PATH ANALYSIS OF COTTON YIELD DETERMINANTS

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Abstract

Within the last ten years, there has been a large increase in the number of commercial cotton cultivars, *Gossypiun hirsutum* L., available for production. Most cotton cultivars available in the past were similar morphologically while more recently developed cultivars set bolls over different time periods than older cultivars. Breeders have inadvertently been selecting plant types with smaller bolls with fewer, smaller seeds per boll. Due to the inverse relationship existing between number of bolls per plant and boll weight, the objective of the research was to determine the relative importance of boll weight as a breeding trait for cultivar stability at varying levels of Tobacco Bud Worms (TBW) (*Helicoverpa virescen* Fabricius) and Boll Worms (BW) (*Heliothis zea* Boddie) damage levels. The experiment was conducted at the Macon Ridge Research Station in Winnsboro, Louisiana in 1995 and 1996, comparing six cotton varieties grouped into three boll weight categories: Heavy boll weight types, [Stoneville LA 887 (STV LA887) and Chembred 830 (CB 830)], Medium boll weight types [Stoneville 132 (STV 132) and Hartz 1215 (H1215)], and Light boll weight types [Delta and Pine Land 5409 (DPL 5409) and Delta and Pine Land (DPL 5415)]. The experimental design was a split plot with three replications: insecticide treatment(main plots) = treated and untreated, and boll types(subplots) = light, medium, and heavy. For the treated insecticide treatment, all economically important insects were controlled until 40% open boll was achieved. For the untreated insecticide treatment all economically important insects were controlled season until the crop reached mid-bloom, then control of TBW/BW was discontinued to inflict mature fruit damage. Insect counts were taken weekly in each plot regardless of treatment to be able to correlate yield to insect density. Path coefficient analysis was preformed using the regression model: Seed Cotton Yield = Open Bolls per Area * Boll Weight * Worm Damaged Open Bolls per Area, and was the predefined cause-and-effect relationship among the variables of the equation described by Dewey and Lu. The path coefficient analysis indicated that boll weight is a significant breeding trait as a contributor to cultivar stability, more so as an indirect effect. As boll weight decrease, the effects of worm damage to seed cotton yield becomes less significant as a yield reducer.

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