

6-BA和ABA缓解棉纤维发育低温胁迫的生理机制

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Physiological mechanisms of growth regulators 6-BA and ABA in mitigating low temperature stress of cotton fiber development.

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摘要

以科棉1号棉花品种为材料,于2006、2007年在江苏南京(长江流域下游棉区)设置播期(4月25日、5月25日)和生长调节剂(6-BA、ABA)试验,研究低温条件下,外施6-BA、ABA对棉铃及棉纤维发育的影响及其生理机制.结果表明:常温和低温条件下,6-BA处理均能使相应部位棉铃铃质量增加、纤维品质提高;ABA处理在常温条件下会导致品质下降,而在低温逆境条件下可使纤维品质下降幅度减小;6-BA显著提高了棉铃蔗糖含量及蔗糖合成酶、蔗糖磷酸合成酶活性,而ABA则可诱导 β -1,3-葡聚糖酶活性;6-BA、ABA对纤维发育关键酶蔗糖转化酶活性的作用效果均不显著.低温条件下外施6-BA、ABA均可提高棉纤维品质,但两者作用机制不尽相同:6-BA主要通过提高纤维素合成相关酶的活性,而ABA则主要通过诱导棉株抗逆性来提高纤维品质.

关键词: 棉花 纤维 低温 6-BA ABA 酶活性

Abstract:

A field trial with high fiber quality cotton cultivar Kemian 1 was conducted in Nanjing (lower reaches of Yangtze River) in 2006-2007 to study the effects of growth regulators 6-BA and ABA on the boll and fiber development and related physiological mechanisms under low temperature stress. The cotton seeds were sown on April 25 and May 25, respectively, which could result in different temperature for the bolls on the same positions, and the growth regulators were sprayed at flowering stage. Spraying 6-BA increased the boll weight and fiber quality under both normal and low temperature conditions; whereas spraying ABA induced the decrease of fiber quality under normal temperature but decreased the reduction magnitude of fiber quality under low temperature condition. 6-BA increased significantly the boll sucrose content and sucrose synthase and sucrose phosphate synthase activities, while ABA only increased boll β -1,3-glucanase activity. Both 6-BA and ABA had less effects on the activity of sucrose invertase, a key enzyme for fiber development. Under low temperature condition, spraying 6-BA or ABA improved fiber quality, but the action mechanisms were different. 6-BA improved fiber quality via enhancing the activities of relevant enzymes; while ABA improved fiber quality via increasing the stress resistance of cotton plants.

Key words: cotton fiber low temperature 6-BA ABA enzyme activity

引用本文:

. 6-BA和ABA缓解棉纤维发育低温胁迫的生理机制[J]. 应用生态学报, 2011, 22(05): 1233-1239.

. Physiological mechanisms of growth regulators 6-BA and ABA in mitigating low temperature stress of cotton fiber development. [J]. Chinese Journal of Applied Ecology, 2011, 22(05): 1233-1239.

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