клітин перехідної зони та зони розтягу, Отже, нами вперше встановлено, що поряд з іншими клітинними мішенями дії іонів токсичних металів (Ni^{2+} і Cd^{2+}) в клітинах виступають актинові філаменти.

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PHOTOSYNTHETIC APPARATUS ACTIVITY OF LEGUMES INFECTED WITH BACTERIOSES AND PHYTOPLASMOSES PATHOGENS

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One of important aspect of environmentally friendly land use is minimizing chemical interference in agrobiocenoses. To available of directions in decision this question is as define of optimal variants of cultural plants that is resist to phytopathogens with high level of genetic potential of productivity, such involved evidence-based of crop rotation with addition of agricultures, which able additionally to enrich soil by nutrition elements and biologically active substances. To such cultures belong legumes. Using of their in crop rotation lead to improve structure, fertility and aeration agricultural lands. Legumes have high protein content, nutrients, amino acids and they are nutritional cultures for cattle breeding. In this connection actual to conduct diagnosis of early changes in activity of photosynthetic apparatus of agricultures that reflect the peculiarities of production process of these plants, in particular – legumes under conditions infection more most widespread phytopathogenic microorganisms.

In field conditions, Fodder galega (*Galega orientalis L.*) and Alfalfa (*Medicago L.*) plants were cultivated on experimental plots. Artificial inoculation of plants was carried out using phytopathogenic strains *Acholeplasma laidlawii var. granulum* st. 118 and *Pseudomonas syringae* pv. *atrofaciens* D13 (closeness suspension in $1x10^9$ CFU/ml) in two true leaves phase. The chart of the field experiment: 1 – control (without inoculation); 2 – inoculation with phytoplasma A*. laidlawii* var*. granulum* st. 118; 3 – inoculation with causative agent of bacteriosis *P. syringae* pv. *atrofaciens;4* – inoculation by both pathogens. Photochemical activity of leafs investigated using method of Chlorophyll a fluorescent induction (CFI) using a portable device «Floratest» on leaves of the upper tiers on 9th and 11th day after infection pathogens under conditions of dark adaptation leaves before the measurement (20 min.). Repeated of experiments – fivefold. The parameters of fluorescence that analyzed: F_0, F_m, F_v/F_m, K_{pl} and K_i. Pigments contents in leaves determinated through 14 days after infection using method of extraction in DMSO with further detection by spectrophotometer.With CFI method use established that after 4 days from the beginning of phytopathogens infection of Fodder galega plants, regardless on increasing of photochemistry efficiency of PS II, noted shortening of electron acceptor pool at blocking of electron transfer to the plastoquinone pool (PQ pool), increasing quantity of Q_B-non-renewable complexes, that not participating in linear electron transport to the PQ pool (parameter K_{pl}). Such changes observed in alfalfa leaves on 8 day. On 14 days observed more noticeable changes (in leaves both cultures) – tendency to content shortening of active chlorophylls, blocking of electron transfer, decreased photochemical efficiency of PS II. It was showing decline of Ki value (of Rubisko activity reflected) in the Fodder galega leaves that indicates on potential inhibition of CO_2-fixation at Rubisco activity decrease. In the Alfalfa leaves observed increasing of Ki value is likely due to of Rubisco oxygenase activity. The visual observa-

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