# AGRONOMIC PERFORMANCE OF BARBADENSE AND LONGICALYX DERIVED BREEDING LINES

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## Abstract

A breeding effort aimed at developing reniform resistant breeding lines adapted to Mississippi was initiated in 2007. Populations segregating for resistance were developed from hybridization of "LONREN", a reniform resistant upland breeding line developed via introgression from a wild species of cotton (*Gossypium longicalyx*), with university breeding lines and obsolete varieties. Following a seed increase in Tecoman, Mexico, marker assisted selection (MAS) of F2 plants (marker BNL3279) was employed to identify individuals possessing the gene ($ren^{lon}$) for resistance from LONREN. Selections (F2:F3) were planted to progeny rows and tested for homogeneity of resistance. All breeding activities were conducted at the Delta Research & Extension Center (DREC) in Stoneville, MS, and included a non-replicated yield evaluation of selected F2:F4 lines. To determine agronomic performance of MAS breeding lines possessing the LONREN source of reniform resistance, the best performing lines were evaluated during the 2012 growing season in replicated yield trials at the following locations: 1) Stoneville, MS, 2) Mississippi State, MS, and 3) the Auburn University Tennessee Valley Research and Extension Center (TVREC) at Belle Mina, AL. Initial reniform populations ($P_i$) at both Mississippi locations were moderate (near treatment threshold of 5,000 nematodes/pint), while the average ($P_i$) at TVREC exceeded 30,000 nematodes/pint. The following entries were included in the trial: 1) 31 MAS breeding lines derived from LONREN, 2) parental line LONREN 21-4, 3) four obsolete commercial varieties, 4) three reniform resistant breeding lines derived from *G. barbadense* "TX110" (DREC and TVREC locations only) and 5) "BARBREN", a reniform resistant breeding line derived from *G. barbadense* "GB713". When averaged across three locations, BARBREN produced the highest lint yield, followed closely by the four obsolete commercial varieties. Only three LONREN derived breeding lines produced lint yields greater than the parental line LONREN 21-4. However, all LONREN derived breeding lines exhibited a higher lint percentage than the *G. barbadense* derived breeding lines, as well as the LONREN 21-4 parental line. Where nematode populations were highest (TVREC), lint yields ranged from a high of 1800 lbs/a for BARBREN to less than 100 lbs/a for several of the LONREN derived lines. The three TX110 (*G. barbadense*) derived breeding lines also ranked among the highest yielding entries at TVREC. Results for fiber quality analysis are pending. To summarize, the majority of lines derived via MAS utilizing the LONREN source of resistance did not perform as well as lines utilizing resistance derived from *G. barbadense* (BARBREN and TX110), or the obsolete commercial varieties. A hypersensitive response has been proposed as a possible mechanism of resistance in LONREN germplasm. Furthermore, it has been suggested that this mechanism of resistance allows for little, if any, "tolerance" to high populations of nematodes resulting in severe stunting and poor yields. Deleterious genes from *G. longicalyx* closely linked to the $ren^{lon}$ gene for resistance is another possible explanation for the poor performance associated with this source of resistance. Despite the low yields currently observed in association with the LONREN source of reniform resistance, breeding efforts directed at identifying new recombinants to "break" any negative linkage, or selection for a more tolerant genotype, should be pursued vigorously before abandoning this potential source of resistance.