EFFECT OF SIMULATED HAIL ON BOLL AND FIBER DEVELOPMENT OF COTTON

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Abstract

Three separate studies were conducted at the Delta Research and Extension Center in Stoneville, MS to assess the recoverability of cotton (*Gossypium hirsutum* L.) after hail damage applied at various developmental stages and severity levels, to determine the effect of non-uniform and uniform stand reductions on cotton maturity and lint quantity/quality, and to develop agronomic and replanting guidelines for hail-damaged cotton. The first study consisted of simulating hail damage to two varieties (DPL 20 and 5415) at five different severity levels (no damage, light damage, moderately light damage, moderate damage, and heavy damage). Hail was simulated by the application of crushed ice to cotton plants at the five true-leaf growth stage according to treatment schedules. The second study consisted of simulating uniform and non-uniform stand reductions caused by hail damage. Hail was simulated by the hand-thinning of the original stand of cotton at the four true-leaf stage according to treatments schedules (0% population reduction, 25% uniform population reduction, 25% skippy population reduction, 50% uniform population reduction, 50% skippy population reduction, 75% uniform population reduction, and a 75% skippy population reduction). The third study consisted of simulating hail damage to two varieties (DPL 20 and 5415) at seven different developmental stages (untreated control, four true-leaf stage, pinhead square stage, match head square stage, early bloom, at peak bloom, and at cutout. Hail was simulated by the application of crushed ice to cotton plants at the various growth stages. In the first study, hail simulation severity treatments applied on June 5 reduced plant stands by 10 to 50% (measured 27 days after treatment) and reduced leaf area by 55 to 95% and 6 to 53% when measured at 13 and 40 days after treatment, respectively. These stand reductions and leaf area reductions were directly associated with the increased severity of the hail simulation treatments. Simulated hail damage imposed on June 5 significantly decreased early-season flowering (before Aug. 4) compared to the undamaged control. In general, only the most severe hail simulation treatment caused a significant decrease in total lint yield. However, a significant variety x hail simulation treatments interaction revealed that DPL 20 (an earlier-maturing variety) was better able to recover from early-season hail damage by increasing late-season lint development compared to DPL 5415. In the second study, plant population reductions resulted in slight increases in late-season flowering (fourth and fifth week flowers) compared to the control, however, no differences in total lint yield were found among the plant population treatments. In the third study, early-season reductions in flowering and the ability of cotton plants to recover from hail damage was significantly affected by the stage of development when the damage occurred. Hail damage occurring at the four true-leaf stage, pinhead square, match head square, early bloom, peak bloom, and cutout reduced total lint yield by 14, 31, 44, 64, 71 and 58%, respectively, compared to the control.

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