tion was determinate symptoms of leaves and stems lesion on 14 days after infection which were as typical at phytoplasmosis and bacteriosis, like untypical for last. It has been established that content of chlorophyll-*a* decreased in all variants infection of two pathogens (on both cultures), despite the fact that content chlorophyll *b* to decrease only in Alfalfa leaves through 14 days from beginning infection. In Fodder leaves chlorophyll-*b* content decreased only at mixing infection, whereas at phytoplasma`s and bacteria`s infection its concentration, on the contrary, slightly increased.

The carotenoids content decreased in Alfalfa leaves, which were phytoplasma`s infected and increased at bacteria`s and mixing infection. In Fodder galega observed another tendency: carotenoids concentration, which is protective pigments, increased at phytoplasma`s and bacteria's infection and decreased at mixing infection.

To sum up, Fodder and Alfalfa plants, artificial infected by phytopathogenic microorganisms lead to degradation of pigment-protein complexes at antenna- shortening PSII-LHCII together with reduced of electrons acceptor pool and decreased photochemical efficiency of PSII, that reflect decreasing of photosynthetic potential of leaves.

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SALT TOLERANCE IMPROVEMENT IN CROPS VIA REGULATION OF Na^+ AND K^+ HOMEOSTASIS

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Soil salinity is a main type of abiotic stresses that leads to considerable crop yield losses, affecting millions of hectares of land around the world. The scale of this problem is expected to increase due to global climate change and expansion of irrigation practices in agriculture. High salinity affects around 6% of the total world's land area. It is estimated that 20% of irrigated areas is affected by high salinity. The negative impact of salt stress on agricultural productivity is significant, because crops exhibit inhibition of growth, reduced tillering and development of reproductive organs. However the creation and development of salt tolerant crops is too slow. There are many reasons affecting speed of this process. The main reason is that salt tolerance of plants relies on tight coordinated regulation of hundreds of genes and depending from them physiological programs. The major target of salinity tolerance research is to improve ability of plants to maintain growth and productivity on saline soils. The modern biotechnology can be very helpful in reaching this target by intensification of gene discovery, gene delivery to crops and genome editing. The negative effects of high salinity are divided into two distinct phases. The first, it is independent from salt tissue accumulation - "osmotic phase". The second is "ionic phase". This type of phase is related to toxic effect of ions, mainly Na^+ and Cl^-, during salt accumulation in plant tissues. Both osmotic and ionic effects negatively affect plant metabolism and induce production of ROS that could harm the cellular structures and biosynthetic processes. The ionic imbalance during the second phase leads to deleterious effects. Potassium (K^+) is one of most important nutrient for plant growth and development. The presence of K^+ is required for osmotic adjustment, turgor generation, regulation of membrane potential and enzyme activation. Due to similar physicochemical properties between Na^+ and K^+, the sodium is a main potassium competitor in key metabolic processes in the cytoplasm. It was suggested that plant survival under salinity requires high cytosolic K^+/Na^+ ratio. The restriction of Na+ transport and accumulation in photosynthetic organs and enrichment of plant tissues by K^+ are very promising approaches for plant salt tolerance improvement. Both these processes recruit a range of transporter and their controllers at both plasma membrane and tonoplast. Thus the one of major mechanism of salt tolerance rely on regulation of function of Na^+ and K^+ transporters. The application of most important transporters that facilitate intra- and intercellular Na^+ and K^+ in plants will be discussed. According to the proposed approach, we have cloned several genes encoding key transporters of Na+ and K^+ comprising NHX (Cation proton exchanger), HKT (High affinity K^+ transporter) and TPK (Two-pore potassium channels) families. By application of transgenic approach for expression or overexpression of these genes, the improvement of salt and in some cases osmotic tolerance was achieved in rice, barley and tobacco plants. The our study demonstrate that the regulation of function and modulation of gene expression of some plant transporters, HKT for Na^+ and NHX and TPK for K^+ homeostasis, are effective approach for salt tolerance crop improvement. The regulation and function of HKTs, NHXs and TPKs and their response to salinity will be discussed in this work. Thus regarding our research direction together with study of other plant scientist, the plant biotechnology needs to introduce correct combination of promising genes into novel crop cultivars. The genes encoding transporters involved in Na^+ and K^+ transport could be very useful for future application and improvement of crop salinity tolerance.

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NITRATE-DEPENDENT FORMATION OF NITRIC OXIDE AND ITS PARTICIPATION IN INDUCTION OF HEAT RESISTANCE OF WHEAT SEEDLINGS

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Nitric oxide (NO) is the important participant of signaling in plant cells. It is established that NO is involved in the signal transduction to the genetic apparatus, that is required for developments of plants resistance to adverse factors of various nature, including hyperthermia. The induction of plant resistance to different stress factors by influence of various donors of nitric oxide is shown. In recent years the experimental data about the significant (probably, dominant) contribution of the pathway of nitrates reduction with the participation of nitrate reductase (NR) to nitric oxide synthesis have been obtained. Also there are numerous facts indicating the existence of pathway of NO formation from L-arginine at involving of protein with NO-synthase activity. Possible reciprocal influence of these pathways on the content of nitric oxide remains almost not investigated. Also the contribution of pathway of nitric oxide synthesis with NR participation in the formation of adaptive responses of plants is investigated a little.

The study of influence of sodium nitrate on the activity of NR, endogenous content of nitric oxide (NO) in roots and development of the wheat seedlings resistance to the damaging heating was the purpose of current research. Also the influence of exogenous L-arginine on the nitrate-dependent formation of NO in root cells and development of seedlings resistance to hyperthermia was investigated.