

USWBSI Durum Coordinated Project Planning Meeting Report

Met Via Zoom

March 17, 2021

The 2021 Durum CP Planning Meeting was virtually held at 1:00 – 4:00 pm on March 17, 2021. The meeting was announced to the entire Scab Community (fhh@scabusa.org), both durum wheat stakeholders/growers and researchers were invited to attend. The meeting was chaired by Steven Xu, notes were taken by Kirk Anderson and Michelle Bjerkness, all anticipated participants were in attendance (18).

Participants

Xiwen Cai, North Dakota State University	Shahryar Kianian, USDA-ARS
Elias Elias, North Dakota State University	Krishna Acharya, North Dakota State University
Jason Fiedler, USDA-ARS	Kirk Anderson, USDA-ARS
Viers Greg, Barilla America Inc	Deanna Harris, USDA-ARS
Louis Kuster, U.S. Durum Growers Association	Mike Giroux, Montana State University
Xuehui Li, North Dakota State University	Mark Sorrells, Cornell University
Steven Xu, USDA-ARS	Dustin Johnsrud, North Dakota Wheat Commission
Andrew Friskop, North Dakota State University	Michelle Bjerkness, USWBSI-NFO
Shaobin Zhong, North Dakota State University	Susan Canty, USWBSI-NFO

Announcement and Introductions

The meeting started with Susan Canty announcing her retirement and Michelle Bjerkness taking on the duties of the incoming Director of Operations (DOO) of USWBSI Networking & Facilitation Office (NFO). Several new individuals joined the meeting for the first time, introductions were made for entire group.

Grower Report

Growers, Louis Kuster and Dustin Johnsrud, participated and provided updates on last year's durum season. There were largely good growing conditions throughout the 2020 season. Growers had average to above average yields and quality. The start of our current dry cycle started in mid to late July and continues to the present time. The lack of soil moisture is concern as the planting season approaches. We don't expect much change in durum acreage this coming year, we may see some shift to canola/soybean given their current market prices.

Industry Report

Pasta industry/end users are concerned about rallies in other commodities (corn, soybeans, and bread wheat), and durum not keeping its normal market premium price. The fear is that durum may not hold all its normal acreage this year. The pasta industry currently has durum inventories

with very good quality due to productive year in 2020. Durum quality standards remain unchanged with DON levels the same as previous years.

Research Reports

All PIs took time to review their individual programs and progress made the past year. A detailed overview on various durum germplasm development programs and mapping of FHB resistance QTL and markers to assist selection was shared. Xiwen Cai (NDSU-Plant Sciences Dept.) reviewed his work transferring Fhb7 form from tall wheatgrass into durum wheat, identifying new FHB resistance QTLs from PI277012, and developing new germplasm and markers. Steven Xu (USDA-ARS Fargo) reviewed progress in the development of elite durum germplasm with improved FHB resistance. His program has developed approximately 1,500 new durum lines carrying Fhb1 and the PI277012-derived 5AL QTL. Shaobin Zhong reported identification and mapping of a novel QTL on chromosome 2A with major effect for FHB resistance in emmer wheat line PI 254188. The FHB resistance from PI254188 has since been transferred to Joppa durum. Shahryar Kianian (USDA-ARS St. Paul, Minnesota) updated progress in enhancing FHB resistance by epigenetic modification of durum cultivars. He found several good lines with improved FHB resistance in a background of Ben and performed transcriptome analysis to see what genes are expressed. He is currently narrowing down the genes that could play essential roles in conferring FHB resistance.

Xuehui Li (NDSU-Plant Sciences) updated progress of his genomics-assisted recurrent selection project. He indicated that there are many major and minor FHB QTL that have been identified and there is a need to integrate more resistance QTL with major, medium, and minor effects into durum varieties. He has evaluated 200 S1 families in Fargo and Prosper and completed two cycles of selection and currently conduct the 3rd cycle. He has selected the top 20 S1 families from the C1 population, which are being intercrossed to generate the C2 population. Jason Fiedler (USDA-ARS Fargo) updated his project's progress in identifying novel haplotypes in durum germplasm with superior agronomic traits and FHB resistance derived from hexaploid wheat Sumai 3 and PI277012. He is merging durum work with the HRSW Pangenome Sequencing Project. He has durum lines selected and seed sourced. He is doing homogeneity tests for seed purity and will need additional space to increase seed. He has acquired needed equipment and is validating protocols for sequencing. He will use 10X resequencing instead of Exon/promotor capture and will develop a contract for sequencing soon.

Two durum wheat breeders presented an overview on developing durum varieties with improved FHB resistance. Elias Elias (NDSU Durum Breeder) first updated progress in the NDSU durum breeding program. Due to Covid-19 concerns, the trials in Langdon were not planted in 2020. But the breeding trials (~6000 plots) were conducted in Prosper and Casselton locations. Throughout 2020 and 2021, about 60 new populations were created, 500-600 lines were in advanced trials in Prosper, 3,000 lines were in the greenhouse, and 1000 lines are in the winter nursery in New Zealand. Elias indicated that he has a good deal of material to work with and will continue to identify sources of disease resistance in cooperation with Xiwen Cai and Steven Xu. For released varieties, Joppa continues to be the most popular durum in ND, it has high yield and low DON. Divide and ND Riveland are the best for disease resistance. ND Stanley is the new variety released in 2021. Mike Giroux (Montana State University) reviewed his project for

developing FHB resistant durum variety for Montana. A new durum variety Lustre was released for northeastern Montana in 2020. Its tolerance to FHB is similar to North Dakota lines and varieties. It is being currently crossing with Sumai 3 source of FHB resistance. Mike indicated that he will have several hundred hill plots at the Eastern Montana Research Station located in Sidney, Mt in the coming growing season.

Resources and Challenges

Available resources for improving durum wheat for FHB resistance were reviewed and several challenges and were discussed. Many resources, including breeding populations, germplasms, markers, and genotyping and phenotyping facilities, are now available for improving durum wheat for FHB resistance. There are still some challenges to develop durum wheat varieties with high level of FHB resistance, including absence of durum variety with a high level of FHB resistance, lack of good markers for most QTL, linkage drag, and expression issues of QTL in good backgrounds. To make the new germplasm with major QTL introduced from non-adapted sources useful for durum breeding programs, Dr. Elias recommends at least five backcrosses. Unfortunately, by time that this is achieved, newly available traits make this work outdated. Therefore, there is need to find ways to shorten length of time to develop germplasm.

Potential Projects

All DUR-CP PIs shared areas they plan to focus on for coming funding cycle. Most of on-going research will be continued, including breeding new durum varieties with further improved FHB resistance, developing new durum germplasm by incorporating and pyramiding major FHB resistance QTL into the leading durum varieties (e.g., ND Riveland), identifying new sources of FHB resistance, developing new molecular markers, and evaluating breeding value (yield potential and end-use quality) of durum germplasm carrying major FHB resistance QTL.