Report for FY24-SW-002: A Double Haploid Initiative to Speed Development of FHB Resistant Soft Winter Wheat

---

1. **What are the major goals and objectives of the research project?**
   The goal of this proposal is to extend the highly successful regional Double Haploid (DH) initiative among eight universities that facilitates rapid development and release of high-yielding varieties that contain an effective FHB resistance pyramid. Specific Objectives are: 1) Develop DH lines that combine multiple effective FHB resistance genes/QTL.
   2) Share new DHs with all VDHR-SWW breeders after the initial culling such that each breeder evaluates over 1,000 new DHs each year.

2. **What was accomplished under these goals or objectives?** *(For each major goal/objective, address these three items below.)*

   What were the major activities?

   In the fall of 2025, 10 g of seed from each of 119 selected DH lines from the DH project were mailed to each of the seven other collaborators. In the fall of 2026, 110 new selected DH lines were sent to collaborators in the same fashion. A total of 332 selected DH lines were received from collaborators in the fall of 2025, and evaluated in single rows in the spring of 2026 alongside 817 DH derived from crosses made at Virginia Tech. Of these collaborator lines, 40 were advanced into yield testing for 2027 along with 180 selected DH developed from crosses in our program.

   In the spring of 2026, 225 DH lines were evaluated in year-1 yield trials across 5 locations in a sparse testing design. This included 73 DH lines designated as GS (genomic selection) and 51 designated as MAS (marker assisted selection) from crosses made in our program, as well as 101 DH lines from collaborators. In the fall of 2026, 9 GS lines, 17 MAS lines and 3 collaborator lines (all from one program) were advanced from these into year-2 yield testing across 13 locations from Ontario to Louisiana. Currently, there are four DH lines in elite testing (year-3+) across those 13 locations and the Virginia state variety trials.

   What were the significant results?

   While MAS lines appeared to be favored over GS lines from advancement to year-2 testing, this was primarily due to severe Hessian Fly pressure in Warsaw, VA, in spring of 2026. All MAS lines contained H13, because they were all derived from a cross where both parents contained H13, while many of the GS lines only had one parent with H13 or neither parent contained the resistance gene. This may have also impacted why only three collaborator lines were advanced into year-2 testing.

   List key outcomes or other achievements.

   1) Four DH lines developed in this program are currently candidates for release and are being tested in the Virginia state variety trial, with three lines containing Fhb1.
   2) Three lines have been released as cultivars all containing Fhb1. The privately licensed lines are marketed under the brand names USG 3673 and Southern Harvest 5123. The public line released is named ‘VT Pitman’ and has seen excellent performance in the mid-Atlantic region with good seed sales.

3. **What opportunities for training and professional development has the project provided?**
   A new PhD student in the lab, Kushal Bhattarai, was trained one-on-one with the breeder to select headrows for advancement. He was tasked with selection of lines within the collaborator DH set, from which he advanced 40 lines.

4. **How have the results been disseminated to communities of interest?**
   Selected DH lines are sent each year to all seven collaborators for their testing. Several lines from Virginia Tech have been advanced in other programs and used as parents.

5. **What do you plan to do during the next reporting period to accomplish the goals and objectives?**
   DH lines received this fall will be planted in single rows in Blacksburg, VA and selected in the spring of 2027. Selected headrows with sufficient seed will be shared with all collaborators. DH in year-1 and year-2 trials will be advanced based on agronomic performance and FHB resistance.