

2016-2017 USWBSI Spring Wheat VDHR CP Milestone Matrix

Objective 1. Increase acreage planted with varieties with improved FHB resistance to reduce DON in the US grain supply.

PI(s)	Month	Milestones	Progress	Outputs/Linkages
Anderson (MN), Mergoum (ND), Glover (SD), Talbert (MT), and Chen (ID)	3	Evaluate FHB and DON resistance in the 2016 spring wheat variety trials (~30-50 cultivars per state and pre-released lines) using inoculated nurseries (MT collaborates with ID)	NOTE to EC: Progress for all milestones in this CP is listed in individual progress reports.	Growers and breeders will know FHB resistance level of cultivars/lines in the nurseries. This informs growers regarding cultivar choice and breeders for release and crossing decisions. Summaries available online at respective Extension websites and in print in <i>Prairie Grains</i> .
MN, ND, SD, MT, ID	3	Evaluate FHB and DON resistance of the 2016 URSN regional nurseries in 3-4 inoculated FHB nurseries		Breeders will know which lines in the nurseries have resistance to FHB and this can be useful for crossing and cultivar/germplasm release decisions.
MN, ND, SD, MT, ID	3	Screen ~18,000 pre-yield trial genotypes and segregating populations for FHB under artificial inoculation conditions in 2016.		
MN, ND, SD, MT, ID	3	Evaluate ~2,500 preliminary/advanced/elite lines in inoculated FHB nurseries in 2016.		
MN, ND, SD, MT, ID	6	Make ~1,000 crosses among FHB resistant lines/cultivars with good agronomic adaptation and suitable hard red spring wheat quality traits.		
MN, ND, SD, MT, ID	9	Screen ~5,500 breeding lines from 2016 field trials for presence of <i>Fhb1</i> and 5AS QTL with DNA markers		
MN, ND, SD, MT, ID	15	Evaluate FHB and DON resistance in the 2017 spring wheat variety trials (~30-50 cultivars per state and pre-released lines) using inoculated nurseries.		Growers and breeders will know FHB resistance level of cultivars/lines in the nurseries. This informs growers regarding cultivar choice and breeders for release and crossing decisions. Summaries available online at respective MAES/Extension websites and in print in <i>Prairie Grains</i> .
MN, ND, SD, MT, ID	15	Evaluate FHB and DON resistance of the 2017 URN and URSN regional nurseries in 3-4 inoculated FHB nurseries		Breeders will know which lines in the nurseries have resistance to FHB and this can be useful for crossing and cultivar/germplasm release decisions.
MN, ND, SD, MT, ID	15	Screen ~18,000 pre-yield trial genotypes and segregating populations for FHB under artificial inoculation conditions in 2016.		
MN, ND, SD, MT, ID	15	Evaluate ~2,500 preliminary/advanced/elite lines in		

PI(s)	Month	Milestones	Progress	Outputs/Linkages
		inoculated FHB nurseries in 2016.		
MN, ND, SD, MT, ID	18	Make ~1,000 crosses among FHB resistant lines/cultivars with good agronomic adaptation and suitable hard red spring wheat quality traits.		
MN, ND, SD, MT, ID	18	Screen ~5,700 breeding lines from 2017 field trials for presence of <i>Fhb1</i> and 5AS QTL with DNA markers		

Objective 2. Increase efficiency of coordinated project breeding programs to develop and release FHB resistant varieties.

PI(s)	Month	Milestones	Progress	Outputs/Linkages
Anderson	12	Development and validation of an GS Model based on 500 F5 lines and comparison of F5 derived GS model to GS model based on advanced lines that was developed in previous funding cycle	NOTE to EC: Progress for all milestones in this CP is listed in individual progress reports.	Testing of hypothesis that F5 derived GS model is more predictive than GS model based on advanced lines.
	24	Development and validation of an GS Model based on 500 F5 lines and comparison of F5 derived GS model to GS model based on advanced lines that was developed in previous funding cycle		Substitution of field based screening of F5 lines with GC model.
Garvin	9	Complete and distribute 2016 URSN report		Breeders will know which lines in the nurseries have resistance to FHB and this can be useful for crossing and cultivar/germplasm release decisions.
	21	Complete and distribute 2017 URSN report		Breeders will know which lines in the nurseries have resistance to FHB and this can be useful for crossing and cultivar/germplasm release decisions.

Objective 3. Develop new breeding technologies and germplasm to further enhance short term and long term improvement of FHB resistance and to efficiently introgress effective resistance genes into breeding germplasm.

PI(s)	Month	Milestones	Progress	Outputs/Linkages
Cai	6	Verify FHB resistance of the advanced introgression lines under field conditions in ND	NOTE to EC: Progress for all milestones in this CP is listed in individual progress reports.	
	12	Make new crosses of FHB-resistant wheat-alien species derivatives with adapted spring wheat genotypes and initiate another round of FHB introgression. Screen segregating materials at early generations and select resistant segregants in the greenhouse.		
	12	Analyze chromosome constitutions of the genetically stabilized lines with FHB resistance. Eliminate unwanted alien chromatin, if necessary, from the resistant lines through chromosome manipulation		
	12	Make crosses to pyramid FHB resistance genes from different sources		Creation of resistant germplasm that is available to regional breeding programs.
	18	Verify FHB resistance of the advanced introgression lines under field conditions in ND		
	24	Make new crosses of FHB-resistant wheat-alien species derivatives with adapted spring wheat genotypes and initiate another round of FHB introgression. Screen segregating materials at early generations and select resistant segregants in the greenhouse.		
	24	Analyze chromosome constitutions of the genetically stabilized lines with FHB resistance. Eliminate unwanted alien chromatin, if necessary, from the resistant lines through chromosome manipulation. Analyze haplotypes and develop suitable markers		
	24	Make crosses to pyramid FHB resistance genes from different sources.		Creation of resistant germplasm that is available to regional breeding programs.
Xu	6	Screen FHB reaction of SHW lines and tetraploid parents in greenhouse and field nurseries (Fargo and Prosper, ND)		
	12	Genotype all the SHW lines and their tetraploid parents using the wheat 9K-SNP array		
	18	Screen FHB reaction of SHW lines, amphiploid and tetraploid parents in greenhouse and field nurseries (Fargo and Prosper, ND)		
	24	Complete statistical analysis		SHW lines and wheat-alien species amphiploid with high and moderate level of FHB resistance will be made available to the wheat geneticists and breeders for developing adapted wheat germplasm
Zhong	12	Identify novel QTL for FHB resistance in PI 185843 by genotyping and phenotyping a population consisting of 200 recombinant inbred lines from the cross between PI 185843 and Wheaton.		
	24	Develop user-friendly DNA markers for the novel QTLs from PI185843.		Creation of resistant germplasm that is available to regional breeding programs
	24	Introgress and pyramid the two major QTL for FHB resistance derived from PI 277012 into adapted spring wheat varieties through backcrosses and marker assisted selection.		Creation of resistant germplasm that is available to regional breeding programs.