218(S211)

EFFECTS OF AUXIN ON STOMATOGENESIS - DOES AUXIN ALTER ITS PROCESS? -

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Physiological effects of auxin have been well investigated. Little is known, however, about its effects on stomatogenesis of young developing seedlings. In the present study we have demonstrated that development of stomatal complex and the cell division plane determination of the guard mother cell (GMC) are greatly affected by exogenous IAA.

IAA treatment resulted in high frequency of immature guard cells although stomatal frequency itself was not affected by IAA. In the presence of IAA, most of the guard cells developed chloroplasts but lost their unique morphology (kidney-shaped cells) resulting in a square-like shape. In addition, incompletion of cell plate formation of the GMC was observed. From these results, involvement of microtubules in cell morphogenesis of the guard cell is strongly suggested. The effects of IAA on stomatogenesis will be discussed in terms of microtubule organization.

219(S212)

GENETIC DISSECTION OF ADVENTITIOUS ROOT FORMATION WITH TEMPERATURE-SENSTIVE MUTANTS OF *Arabidopsis thaliana*

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When cultured on the medium containing auxin, hypocotyl explants of *Arabidopsis thaliana* generate advenitious roots. We have isolated a series of novel mutants that are temperature sensitive for this phenomenon. In the primary screening, we selected 985 candidates out of 8003 M2 plants, and in the second screening, 60 mutant lines from 473 M3 lines. They could be classified into 4 groups on the basis of their phenotypes at the restrictive temperature; (A) mutants incapable of initiating root primordia, (B) mutants forming cell clumps in place of normal roots, (C) mutants forming roots with abnormal morphology, and (D) mutants forming many roots over the explants.

In order to genetically dissect auxin signal transduction leading to the initiation of root primordia, we are further characterizing the (A)-type mutants. Adventitious root formation from hypocotyl explants consists of at least two auxin-requiring steps; dedifferentiation and induction of root primordia. Morphogenetic responses of our mutants to auxin are under careful investigation in reference to these two steps.

220(S213)

PHENOTIPIC ANALYSIS OF AN *Arabidopsis* MUTANT WITH NARROW LEAVES AND RIGHT-HANDED SPIRAL OF EPIDERMAL CELL FILES

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An *Arabidopsis* mutant line 20-15 was isolated from screening based on resistance to growth inhibition and chlorophyll degradation by ABA. This mutation was mapped near *ANGUSTIFOLIA* (*AN*) gene on chromosome 1. Since this mutant has narrow leaves and two-blanched trichomes as in the *an* mutant, it is likely to be a new allele of *an*. Line 20-15 showed right-handed spiraling in the epidermal cell files of root and etiolated hypocotyl, and skewed to the right on the vertically positioned agar plate. When grown on the plate containing 10 μM ABA, the mutant root did not skew. We analyzed the effect of ABA on the directional control of cell elongation using some spiral and, ABA insensitive/ deficient mutants and line 20-15.

221(S214)

Isolation and characterization of mutants defective in the root apical dominance from *Arabidopsis thaliana*

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The formation of adventitious or lateral roots in higher plants is induced by cutting stem or root. This phenomenon is called as "root apical dominance" corresponding to "apical dominance". Auxin transported from shoots and wounding, etc. are known to be involved in this phenomenon. Moreover, it is suggested that the inhibitors (e.g., cytokinins) produced by root control negatively the formation of roots. We recently have found that xylem sap from squash root had inhibitory activity against the formation of adventitious roots. However, the mechanisms of root apical dominance are not well understood.

In this study, mutants defective in the root apical dominance were screened and we isolated a number of mutants, in which the formation of adventitious and/or lateral roots in intact plant was promoted, from M_2 seeds mutagenized by EMS. The *rot302* mutation causes the inhibition of root growth, highly branching of roots, and the stimulation of adventitious root formation. The *ar-L14* mutation causes the stimulation of lateral and adventitious root formation. The *ar-C12* mutation causes remarkable stimulation of adventitious root formation. These mutants have normal root apical meristems. The *ar-C22* mutation causes the arrest of the growth of only primary roots in early stage of development, the inhibition of lateral root formation, and the stimulation of adventitious root formation. It is possible that these mutations occur in the function of roots and cause the deficiency of the root apical dominance. Physiological and genetical analysis in these mutants are under investigation.