

# **THIPS INJURY AND EARLY-SEASON COTTON GROWTH: POTENTIAL INTERACTION OF PENDIMETHALIN INJURY AND SYSTEMIC INSECTICIDES**

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## **Abstract**

Pendimethalin is applied preemergence (PRE) to approximately 30% of Georgia cotton. Pendimethalin is registered for PRE application up to 2 days after cotton has been planted. However, delayed application in combination with adequate moisture (rainfall or irrigation) can result in injury to seedling cotton. Pendimethalin's mode of action is through inhibition of cell division in developing root systems. Prowl injury to cotton seedling results in delayed hypocotyl development and can also result in abnormal root growth and development. Aldicarb and imidacloprid are systemic insecticides used for control of early-season thrips, aphids, and other insects. If damaging infestations are not controlled, early-season insect damage can reduce seedling vigor and result in delayed plant development.

In an effort to determine if early season pendimethalin injury to cotton would limit insecticide uptake and thus lead to increased thrips injury, a study was initiated during 2000 and 2001 at Plains GA. Roundup Ready-Bolgard ST 4892 cotton was planted in a conventionally prepared seedbed with 4 rows per plot. The design was a 3x5 factorial arrangement of treatments with three insecticides (none, imidacloprid, and aldicarb) and five herbicides [none and pendimethalin 1.12 and 2.24 kg $\text{ha}^{-1}$  a.i. PRE and 2 days after planting PRE (2-DPRE)]. Pendimethalin was incorporated with irrigation on the day of application. Acephate was applied to all plots after June 21 to control other pest.

Thrips monitoring began by hand harvesting five consecutive plants for two weeks after planting and conducted consecutively for four weeks. Also beginning two weeks after planting, stand counts were taken and ten consecutive plants from each plot were excavated by hand and these samples used to determine leaf area, root and stem length, and dry weights for each of these variables. This entire plant sampling routine was conducted at two-week intervals for a total of three sampling dates.

Stand and yield were significantly affected by treatments and year. Results from this field experiment indicate dramatic differences in early-season cotton growth relative to herbicide injury and lack of thrips control. Early season thrips injury was increased on cotton plots treated with 2-DPRE applications of pendimethalin. Adequate soil moisture led to rapid cotton hypocotyl development within 24 hours of planting, which was followed by the 2-DPRE application of pendimethalin. Pendimethalin injury to the cotton plants reduced root development, reducing the seedlings' ability to absorb soil residual insecticides. This decreased insecticide absorption resulted in cotton seedlings that were more susceptible to thrips injury. Upon seedling emergence, thrips damage on cotton seedlings that had received delayed pendimethalin application was noted. Further investigation noted that the developing roots of the thrips-injured plants exhibited pendimethalin injury symptoms. Analysis revealed that insecticide and herbicide did affect these variables, but the interaction of insecticide by herbicide did not statistically occur for stem length and dry weight, tap root length and dry weight, number of leaves, and leaf area and dry weight. This indicates that pendimethalin injury that leads to decreased insecticide absorption with resultant increased thrips injury may be an additive affect. Pendimethalin is commonly used for Georgia cotton production and could be reducing effectiveness of soil applied insecticides on a much larger scale than realized.