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(1 Page Limit)

Synopsis addressing relevant research objectives: Problem Addressed and Rationale: In 2007 and 2008, major scab epidemics occurred in eastern NE (approximately 600,000 acres of wheat production). In 2009, scab was found in every part of the state (1,700,000 acres), fortunately at low levels. Genetically improved seed coupled with appropriate management practices (cultural practices and fungicide uses) are the quickest and most cost effective ways to reduce DON in the grain supply.

Approach: 1. *Increase acreage planted to varieties exhibiting improved FHB resistance (low DON).* We have recently released 'Overland' and 'Settler CL' that have improved FHB tolerance. Overland will have the greatest impact in the scab prone region of Nebraska (eastern NE) and in the upper Great Plains and has been proven to be an agronomically superior cultivar (e.g. one that you would grow regardless of the presence of FHB). We will carefully monitor all aspects of these lines and make recommendations to prolong their life as needed. We will continue to validate their lower FHB and DON levels and communicate these results to growers. Currently 'Everest' (KS), 'Art' (AgriPro), 'Hitch' (Westbred), 'Lyman' (SD) and Overland have excellent native resistance and are recommended in Scab Smart. We will also incorporate information on flowering date into our scab recommendations. In the state variety testing effort, we will spray Prosaro on one to two replications to begin to address genotype x fungicide interaction. Efforts combining elite tolerance, flowering date differences, and fungicides will be our approach for immediate impact on reducing DON and FHB. 2. *Increase efficiency of individual breeding programs' ability to develop and release new FHB resistant varieties.* Our conventional breeding effort is devoted to create new lower DON lines. Everest (KS), Art (AgriPro), Hitch (Westbred), Lyman (SD) and Overland which have excellent native resistance will be intermated and crossed to lines with known FHB QTLs (Fhb1, Fhb QTL on 5AS, and Fhb3). We will be intercepting three-way, BC1, and F2 populations and using molecular markers for known FHB QTLs and optical kernel sorting to remove soft types to enrich our populations with known FHB QTLs in hard wheat backgrounds. Our goal will be to make a minimum of 75 crosses each year specifically for breeding FHB tolerant lines. The conventional breeding program details have been described in detail in previous proposals and can be found at: <http://agronomy.unl.edu/grain/grain/wheatbreed.pdf>. We are concentrating on: a) evaluating agronomically and for DON the Wesley *Fhb1* BC2F3:5 population collaboratively developed with Dr. Guihua Bai and b) advancing lines from previously supported USWBSI funding that are now in later generations. Coupled with the use of markers (in collaboration with Dr. Bai), we are beginning to find lines with interesting gene combinations. 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 our breeding germplasm.* We will continue to work with crosses Fhb3 in a 'Jagger' or 'Overley' background. Our goal will be to pyramid Fhb1 with Fhb3 and the native resistance found in Everest, Art, Hitch, Lyman and Overland, as well as newly identified lines. 4. *Expand the testing and evaluation of regional germplasm to include breeding lines from public and private breeding programs...* We will grow and evaluate the commercial wheat scab nursery using our standard protocols under mist nurseries at either Lincoln or Mead.