10 mg/l or 60 mg/l respectively, was used as a soaking treatment for lettuce and pepper seeds. As expected, the germination time of treated seeds in standard germination trials was substantially reduced. However, seedlings from treated seeds showed some abnormal growth (stem distorsions). These effects may have undesirable consequences for practical applications.

An almost complete reduction of the stem growth abnormalities was obtained by soaking MAF-treated seeds in a 5-10 mg/l solution of benzyladenine (BA) for 3 h. However, roots of treated lettuce seedlings were shorter than those of controls. Addition of 10 mg/l $AgNO_3$ to BA gave no substantial advantage. Seed treatment with kinetin (2.5 mg/l) gave results similar to BA, without affecting root length.

The results of the experiments seem to indicate that the abnormal growth of the seedlings is mainly a consequence of the effect of MAF on plant cell growth and may be counteracted by cytokinins.

EFFECT OF FUSARIC ACID AND ITS STRUCTURAL ANALOG PICOLINIC ACID ON THE RELEASE OF SUBSTANCES FROM BARLEY LEAF SEGMENTS AND RED BEET ROOT DISKS

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Treatments with 1 mM fusaric acid (pKa 5.75) induced the release of electrolytes from barley leaf segments, indicating some modification on plasmalemma permeability. In red beet root disks fusaric acid induced both electrolyte leakage (measured as electrical conductivity) and betacyanin release (measured as optical density at 535 nm) already at the 0.5 mM concentration. The structural analog picolinic acid (pKa 5.35) was completely ineffective between 0.5 mM and 4 mM concentrations. The effect of fusaric acid in red beet root disks was also tested at three external medium pH (4.5, 5.5 and 6.5). The leakage of electrolytes and the release of betacyanins increased with the decrease in pH of the medium, suggesting that only the uncharged molecule was active. Moreover, the release of betacyanins indicates that fusaric acid also influences tonoplast functionality or structure.

CALCIUM INVOLVEMENT IN THE INHIBITING ACTION OF OPHIOBOLIN A IN THE EARLY PHASES OF RADISH SEED GERMINATION

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In maize roots ophiobolin A (OPH) interferes with proton extrusion activity, which operates at plasmalemma level, and increases potassium permeability. More

recently, an inhibiting effect of OPH on the calcium-calmodulin system has been shown. The effect of OPH during the early phases of radish (*Raphanus sativus* L.) seed germination has been investigated. Seed germination is characterized by the reactivation of membrane functions: proton extrusion, evolution of potassium transport (leakage and following reabsorption), and negative transmembrane electric potential.

OPH inhibited the increase in fresh weight, which takes place in early germination, at least up to the first 40 h. This inhibition was accompanied by a delay in the reactivation of proton extrusion and potassium uptake; the leakage of this latter cation was not affected by the toxin. The leakage of calcium, which takes place during early germination, was enhanced by OPH. OPH inhibited the incorporation of labeled precursors into both proteins and RNA. The presence of calcium in the incubation medium did not affect H^+ extrusion, K^+ uptake, and fresh weight increase. The administration of EGTA or calmidazolium (a powerful inhibitor of calmodulin) enhanced the inhibitory effect of OPH. OPH inhibited the *in vitro* activation of the calmodulin-dependent brain phosphodiesterase, with a kinetics similar to the one found in maize. Since the inhibition was relevant only at high OPH concentration and after a long preincubation period, the effect might not be physiologically significant.

These results show that in germinating radish seeds the effect of OPH is accompanied by enhanced calcium permeability, in contrast with what previously found in maize roots. These results might suggest that OPH acts at membrane level through the calcium-calmodulin system, even though the *in vitro* effect of OPH on calmodulin does not appear sufficient to support the hypothesis that the *in vivo* effect of the toxin depends on an inhibition of the calcium-calmodulin system.

STRATEGIES FOR SELECTING *ARABIDOPSIS THALIANA* MUTANTS RESISTANT TO FUSICOCCIN

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We are interested in developing selective systems for the isolation of *Arabidopsis* mutants altered in their sensitivity to fusicoccin (FC). Preliminary experiments demonstrated that FC induces in *Arabidopsis* (like the majority of higher plants) a wide variety of physiological responses. Among them, FC promotes germination, overcomes ABA inhibition on germination, induces stomata opening and wilting. At the biochemical level, FC stimulates the activity of a K^+-dependent, erythrosin B and vanadate-sensitive H^+-ATPase located in the plasmamembrane. The receptor site for FC in *Arabidopsis* seems to be a 34 Kda polypeptide with properties similar to the high affinity FC binding sites of other higher plants.

Arabidopsis mutants resistant or hypersensitive to FC can be isolated when a selectable phenotype, directly related to the action of the toxin, is identified: this