# USWBSI Individual Project(s)

<table>
<thead>
<tr>
<th>USWBSI Research Category</th>
<th>Project Title</th>
<th>ARS Adjusted Award Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDHR-NWW</td>
<td>Accelerating the Development of FHB-Resistant Soft Red Winter Wheat Varieties.</td>
<td>$54,560</td>
</tr>
<tr>
<td>VDHR-NWW</td>
<td>Mapping Fusarium Head Blight Resistance in Truman Wheat.</td>
<td>$2,305</td>
</tr>
<tr>
<td></td>
<td><strong>Total Award Amount</strong></td>
<td><strong>$56,865</strong></td>
</tr>
</tbody>
</table>

* MGMT – FHB Management  
FSTU – Food Safety, Toxicology, & Utilization of Mycotoxin-contaminated Grain  
GDER – Gene Discovery & Engineering Resistance  
PBG – Pathogen Biology & Genetics  
BAR-CP – Barley Coordinated Project  
DUR-CP – Durum Coordinated Project  
HWW-CP – Hard Winter Wheat Coordinated Project  
VDHR – Variety Development & Uniform Nurseries – Sub categories are below:  
  SPR – Spring Wheat Region  
  NWW – Northern Winter Wheat Region  
  SWW – Southern Sinter Wheat Region

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

This project addresses the need for FHB resistance in soft red winter wheat varieties adapted to Kentucky. Many varieties grown in our region are susceptible to FHB; thus, Kentucky wheat producers and end users are at risk for severe economic losses as a result of head scab epidemics.

This breeding process involves: 1) evaluating germplasm and breeding lines as parents for FHB resistance; 2) incorporating known resistance into crosses with elite, high yielding lines and cultivars, and 3) evaluating resistance in the progeny of the crosses. We evaluate early generation populations in inoculated nurseries so that only resistant segregates are brought forward and developed into lines that can be evaluated for the usual array of traits at multiple locations.

Field evaluation is carried out at two locations: Lexington, under mist irrigation with inoculum provided by the scabby corn method, and at Princeton in a non-irrigated nursery with a combination of conidial spray and scabby corn as inoculum sources.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):

Accomplishment (1): Approximately 4 single seed descent derived lines homozygous for Fhb1 resistance were planted were entered in the state variety trial during the period covered by this grant.

Impact: These lines will provide breeders with additional germplasm and parental lines to use in crosses for the development of scab resistant germplasm and varieties. The combination of Fhb1 and native resistance QTL will be especially useful. If superior performance is demonstrated, one or more of the lines may be released as cultivars.

Accomplishment (2): Approximately 40 breeding lines and varieties were grown at two locations, Lexington and Princeton in inoculated scab nurseries in the presence and absence of Prosaro® fungicide.

Impact: There is no more critical decision for growers than the choice of a resistant variety. This must be coupled with the decision to use fungicides when conditions warrant. This study gives KY growers the information they need to implement the best tools we have for fighting FHB.

Accomplishment (3): Approximately 82 breeding lines in the cooperative Mason Dixon nursery (VA, MD, NC, KY) were grown in a mist irrigated, inoculated scab nursery at Lexington for purposes of FHB phenotyping.
Impact: The data generated from this type of nursery allows breeders to compile a reliable scab profile for their breeding lines and facilitates more informed selection and release decisions.

Accomplishment (4): Approximately 3500 rows including UK breeding lines, varieties, populations, accessions and recombinant inbred lines were grown in a mist irrigated, inoculated scab nursery at Lexington for purposes of FHB phenotyping.

Impact: This procedure allows us to eliminate very susceptible lines from the breeding program early on and allows us to increase resistance in segregating populations prior to line derivation.

Accomplishment (5): Approximately 50 F2 and F3 populations were subjected to recurrent phenotypic selection in the mist irrigated, inoculated scab nursery at Lexington.

Impact: This procedure increases resistance in the population by the time we are ready to derive inbred lines.

Accomplishment (6): Approximately 650 crosses were made in the winter greenhouse. All of them involved at least 1 scab resistant parent.

Impact: These crosses will generate populations and lines with increased and diverse resistance that will benefit other breeding programs as well as our own.

Accomplishment (7): The third backcross of *Fhb1* into seven different recurrent parent backgrounds was completed.

Impact: This effort will combine outstanding yield potential with known, QTL derived resistance. Two of the recurrent parents would have been released but for scab susceptibility. It is possible that scab resistant versions of these lines may be released as varieties.
Project 2: Mapping Fusarium Head Blight Resistance in Truman Wheat.

1. What major problem or issue is being resolved relevant to Fusarium head blight (scab) and how are you resolving it?

Truman is one of the best examples of native resistance that we have in soft winter wheat. To use it successfully as a parent however, we must be able to recover that resistance in the progeny of crosses with other lines. DNA markers that are linked to the resistance genes would greatly aid the process.

2. List the most important accomplishment and its impact (i.e. how is it being used) to minimize the threat of Fusarium head blight or to reduce mycotoxins. Complete both sections (repeat sections for each major accomplishment):

   **Accomplishment:** We phenotyped approximately 225 recombinant inbred lines from a cross of Truman x a susceptible parent.

   **Impact:** This phenotypic data will expedite the mapping process and allow us to determine in a relatively short time if there are DNA markers that can be used to tag the resistance genes and thus speed up the breeding process.
Include below a list of the publications, presentations, peer-reviewed articles, and non-peer reviewed articles written about your work that resulted from all of the projects included in the grant. Please reference each item using an accepted journal format. If you need more space, continue the list on the next page.

Peer Reviewed:


Non-Peer Reviewed:


Presentations:

