

USWBSI VDHR -SWW CP Annual Planning Meeting Report

Met Via Zoom

March 17, 2021

ATTENDEES

Steve Harrison (VDHR-SWW Chair), LSU	Nicholas Santantonio, VA Tech
Allen Becker (VDHR-SWW SC member), GrowPro	Vijay Tiwari, UMD
Rick Boyles (VDHR-SWW SC member), Clemson	Jerry Johnson, UGA emeritus
Paul Murphy, NCSU	Jeanette Lyerly, NCSU
Mohamed Mergoum, UGA	Michelle Bjerkness, incoming USWBSI Director
Amir Ibrahim, TAMU	Sue Canty, outgoing USWBSI Director

WELCOME AND INTRODUCTIONS

Individual introductions commenced at 9:35am and ended at 9:45am. Sue Canty announced her retirement in December 2020 and introduced the incoming chair, Michelle Bjerkness (attending the meeting). Michelle introduced herself and gave a little of her background. Likewise, each attendee gave a brief background for Michelle.

DISCUSSION AND UPDATES TO THE ACTION PLAN

The VDHR-SWW CP Committee reviewed the current action plan, last updated on 5/31/19, and thoroughly discussed each goal outlined associated with their Coordinated Project. Overall, the group supported continuation of the current plan with a few potential new opportunities being considered.

Goal #1 Increase and document the number of varieties with improved FHB resistance and high grain yield and grain quality, that are tested in statewide variety trials and available to farmers, to reduce DON in the US grain supply.

The current Action Plan eliminated acreage planted to FHB resistant varieties because of the difficulty in tracking acreage. The option to determine a % of acreage grown with FHB resistance varieties produced by Scab Initiative was discussed as a way to clearly depict impact. Several limitations in availability of all data needed to determine this accurately, various options were discussed. Additional resources would be needed. A motion was made and approved to recommend no changes to Goal 1.

Nicholas: Can we provide a rough estimate of acreage by variety based on royalties received back to universities?

A rough estimate of percentage will be valuable to constituents for perspective.

Steve: We will have no clue what the private companies are doing.

Vijay: What proportion of varieties are resistant that are released? Is this number increasing?

Steve: We can document and track what varieties are released. With a few exceptions, no outdated varieties will be grown on significant acreage because of high turnover rate.

Mohamed: Lobby for USDA to survey growers on what wheat varieties are being grown. Contact USDA to see about interest and if there is a cost associated.

Rick: Tracking acreage by variety is an extension task and is not the true purpose of the CP.

Allen: Some private companies report on FHB resistance QTL, but most do not and will not likely start reporting in the future.

Steve: Compare DON data for released varieties along with standard checks over a number of years to measure year-over-year improvement in FHB resistance.

Paul: We have evolved to the point that nearly all entries in the USSN are largely resistant.

Nicholas: Bryan Gerard (JoMar) states that growers want to see FHB1 on seed bags. Why would private companies not want to advertise that a variety has FHB1?

Paul: More broadly, companies do not report H13 for Hessian fly, FHB1, etc.? In other words, why are you hiding trait improvements that have been done by public breeding programs? It seems to be doing a disservice to the wheat industry.

Amir: We can just report the improvement of FHB (what QTL, data) public releases.

Nicholas: Volunteered Josh Fitzgerald to upload all USSN data to T3.

Mohamed: The milestones established are still appropriate and should not be changed.

Paul: To Michelle, you may be wondering since the USWBSI has made excellent progress in reducing the scab and DON problems, why is the Initiative still around? The problem is this disease can overcome genetic improvements very quickly and so it is a challenge to maintain, much less improve, the advancements made to this point.

Rick: There is a tradeoff between yield and DON, so if we do not select concurrently for both traits and only focus on yield, we will lose the progress made by the VDHR CP very quickly.

Steve: Any more discussion on Goal #1?

Mohamed: Can we commit to conducting a variety survey, possibly every other year?

Paul: You do not see scab susceptible varieties anymore. We do not need to get down into the weeds with individual variety reporting.

Nicholas: By breaking the varieties down into resistance reaction categories, we may be doing a disservice to varieties with slightly less resistance because the majority of entries are in the moderately resistant category.

Paul: None needed. All agree.

Motion to keep Goal #1 as is. Seconded by

Goal #2 Increase efficiency of the CPs' funded projects to develop and release FHB resistant varieties and germplasm.

Steve commented that the group has made very good job with progress overall and genomic prediction efforts by Jeanette are top notch. Tracking of DHs that are funded by Scab Initiative was determined should be put in place in notation. Speed breeding efforts need further discussion. The group is planning a half-day workshop (via Zoom) to develop a shared speed breeding protocol and possible proposal for next funding cycle. Creation of a non-linear Genomic Selection Index was also identified for further consideration. Sparse Testing was another approach for the collaborating universities to consider, a diagram of approach will be developed.

Mohamed: Need to discuss status of doubled haploids. Are we going back to Heartland?

Paul: USDA DH facility will likely not be up and running until 2024. David Marshall is delaying retirement to ensure that this building get built on time and strategically so that it benefits regional cultivar development programs. David began working to hire two technicians immediately, but COVID-19 has significantly delayed progress toward making these hires. George (Paul Murphy's DH lead at NCSU) was temporarily hired to train new USDA technicians but, now with the delay in hiring, George will retire soon without the ability to train. Fears that we will have to go back to Heartland for the next few years.

Steve: Sue and I discussed that the money reallocated from the Arkansas program will be split among CP programs for extra DH funding to accommodate the increased cost in Heartland compared to NCSU.

Steve: One issue that we need to discuss is the sharing of DHs among SunGrains programs, but we have not kept track of the funding source of each DH. We need to consider tracking the USWBSI funded DHs across programs and make an effort to share selected DHs by program to others in the CP. This would be in the form of a few grams of seed to each program for headrow observations after the originating breeder evaluates the DH in headrows, makes an initial selection, and harvests entire headrows. This allows greater opportunity for a DH line to reach cultivar release and helps to increase the impact of the DH project for the entire RCP.

Nicholas: A technician sprayed roundup on crosses last year and so no F1 topcrosses are being made this year at VA Tech.

Steve: (to Nicholas) Do you need F2 seed from crosses across other programs?

Nicholas: We may just scratch that year and move forward with the germplasm in the program.

Steve: Make it a point to share USWBSI DHs across the entire VDHR-SWW CP.

Steve: What about markers? Speed breeding?

Vijay: Trying to get four generations a year for winter wheat using early seed harvest. Also, the program is looking into enriching the Jamestown 1B region with markers to improve genotyping ability. Need to start utilizing FHB7 in programs.

Steve: Need to have a separate discussion on speed breeding.

Steve: Where are we on FHB7 sources?

Rick: Was unable to get FHB7 lines and populations from Mohsen Mohammadi at Purdue to put in headrows last fall or in the greenhouse for initial backcrossing into adapted germplasm.

Vijay: Have FHB7 and Sr43 in intermediate background that I can start backcrossing using speed breeding to get populations circulated to VDHR programs.

Amir: Who is doing marker-assisted backcrossing?

Rick: Started a MABC program at Clemson last fall to introgress FHB1 and H13 into popular SunGrains lines that are high yielding.

Goal #3 Evaluate and implement new breeding technologies and develop germplasm to further enhance short term and long-term improvement of FHB resistance, and to efficiently introgress effective resistance genes into breeding germplasm.

Several Items were discussed that pertain to Goals 1 & 2, including speed breeding methodology and creating an index for use with genomic selection.

Nicholas: Why not build genomic selection index for FDK and DON in populations without major effect QTL? Sending observation lines to Gina for genotyping.

Amir: Looking at UAV-based data collection to improve selection intensity.

Nicholas: How can we more effectively look at the temporal aspect of resistance?

Rick: Need to continue genotyping of 3-way F1 enrichment prior to DH cross selection.

Nicholas: Sparse testing?

POTENTIAL CHANGES IN FUNDING CYCLE

The committee discussed the new 4-year funding cycle that is being considered. There were reservations with new approach and additional detail needed to help clarify. Key concerns raised including: 1) less flexibility with a four-year cycle in terms of new research initiatives and loss or addition of breeding programs; 2) ability to allocate special funding and adopt new techniques and approaches.

Steve: One issue is if new programs want to participate and have to wait a number of years before a new funding cycle begins.

Steve: Will there be a slush fund to maintain flexibility to pursue special projects within the 4-yr cycle?

Mohamed: There are positives and negatives to long-term funding.

Steve: New programs do not have the ability to scale up funds incrementally (vesting) to reach the level of funding by more established programs and CP members. In this group we have traditionally started new participants at a moderate level of funding and scaled them up as the research activity developed. You can't really do that with fixed four year funding and will have to make some decisions upfront about re-allocating funding based on potential rather than on history.

Steve: Arkansas will not receive funding for FY21. EC declined Steve's proposal to give money to Vijay to develop a marker for Jamestown 1B. End up splitting it among groups for DH production.

Steve: The funding cycle of 4 years is set in stone. Suggest Michelle speak with EC about flexibility in budget reallocation or presence of slush funds within VDHR-SWW CP to allow for special projects, equipment purchases, or for a potential new program to join mid-cycle.

SPECIAL PROJECTS

Vijay discussed the mutagenized Jagger and Shirley populations. Selected mutants show a good level of FHB resistance and lower severity and DON levels compared to Jagger parent. A paper is accepted in TAG on results from negative regulator of FHB resistance using similar approach. Mohamed suggested adding special project for mapping new QTL for FHB resistance.

GENOMIC SELECTION PROTOCOL

Jeanette discussed progress and status of the regional genomic selection project. Even with COVID issues, the project remains on time with genomic data generation and genomic predictions. Steve asked Jeanette if she knew where Gina's lab is on marker genotyping advanced nurseries. Jeanette responded that she was unsure about status of KASP genotyping. Jeanette had talked to Gina and Brian Ward about using GBS data to make predictions on important QTL. She is working with Brian Ward to get data for Bess 2B and 3B to incorporate into predictions. It may be possible to get good predictions on Jamestown 1B. Mohamed commented that stacking resistance QTL is very dependent on which specific QTL are being combined. The group concluded that the GS program is the best in the country and getting better each year.

CLOSING COMMENTS

Steve noted that he has feedback on VDHR progress form from Mohamed, Rick, and Allen. He asked that everyone else send comments by March 22 to compile prior to the March 25 deadline.

Plans were made for a second meeting in July, after everyone is out of the field for the summer.

The meeting adjourned 11:59a EST.