Hormones and Growth Regulators

178(F201)
The M locus and ethylene control sex determination in andromonoecious cucumber plants.

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Sex determination in cucumber (Cucumis sativus L.) plants is genetically controlled by the F and M loci. The F and M loci interact to produce three different sex phenotypes: gynoecious (M-F), monoecious (M-mf), and andromonoecious (mmff). Gynoecious cucumber plants produce more ethylene than do monoecious plants. We found that the levels of ethylene evolution and the accumulation of CS-ACS2 mRNA in andromonoecious cucumber plants did not differ from those in monoecious plants and were less than the levels measured in gynoecious plants. Ethylene inhibited stamen development in gynoecious cucumber but not in andromonoecious one. Furthermore, ethylene caused substantial increases in the accumulation of CS-ETR2, CS-ERS, and CS-ACS2 mRNA in monoecious and gynoecious cucumber plants, but not in andromonoecious plants. In addition, the inhibitory effect of ethylene on hypocotyl elongation in andromonoecious cucumber plants was less than that in monoecious and gynoecious plants. These results suggest that ethylene responses in andromonoecious cucumber plants are reduced compared to those in monoecious and gynoecious plants. This is the first evidence that ethylene signals may mediate the product of the M locus to inhibit stamen development in cucumber. The andromonoecious line provides novel material to study the function of the M locus during sex determination in flowering cucumbers.

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Light regulation of brassinosteroid-biosynthetic genes in Arabidopsis thaliana.

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Plant growth and development are strictly regulated by light environment. Plant hormones have been suggested to be involved in this regulation. Brassinosteroid has been suggested to be involved in photomorphogenesis using Arabidopsis mutants, such as det2, cypd and dwf. It has also been suggested that light acts as a negative regulator of brassinosteroid biosynthesis based on the analyses of these mutants. It has not been shown, however, how light controls brassinosteroid biosynthesis. We analyzed light regulation of brassinosteroid-biosynthetic genes in Arabidopsis using real time-monitoring RT-PCR. When we tested dark- or light-grown seedlings, the biosynthetic genes are regulated negatively by light. When we transferred light-grown seedlings to darkness or dark-grown ones to the light, we found that some components of gene expression are regulated positively by light. Together with our results of endogenous brassinosteroid level analysis, it is likely that light controls brassinosteroid biosynthesis in more complex fashion.

180(F203)
LIGHT PROMOTES BRASSINOSTEROID BIOSYNTHESIS IN RICE

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The levels of endogenous brassinosteroids in shoots and roots of rice seedlings grown in light or dark were compared by GC-SIM: Castasterone, typhasterol, teasterone, 6-deoxocastasterone, 6-deoxotyphasterol, 3-dehydro-6-deoxoteasterone, 6-deoxoteasterone and 6-deoxocathasterone were identified from shoots and roots. 3-dehydrotestosterone was detected only in shoots. There was no detectable amount of brassinolide and cathasterone in rice. Continuous fluorescent light increased the levels of all of these brassinosteroids: The levels of typhasterol and castasterone were increased about 33-fold and about 6-fold respectively, while the levels of other brassinosteroids were increased about 2 to 3-fold. It is likely that light activates a putative C-6 oxidase(s) that may convert 6-deoxotyphasterol and 6-deoxocastasterone to typhasterol and castasterone, respectively. Interestingly, in roots, there was no clear difference between light- and dark-grown seedlings.

181(F204)
GIBBERELLIN REGULATION OF PLASTIC EXTENSION IN ROOTS OF LEMNA MINOR


We aimed to analyze the rheological characteristics during elongation of the root segments in Lemna minor. Uniconazole-P (Un-P), a gibberellin biosynthesis inhibitor, inhibited the total elongation of root segments (TE), and this inhibition was mainly caused by suppression of the plastic component of the segment elongation (PC). Concomitant with this inhibition, the cortical microtubule (CMT) array became disorganized in the presence of Un-P. Addition of GA3 abolished the inhibition of TE by Un-P treatment, and this recovery was caused not by the increase in the elastic component but by an increase in the PC. Furthermore, the CMT arrays also recovered their characteristic organization in the presence of GA3. These findings suggest that endogenous gibberellin accelerates TE by activating the PC via control of CMT arrays. This conclusion was also supported by rheological analysis using a microtubule-disrupting agent, propyzamide.