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Response to Defoliation Timing Based on Heat-Unit Accumulation In Diverse Field Environments

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Defoliation timing affects lint yield and quality of cotton (*Gossypium hirsutum* L.). A timing method based on heat-unit accumulation was evaluated in replicated field plots in Georgia, Louisiana, Tennessee, and Texas during a 3-year period. Objectives were to evaluate effects of different intervals of heat-unit accumulation prior to defoliation in diverse environments on yield and fiber quality. Defoliation timing treatments were aimed at 361, 417, 472, and 528 degree-days (base 15.6°C) after five nodes above white flower (NAWF=5) at all locations. There were additional treatments at some locations. The control treatment aimed to defoliate at 472 degree-days (DD15) after NAWF=5. Crop maturity, as measured by boll opening at the time of control treatment, varied widely across site-years. A seed cotton sample from each plot was ginned to determine lint yield and fiber properties. The control treatment produced yields that were not significantly different from the maximum yield in 9 of 16 site-years. In four environments where the control treatment was too early, yield loss averaged 18.5%. In four other environments where control treatment was too late, lost time averaged 4 days to harvest. Across environments, heat-units after NAWF=5 required to reach the earliest maximum yield at each site-year was associated with yield level, as each increment of 100 kg lint ha⁻¹ was associated with 12 more DD15. Fiber properties were less sensitive than yield to defoliation timing by heat-unit accumulation in this study with significant effects on micronaire, fiber strength and length in 9, 4, and 1 site-years, respectively. To achieve consistent results, the heat-unit approach is best used in conjunction with traditional methods of defoliation timing. The existing heat-unit model could be improved for use in diverse environments by incorporating a yield predictor.