

Marker-assisted breeding for late leaf spot resistance: Breeding line selection and phenotyping

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IAC322 is a breeding line with a high level resistance to leaf spot disease. The three introgressed regions (A02 top, A02 bottom and A03 bottom) from *A. cardenasii* residing in IAC322 may confer the disease resistance. In order to clarify the contribution of the three introgressed regions to LLS resistance, F₃/F₄ recombinant families with all combinations of wild segments from TifNV-HiOL x IAC322 were selected by KASPar markers delineating the introgressed segments. The distribution of introgressed segments among the selected lines was confirmed by genotyping using the Affymetrix SNP array. These lines were phenotyped for leaf spot resistance both in vitro and in the field in year 2018. This project was part of the MS research of Samuele Lamon, University of Padova dual-degree student in CRSS Sustainable Ag.

For the in vitro study, late leaf spot spores were collected from field-infected peanut leaves and applied on fresh leaves of testing lines maintained in moist petri dishes. The recombinant lines with A02 top/A03 bottom introgressed regions developed the least number of lesions demonstrating a comparable level of resistance to IAC322 and the recombinant line with all three introgressed regions (Figure 1)

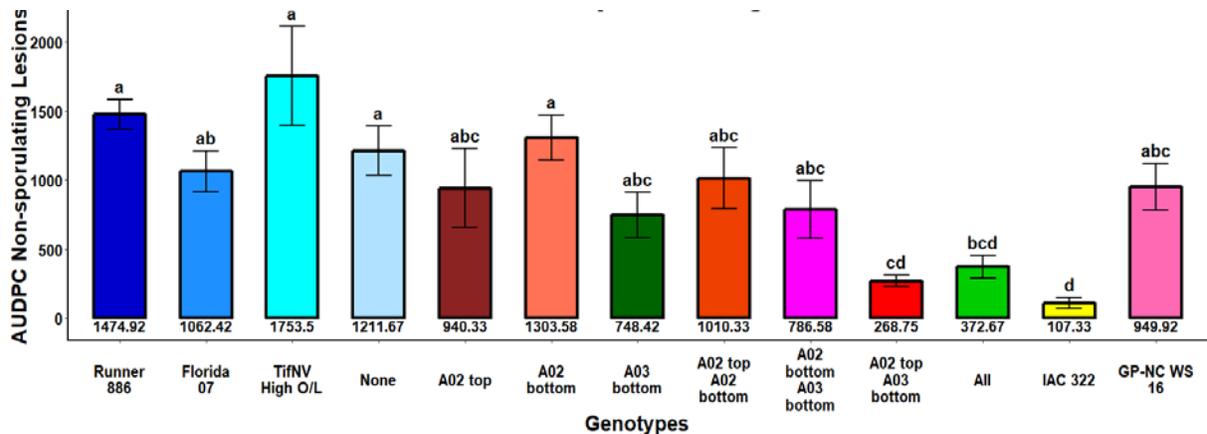


Figure 1. In vitro inoculation of late leaf spot on recombinant lines harboring all combinations of introgressed regions from *A. cardenasii*. AUDPC of the number of non-sporulating lesions was calculated.

For the field study, a complete randomized block design with three field replicates was planted in both Gibbs and Lang-Rigdon farms. However, due to the limitation on seed supply, the test plots were short (5 feet long at a seeding rate of 4 seed per foot). The Florida 1-10 scale was used to evaluate LLS disease progression. The leaf spot disease pressure was higher in the Lang-Rigdon farm than the Gibbs farm. The test results from the Lang-Rigdon farm were similar to those of the in vitro study in which the recombinant line with A02 top/A03 bottom introgressed regions demonstrated comparable level of resistance to IAC 322. However, the data from the Gibbs farm showed that none of the recombinant lines reached a level of disease resistance as high as IAC 322. The small plot size of this study may have contributed to the lack of consistent separation of disease resistance among the tested lines. With sufficient seed supply, this field study will be performed again at a larger scale with additional checks in year 2019.

In addition, further crosses were made with BC₂F₁ hybrids as male donors resulting in 273 BC₃F₁ seeds in year 2018. Genotyping will be performed to check for hybridity before advancing in the field in year 2019. Breeding lines of BC₁F₂ and BC₂F₁ lines were advanced and selected in 2018. High yielding lines were further advanced in Puerto Rico this winter.