TEST OF CONCEPT: GASEOUS 1-MCP APPLIED TO CONTAINER-GROWN COTTON PLANTS

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Abstract

Gaseous 1-MCP (1-methylcyclopropene) is used commercially in post-harvest handling of fresh fruits, vegetables and ornamental plants, to control ethylene-mediated ripening processes. The compound inhibits ethylene activity by preemptively occupying ethylene receptor sites. It may be beneficial to cotton subject to environmental stress by reducing ethylene-induced abscission of leaves and fruit. Because of high vapor pressure of 1-MCP, however, response of field-grown cotton to this PGR has been inconsistent. To test the 1-MCP concept, we evaluated the response of container-grown cotton plants to a commercial gaseous formulation of 1-MCP (SmartFresh™). Cotton was grown in 7-gallon containers in the greenhouse, arranged in a replicated factorial design of SmartFresh treatment and water regime. Designated plants were either fully irrigated or subject to progressive moisture deficit after first square. Water used by the fully irrigated plants was replaced twice weekly, while the droughted plants received less than half of full irrigation from 48 to 76 days after planting (DAP). Gaseous 1-MCP was applied to designated plants in fumigation tents at 1 ppm for 15 hours, while untreated plants were placed in separate tents for the same time, 55 DAP. Data were collected weekly on water regime, stomatal conductance, plant growth, fruit set and leaf abscission. Data on dry matter partitioning were collected at the end of the experiment, 86 DAP.

The drought treatment reduced leaf stomatal conductance, mainstem node production, and fruit set, but these responses were not modified by gaseous 1-MCP treatment. Drought increased leaf abscission, but 1-MCP treatment did not modify the extent of leaf shedding. Drought also reduced total aboveground dry matter by 86 DAP, but this response was not modified by 1-MCP. Under drought stress, however, total fruit retention and partitioning of dry matter to fruit were reduced with 1-MCP treatment, relative to untreated. Final plant height was reduced less by drought stress with 1-MCP treatment than without, indicating that partitioning shifted to vegetative growth. Neither of these responses to 1-MCP occurred under full irrigation. Results from this test did not support the concept that 1-MCP would reduce injury from drought stress by reducing abscission of leaves and fruit.

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