2018 Malting Barley Quality Overview

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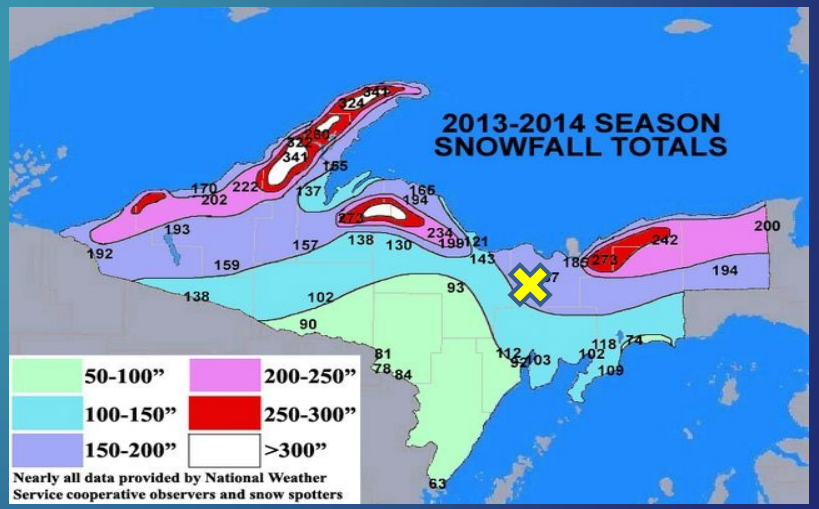
MSU-UPREC

MSU Lab Overview

- Located in 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.

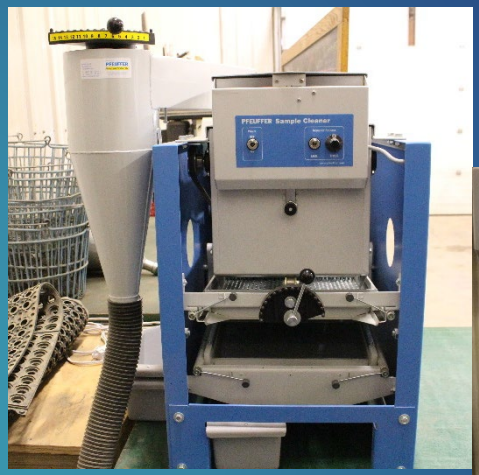


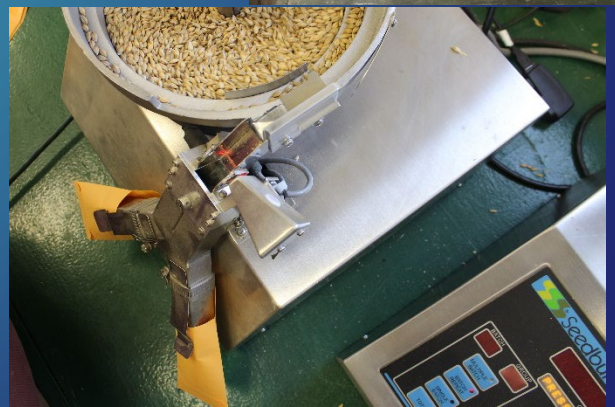
Tests offered

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

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





2018 Overview

- Over 200 samples tested from 9 states
- Main rush between early July-late August
- In-house research samples also ran
- Majority complete analysis
- Big 3

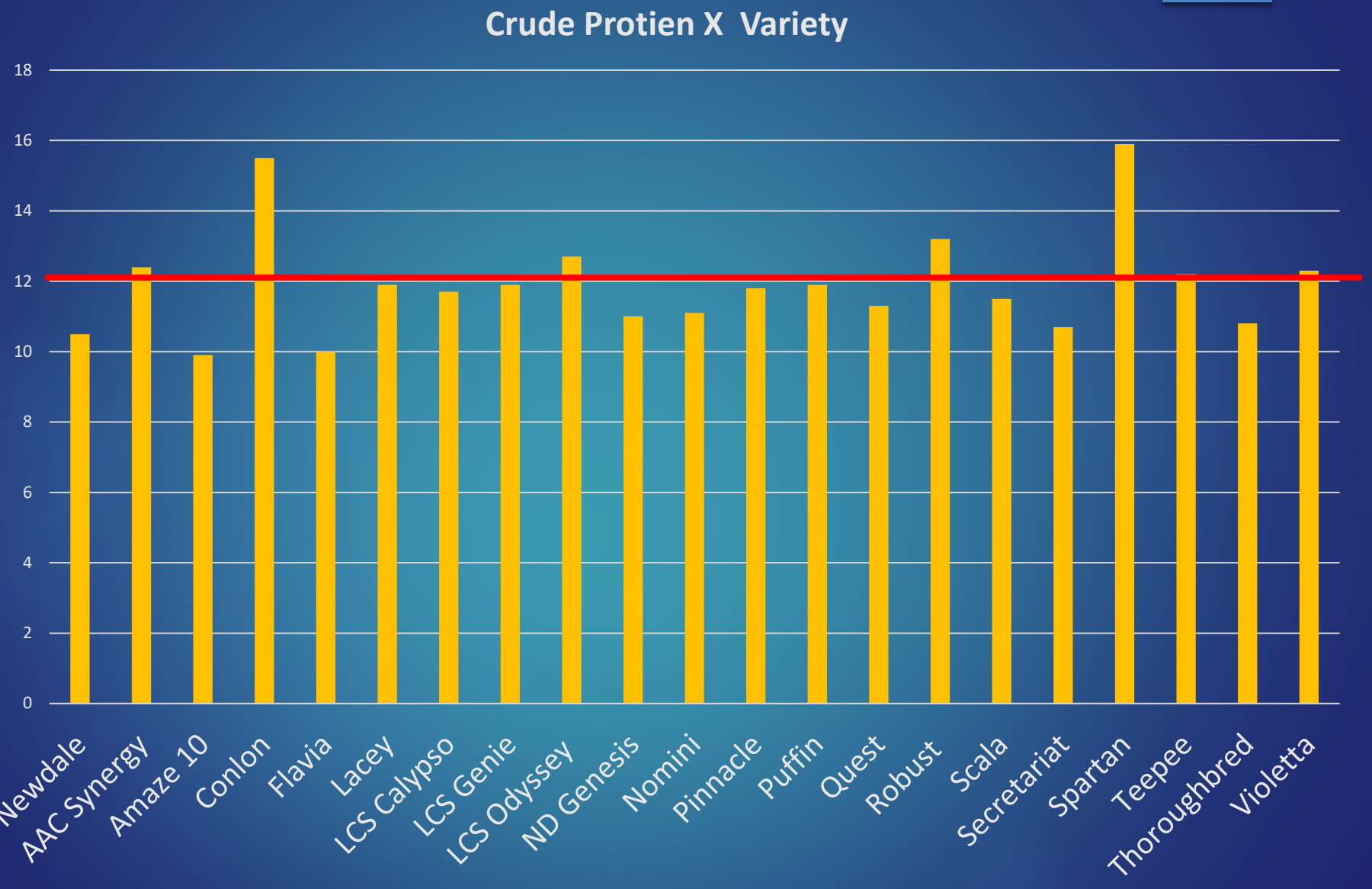
Sample packages

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

Crude Protein

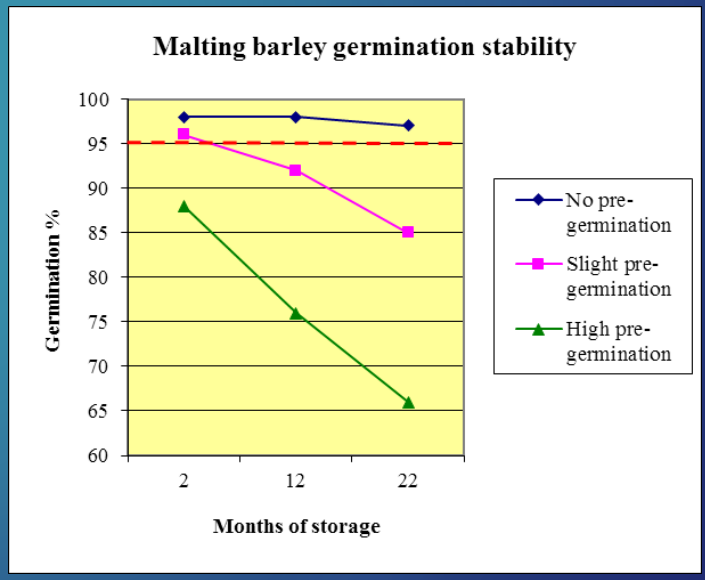
- CP is defined as the approximate amount of protein in foods that's calculated from the determined nitrogen (N) content by multiplying by a factor derived from the average percentage of nitrogen in the food proteins (Merriam-Webster, 2017).
- **Higher CP, lower available extract, lower amount of sugars-very 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)

2018 CP Overview



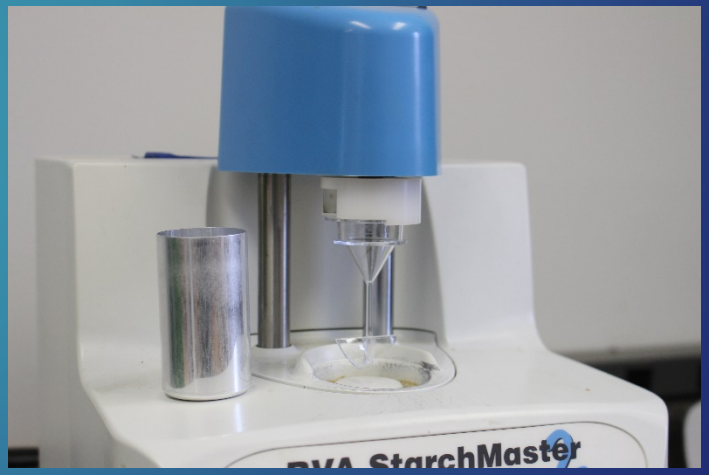
Pre-harvest sprout

- 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

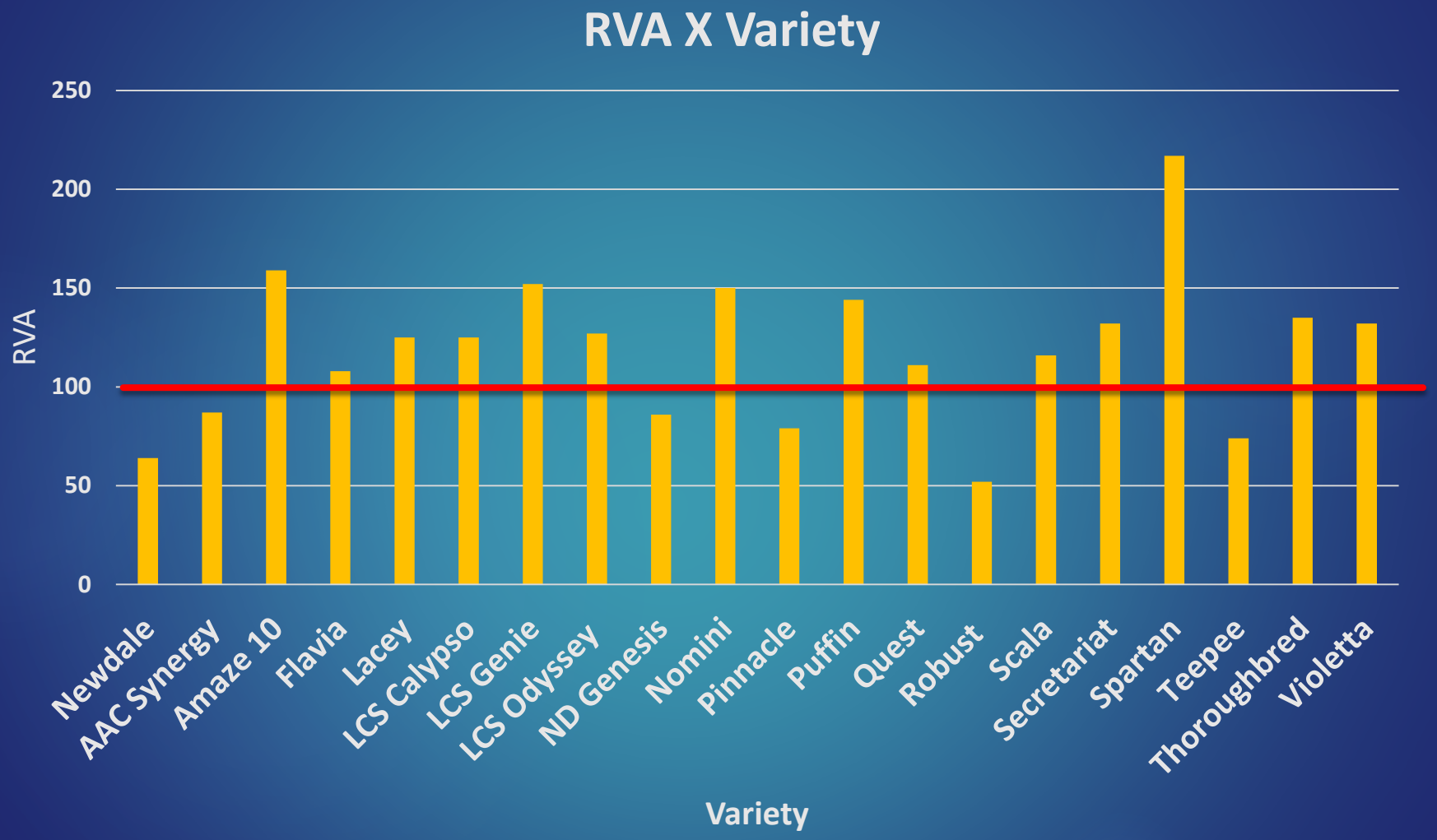


RVA interpretation

< 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%

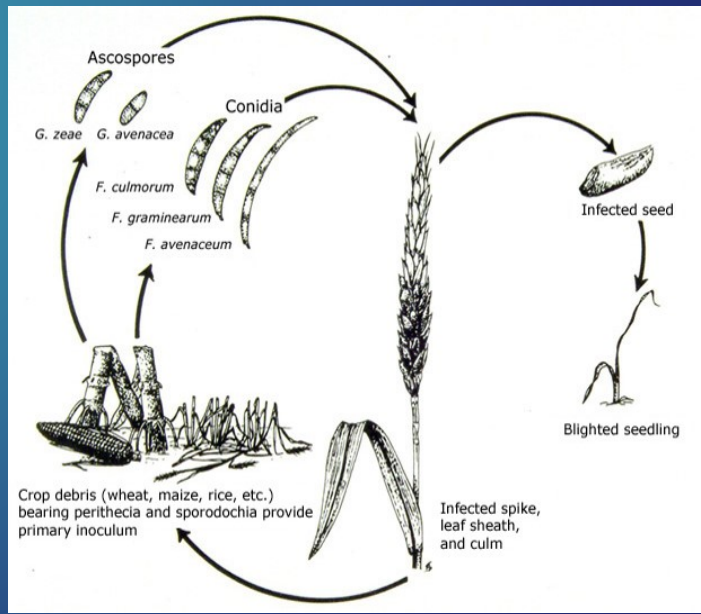
- Canadian Grain Commission excellent source of information
- www.grainscanada.gc.ca

2018 Pre harvest sprout



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

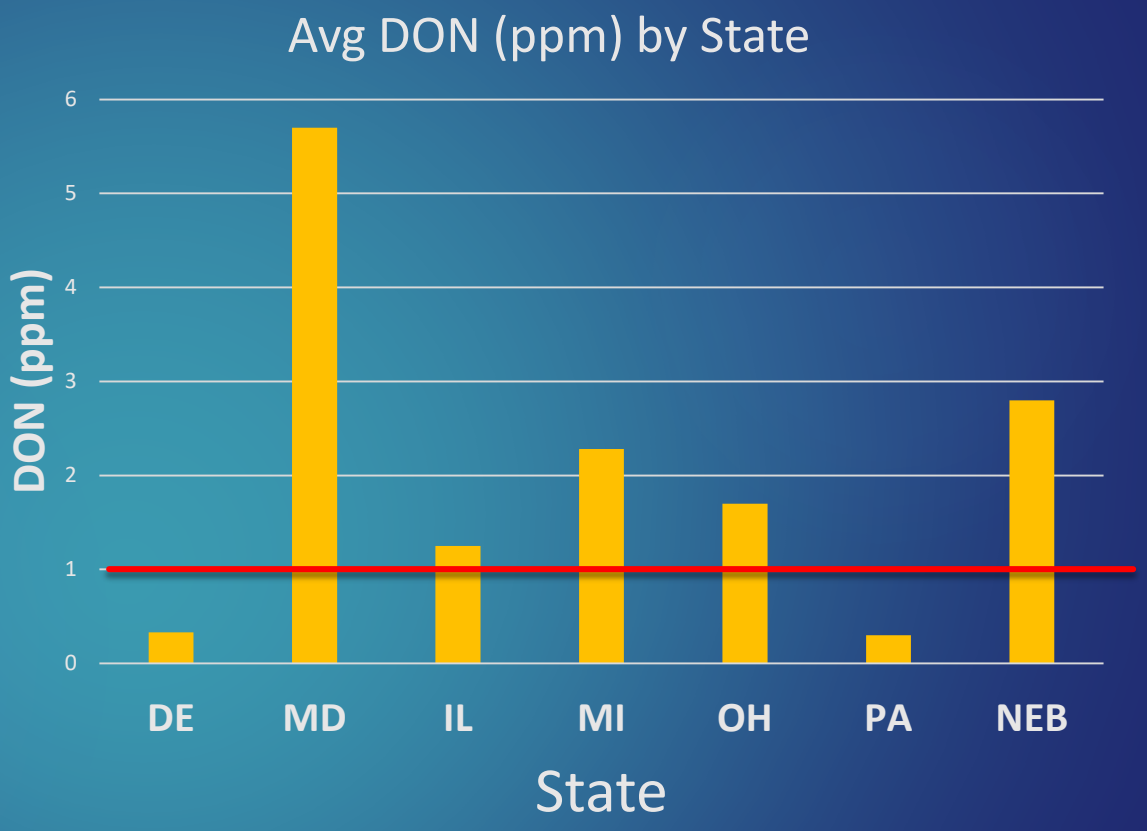


DON testing procedure

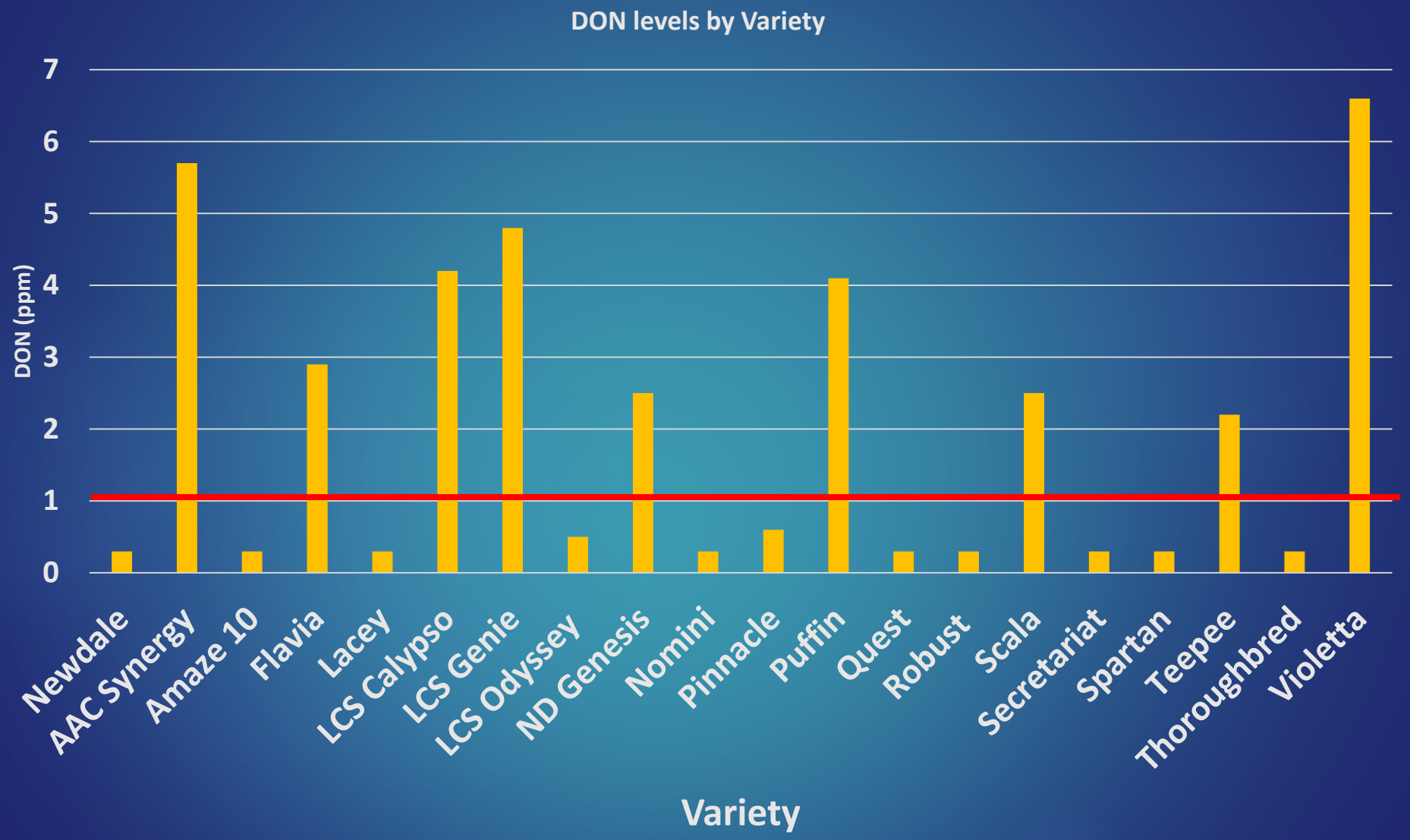
- Lab uses the Reveal® Q+ for DON test along with an AccuScan® Gold reader
- Manufactured by Neogen corporation
- Test is a single step lateral flow immunochromatographic assay based on a competitive immunoassay format
- Lab participates in Neogens check sample profiency program

2018 DON Overview

- FHB rears its ugly head
- Disclaimer-some states small sample size
- MI greatest representation with 35 total



Don X Variety



MSU Lab Information

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Special Thanks

- Andrew Barhman
- Joseph Charlebois
- Floyd Kientiz
- Michelle Coleman
- Scott Graham
- Dr. Dean Baas
- Dr. Brooke Wilke
- James Dedecker (soon to be Dr.)
- Christian Tollini
- Dr. Russell Freed

(the godfather emeritus)