Research Report (FY 2019-2020) to
the Georgia Peanut Commission

TITLE: **Development and Evaluation of Cultivars with Disease Resistances to Increase On-Farm Profitability**

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PROGRESS REPORT:

Breeding for Resistance to the Peanut Root-knot Nematode.

- Continued breeding program to combine resistance to the PRN with high yield and grade, resistance to other pathogens such as leaf spot and white mold, and high oleic acid content. This included continued hybridization and generation advance for breeding populations involving over 50 cross combinations. Material is first advanced to the F_4 generation when seed tissue is sampled for DNA extraction and analysis for marker assisted selection (MAS) for nematode resistance and high oleic fatty acid composition. These selections are then evaluated in the field for yield and other characteristics. The use of MAS is greatly speeding the process of developing future resistant varieties. The first product of these efforts is TifNV-High O/L. This is a high yielding variety with resistance to nematodes and high O/L ratio. Using conventional breeding approaches, it would have taken several years to develop this variety. Using marker assisted selection, this was accomplished much more rapidly and efficiently. We in the process of releasing two additional nematode resistant varieties, 13-3532 (a virginia-type) and 13-1125 (a runner-type).

Breeding for Resistance to Leaf Spot and TSWV.

S Continued breeding program to combine resistance to leaf spot with high yield and grade and high oleic acid content. This included continued hybridization and generation advance for breeding populations involving over 40 cross combinations. Material is first advanced to the F_4 generation when MAS is used to identify individual plants for harvest. This material is grown the following year with no fungicide sprays. Progeny that show resistance and high yield are selected. These selections are then tested in replicated yield trials. We have several late generation breeding lines that have a high level of resistance to leaf spot and good yield when grown with no fungicide sprays. We are also cooperating with plant pathologist and economists to examine the net return of growing these lines under sprayed, and reduced or non sprayed conditions.

- Three well-defined segments of the wild *A. cardenasii* chromosome confers excellent resistance to late leaf spot. We are using MAS in an accelerated backcross breeding scheme to develop leaf spot resistant cultivars. We have completed the third backcrosses, and those hybrid seed were grown in 2019. We have begun to evaluate progenies from the first and second backcrosses and will continue those efforts in 2020.

S Continued breeding program to combine resistance to TSWV with acceptable yield and grade. This included continued hybridization and generation advance for breeding populations involving over 100 cross combinations. We have numerous late generation breeding lines that have a higher level of resistance than GA-06G.