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ONLINE ISSN: 1349-0990

PRINT ISSN: 0011-1848

■ Japanese journal of crop science

Vol.66 , No.4(1997)pp.682-690

[\[Full-text PDF \(3346K\) \]](#) [\[References \]](#)**Acetylcholine as a Signaling System to Environmental Stimuli in Plants : II.
Ca²⁺ movement in the coleoptile node cells of heat-stressed Zea mays seedlings**

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[Received: 1996/12/09]

[Published: 1997/12/05]

[Released: 2008/02/14]

Abstract:

The acetylcholine (ACh) -acetylcholine receptor system requires the presence of acetylcholinesterase (AChE) and Ca²⁺ as a trigger of ACh release at the plasmodesmatal junction between the stele and cortex in plants. In this work, Ca²⁺ movement and cytochemical AChE activity were detected in the coleoptile node cells of maize seedlings following heat stress. Fluorescent Ca²⁺ labeled with calcium green was detected in the cells with a laser scanning confocal microscope. The labeled Ca²⁺ in the coleoptile node cells was found mainly in starch grains. Heat stress remarkably increased labeled Ca²⁺ in the endodermal and cortical cells. Most of the starch grains in the endodermal cells lost shape immediately after the treatment of heat stress, and the crumbling starch grains exuded labeled Ca²⁺ into the cells. From the results, the Ca²⁺ in starch grains can be activated by heat stress, and consequently, the released Ca²⁺ can induce an elevation of Ca²⁺ concentration in the cells. Further, the endodermal cells rapidly responded to heat stress as compared to the cortical cells. The AChE activity in the endodermal cells also greatly increased after heat stress. Therefore, the appearance of Ca²⁺ in endodermal cells after heat stress can be correlated to its function as a trigger for ACh release.

Keywords:

ACh release, ACh response, Ca²⁺ movement, Heat stress, Starch grains, Zea mays

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