# INTROGRESSION OF ROOT-KNOT NEMATODE RESISTANCE INTO PD GERMPLASM

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## Abstract

The Southern root-knot nematode (RKN), *Meloidogyne incognita* (Kofoid and White) Chit., race 3 is the most important worldwide nematode pest on cotton. This study evaluated progress for increased RKN resistance from mass selection of two $F_2$ populations of cotton. The two populations, PD-3-14 x M-75 RNR and PD 5363 x M-75 RNR (resistant parent), were grown in a field naturally infested with RKN during the 1995 ($F_2$) and 1996 ($F_3$) cotton growing seasons. Remnant seed of $F_2$ and $F_3$ individual plants were preserved in a cold room to represent $C_0$ (cycle zero) and $C_{1,}$ respectively. Host-plant resistance was evaluated in the field using galling indices. In the $F_2$ generation 96 and 92% respectively, of the populations PD-3-14 x M-75 RNR and PD 5363 x M-75 RNR had galling indices of 2.5 or less. Ninety-two and 78% of $F_3$ plants rated 2.5 or less for the PD-3-14 x M-75 RNR and PD 5363 x M-75 RNR crosses, respectively. Standard-unit heritability estimated by the correlation between galling score of $F_2$ plants and the mean galling score of $F_3$ progeny were -0.12 and 0.15 for the populations PD-3-14 x M-75 RNR and PD 5363 x M-75 RNR, respectively. Since response to selection is partially dependent on the heritability of RKN resistance, the PD-3-14 x M-75 RNR population was eliminated from further analysis due to a negative heritability estimate.

The 46 plants with the lowest gall rating within the PD 5363 x M-75 RNR $F_3$ population that corresponded with single $F_2$ plants with gall ratings of zero were selected to represent $C_2$. The 46 $F_3$ lines derived from the PD 5363 x M-75 RNR population, the resistant parent M-75 RNR, the susceptible parent PD 5363, and two cultivar standards, moderately resistant LA 887 and susceptible Deltapine 90, were evaluated in the greenhouse from May to August of 1997 to determine the progress from mass selection. The experimental design was split-plot with run of the test as the whole-plot and entries as the subplot. Entries were replicated 5 times in a run. Each entry in Run I was inoculated with 20,000 eggs of *M. incognita* and 10,000 eggs in the subsequent runs. Galling index, gall number, and the number of galls per gram of root dry weight were used to assess RKN resistance. There was minimal variation among the PD 5363, M-75RNR, Deltapine 90, and LA 887 for either number of galls per plant, galling index, or galls per gram of root dry weight across the four runs. Thus, neither number of galls per plant, galling index, nor galls per gram differentiated the levels of RKN resistance reported for LA 887 and M-75 RNR in previous tests utilizing egg counts. These criteria varied greatly for the same cultivars between runs and may not be appropriate for evaluating resistance under greenhouse conditions.

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