



## Mode of Action of Jasmonates

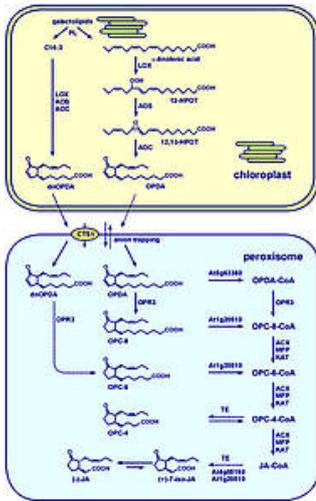
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- Publications

Jasmonates (JA) are phytohormones known as signals in plant responses to biotic and abiotic stress and as signals in developmental processes. The mode of action of jasmonates was studied by “gain of function” and “loss of function” experiments using transgenic approaches and mutants in biosynthesis, metabolism and signaling of JA and its metabolite 12-hydroxyjasmonate. Modulation of JA levels in planta was performed by constitutive, inducible as well as tissue-specific expression of the allene oxide cyclase (AOC) gene, which codes for an essential enzyme in JA biosynthesis.

JA is synthesized from  $\alpha$ -linolenic acid of chloroplast membranes. The three chloroplast-located enzymes 13-lipoxygenase (13-LOX), 13- allene oxide synthase (13-AOS) and the AOC catalyze the first half of JA biosynthesis up to the intermediate product cis-(+)-12-oxophytodienoic acid (OPDA) (Fig. 1). The AOC product OPDA carries the naturally occurring enantiomeric structure of (+)-7-iso-jasmonic acid indicating the role of AOC in JA biosynthesis.

The second half of JA biosynthesis takes place in peroxisomes if OPDA or its CoA ester is transported. Within the peroxisomes, the cyclopentenone ring is reduced and subsequently, enzymes of  $\beta$ -oxidation of fatty acids catalyze  $\beta$ -oxidation of the carboxylic



after Kienow et al., J. Exp. Bot. 59: 403-419 (2008)

*Arabidopsis thaliana* and tomato were used for the functional analysis of AOC and JA. In both species a mechanistic analysis was performed on mode of action of jasmonates as signals in plant defense reactions and plant development. Numerous cooperations with groups in Germany and abroad were performed (cf. publication list).

The experimental activities of the research group were finished in 2008 due to retirement of several group members and the group leader. The former department of Natural Product Biotechnology is now renamed as department of Molecular Signal Processing and is led by Professor Steffen Abel (formerly UC Davis, California, USA). The scientific and technical know-how of the research group "Mode of action of jasmonates" in respect to analysis of jasmonates is mostly transferred to the research group "Jasmonate Function & Mycorrhiza" (Bettina Hause) within the Department Cell and Metabolic biology.

Claus Wasternack is active as guest of the IPB to fulfill tasks as referee for manuscripts and projects submitted in Germany and abroad, to finish publications and to give seminars on mode of action of jasmonates in Germany and abroad. He has additional tasks each year as Visiting Professor at the Palacky-University of Olomouc, Czech Republic, and in the framework of a new program of the Czech Republic, "Centre of the Region HANA for Biotechnological and Agricultural Research".