

FIELD PERFORMANCE AND HERITABILITY OF THRIPS RESISTANCE FOR COTTON VARIETY DEVELOPMENT**Dylan Q. Wann****Texas A&M AgriLife Research and Texas Tech University****Lubbock, TX****Jane K. Dever****Megha N. Parajulee****Mark D. Arnold****Heather D. Flippin****Texas A&M AgriLife Research****Lubbock, TX****Abstract**

In the absence of synthetic pesticide applications, thrips (Thysanoptera: Thripidae) management can be more problematic in organic production systems than conventional cotton systems. Additionally, nearly all organic cotton acreage on the Texas High Plains (THP) is planted with one or two conventional cultivars and seed-saving is near-ubiquitous, as these cultivars are no longer commercially available. Therefore, development of new thrips-tolerant, non-transgenic cultivars has the potential to greatly improve the availability and diversity of viable cultivars and overall production of organic cotton on the THP. Fifteen advanced breeding lines, 4 cultivars, and 1 newly-released germplasm line were planted at 2 field locations in 2013. Each genotype was evaluated for thrips resistance potential and overall field performance under organic management. Thrips resistance was assessed using visual injury ratings at both study sites. Yield and fiber quality data were collected to evaluate overall field performance of each genotype. Breeding lines '07-7-519CT', '07-7-1407CT', and '11-2-802GD' exhibited high field tolerance to thrips feeding. Lines '07-14-510FS' and 11-2-802GD and cultivars FiberMax® 'FM 958' and 'Tamcot 73' displayed the greatest lint yields among all evaluated genotypes. Both 07-7-519CT and 11-2-802GD exhibited a desirable combination of high thrips tolerance and yield potential, and would therefore be candidates for release as cultivars or parent material.

In addition, two broad-sense heritability trials were conducted to evaluate the inheritance of the thrips resistance trait and potential utility in variety development. Two separate families were evaluated, each originating from different interspecific *Gossypium hirsutum* L. and *Gossypium barbadense* L. crosses. The first family was derived from cold-tolerant *G. hirsutum* breeding line 07-7-1407CT and *G. barbadense* 'Cobalt'. Parents and the F₁ and F₂ generations were evaluated in a field study in 2012, and visual thrips injury ratings were conducted on individual plants for each genotype at 4-5 true leaves. The H^2 value for thrips resistance in this trial was 26.1%. The second family was derived from a CA 2266 (*G. hirsutum*) x TX 110 (*G. barbadense*) cross, and parents and F₁, F₂, and F₃ generations were evaluated in a greenhouse trial under elevated thrips pressure in 2013. H^2 values for F₂ CA 2266 x TX 110 and F₃ CA 2266 x TX 110 generations were 22.9% and 28.4%, respectively. These values support previous assumptions regarding the quantitative nature of thrips resistance. While these values were relatively low, they indicate that visual phenotyping for thrips resistance and subsequent selection is consistent between the field and greenhouse. More work is necessary to further validate these data at both the greenhouse and field level.