Selection of A. stenosperma-derived advanced lines with strong resistance to LLS using association analyses

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Overview

Peanut lacks strong sources of resistance against important diseases, and therefore is one of the most expensive row crops for farmers to grow. In contrast, wild relatives of peanut such as *Arachis stenosperma*, present strong resistances to several fungal and viral diseases, and nematodes. We have identified peanut lineages highly resistant to Late Leaf Spot which incorporate genetics from *A. stenosperma*. We are performing genetic analyses on these lineages, using advanced tools developed by the peanut genome sequencing project. This will allow the development of Georgia-adapted cultivars with much superior late leaf spot resistance, and the reduction of spraying regimes, making cultivation of peanuts more economically and environmentally favorable.

Results

In 2022 we planted all BatSten BC_3F_4s and ValSten BC_1F_3s in Midville on sprayed and non-sprayed conditions for further disease and agronomic trait evaluation. KASP markers were designed for the disease related A06 and B02 regions and were validated. on the BatSten derived lines. The best ValSten BC_1F_3s were selected for backcrosses. The best performing lines were sent to the winter nursery in Puerto Rico for seed multiplication. There was a confusion with labeling and therefore the seeds that came back from Puerto Rico were rendered unusable, so we will need another year of seed multiplication for multi-location trials. This time we will multiply the seeds in Midville, GA.

In 2023, selected BatSten and ValSten lines were tested in Midville and Tifton. All lines had superior leaf spot and TSWV resistance than most peanut cultivars (Figure 1).

We also mapped a very strong rust resistance locus on chromosome B02. Selected lines were tested in Haiti, where rust is endemic and consistent. The most resistant line, called 226-C that possesses B02 segment, is now being registered as germplasm (application was sent to UGA Jan 31st).

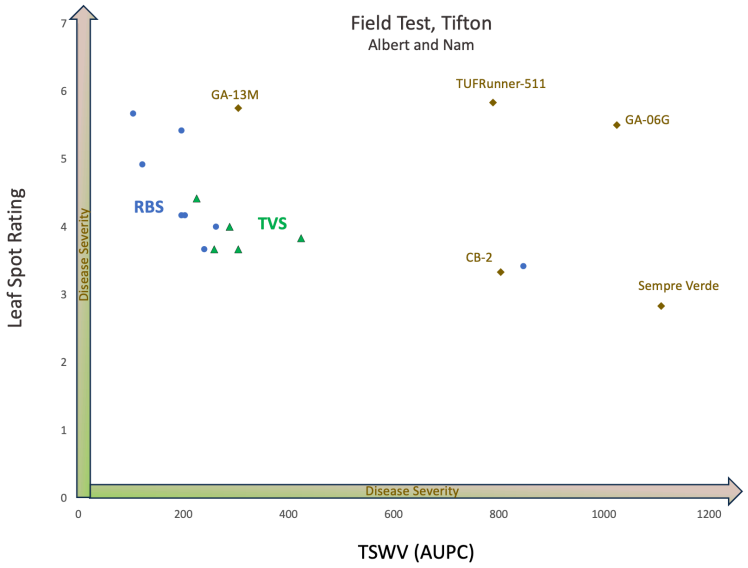

Figure 1: Summary of disease evaluations of leaf spots and TSWV in Tifton in 2023. Experiments were set up anc evaluated by the PhD student Namrata Mahjaran and Dr. Albert Culbreath.