

Summary

IMPACT STATEMENT

Early leafspot (ELS) and Tomato Spotted Wilt Virus (TSWV) have been the most persistent disease problems that the peanut growers have to confront annually in North Carolina. Although commercial cultivars available in the V-C production area have moderate levels of resistance to ELS and TSWV, stable resistance is lacking in these cultivars. Many diploid *Arachis* species have exhibited very high levels of resistance to ELS and TSWV with some also resistant to CBR and Sclerotinia blight. As a result, development of genetic resistance by transferring resistance genes from diploid *Arachis* species into *A. hypogaea* will help NC peanut growers reap good quality peanuts with less input costs.

We selected 68 whole plots for TSWV resistance and also are in the process of developing new interspecific hybrid (Gregory x *A. diogeni*, Gregory x *A. correntina* and VA 98R x *A. correntina*) populations to select for TSWV resistance. Additionally, 64 whole plots were selected for high levels of ELS resistance. Further, new diploid *Arachis* species have been identified for resistance to CBR and Sclerotinia blight. These species will be utilized to make new crosses to produce populations for multiple disease evaluations. It is anticipated that the selections resulting from the interspecific breeding materials will provide lines with high levels of multiple disease resistance with good quality pods.

279
914
200

Sail

Transfer of Disease-Resistance Genes from Diploid *Arachis* Species into Peanut Cultivars

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A. Field evaluation of interspecific hybrid populations for Early Leaf Spot (ELS) resistance in Unsprayed Leaf Spot Tests at Lewiston, 2010

Early Generation Single Plant Selections:

F₂ generation progenies:

Progenies from six multiple disease resistant interspecific breeding lines crossed with 10 PIs with multiple disease resistances were evaluated 123 single plant selections were made based on ELS defoliation scores of 4.0 or less (1 = resistant and 9 = susceptible).

F_{2:4} and F_{4:6} families

Similarly, 128 single plant selections were made from 182 plots evaluated. The defoliation scores of selections varied from 2.0 to 4.0

Seeds from selected plants were planted in the Puerto Rico Winter Nursery (PRWN) for generation advance and for field evaluations in 2011.

Advanced Generation Whole Plot Selections:

F_{6:8} families

64 whole plots were selected from 92 plots tested based on low defoliation, plant habit and pod characters.

These lines will be evaluated in replicated tests in 2011 at Lewiston and Rocky Mount

B. Field evaluation of interspecific hybrid populations for TSWV resistance in no insecticidal tests at Lewiston, 2010

Entries from the ELS study (182 plots) and 92 advanced lines were evaluated and TSWV incidence recorded every 2 weeks from June through September Plant and pod characters evaluated at the time of selection

76 single plant selections and 68 whole plot selections were made based on TSWV incidence

Of the 68 whole plot selections, 22 were also highly resistant to ELS and one of these is a high-oleic line

Selections will be evaluated at Lewiston in 2011 for yield and multiple disease resistance

New Interspecific Hybrids for TSWV (Sandhills Research Station, 2010)

F₁₀ generation interspecific hybrids (60 chromosomes)

Gregory x *A. diogeni* (10602), Gregory x *A. correntina* (9530)

VA 98R x *A. correntina* (9530)

These hybrids will be advanced until tetraploid 40 chromosome progenies are identified which will be tested for TSWV-resistance incorporated from peanut species into cultivars

C. Greenhouse evaluations of diploid Wild Species for CBR and Sclerotinia blight resistance

CBR and Sclerotinia Evaluations (2010 Greenhouse Test)

To identify new sources of disease resistance, 100 accessions of 27 *Arachis* species were manually inoculated with CBR and Sclerotinia inoculums. The following list of *Arachis* species were identified as resistant

CBR:

A. duranensis (5 accessions)

A. stenosperma

A. helodes

A. williamsii

A. kuhlmannii

A. kempff-mercadoi

Sclerotinia blight:

A. diogeni

A. kuhlmannii

A. glandulifera

A. helodes

D. Multi-state Testing

2010 PVQE

Entered 2 multiple disease resistant interspecific breeding lines,

SPT 06-06

SPT 06-07

2010 UPPT

Entered one multiple disease resistant interspecific breeding line,

SPT 06-06