

USWBSI VDHR Spring Wheat Mid-Year Planning Meeting Report

Met Via Zoom

March 19, 2021

ATTENDEES

Andrew Green, North Dakota State University	Jason Fiedler, USDA-ARS
Jim Anderson, University of Minnesota	Xiwen Cai, USDA-ARS (left after 10:00)
Shaobin Zhong, North Dakota State University	Karl Glover, South Dakota State University
Steven Xu, USDA-ARS	Juliet Marshall, University of Idaho
Jason Cook, Montana State University	Jianli Chen, University of Idaho (joined ~ 11:00)
	Michelle Bjerckness, USWBSI-NFO

1. Announcements:

Sue Canty is retiring after the 2021 Scab Forum. Michelle Bjerckness has been hired to assume Sue's responsibilities and is overlapping with Sue for this year.

2. Everyone introduced themselves

3. The primary objective of the meeting was to discuss ideas for VDHR spring wheat collaborative projects for FY22-26. The main idea discussed was to emulate a SunGrains USWBSI cooperative grant doing Genomic Selection (GS) for yield and diseases, including FHB.

Andrew recapped a zoom meeting from Mar. 17 attended by A. Green, J. Anderson, Paul Murphy Jason Fiedler, and Jeanette Lyerly who works with Dr. Murphy and Gina Brown-Guidera on the SunGrains GS project. Each year they develop 5 regional training models for yield and 1 training model for FHB and other diseases.

Much discussion was devoted to how we would construct a training population to do GS for yield and FHB for our region. Jason Fiedler has observations on FHB in the region based on URN and URSN for ~ last 7 years and has done some preliminary diversity analyses based on DNA-based relationship that show Montana St. and S. Dakota St. germplasm are more distant, MN and NDSU are closer together.

J. Anderson suggested that the most important aspect of a collaborative project would be to predict grain yield since many programs already have a good base of MR for FHB. **J. Cook** was more interested in GS for FHB prediction.

S. Zhong offered that he could do more FHB screening in his Fargo and Langdon nurseries, perhaps freeing breeding resources to do more yield testing.

All were agreement to do GS for yield

SunGrains has a dedicated person to coordinate the project and we would like to do the same. Personnel cost with salary and fringe would be around \$100K; could be at Fargo, St. Paul, or virtual – we should get the best person and let them decide where they want to work from.

K. Glover asked about DNA sampling that is needed; Jason is working on getting seed extraction up and running better - he's getting some new equipment. With his new mixer mill 2-3 seeds per line may be enough and we wouldn't have to supply leaf tissue.

J. Cook: could grow a lot more plots in Bozeman, but that is not a very representative location. He will contact research stations in north central MT and see what cost per plot would be. Jason is mostly interested in GS for FHB, not yield. He is seeing improvements in FHB resistance, but having some escapes. 5's (on 1-9 scale) would be good enough.

NW ND and Eastern MT regions need to have some FHB resistance because those growers don't apply as much fungicide and farms are large.

J. Marshall: getting rid of super susceptible varieties would be effective.

A. Green: Would more FHB screening of URN to help develop an FHB training model?

K. Glover has been doing scab testing on URN in Brookings for at least 10 years, **A. Green** has been screening it too since 2015 but hasn't published it. Just incidence & severity at NDSU except since 2018. S. Zhong has severity data before 2015. **J. Anderson** has been publishing FHB nursery data on URN since at least 2000.

J. Fiedler: Genotyping platform. Two things he's working on:

1. single primer enrichment (commercial product from Allegro) - he will take 16K subset of 90K with known positions and see what is polymorphic. \$12-14 per sample for reagents + Novaseq which doesn't add too much to cost

2. Developing 3K chips in wheat, oat, soy to meet 50K sample requirement and then cost is \$12/sample

Also, dual species chip (Australia does this for wheat-barley) - if this works, would be about \$6/sample

He's working on Practical Haplotype Graph to see if that's a good way to do imputing

Possible **Locations** for additional regional yield trials: St. Paul, Crookston, Brookings, Groton, a few ND locations at least the ones that A. Green controls. Also need to consider experimental design. 1 rep + augmented design, 2 reps? How many entries? Unbalanced with more entries for "home" programs? For example, in a 40 entry trial, 20 entries are from "home" state, 5 entries from two neighboring programs, and 10 for checks. Should fungicide be used?

Other updates from the group:

S. Zhong introgressing 5A QTL & Fhb1 into regional lines. Will send breeders BC5 homozygotes later this summer.

Steven Xu:

backcrosses from PI277012 (2 QTLs on 5A), and has many backcross derivatives.
7EL (Fhb7) also contains Sr43 - his is only program in US with Fhb7 introgressions.
yield genes from Ae. Tauschii
salt tolerance from Th. ponticum and Th. junceum

S. Xu has cloned 2 linked genes from Ae. tauschii that increase yield 14-25%; is backcrossing 2 genes into regional germplasm, has F1's now. Had to swap out some crossability genes due to hybrid necrosis.

this could be a separate objective to backcross into regional germplasm and get them tested

Action items: Collect FHB data from URN trial and send to Fiedler and deposit into T3.

Expecting RFP July/early August. Pre-proposals in September. LOI probably due mid July.

We discussed implications of 4-year projects and was generally considered a positive development for breeding and screening projects but will be difficult for research-based projects to compete.

J. Fiedler will take the lead on GS proposal