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Subject: Final Report

Title: Development of molecular markers for Sclerotinia Blight Resistance and Drought Tolerance.

Personnel and Agency:

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Consultants: Dr. Hassan Melouk (USDA-ARS Oklahoma) and Dr. Mark Burow (Texas A&M Agricultural Experiment Station)

Problem and Need: Sclerotinia Blight, a fungal disease of peanuts, is rapidly emerging as a serious problem for peanut producers in West Texas. The disease was first discovered in Texas in the fall of 1981 and since that time it has been seen in all of the peanut-producing counties of Texas and is considered to be a major soil-borne pathogen in the state (Wildman et al., 1992). In other areas of the US, e.g., Virginia and Oklahoma, epidemics of Sclerotinia blight have resulted in crop losses of between 5 and 13% on a yearly basis. Crop loss figures for Texas are not yet available but the emergence of this disease in West Texas peanut fields indicates that this will be a significant problem for Texas peanut growers. Infection of peanuts with Sclerotinia occurs when temperatures are between 17-21°C coupled with high soil moisture and relative humidity of 95% or above, conditions that commonly occur under a maturing peanut canopy. During drought conditions or under open canopy architectures, infection rates are negligible. The development of commercially viable Sclerotinia Blight resistant runner and Spanish peanut lines would be the most effective way to combat this emerging problem. If this resistance is also coupled with drought tolerance then the resistance would be enhanced and impact of the disease minimalized. Our laboratories have the technology available to establish the molecular tools necessary for peanut breeders to effectively isolate and commercialize disease and drought resistant peanut varieties.

Plan of Action:

Objectives:

1. **To establish patterns of gene expression associated with the response of peanut stems and pegs to Sclerotinia infection and drought.**
2. **To determine the relationship between the patterns of gene expression observed in the response to Sclerotinia resistance and drought tolerance.**
3. **To generate target genes for use in molecular assisted plant breeding for Sclerotinia Blight resistance into cultivars of commercial importance for Texas peanut producers.**

In collaboration with Dr. Hassan Melouk (USDA-ARS at Oklahoma State University) we have collected Sclerotinia from field sites in Gaines County, Texas and infected tissue under laboratory conditions for cDNA synthesis and library construction. Additionally, we have collected tissue from drought-stressed peanut leaf, stem, and root tissues for library construction. Funding for this project was received one year later than proposed

and work is continuing on this project. Currently, we have constructed 2 cDNA libraries enriched for drought-induced genes from two runner varieties (TAMrun and OKrun). We have received Medicago truncatula microarrays from Greg May at the Noble Foundation for heterologous probing of the peanut tissue for expression profiling. For library construction, we have optimized RNA isolation from leaf and stem and are now poised to begin expression profiling studies. We will begin sequencing our peanut cDNAs with in-house funds, in collaboration with Diane Rowland at USDA-ARS National Peanut Research Lab in Dawson, GA. Subsequent library construction will result in array fabrication, candidate gene identification, and sequence release to the public domain. All expression data will be available on our bioinformatics link at www.lbk.ars.usda.gov and through publication.