0203-YE-063 Implementation of Marker-assisted Selection in the Scab Breeding and Germplasm Enhancement Programs in South Dakota.

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PROJECT ABSTRACT
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National and international efforts have been made to identify DNA markers linked to scab resistance in wheat. An important purpose of DNA marker development is to use them in marker-assisted selection in breeding and germplasm enhancement programs. The goal of this proposed research is to implement marker-assisted selection (MAS) in South Dakota's wheat breeding programs and the USWBSI spring wheat germplasm program. To reach our goal, we will adopt useful markers from other programs while incorporating new marker selection practice into our breeding routine. We will focus our efforts on PCR based markers, particularly SSR, and work primarily with our breeding parents and the derived populations. As the first step toward our goal, we have molecularly fingerprinted 78 elite breeding materials with primer sets *gwm533* and *gwm493*. These includes 50 lines from our 2000 fall crossing block, 24 lines from the 2000 preliminary yield experiment and three lines with unknown pedigrees from SD spring wheat breeding program. Our data shows that eight lines possess the *Qfhs.ndsu-3BS-Xgwm533* marker and 36 lines possess the *Qfhs.ndsu-3BS-Xgwm493* marker. However, only five of these lines have both markers as in Sumai 3. 87 scab-resistant elite selections were also fingerprinted with the two SSR primer sets plus for primer set gwm389. High polymorphism was observed among the lines. 27 lines have the *Qfhs.ndsu-3BS-Xgwm493* markers, 31 lines have the *Qfhs.ndsu-3BS-Xgwm533* marker, and 26 lines have the *Qfhs.ndsu-3BS-Xgwm389* marker. New markers were observed in both the elite breeding lines and the germplasm selections. Therefore, in this grant period, efforts will be made to screen the bulked scab-resistant and scab-susceptible lines from the same segregated populations for association of these new markers with scab resistance. Additional 96 scab-resistant elite germplasm selections will be fingerprinted. Several scab-associated ESTs have been cloned in our lab. Efforts will also be made to develop PCR-based or array-based markers from these ESTs.