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Annual Report + Summary

~~PROGRESS~~ REPORT
TO
NORTH CAROLINA PEANUT GROWERS ASSOCIATION, INC.

TITLE: **Utilizing Arachis Species for Improving Disease Resistant Cultivars**

LEADER(S): **H.T. Stalker**

DEPARTMENT(S): **Crop Science**

REPORT:

Thirty lines derived from advanced interspecific hybrids were grown in replicated experiments at Lewiston, NC and compared to susceptible cultivar checks for early leaf spot and tomato spotted wilt virus resistances. No fungicides were applied to the plants. Based on low defoliation scores, plant and pod characteristics, twelve entries were selected for early leaf spot resistance with defoliation scores of 2.0 or 2.5 as compared to the checks (Perry = 5.5; Georgia Green = 5; VA 98R = 7.5; NC 303 = 8). In this test, a score of 1 = highly resistant and 9 = completely defoliated). The same lines were evaluated for TSWV resistance and several lines were also highly resistant. Progenies from these lines will be hybridized with high-yielding Virginia-type cultivars and breeding lines during 2015.

During the summer of 2013, 5 of Dr. Isleib's highest yielding and disease resistant lines were hybridized with 7 interspecific hybrid selections with multiple, high levels of disease resistance to leaf spots, Sclerotinia blight, and CBR in the greenhouse. First generation seeds were grown in a winter nursery in Puerto Rico for seed increase and 90 second generation lines were planted at Lewiston in a leaf spot selection nursery during 2014. The lines were evaluated for leaf spot resistance during late September. The checks were highly defoliated or dead, but many of the lines were highly resistant with a score of 2 or 3 (highly resistant). Individual plant selections were made based on disease resistance and pod shape and progenies will be grown in a replicated test during 2015 and rated for disease resistances.

Hexaploid crosses Gregory x *Arachis diogoi* (10602) and Gregory x *A. correntina* (9530) were advanced to the next generation at Sandhills Experiment Station. One line was discovered with 40 chromosomes and a large number of seed was harvested. The line will be evaluated for leaf spot resistance in 2015, and if sufficient numbers of seeds are available, also for tomato spotted wilt virus resistance.

Diploid A-genome species with extremely high levels or resistance to early and late leaf spot, tomato spotted wilt virus, and many other disease and insect pests (*A. diogoi, A. stenosperma, A. correntina*, and *A. cardenasii*) were hybridized to four species with B genomes (*A. ipaensis, A. magna, A. batizocoi, and a A.trinitensis*). Approximately 300 pollinations were made for each of the 16 hybrid combinations. Seeds were collected from hybrids and the will be colchicine treated during the winter, 2014-15 in order to double the chromosome number. Additional hybrids were colchicine treated during the summer of 2014 and 40-chromosome sectors identified. These materials will be hybridized with several high-yielding Virginia-type cultivars (including Bailey), during the summer of 2015. The next generation hybrids should yield highly disease resistant lines with good yields and pod shape from which to select improved cultivars.

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 growers reap good quality peanuts with less input costs. 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.