

Induction of Anthranilate Synthase Activity by Elicitors in Oats

Tetsuya Matsukawa^{a,b,*}, Atsushi Ishihara^{a,b} and Hajime Iwamura^{b,c}

^a Division of Applied Life Sciences, Graduate School of Agriculture, Kyoto University, Kyoto 606-8502, Japan. Fax: +81 (75) 753 6408. E-mail: tmatsu@kais.kyoto-u.ac.jp

^b CREST, Japan Science and Technology Corporation (JST)

^c Department of Bio-Technology, School of Biology-Oriented Science and Technology, Kinki University, Uchita-cho, Naga-gun, Wakayama 649-6493, Japan

* Author for correspondence and reprint requests

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Oat phytoalexins, avenanthramides, are a series of substituted hydroxycinnamic acid amides with anthranilate. The anthranilate in avenanthramides is biosynthesized by anthranilate synthase (AS, EC 4.1.3.27). Induction of anthranilate synthase activity was investigated in oat leaves treated with oligo-*N*-acetylchitoooligosaccharide elicitors. AS activity increased transiently, peaking 6 h after the elicitation. The induction of activity was dependent on the concentration and the degree of polymerization of the oligo-*N*-acetylchitoooligosaccharide elicitor. These findings indicate that the induction is part of a concerted biochemical change required for avenanthramide production. The elicitor-inducible AS activity was strongly inhibited by L-tryptophan and its analogues including 5-methyl-DL-tryptophan, and 5- and 6-fluoro-DL-tryptophan, while the activity was not affected by D-tryptophan. The accumulation of avenanthramide A was also inhibited by treatment of elicited leaves with these AS inhibitors, indicating that a feedback-sensitive AS is responsible for the avenanthramide production. In elicited leaves, the content of free anthranilate remained at a steady, low level during avenanthramide production. Moreover, administration of anthranilate to elicited oat leaves resulted in an enhanced avenanthramide accumulation. AS may play a role as a rate-limiting enzyme in the biosynthesis of avenanthramides.