2019 Malting Barley Quality Overview

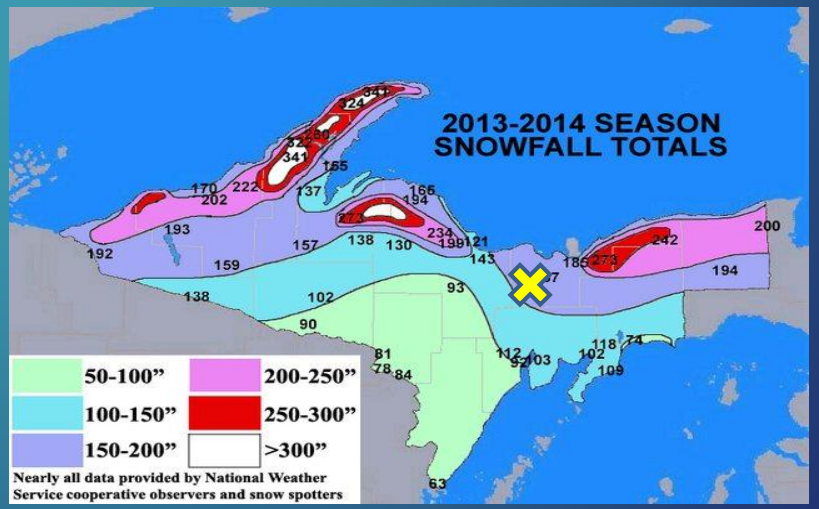
CHRISTIAN KAPP

RESEARCH ASSISTANT

MSU-UPREC

MSU Lab Overview

- Located in beautiful sunny Chatham MI, within Michigan State University's Upper Peninsula Research and Extension Center
- Formed in 2016
- ASBC member
- Participates in ASBC proficiency program and Neogen corporation check sample program.



Tests offered

- Germination Energy- 4mL and 8 mL
- Germination Capacity
- Grain Moisture
- Kernel Plumpness
- Grain Protein
- Pre-harvest Sprouting
- Deoxynivalenol (DON)
- Ergot alkaloid?
- Aflatoxin?

Initial procedures

- Sample logged in database
- Cleaned through Pfeuffer debearder/seed cleaner
- Sample then counted for GE, GC through Seedburo vibratory seed counting bowl
- Crude protein, grain moisture and kernel assortment then conducted
- Sample then halved, grain portion goes into storage
- Other ½ ground through Perten lab mill
- DON and PHS tests run on ground portion

2019 Overview

- 125 samples tested from 5 states
- Rise of other species
- Main rush between early July-late August
- Majority complete analysis
- 38% reduction from 2018
- Why?

Sample packages

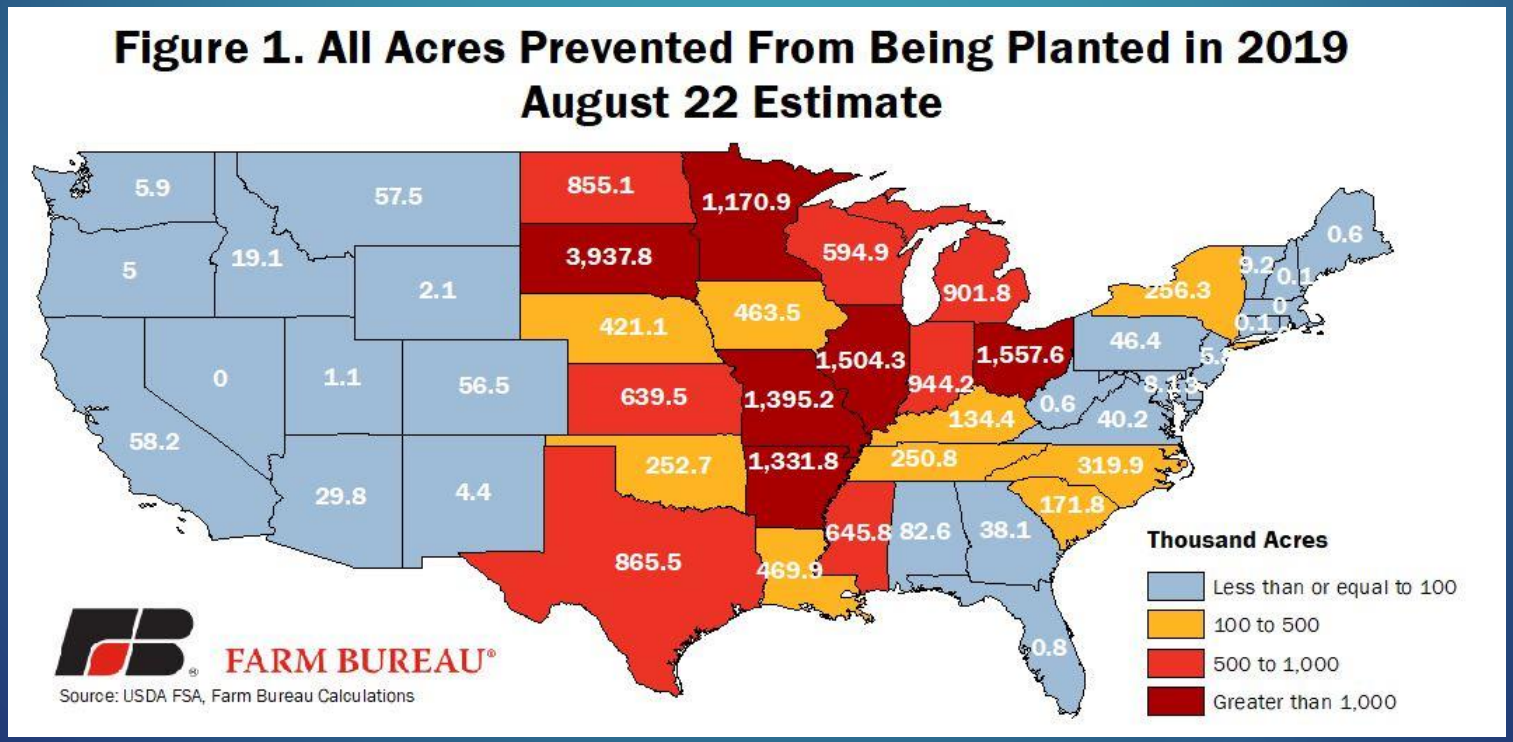
Analysis option	Includes	Price/sample
Complete analysis	moisture, kernel plump & thin, germination tests, protein, pre-harvest sprout, and DON	$50
Protein + DON only	NIR + Neogen Reveal Q+	$30
DON only	using Neogen Reveal Q+	$20
Germination only	germination energy, capacity and water sensitivity	$20

Reasons?

- Other labs
- In house testing
- Market contraction
- Lack of alternative farmers
- Malthouses are staying with a 1 or 2 known growers and increasing overall acreage with said growers
- Overall decline of acres grown
- Weather

2019 Weather

- Unprecedented and biblical
- Massive amount of acreage unplanted due to soil saturation
- Prevent plant acreage set record

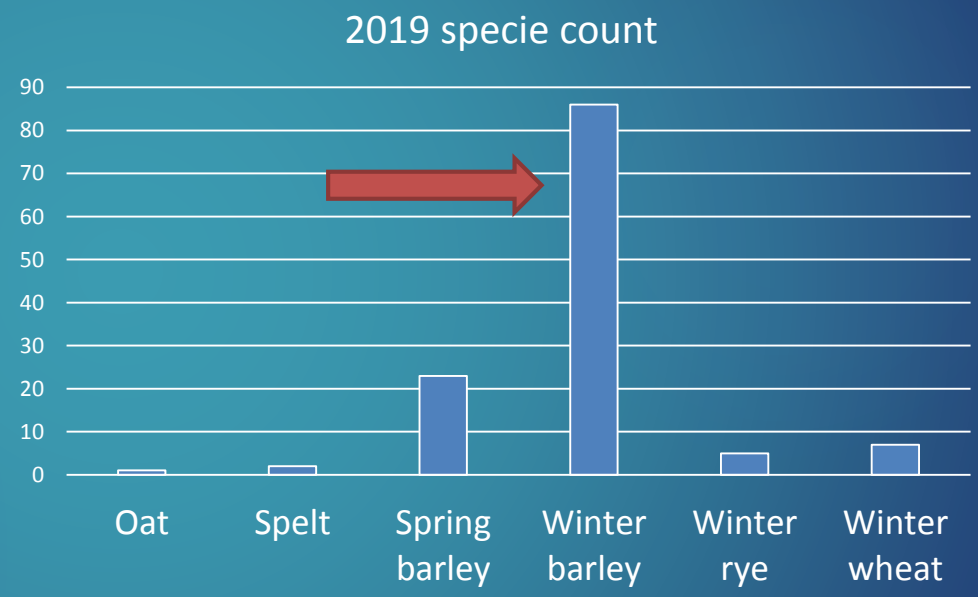


But it could always be worse?

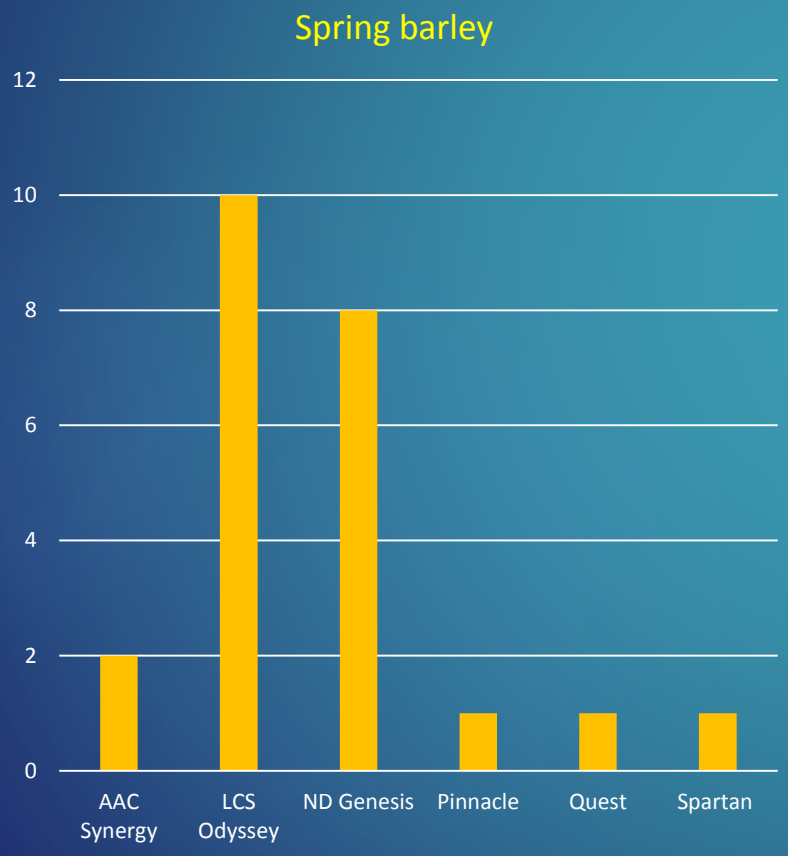
And 2020 will be the best crop year ever somewhere……

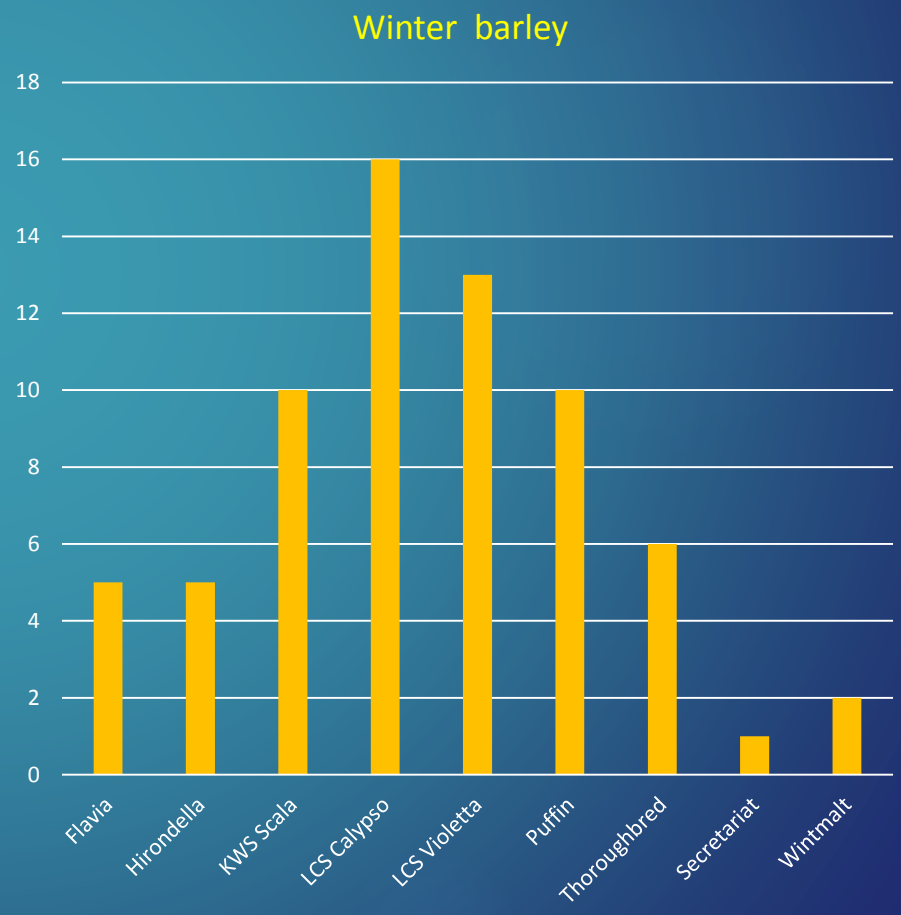
Species tested 2019

- Oats
- Winter wheat
- Spelts (hulled wheat)
- Spring barley
- Winter barley
- Winter rye



Barley varieties tested

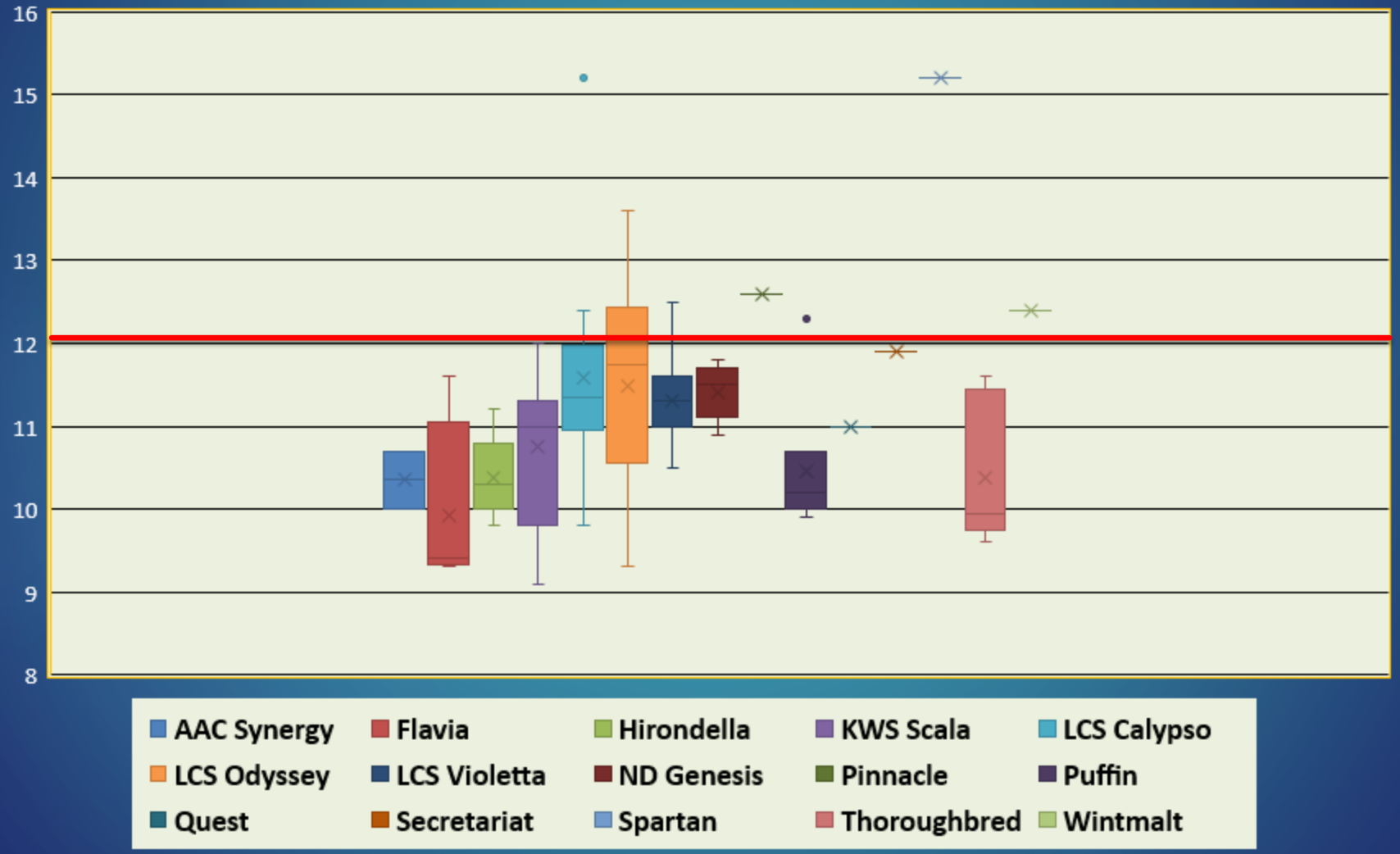




Crude Protein

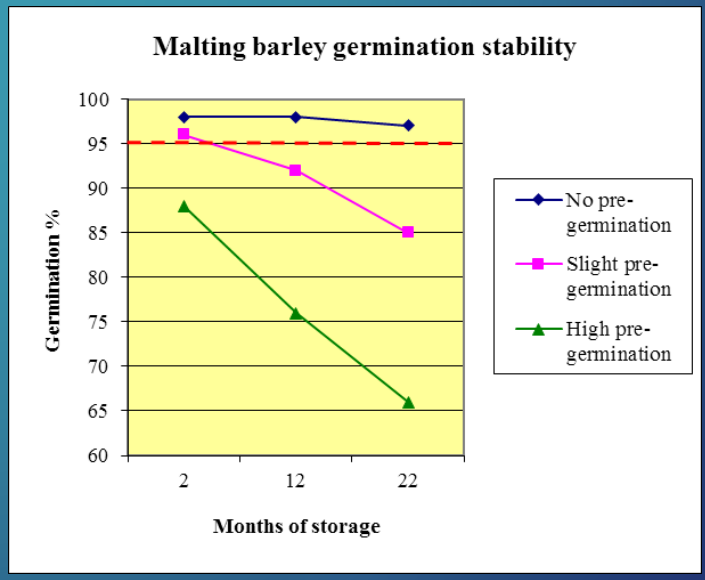
- CP is defined as the approximate amount of protein in foods that's calculated from the determined nitrogen (N) content by multiplying by a factor derived from the average percentage of nitrogen in the food proteins (Merriam-Webster, 2017).
- **Higher CP, lower available extract, lower amount of sugars-very important for brewers**
- Contributing factors to high protein
- High N rate or not taking N credits into consideration
- Stress during grain fill
- MSU Lab uses NIR (FOSS Infratec Nova)

2019 Crude protein X variety



Pre-harvest sprout

- Michigan's worst enemy
- Occurs when grain germinates prematurely in field before harvest
- Due to environment and variety
- High levels of α-amylase within endosperm quicken germination
- Pre-germinated barley results in reduced germination in malthouse, which can result in high levels of beta-glucans in the wort
- Also affects storability of grain



Pre-harvest sprout test

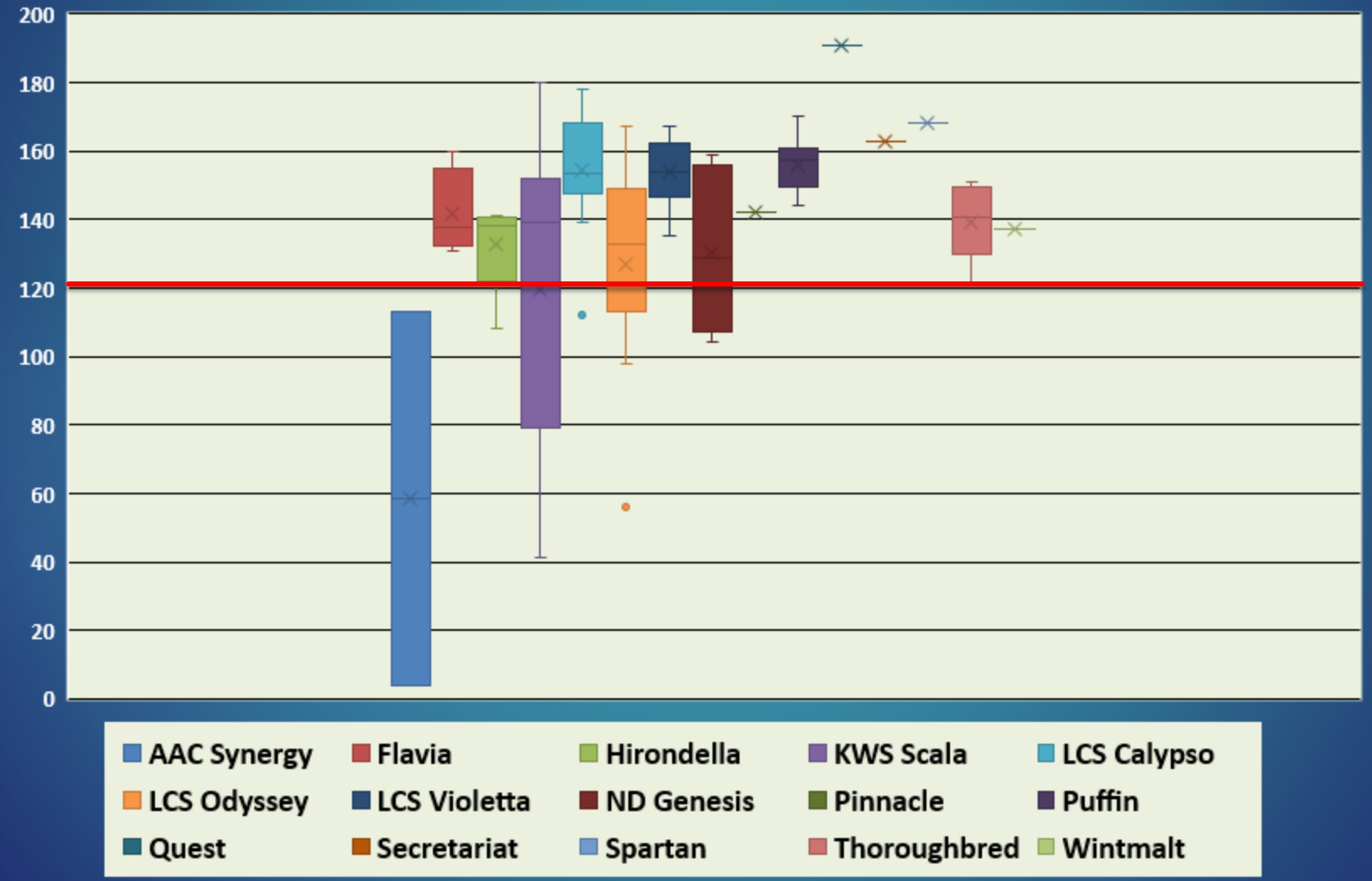
- Lab uses a Rapid ViscoAnalyser-RVA StarchMaster2 manufactured by Perten
- Measures viscosity
- 4 g of a ground sample is added to a canister, then 25 mL of water is added
- Paddle placed into canister, sample mixed by jogging paddle, then canister and paddle are placed into machine
- Viscosity recorded after 3 min as cP, stirring number (RVA) then calculated
- Low RVA = High α-amylase levels

RVA interpretation

< 100 RVA	100-135 RVA	> 135 RVA
Malt immediately	Intermediate	Sound
Probability of GE loss in storage 95%	Probability of GE loss in storage 75% Store with low moisture, cool and dry conditions	Probability of retaining GE in storage 99%

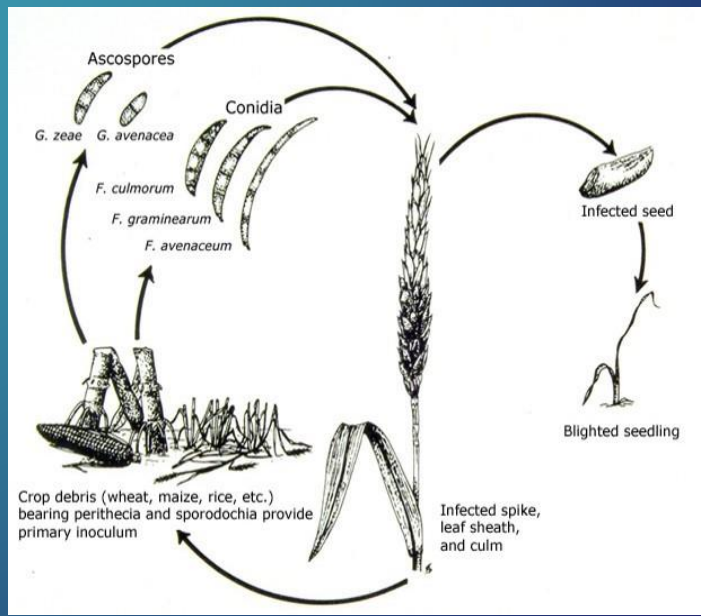
- Canadian Grain Commission excellent source of information
- www.grainscanada.gc.ca

2019 RVA X Variety



Fusarium graminearum
otherwise known as scab, vom, or don

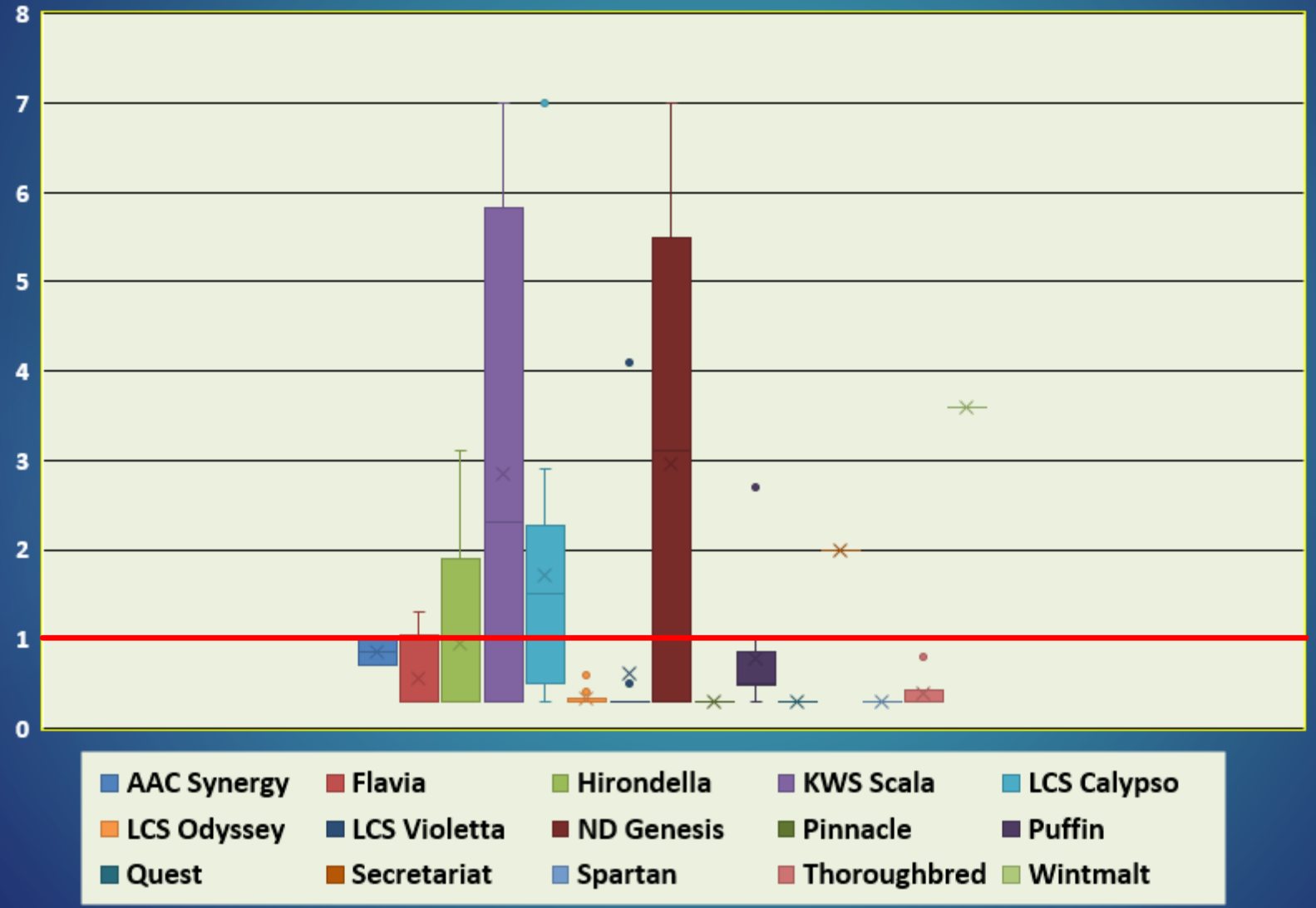
- Fungal disease that infects kernels, commonly known as Fusarium head blight (FHB)
- Develops mycotoxins-deoxynivalenol (DON)
- Regulate by FDA, levels over 1ppm lead to rejection
- Favorable environment for infection-long periods (48 to 72 hrs) of high humidity and temperatures between 75 to 85 degrees F
- Spores carried by wind or splashed by rain
- Fungicides can used as preventative
- Causes gushing in beer, contaminated grain difficult to brew



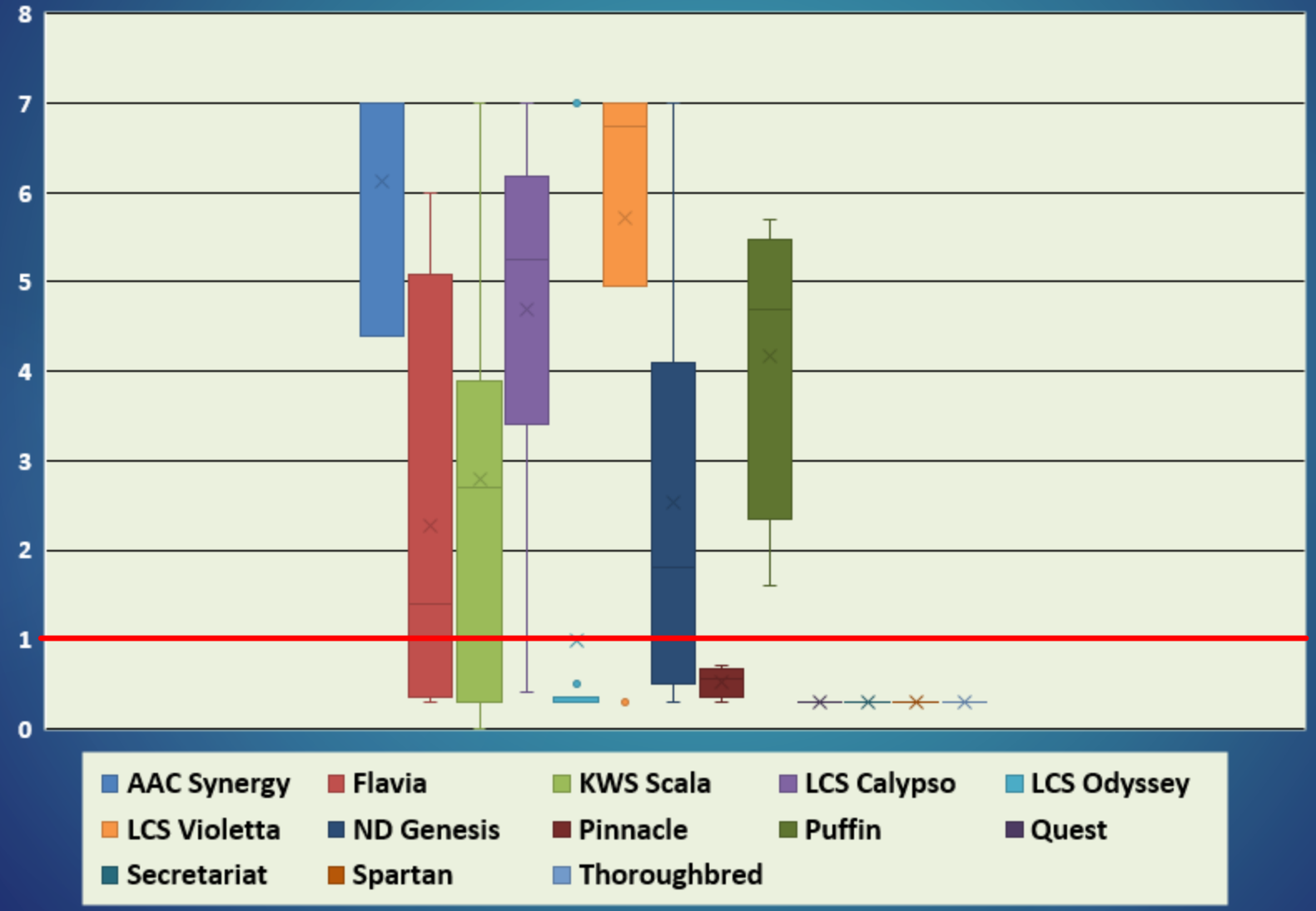
2019 DON testing procedure

- Lab used the Reveal® Q+ for DON test along with an AccuScan® Gold reader in 2019
- Manufactured by Neogen corporation
- Test is a single step lateral flow immunochromatographic assay based on a competitive immunoassay format
- In process of transitioning to Raptor reader-will give greater functionality
- Lab participates in Neogens check sample profiency program

2019 DON (ppm) X variety



2018 DON (ppm) X variety



MSU Lab Information

- https://www.canr.msu.edu/malting_barley/lab Malt Analysis
- Christian Kapp kappchri@msu.edu

  906-439-5114 ext 6
- Michelle Coleman 906-439-5114 ext 1

AgBioResearch
MICHIGAN STATE UNIVERSITY

MICHIGAN STATE UNIVERSITY | Extension

Special Thanks

- Everyone who used the lab!
- Andrew Barhman
- Erin Kellar
- *Pink* Floyd Kientiz
- Michelle Coleman
- Scott Graham
- Dr. Dean Baas
- Dr. Brooke Wilke
- Dr. James Dedecker
- Christian Tollini
- Martin Naglekirk
- Ryan Hamilton
- Dr. Russell Freed **(the godfather)**