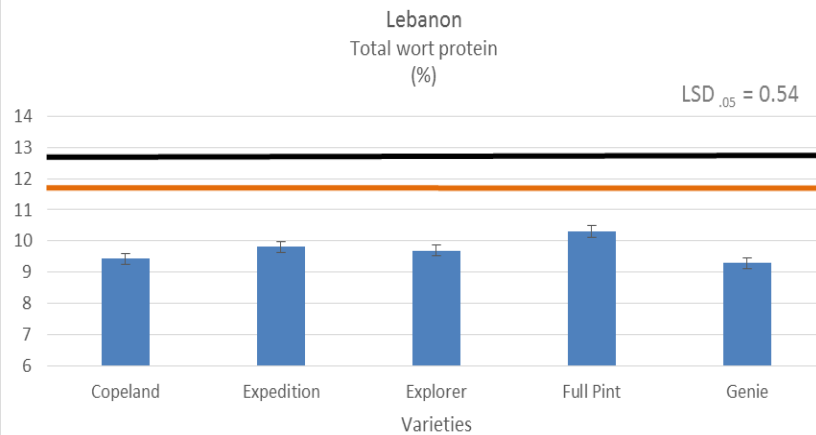
To simplify:

- Treated labs as reps and averaged across nitrogen rates within locations
 - justified by lack of variety x nitrogen rate interaction for agronomic traits
- Since grain protein reported by only one lab, used total wort protein (reported by both labs) as a surrogate

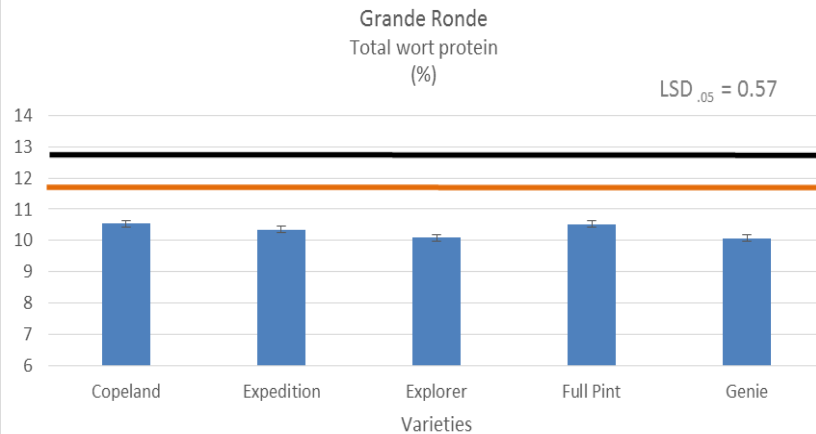
In the following slides

- Means for each variety at each of the three locations presented, along with
 - AMBA adjunct and all-malt specifications (in text boxes and as thresholds in the graphs)
 - LSD(.05)
 - Standard deviation for the trait
 - Succinct summary of key findings
- An attempt to integrate multiple traits by
 - Summing number of specifications met for all 7 malt traits
 - Spider plots based on all adjusted/standardized values 7 malt traits

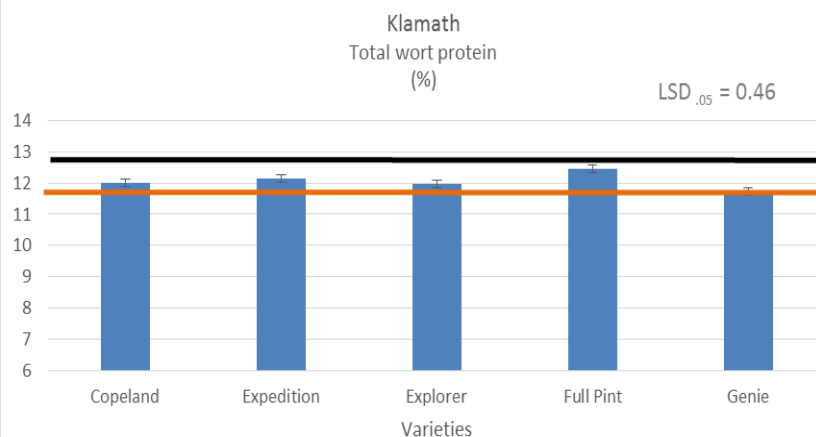
AMBA specifications
Adjunct Two-Row $\leq 12.8\%$
All Malt Two-Row $\leq 11.8\%$



All varieties meet adjunct and all-malt specifications

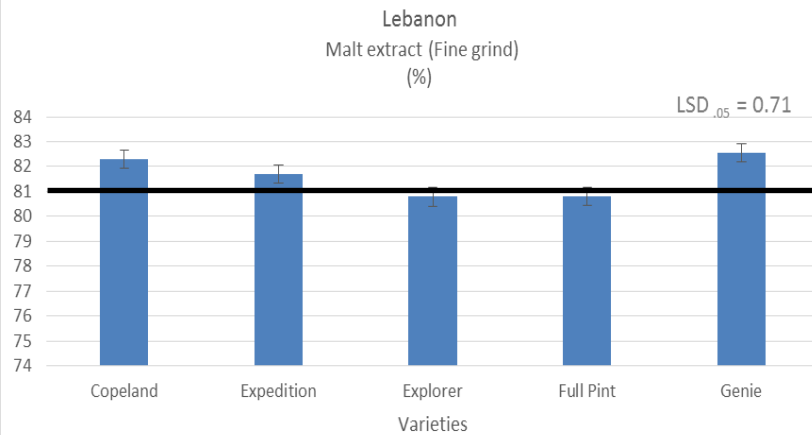


All varieties meet adjunct and all-malt specifications

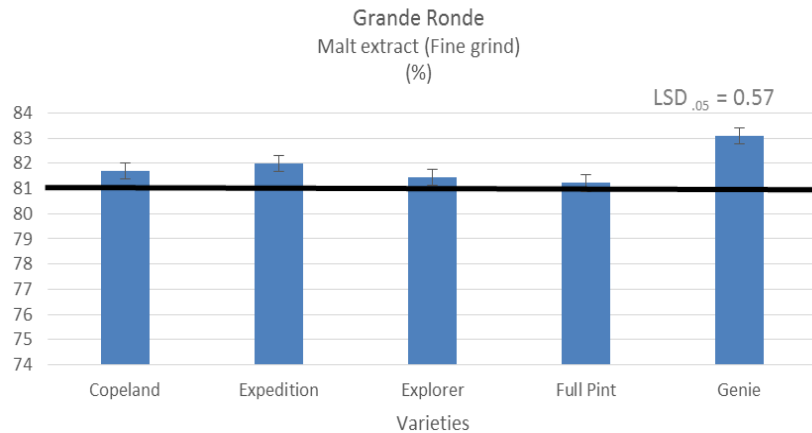


All varieties meet adjunct specification and all but Full Pint within range of all-malt specifications

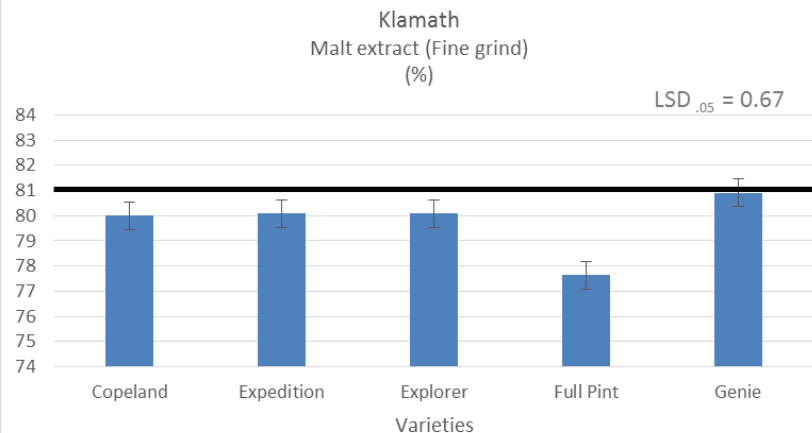
AMBA specifications
Adjunct Two-Row >81%
All Malt Two-Row >81%



All varieties meet adjunct and all-malt specifications, or within range

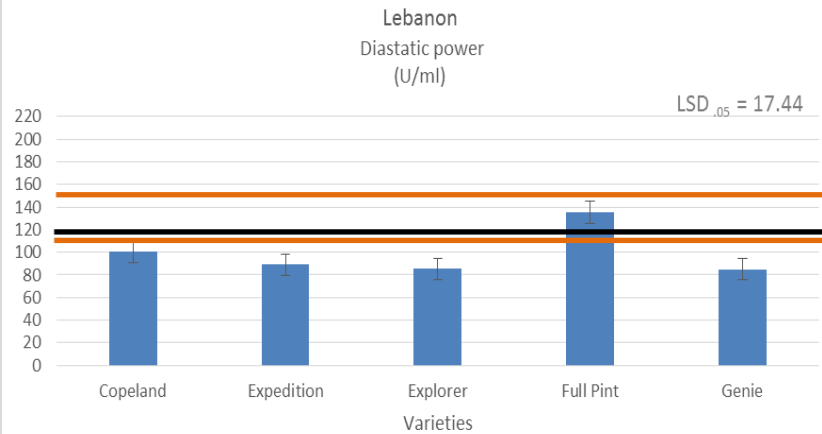


All varieties meet adjunct and all-malt specifications, or within range

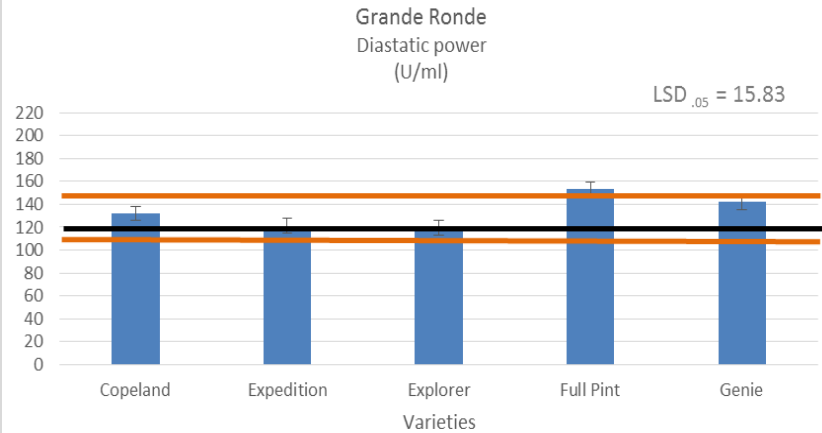


Only Genie meets/within range of adjunct and all-malt specifications

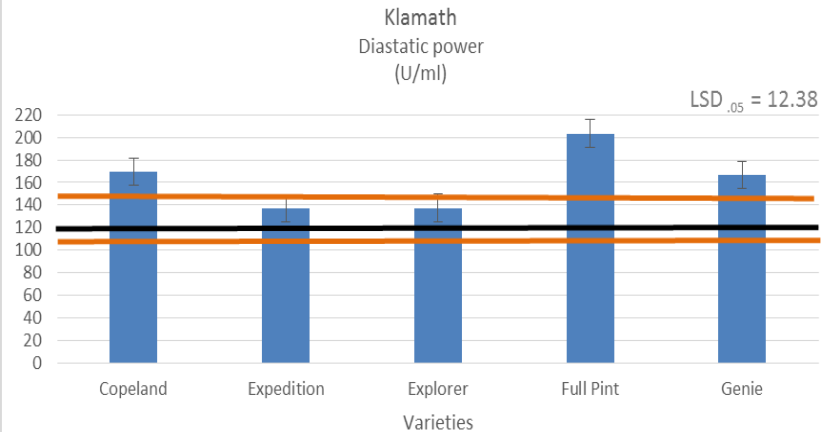
AMBA specifications
Adjunct Two-Row >120
All Malt Two-Row 110-150



Only Full Pint meets adjunct and all-malt specifications

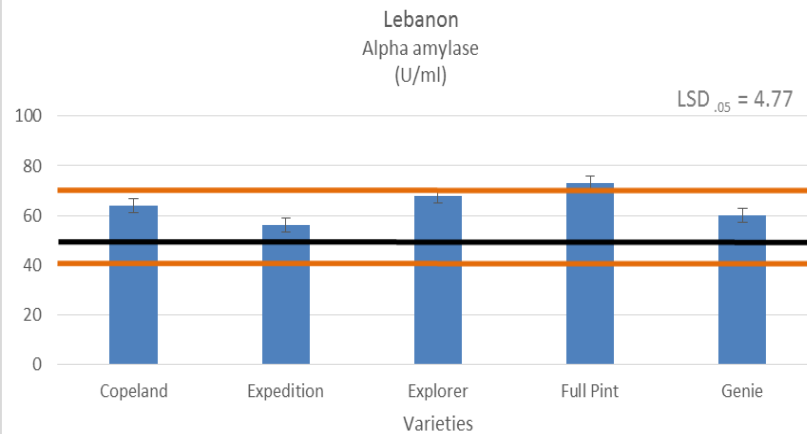


All varieties meet or within range for adjunct and all-malt specifications

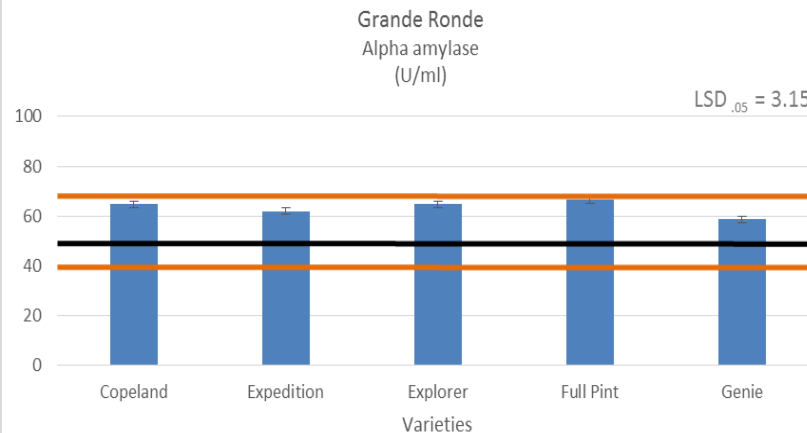


All varieties meet or within range for adjunct specifications; only Expedition and Explorer meet all-malt specifications

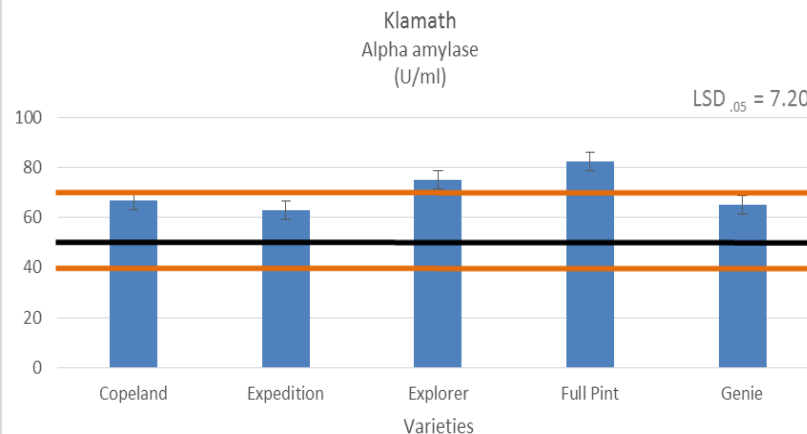
AMBA specifications
Adjunct Two-Row >50
All Malt Two-Row 40-70



All varieties meet or within range for adjunct and all-malt specifications

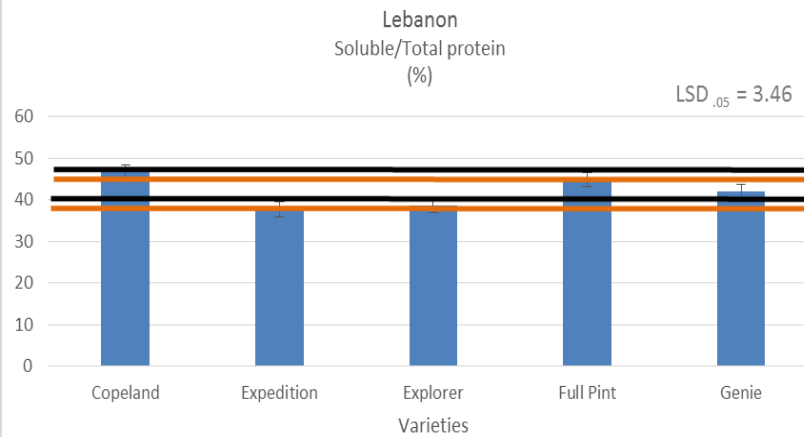


All varieties meet or within range for adjunct and all-malt specifications

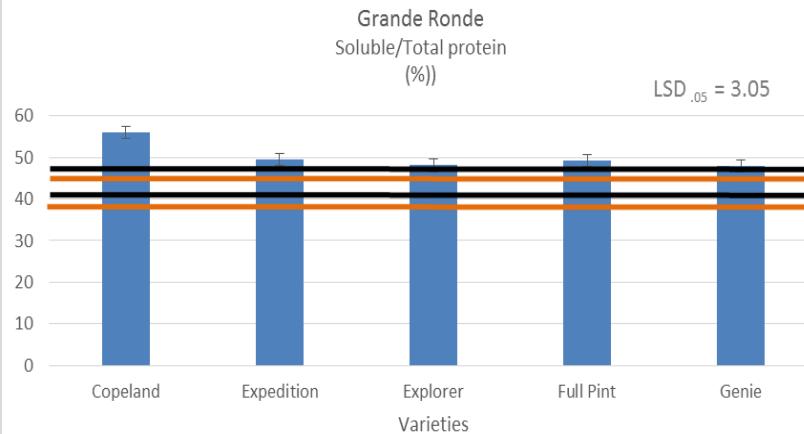


All varieties meet or within range for adjunct and all-malt specifications

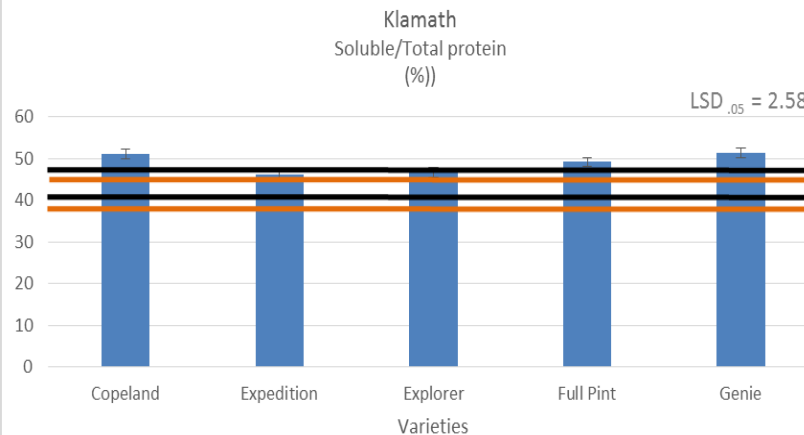
AMBA specifications
Adjunct Two-Row 40-47%
All Malt Two-Row 38-45%



All varieties meet adjunct and all-malt specifications

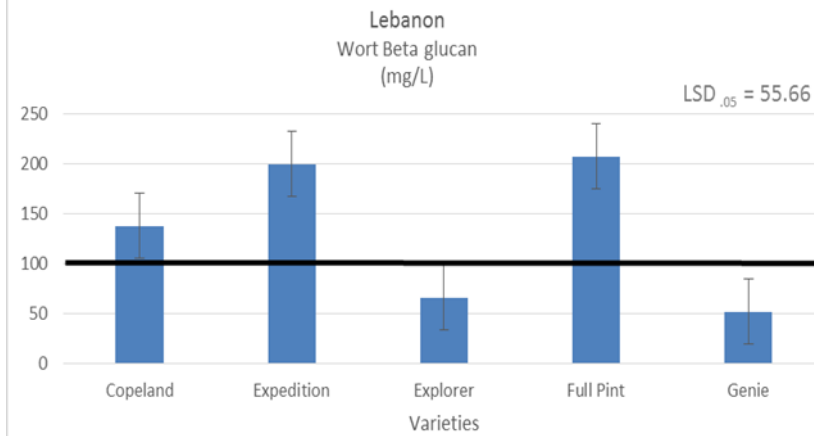


All varieties but Copeland meet or within range of adjunct and all-malt specifications

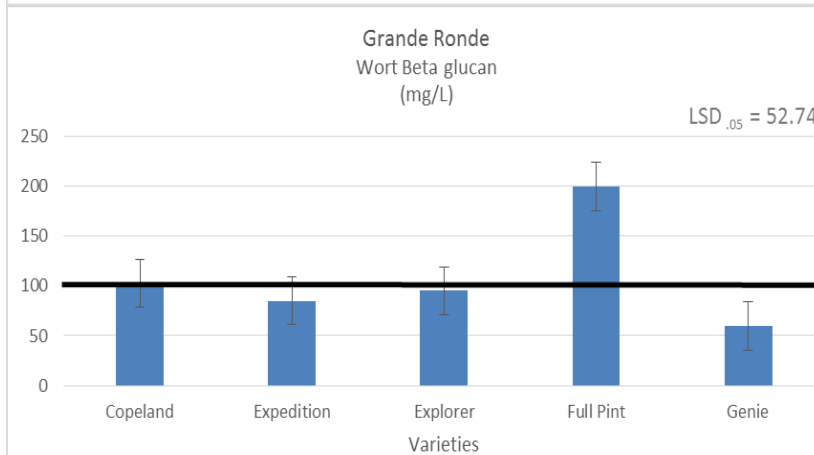


All varieties meet or within range of adjunct specifications and all but Copeland and Genie meet or within range of all-malt specifications

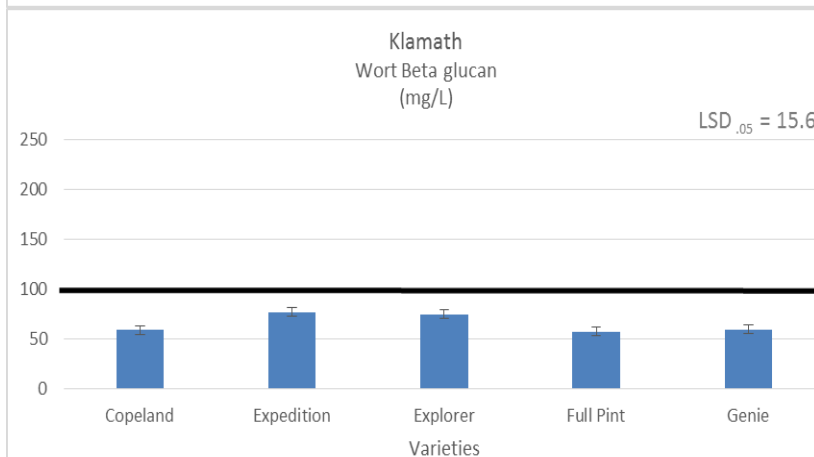
AMBA specifications
Adjunct Two-Row < 100
All Malt Two-Row < 100



Only Explorer and Genie meet or within range of adjunct and all-malt specifications

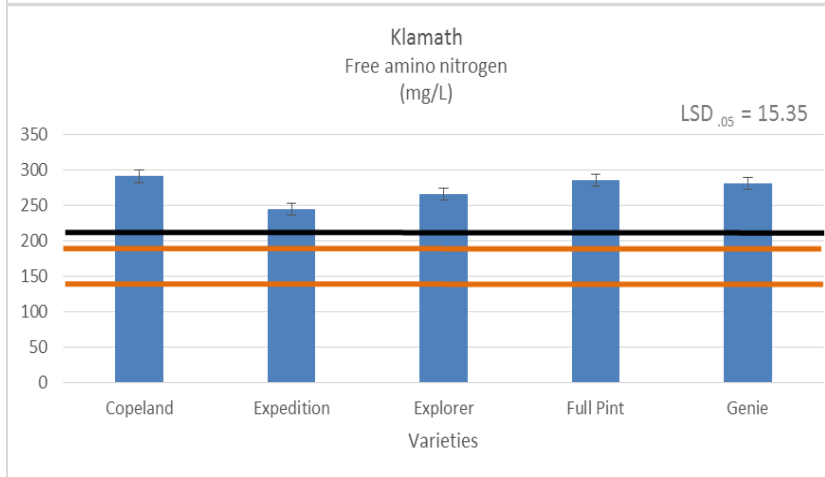
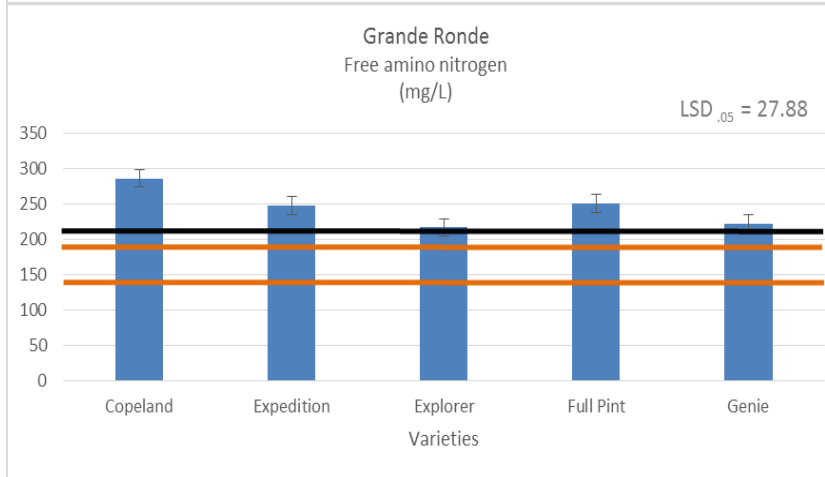
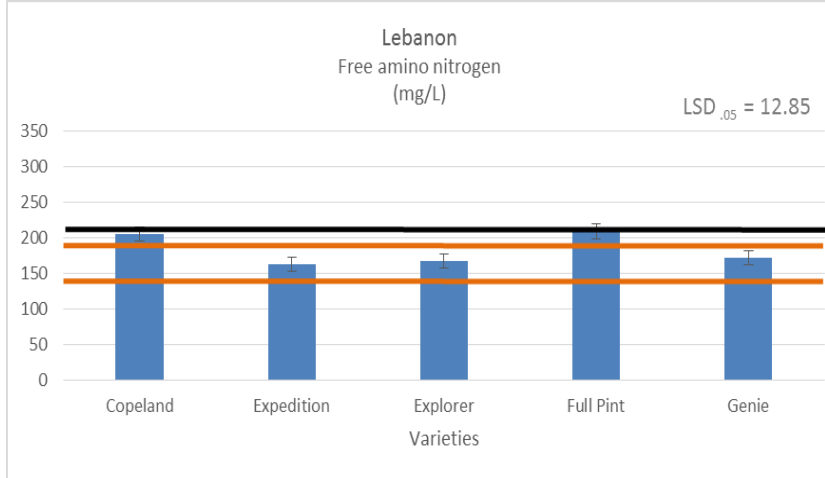


All varieties except Full Pint meet or within range of adjunct and all-malt specifications



All varieties meet adjunct and all-malt specifications

AMBA specifications
Adjunct Two-Row >210
All Malt Two-Row 140-190



Meeting expectations for adjunct 2-row (X = meet)

Site	Lebanon					Grande Ronde					Klamath					Sum
	C	Ee	El	F	G	C	Ee	Ex	F	G	C	Ee	Ex	F	G	
ME	x	x	x	x	x	x	x	x	x	x					x	11
DP				x		x	x	x	x	x	x	x	x	x	x	11
AA	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15
TWP	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	15
S/T	x		x	x	x			x	x	x		x	x			9
BG			x		x	x	x	x	x	x	x	x	x	x	x	12
FAN	x			x		x	x	x	x	x	x	x	x	x	x	12
Sum	5	3	5	6	5	6	6	7	7	7	5	6	6	5	6	

Sum of meeting specifications across locations

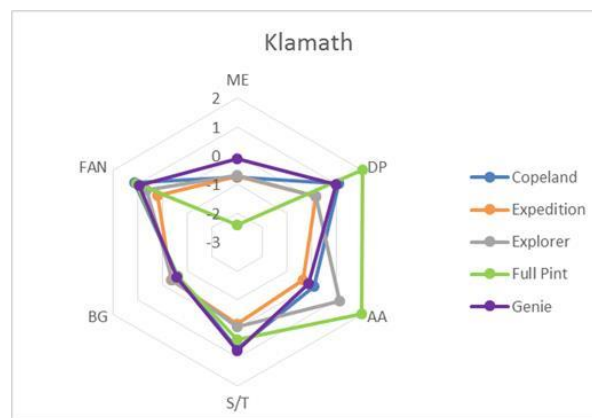
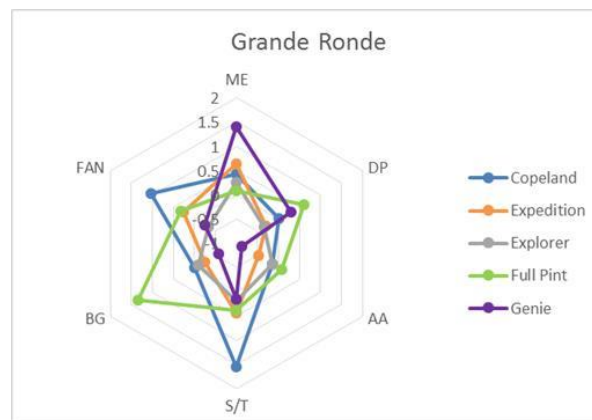
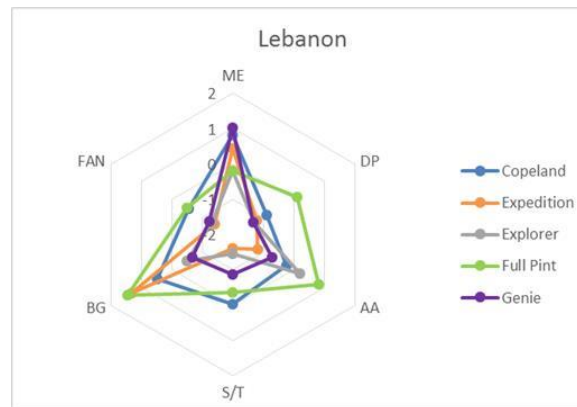
Copeland	16
Expedition	15
Explorer	18
Full Pint	18
Genie	18

Meeting expectations for all malt 2-row (X = meet)

Site	Lebanon					Grande Ronde					Klamath					Sum
	C	Ee	El	F	G	C	Ee	Ex	F	G	C	Ee	Ex	F	G	
ME	x	x	x	x	x	x	x	x	x	x					x	11
DP	x			x		x	x	x	x	x	x	x				9
AA	x	x	x	x	x	x	x	x	x	x	x	x			x	13
TWP	x	x	x	x	x	x	x	x	x	x					x	11
S/T	x	x	x	x	x							x				6
BG			x		x	x	x	x		x	x	x	x	x	x	11
FAN		x	x		x											3
Sum	5	5	6	5	6	5	5	5	4	5	2	3	3	1	4	

Sum of meeting specifications across locations

Copeland	12
Expedition	13
Explorer	14
Full Pint	10
Genie	15



Conclusions

All varieties met many AMBA specifications for adjunct and/or all-malt 2-row at the three locations: no variety or location met all specifications

- Adjunct specifications were met more often than all-malt specifications
- Specifications were most often met at Grande Ronde
- Changes in management and/or malting regime could potentially assist in meeting specifications for more varieties and in more environments

In terms of overall modification, Full Pint was at the under-modified end of the spectrum and Genie at the over-modified end of the spectrum

- Tailoring crop management and malt protocols could assist in optimizing modification

Communication between growers, maltsters and brewers essential to ensure maximum satisfaction from all parties: two examples from the production and brewing ends of the chain

- a grower may wish to produce a variety that maximizes agronomic satisfaction (e.g. Explorer) but a maltster might prefer Copeland or Expedition due to familiarity, seed cost, and/or established customer preference
- A brewer might prefer Full Pint due to contributions to beer flavor but the maltster might prefer Genie due to ease of modification following standard malting regimes