GPC Project#: UGAT-26-19/25

Long-term germplasm enhancement and development of DNA molecular marker resources for peanut.

Nino Brown – UGA-CRSS – Peanut Breeding

Growers in Georgia are increasingly faced with a difficult financial outlook for their businesses. Cost of production continues to creep upward while prices for their crops remain flat. In our efforts to develop improved genetics that will keep peanut production profitable in Georgia, our work has focused primarily on improving disease resistance, yield, yield stability, and quality. With this long-term research project, we seek 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.

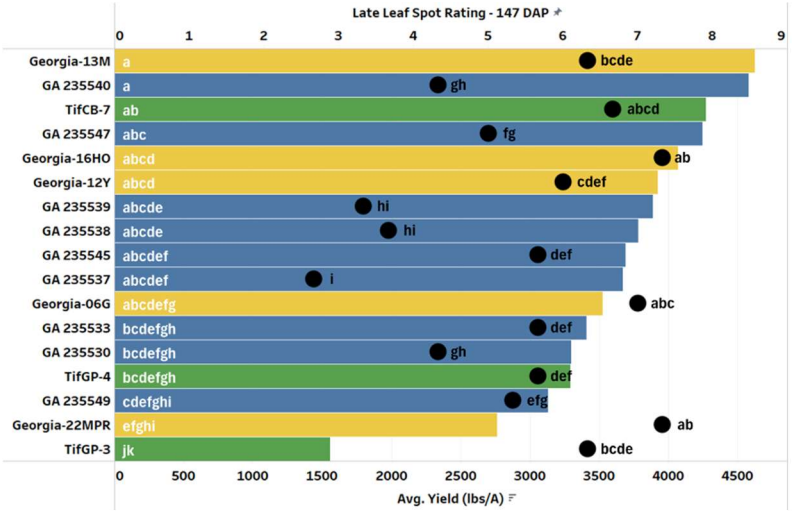

Figure 1. *Pod yield (bars and white letters) and late-leaf spot severity score (black circles and letters) for a selection of GA breeding lines (blue), susceptible checks (yellow) and resistant checks (green) in the no-fungicide 2024 PYT_LLS trial at Attapulgus REC.*

We are currently incorporating a number of unique sources of late-leaf spot (LLS) resistance into our breeding pipeline. One of these sources is 'TxAG-6' (Simpson et al., 1993), a tri-species hybrid with high levels of LLS-resistance. Initial crosses with UGA cultivars were made in the greenhouse during the winter of 2018-19. After several years of selecting progenies with acceptable agronomic performance, shelling quality, and LLS-resistance, sufficient seed was available for replicated testing in 2024. Twenty of these new breeding lines were tested in a no-fungicide trial at UGA's Attapulgus REC, along with 5 susceptible cultivar checks and 3 LLS-resistant checks (Fig. 1). Several new breeding lines (blue), such as GA 235530, -37, -38, -39, -40, and -47 exhibited LLS-resistance that was significantly better than the best resistant check (green) as well as competitive yields.

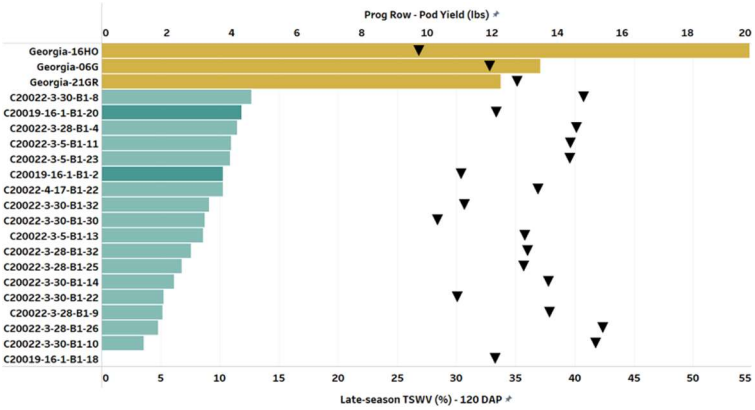

Figure 2. *Late-season TSWV (bars) and pod yield (black triangles) of the F_5 progeny row plots grown at Tifton, GA in 2024.*

For improving resistance to tomato spotted wilt virus (TSWV), we are using NC 94022, a germplasm line developed at NC State, further selected at Univ. of Florida, and tested by Culbreath et al. in 2005. Initial crosses with this line were made in 2020. In 2024, F_5 progeny rows were grown with 2 replications. With seeds spaced 1 ft apart, TSWV pressure was high (Fig. 2). In the cultivar checks, TSWV incidence ranged from 34% to 55%, whereas the NC94022-derived breeding lines showed high levels of TSWV-resistance with incidence ranging from 0% to 13%. Replicated yield trials at multiple locations will confirm the level of resistance in these lines in 2026.