

Milestone Matrix of the VDHR-Southern Soft Winter Wheat CP

Variety Development Objectives for Year 1 (5/1/2014-4/30/2015) and Year 2 (5/1/2015-4/30/2016)

1. Increase acreage planted to varieties exhibiting improved FHB resistance.
2. Increase efficiency of individual breeding programs' to develop and release FHB resistant varieties.
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.

Variety Development Milestones

| State(s) | # | Description | Target and Date | Outputs/Linkages |
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| All | 1 a | Complete biparental, 3-way and 4-ways crosses to improve FHB resistance in adapted SRWW | Yr1: Complete 1885 crosses by 5/2015 Yr2: Complete 1885 crosses by 5/2016 | Generate 100,000+ recombinant lines for future evaluation and selection of pure lines |
| All | 1 b | Evaluate and advance multiple segregating breeding populations and select desirable pure lines. Emphasize the development of germplasm that incorporates FHB QTL, such as <i>Fhb1</i> , 2DL, 3BSc, 4B, 5AS, and other hexaploid sources into adapted SRWW backgrounds. More reliance on 'native' resistance and adapted lines containing QTL listed above | Yr1: Evaluate and select among more than 3,500-7,000 F2-F5 breeding populations and more than 100,000 progeny rows by 5/2015 Yr2: Evaluate and select among more than 3,500 - 7000 F2-F5 breeding populations and more than 100,000 progeny rows by 5/2016 | Generate a diverse set of 100,000+ SRWW with known, and unknown, FHB QTL. Disseminate to SRWW breeders for evaluation with a view to release as varieties and germplasms. |
| All | 1 c | Evaluate new advanced generation breeding lines developed within programs for FHB resistance. Continue evaluating lines that are advanced within each program each year. Note: this is not cooperative, | Yr1: Obtain data on more than 2000 new lines by 7/2015. Process data and select lines to retest by 9/2015 Yr2: Obtain data on more than 2000 new lines by 7/2016. Process data and select lines to retest by 9/2016 | Identify new recombinant lines with enhance FHB resistance and agronomic potential. Germplasm information compiled into database. |

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| | | multi-state testing | | |
| All | 1 d | Increase seed of breeding lines with improved FHB resistance for potential commercial release. Report increases to CP coordinator | Yr1: Harvest increase seed and report by 10/2015 Yr2: : Harvest increase seed and report by 10/2016 | Facilitate commercial production of FHB resistant cultivars and disseminate information to seed companies, Extension services, milling industry, and growers |
| All | 1 e | Release of cultivars with improved FHB resistance. Report releases to CP coordinator. | Yr1: Release by 10/2015 Yr2: Release by 10/2016 | Provide the wheat community with wheat cultivars with improved FHB resistance. Goal is to release four new varieties with high levels of FHB resistance in the region during the two year cycle |
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| All | 2 a | Marker-assisted selection will be used in all programs to increase efficiency to meet their specific needs and breeding strategies including MAS enrichment of F ₁ s from multiparent crosses, early generation F ₂ or F ₃ plant or family selections, MAS-BC and background parent selection. Apply information from ongoing studies on mapping FHB and DON resistance in MD01W233-06-1 (MD), Neuse (NC), Roane/Jamestown (VA), Tribute (VA), and Catbird. | Yr1: Harvest tissue and obtain marker data from USDA Genotyping Center for over 2,600 lines by 5/2015. Yr2: Harvest tissue and obtain marker data from USDA Genotyping Center 2,600 lines by 5/2016. Additional genotyping to be done in-house | Frequency of FHB resistance QTL in variety development populations will be increased with MAS. Will enhance parental selection for crossing programs also. |
| All | 2 b | Deploy double haploid technology to accelerate development of FHB resistant lines and mapping populations. Combination of contracts with Heartland Plant Innovations (HPI) and NC State in- | Yr1: Up to 500 DH lines distributed by NC State program 9/2015. Yr2: Seed of 1000 DH lines from four populations distributed for evaluation in 9/2016 from HPI contracts. Up to 500 more DH lines distributed from | Speed the development of cultivars and breeding lines that combine FHB resistance from native and exotic sources in adapted SRWW backgrounds. |

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| | | house DH production. | NC State program. | |
| VA | 2 c | Assess FHB resistance of lines in the multi-state NUWWSN. Evaluate other agronomic traits and resistance to other diseases as they occur. | Yr1: Obtain data on more than 50 lines and send to coordinator by 9/2015 Yr2: Obtain data on more than 50 lines and send to coordinator by 9/2016 | Assess FHB of lines for potential release. Germplasm information compiled into to database and germplasm made available to all breeders |
| VA | 2 d | Assess FHB resistance of lines in the multi-state PNUWWSN. Evaluate other agronomic traits and resistance to other diseases as they occur. | Yr1: Obtain data on 60 lines and send to coordinator by 9/2015 Yr2: Obtain data on 60 lines and send to coordinator by 9/2016 | Assess FHB of lines for potential release. Germplasm information compiled into to database and germplasm made available to all breeders |
| All USDA Quality Lab USDA Eastern Genotyping Center | 2 e | Assess FHB resistance of lines in the multi-state SUWWSN. Evaluate other traits such as quality, and resistance to other diseases as they occur. Includes obtaining haplotype data. | Yr1: Obtain data on up to 70 lines and send to cooperators by 9/2015 Yr2: Obtain data on up to 70 lines and send to cooperators by 9/2016 | Assess FHB resistance and other quality and agronomic traits of lines for potential release. Genotype data provided on up to 35 loci. Germplasm information compiled into a database and germplasm made available to all breeders |
| All | 2 f | Assess FHB resistance of cultivars entered in the State Evaluation Trials of commercially available cultivars. Disseminate information to growers via Extension. | Yr1: Collect data on approximately 500 entries and disseminate by 9/2015 Yr2: Collect data on approximately 500 entries and disseminate by 9/2016 | Assess FHB of lines for commercially available cultivars. Data will be compiled into a database that will be used in various Extension outreach media (reports, websites, presentations, etc). |
| All | 2 g | Assess FHB resistance of advanced generation lines in cooperative nurseries: Uniform Southern Yield, GAWN, SUNWHEAT. | Yr1: Obtain data on up to 150 lines and send to cooperators by 9/2015 Yr2: Obtain data on up to 150 lines and send to cooperators by 9/2016 | Assess FHB of lines for potential release. Germplasm information compiled into a database and germplasm made available to all breeders |
| NC | 2 h | Coordinate the SUWWSNs of up to 70 SRWW genotypes and checks. | Yr1: Preliminary report by 8/2015, Final report by 11/2015. | Data sent to all breeders, summarized in Forum proceedings, posted on |

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| | | Disseminate preliminary and final reports in a timely fashion | Yr2: Preliminary report by 8/2016, Final report by 11/2016. | USWBSI website, placed in database. |
| LA AR | 2 i | Collaborate in male sterile recurrent population development for pyramiding FHB resistance | Yr1: Grow populations in breeding programs and make selections. Yr2: Grow populations in breeding programs and make initial selections | Improved germplasm developed through recurrent selection |
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| LA, AR, GA | 3 a | Mapping FHB and DON resistance in ARGE04-1163-67 (Freedom / Catbird // Mason / Catbird) / LA05027D-98. DH population of 225 lines. | Yr1: Collect phenotypic data from all six states by 9/2015. Yr2: Collect phenotypic data from all six states by 9/2016 | Identity and diversity of QTL for resistance to FHB and DON. Population segregating for 'Catbird' and 'Native' resistances. Information on putative QTL will be presented at the forum, published, and placed in database for ready use by breeders. |
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