#149
2005
FINAL
(GA only)

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

Quarter ending December 31, 2005

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Insecticide Treated and Un-treated Soils

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

EXPIRATION DATE: December 31, 2005

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 gas exchange, 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, and 3) correlate the expression of peanut defense response genes involved with increased resistance to TSWV with the above physiological responses.*** During May – September of 2005, 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 and physiological function, 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 2005, and tissue analyses/grades have now been completed. Genetic analysis is ongoing and extractions are being completed for genetic response testing. We have identified differences in varieties in fluorescence stress response (a physiological response) that appears to be correlated with TSWV resistance. Additional data analysis is now ongoing. 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 2005 through Jan 2006.

#149 GA 2005

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

Quarter ending
September 31, 2005

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE:

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

EXPIRATION DATE: December 31, 2005

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 gas exchange, 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, and 3) correlate the expression of peanut defense response genes involved with increased resistance to TSWV with the above physiological responses.*** During May – September of 2005, 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 and physiological function, as well as analyzed samples for differences in genetic expression among treatments. The final harvest and testing of tagged plant roots will be completed by September 2005, and tissue analyses/grades are scheduled. Data analysis is now ongoing. 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 2005 through Jan 2006.

#149GR
2005

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

Quarter ending
June 31, 2005

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Insecticide Treated and Un-treated Soils

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

EXPIRATION DATE: December 31, 2005

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 gas exchange, 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, and 3) correlate the expression of peanut defense response genes involved with increased resistance to TSWV with the above physiological responses.*** During May of 2005, 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 our first physiological and genetic sampling. To date, we have collected data on the presence of TSWV and the correlation with TSWV infection and physiological function, as well as begun to analyze samples for differences in genetic expression among treatments. We have added measurements of fluorescence at each physiological harvest and have found variation among cultivars in this physiological trait; fluorescence appears to be correlated with TSWV resistance. 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 2005 through Jan 2006.

#149 GH
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NATIONAL PEANUT BOARD/SOUTHEAST PEANUT RESEARCH INITIATIVE
QUARTERLY PROGRESS REPORT FOR WORK DONE UNDER RESEARCH AGREEMENT

Quarter ending
March 31, 2005

INSTITUTION: USDA-ARS, National Peanut Research Laboratory

PROJECT TITLE: Physiological and Genetic Responses Associated with Tomato Spotted Wilt Virus in Insecticide Treated and Un-treated Soils

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

EXPIRATION DATE: December 31, 2005

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 gas exchange, 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, and 3) correlate the expression of peanut defense response genes involved with increased resistance to TSWV with the above physiological responses.*** During March of 2005, plots were designed incorporating a fully factorial, replicated design, and the field at NPRL prepared accordingly. The design includes the measurement of physiological and genetic variation in six peanut varieties under three insecticide treatments: aldicarb, phorate, and control. Planting is scheduled for April 15 in order to increase the probability of TSWV infection. Plants will be tagged and tested for TSWV using the ELISA test through the growing season. TSWV severity will be rated at harvest. 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 2005 through Jan 2006.

FINAL #149 2005 (continues) FL only

PHYSIOLOGICAL AND GENETIC RESPONSES ASSOCIATED WITH TOMATO SPOTTED WILT VIRUS IN PHORATE TREATED AND UN-TREATED SOILS
Final Report

MARIA GALLO, Agronomy Department, University of Florida, Gainesville, FL, , 352-392-1823.

Objective: Correlate the expression of peanut defense response genes involved with increased resistance to TSWV with physiological responses.

Leaf samples from all six varieties and treatments (control, temik and thimet) were collected over the course of the growing season. Total RNA from all the samples was extracted, and quantitated. Northern blot analysis was used to look at the levels of gene expression among the treatments. Photosynthetic levels indicated that the more TSWV resistant varieties such as ANorden and AP3 were better at maintaining photosynthetic capacity than susceptible varieties such as SunOleic97R. Expression analysis over the course of the season revealed that early sampling dates were more reliable in predicting end-of season response than later season samples. Expression of PR-4a and glutathione reductase was high in the TSWV resistant varieties particularly in response to thimet treatment, whereas susceptible varieties appeared to express these genes at low levels or at undetectable levels using Northern blot analysis. RT-PCR analysis was developed to quickly screen more samples and increase the sensitivity of the assay. All data indicate that defense and stress-response genes in more TSWV resistant varieties appear to be highly expressed, particularly following treatment with thimet. We hypothesize that such gene expression leads to a reduction in the impact of TSWV by delaying adverse physiological responses and thereby increasing yields.