

Research Report (FY 2022-2023) 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 (PRN).

- 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 F₄ 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 was 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 have recently released two additional nematode resistant varieties, TifJumbo (a virginia-type) and TifNV-HG (a runner-type with very good yield and higher grade).

Breeding for Resistance to Leaf Spot and TSWV.

- 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 began replicated yield trials with selections from the first backcross in 2019. We added selections from the second backcross in 2020. We continued testing these selections in 2021 and 2022. Based on results from 2020 and 2021, three lines (CB 1, CB 2, and CB 7) were selected for release and seed increases were grown in 2022 by Georgia Seed Development in Plains, GA. Multiple years of leaf spot ratings from non-sprayed trials have confirmed that these selection have excellent resistant to leaf spot. These lines also have excellent yields and grade with no fungicide sprays. Because of this, CB 1 and CB 7 produced the highest per acer profitability over two years (2021 and 2022) compared to other breeding lines and currently grow check cultivars grown under three fungicide regimes (full-, minimum- and no-fungicide spray).
- 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 to TSWV in comparison to Georgia-06G.