GPC Project # UGAT-26-19/21

LONG-TERM GERMPLASM ENHANCEMENT AND DEVELOPMENT OF DNA MOLECULAR MARKER RESOURCES FOR PEANUT

Nino Brown – UGA-CRSS-Peanut Breeding - inbrown@uga.edu

Figure 1. *An F_4 progeny row (middle, foreground) derived from crosses with NC 94022, is pictured with a check cultivar (right) in an early-planted, space-planted F_4 nursery plots in 2024.*

Growers are continuously faced with biotic and abiotic constraints on production. Some of these constraints can be mitigated with improved genetics, such as improved disease resistance, higher yields, better yield stability, and others. Our goal for this project is to (1) improve genetic diversity; (2) incorporate germplasm with improved resistance to biotic and abiotic stresses; (3) and map genes that are important to peanut growers for DNA marker-assisted breeding.

We are currently incorporating a number of unique sources of late-leaf spot (LLS) resistance into the breeding pipeline. These include TxAG-6 (Simpson, 1993), a multi-species hybrid that has high levels of LLS-resistance, and is also the donor parent of root-knot nematode resistance in commercially-available cultivars. Initial crosses with elite Georgia breeding material were made in 2018. From 54 plots (2000 plants) of the F_4 progenies grown in a no-fungicide, LLS nursery in 2022, 57 plants were selected based on visual LLS-resistance and agronomic performance compared to elite cultivar checks. Over twenty of these were selected for F_5 seed increase plots in 2023. Replicated yield trials will begin in 2024. Other sources of LLS-resistance currently being used include germplasm lines GP-NC WS 16 (Tallury et al., 2013), developed at NC State, and TifGP-3 and TifGP-4 (Hollbrook et al., 2021), developed at USDA in Tifton, GA. Families developed from crosses with these germplasm lines in 2019 and 2020 were planted in a no-fungicide, LLS F_2 and F_3 nursery in 2022 consisting of 68 plots. A total of 98 individual plants were selected in the field, 60 of which were advanced to the LLS F_3, F_4 nursery in 2023. A total of 264 plants were individually harvested, from which 67 were advanced to 2024 nurseries; 64 in F_4 nurseries, and 3 advanced to F_5 seed increase.

For improving resistance to tomato spotted wilt virus (TSWV), we are using NC 94022, an interspecific germplasm line developed at NC State, further selected at Univ. of Florida, and tested by Cullbreath et al. in 2005. Initial crosses with this line were made in 2020. In 2023, 47 lines derived from NC 94022 were planted in the TSWV F_3 and F_4 nurseries (**Figure 1**). Individual plants were selected from these plots and further selection will be made based on shelling characteristics prior to planting the F_4 nursery plots and F_5 seed increases in 2024. Replicated yield trials will begin in 2025 and 2026.