

Identification and utilization of new sources of resistance to White Mold in wild tetraploid *Arachis* for peanut improvement
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Overview

Peanut lacks strong sources of resistance against important diseases, and therefore is one of the most expensive crops for farmers to grow. Wild relatives of peanut, on the other hand, have strong resistances to several fungal and viral diseases, and nematodes. Wild-derived tetraploids are promising sources of resistance to white mold, but because their architecture is so different from cultivated peanuts, methods that gave meaningful comparisons needed to be developed. With the support of the GPC and other funders, our group has devised two methods: a greenhouse bioassay method and a field method both of which can be used to test wild-derived ‘hybrid peanuts’ with diverse growth habits against white mold. We have also produced tetraploid hybrids with several combinations of wild species and identified some white mold resistant genotypes. We have now begun to use them for breeding. The production of peanut varieties with increased resistance to white mold will reduce the need for application of fungicides and increase productivity.

Results

We have developed two methods to evaluate white mold resistance suitable for wild peanut hybrids with diverse growth habits, one using cuttings in a greenhouse incubator, and one in the field. The greenhouse method was developed by testing and progressively modifying several *in vitro* and greenhouse methods. The most successful of these methods used a greenhouse incubator: stem cuttings from greenhouse grown plants are transplanted into a cup filled with potting mix and inoculated with active whitemold mycelial plugs. The inoculated cuttings are put in a greenhouse mist incubator chamber to keep humidity high. Evaluations taken at 3, 5, 7, and 9 days after inoculation significantly correlated with field evaluations. To allow other researchers and breeders to use this method, it will be published shortly (manuscript in press). The field-based method transplants test genotypes as greenhouse grown seedlings in between young control susceptible peanuts in an experimental field. The soil in the experimental field is sterilized prior to planting to remove uncontrolled fungus inoculum and a controlled amount of fungal inoculum is applied in an agar plug to the base of each the test genotypes. This method allowed comparison of hybrids with diverse architectures and will be submitted for publication soon.

Using these methods we have identified the hybrid ValSten as the most promising of wild tetraploid hybrids for white mold resistance. Furthermore we have identified two F4 progeny of ValSten with TifNV as having good resistance (F4.424.45 and F4.424.45). These two F4 progeny were hybridized to GA-12Y and York to begin the production and selection of white mold resistant elite performing peanut lineages.

