SPRINKLER IRRIGATION INDUCED FLOWER SHEDDING

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Abstract

Cotton research in the 1920s, 1940s, 1950s, and 1980s found that rain or sprinkler irrigation during the morning hours resulted in decreased boll set. Analysis of daily fluctuations in humidity, rainfall and temperature from successive days of flowering in relation to flower set and mote formation showed that rain or sprinkler irrigation during the time of pollination, even that falling shortly thereafter, affected the number of ovules receiving pollen tubes by interfering either with pollen deposition on the stigma or with pollen-tube growth. The purpose of this study was to determine the mechanism of water injury to pollination by sprinkler irrigation. Treatment of cotton flowers with water as the pollen dehisced resulted in the osmotic disruption of the pollen grains and prevented self-pollination of the cotton flowers. Morphological analysis of isolated pollen grains before and after water treatment showed the exudation of pollen cytoplasm into the surrounding water medium within seconds of the water treatment. The water treatment resulted in the loss of fruiting bodies unless the flowers were subsequently pollinated with viable pollen. The bolls that were set following hand pollination of water emasculated flowers produced seed numbers equivalent to self-pollinated controls. In conclusion, cotton pollen is hypersensitive to osmotic injury and any contact with water will destroy the pollen without significant injury to the stigma of the flower.

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