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[Image PDF (670K)] [References]

Light Induction of 1-Aminocyclopropane-1-carboxylic Acid Synthase Activity in Quinclorac-Treated Maize Seedlings

Yukari SUNOHARA[1)], Mari KOBAYASHI[2)] and Hiroshi MATSUMOTO[1)]

1) Institute of Applied Biochemistry, University of Tsukuba
2) Master's Program in Environmental Sciences, University of Tsukuba

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The effect of light on quinclorac (3,7-dichloro-8-quinolinecarboxylic acid)-induced phytotoxicity and on 1-aminocyclopropane-1-carboxylic acid (ACC) synthase activity in intact maize (*Zea mays* L. cv. Honey Bantam) seedlings was investigated. The root-treatment of intact seedlings with quinclorac significantly reduced the FW of the plants, and water and chlorophyll contents of the first leaves under illumination, but not in the dark. Quinclorac (50 μM)-treated seedlings produced approximately two-fold larger amounts of ethylene in the light than in the dark. 2,5-Norbornadiene (NBD), a competitive inhibitor of ethylene, significantly recovered the quinclorac-induced decrease in water and chlorophyll. For determining ACC synthase activity, the seedlings were treated with quinclorac (50 μM) for 12 hr in the dark, and then transferred to light or kept in darkness. Quinclorac significantly enhanced ACC synthase activity in the shoot 6 hr after exposure to light, while no significant activation was observed in the dark. These results suggest that light is involved in the phytotoxic action of quinclorac in intact maize seedlings through an enhancement of ethylene biosynthesis, and that the generation of unknown light-regulated factor(s) might be responsible for the induction of ACC synthase activity following quinclorac treatment.

Keywords:
ACC synthase, chlorophyll content, ethylene production, light, 2,5-norbornadiene, quinclorac

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