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FY03 ARS Agreement #: 59-0790-9-056

Research Area: VDUN

Duration of Award: 1 Year

Project Title: Development of Fusarium Head Blight-Resistant Wheat for the Southeastern United States.

PROJECT 2 ABSTRACT

(1 Page Limit)

The Fusarium Head Blight (FHB) epidemic of 2002-03 left one-half of the North Carolina wheat crop unsuitable for human consumption. The goal of this research is to develop varieties of soft red winter wheat with enhanced FHB resistance for the Southeastern United States. The focus of the research at N. C. State will be twofold: a) to develop cultivars adapted to North Carolina, the largest wheat-growing state in the region, and b) to facilitate development of cultivars adapted throughout the region by coordinating the 2004-05 Uniform Southern Soft Red Winter Wheat Fusarium Head Blight Nursery. During the 2004-05 season the North Carolina program will contain breeding populations segregating for FHB resistance in the F₁ to F₈ generations. The pedigrees of the populations will contain over 50 different exotic and adapted parents exhibiting partial to high levels of FHB resistance. Approximately 282 bulk populations in the F₂ and F₃ generation will undergo generation advance and we will utilize an inoculation protocol combined with travelling overhead irrigation on the F₃ nursery. Individual heads exhibiting Type 1 and Type 2 resistance will be tagged prior to senescence. Approximately 14,000 F_{3,4} and F_{4,5} headrows will undergo selection for plant height, maturity, powdery mildew, leaf rust, Septoria, BYDV and perhaps Hessian fly resistance. F_{5,6} headrows will be evaluated in a mist-irrigated nursery and inoculated with a spore suspension at heading. Selection will be imposed for maturity, plant height, leaf and head fungal diseases. Eight heads will be harvested per F₄ and F₅ headrow and all plants will be harvested in selected F₆ headrows. Kernel quality will be evaluated on all selected plants. The USDA-ARS Genotyping Center should be functional at Raleigh by the 2004-05 season. Seed of F_{5,6} lines containing Sumai 3 or one of its derivatives in their pedigrees will be evaluated for SSR markers linked to major resistance QTLs. Marker analysis data will be available prior to field selection in spring 2005. A Uniform Soft Red Winter Wheat FHB Screening Nursery for the 2004-05 season will be coordinated from N.C. State University. All FHB researchers will be entitled to enter materials and/or evaluate the nursery. Data will be returned to N.C. State, summarized and distributed to interested parties in a timely fashion. This project will provide breeders with critical information in a comprehensive, rapid and efficient manner to aid release of FHB-resistant varieties for southeastern producers. An added benefit will be the free exchange of breeding lines between variety development programs. These proposed objectives are related to the USWBSI goal of developing, as quickly as possible, control measures that minimize the threat of Fusarium Head Blight (scab) to the producers, processors, and consumers of wheat.