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Biotechnology Approaches for Exploitation and Preservation of Plant Resources

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ABSTRACTS

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of the adenylate pool in plants, and of the value of the energy charge. The author was first to study in detail the properties of the adenylatekinase in plants with different resistance to herbicides: availability of two main components of an enzyme with various functions (ADP-ase and ADP-reductase), different cation dependency, unequal localization of adenylatekinase in whole chloroplasts and their fragments.

The mode of herbicide action is to destruct pigments, to discontinue the electron transport dependent ATP synthesis, to decrease the amount of amino acids, to modulate activity of enzymes in chloroplasts by blocking their metabolism, and to sharply change the activity of enzymes controlling the degradation of herbicides in plants.

Potential toxicants, the accumulation of which in a plant cells causes marked shifts in metabolism, include free and bound nitrites, unchanged herbicides, and not least phytotoxic products of their metabolism. Toxic action of herbicides is accompanied by changes in the energy status of plants, increasing the permeability of membranes and caused, in particular, e.g. by sharp changes in the phospholipid composition.

Condition of mineral nutrition in studied plants determined considerably the degree of phytotoxicity of the herbicides used. In many cases phosphorus has performed a protective function, and nitrogen has increased the phytotoxic action of herbicides.

The modern intensified technologies of crop cultivation provide the usage of different chemicals in combinations. Under these conditions not only one, but several active ingredients of pesticides, growth regulators, micro-and macronutrients may be present in soil and plants. It can be assumed that molecules of these substances may be involved in different interactions, which are difficult to predict, but certain to occur.

The behavior of 2,4-D, simazin, chlorsulfuron in soils and plants has been studied by using combinations with nitrogen and phosphorus fertilizers, fungicides, insecticides, and growth regulators. The results clearly indicate those agrochemical combinations changes considerably in their transformation behavior in soils and plants. The behavior of herbicide molecules in tolerant and susceptible plants changes differently.

IN VITRO TESTING OF GRAPE ROOTSTOCKS FOR DROUGHT RESISTANCE

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Since vine is cultivated mainly in southern regions with temporary arid conditions, testing for drought resistance acquires considerable importance in this crop. Screening of both cultivars and rootstocks is needed as the world's grafted vineyards account for about 80%.

Three rootstocks which differed in their drought resistance were tested: *Riparia Gloire de Montpellier, Riparia x Rupestris 101-14 and 140 Ruggeri*. 30 explants of each rootstock were established in culture in control and experiment media. Experiment medium imitated soil drought conditions by addition of osmotic, polyethylene glycol (PEG) at different concentrations.

After subculturing over a period of 6 weeks, control and experiment plants were assessed for their morphology based on such parameters as stem length of the plants, leaf surface area and root surface area. Osmotic concentrations modeling the drought conditions were determined. The rootstocks tested were differentiated based on the inhibition of their growth functions.

The results obtained may be helpful for the efficient location of grape rootstocks in compliance with climatic conditions, enabling best expression of their potential.

THE IINTERACTION OF RUST FUNGI *PUCCINIA GRAMINIS F.SP. TRITICI* AND *UROMYCES CARYOPHYLLINUS* WITH HOST PLANT CALLUSES

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The investigation of plant-pathogen interaction by dual culture methods has good potential but is still not being used to the full extent. The characteristics of the first developmental stages of rust fungi *Puccinia graminis* Pers. *f.sp.tritici* and *Uromyces caryophyllinus* (Schrank.) had been studied in culture of wheat and carnation calli differing in their morphology, physiological state, viability and genotype resistance.

The strongly expressed tendency for the inhibition of rust spore germination was observed on the compact morphogenic carnation and wheat calli, whereas loose, nonmorphogenic calli were less inhibitory. No inhibition of germination had been observed in the case of non-viable wheat and carnation calluses. There was appressoria formation on compact morphogenic and loose heterogeneous carnation calli inoculated with *U. caryophyllinus* . No appressorias were formed on degrading calli as well as in controlled conditions (water agar-agar). On the calli inoculated with *P.graminis tritici* only a few appressorias were recorded on the high viable type of wheat calluses. So, the type of interaction of rust fingi with host callus cultures mainly depends on the morphological stage and viability of calli used for the experiment.

The dependence of *P.graminis tritici* development on wheat callus genotype resistance was not so clearly expressed as depend on morphological and viability stages. However the impact of stress factors such as thermoshock can help to increase this difference between the variants. The degree of spore germination, appressoria initiation as well as germ tube length and germ tube adhesion on callus cells was differed by shock influence on susceptible and resistant calli genotypes. The resistant genotypes that were chosen were *Triticum diccocum* 'Vernal', *T. diccocum* 'Khapli' and *T. persicum stramineum*, as susceptible – *T. compactum* 'Little Club' and *T. aestivum* 'Marques'.

The difference in the ability of callus formation between resistant and susceptible wheat genotypes was observed. The immature embryos of resistant genotypes were less capable of producing callus than susceptible ones. Probably, the callusogenesis ability and resistance to obligate biotrophic pathogens such as rust fungi could have some common mechanisms in their basis connected with genome conservatism in response on the influence exogenous hormones and regulatory substances.

The rust spore germination and development on callus cultures host plants can provide valuable information for the estimation of genotype resistance as well as for modeling plant-rust fungus interaction.

ANTISTRESS ACTIVITY OF OLIGOSACCHARINES IN PLANTS

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Oligosaccharins (biological active oligosaccharides) are nontraditional regulators of plant growth, development, and gene expression. In the plant oligosaccharins obviously play

the role of molecules-mediators in the process of intercellular communications, stimulating the growth and development, the survival under the environmental conditions. We studied oligosaccharins from female milk influencing on plants immunity increase: their stability in stress conditions. These carbohydrate molecules are Lewis type saccharide. Influencing of stresses, caused by heavy metals ions and salt, studied on seedlings of a tomato (*Lycopersicon esculentum L.*, cv. Novichok). A seeds sterilised in solutions of $KMnO_4$ and $CaOCl_2$, after they sowed on Knopp medium, in which one added $CuSO_4$ (400 mg/l) or NaCl (1%) and oligosaccharins (10^{-13}, 10^{-11}, 10^{-9}, 10^{-7} mol/l). The seedlings grew one week at 25° C with a 16 hourly photoperiod. Metered following parameters: shoot height, root length and plant mass. Some female milk oligosaccharins stimulate tolerance of tomato seedlings to salt and heavy metal stress. Optimal concentrations at 10^{-13} to 10^{-7} mol/l. Fucogalactosylgalacton-ol, lacto-N-fucopentaosa 1, lacto-N-difucohecsaosa 1 and trifucosyllacto-N-hecsaosa have the best antistress activity in heavy metal stress and lacto-N-difucohecsaosa 1, difucosyllacto-N-hecsaosa and trifucosyllacto-N-hecsaosa in salt stress.