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NATIONAL PEANUT BOARD/SOUTHEAST PEANUT RESEARCH INITIATIVE
QUARTERLY PROGRESS REPORT FOR WORK DONE UNDER RESEARCH AGREEMENT_____

Quarter ending
December 31, 2004

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Identification of Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Cultivated Peanuts

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RES. AGR. NO.: Not available PROJECT LEADER: Dr. Diane Rowland

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EXPIRATION DATE: December 31, 2004

SPRI CONTACT: Emory Murphy NPB CONTACT: Stephen O'Brien

REPORT OF PROGRESS:

The specific objectives for this research were: *1) quantify the physiological responses to TSWV infection, especially related to water use, in different peanut varieties through the growing season at different stages of TSWV infection, 2) examine the effect of pre-plant insecticide treatments on these physiological responses, 3) correlate the expression of peanut defense response genes involved with increased resistance to TSWV with the above physiological responses, and 4) determine the impact of specific climatological factors on peanut plant growth and severity of TSWV.* During May – September of 2004, plots were established and planted, and permanent identification of 6 plants each from every replication of a fully factorial, design was completed. The design includes the measurement of physiological and genetic variation in six peanut varieties under three insecticide treatments: aldicarb, phorate, and control. Plants were tagged and tested for TSWV using the ELISA test during three separate physiological and genetic sampling periods. To date, we have collected data on the presence of TSWV and the correlation with TSWV infection, as well as analyzed samples for differences in genetic expression among treatments. The final harvest and testing of tagged plant roots was completed by September 2004, and tissue analyses/grades were completed in November 2004. Data analysis shows significant differences in physiological responses to TSWV among varieties and insecticide treatments. Some varieties show a beneficial physiological response to aldicarb, while others appear to benefit more from phorate. These responses are often magnified when tissue is infected with TSWV. The temporal expression patterns of 11 cloned genes were also affected by insecticide treatments. Arachis maturase which is a chloroplast product was down-regulated in response to phorate and aldicarb treatments in all genotypes except Georgia Green indicating that photosynthetic processes in these peanut plants were somewhat inhibited. Caffeic acid O-methyltransferase, an important enzyme in lignin biosythesis and is often generated as a mechanical defense against pathogen attack, was up regulated in treated plants of all genotypes. The expression of PR-4 mRNA was found to increase dramatically in controls and phorate treated plants. Similarly, catalase transcripts in control plants were higher than the treated plants. High abundance of PR4a and catalase in controls may be due to the fact that phorate is a volatile and may be induced slowly in controls compared to the treated plants. Results of methionine synthase and ozone responsive stress related transcripts were inconclusive. The continuation of this work will allow us to better identify and quantify specific physiological and genetic responses that are associated with insecticide treatments in order to understand the benefit of these treatments and the mechanisms behind increased TSWV resistance in some varieties. At the end of this experiment, we expect to provide information to growers about the physiological tolerance to TSWV that different varieties provide. In addition, we will be able to identify genetic response profiles corresponding with these physiological characteristics. Funding from the NPB for this research was for a single year running Jan 2004 through Jan 2005.

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NATIONAL PEANUT BOARD/SOUTHEAST PEANUT RESEARCH INITIATIVE
QUARTERLY PROGRESS REPORT FOR WORK DONE UNDER RESEARCH AGREEMENT_____

Quarter ending
September 31, 2004

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Identification of Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Cultivated Peanuts

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RES. AGR. NO.: Not available PROJECT LEADER: Dr. Diane Rowland

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NATIONAL PEANUT BOARD/SOUTHEAST PEANUT RESEARCH INITIATIVE
QUARTERLY PROGRESS REPORT FOR WORK DONE UNDER RESEARCH AGREEMENT_____

Quarter ending
June 31, 2004

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Identification of Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Cultivated Peanuts

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RES. AGR. NO.: Not available PROJECT LEADER: Dr. Diane Rowland

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EXPIRATION DATE: December 31, 2004

SPRI CONTACT: Emory Murphy NPB CONTACT: Stephen O'Brien

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NATIONAL PEANUT BOARD/SOUTHEAST PEANUT RESEARCH INITIATIVE
QUARTERLY PROGRESS REPORT FOR WORK DONE UNDER RESEARCH AGREEMENT_____

Quarter ending
March 31, 2004

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Identification of Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Cultivated Peanuts

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RES. AGR. NO.: Not available PROJECT LEADER: Dr. Diane Rowland

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EXPIRATION DATE: December 31, 2004

SPRI CONTACT: Emory Murphy NPB CONTACT: Stephen O'Brien

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