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INFLUENCE PLANT PATHOGENIC BACTERIA AND FUNGI ON THE EFFICIENCY OF THE SYMBIOTIC SYSTEM RHIZOBIUM GALEGAE – *GALEGA ORITNTALIS* L

Various pests and diseases, such as insects, fungi, bacteria, mycoplasma can cause significant harmful effect of galega crops. If you do not take action at the first signs of disease, their pathogenic effect causes a significant reduction in the yield of green mass of galega in the 32-42% and 15-30% of seeds [10, 21, 24, 25].

The most studied in the world is insects pests and fungal diseases of galega. It should be noted that bacterial diseases of galega insufficiently studied, which explains the limited number of protective drugs of this class in the market of protection. However, in recent years, phytopathogenic bacteria are increasingly occupy important place among the diseases of crops [5, 7, 20, 21, 26, 27]. Not defined circle of bacterial pathogens of plants. Unidentified risks of cross-contamination galega and other legumes, which are widely cultivated in Ukraine.

Diseases are very harmful galega that hit the ground plant parts, causing premature defoliation. This reduces the yield and the quality of the green mass and seeds. Seeds on affected plants are produced in most cases flat or low viability. Therefore, monitoring of diseases, their diagnosis and galega crop protection from various diseases is of great practical importance [1, 8, 10, 24].

We have found that the main bacterial pathogen galega is *Pseudomonas syringae* pv. *syringae*. The pathogen is polyphage and usually causes black-brown necrotic spots, so the name of the disease varies as bacterial spot, black spot, brown spot fine [4, 14]. It should be noted that especially this culture suffers from fire blight[5, 8, 9, 21].

Since some of the most common and harmful pathogens of bacterial diseases of legumes are members of the genus *Pseudomonas* can be assumed that further monitoring will identify representatives *Pseudomonas syringae* on galega [3, 6, 11].

It is found that the *Pseudomonas syringae* pv. *syringae* affects all parts of terrestrial plants. The disease appears first on the tips of young leaves in the form of small transparent dark spots, which rapidly coalesce and cover a large area of the leaf, and then the whole area of the sheet. The top sheet is twisted or bent. Diseases causing death of a large number of leaves of the plant. With the defeat of the stems, and cuttings of the bacteria move to the vascular bundles and penetrate the seed. Often on the stems there are small (2-5 mm in diameter) dry black necrotic spots that grow over time and crawl into strips. The stem is twisted and can break in [13].

During the monitoring of bacterial diseases galega on scientific research and industrial crops are a number of symptoms of plant injury was determined in the Vinnitsa region, which were caused by bacterial plant pathogens [9, 15, 27].

1. The light brown spots (2-4 mm in diameter) of irregular shape edged with chlorotic;
2. light brown frame sheet;
3. necrotic light brown spots
4. empty spaces with light beige border;
5. "burn" the tip of the leaf;
6. dry translucent beige spots
7. dry black necrotic spots
8. blackening and wilting on the scaffold with spreading;
9. black hauling leaf cuttings.

Bacteriological analysis of samples of the affected galega collected in the Vinnitsa region, characterization of isolates is shown in Table 1. What can serve as an example for the primary identification and selection of bacterial pathogens. For a variety of visual characteristics and virulence isolates selected type *Xanthomonas* for monitoring galega in the Vinnitsa region (Table 1). The pathogen bacteriosis galega genus *Xanthomonas* - motile gram-negative rods, oxidese negative, catalase positive. The cells have a capsule. Colonies of 5-8 mm in diameter, round, convex, smooth, shiny, opaque with smooth edges are yellow-green pigmentation [16, 18].

Table 1. Phytopathological analysis of samples of galega (bacterial isolates from Vinnitsa region crops)

Variant	Samples			Quantity isolates			
	Analyzed	For some isolated bacteria	Selected for further study	Yellow pigment: type *Pantoea agglomerans*	Yellow pigment: type *Xanthomonas*	Gray-white, translucent, type *Pseudomonas*	White, opaque, type *Bacillus*
1	17	11	9	2	2	3	2
2	17	13	18	8	4	6	1
3	15	12	9	4	1	2	2
4	10	3	12	3	3	4	2
5	9	7	7	3	1	1	2
Total	68	47	55	18	11	16	9

Biochemical properties

Biochemical properties considered an important criterion for the identifycation of bacterial pathogens of plants. The causative agents of bacterial galega

Pseudomonas syringae pv. *syringae* and defined by the authors *Pseudomonas* sp. and *Xanthomonas* sp. They have the ability to break down carbohydrates to aldehydes and acids to form carbon dioxide and water .

It was found that strains of *Pseudomonas* sp. used as the sole carbon source, carbohydrates such as glucose, sucrose, xylose, galactose, fructose, raffinose, mannitol and glycerol. Do not ferment lactose, maltose, fructose, dulcitol (Table 2).

Table 2. Physiological and biochemical properties of pathogens bakteriosis galega

Tests	Genera and species of pathogens		
	Pseudomonas syringae pv. *syringae* (according to the literature)	*Xanthomonas* sp. (defined in Ukraine)	*Pseudomonas* sp. (defined in Ukraine)
Color colonies	Grayish-white	Greenish-yellow light	Gray, translucent
Gram staining	–	–	–
Mobility	+	+	+
Oxidase	–	–	–
Reduction of nitrates	–	–	–
Litmus whey	M	reduction	M
Use milk	–	–	–
The formation of H_2S	–	–	–
Hydrolysis of gelatin	–	+	–
Growth in meat-peptone agar (MPA)	steady growth, ring	growth ring, film	growth ring
Using:			
Glucose	A	–	A
Glucose anaerobic	–	–	–
Lactose, maltose	–	–	–
Saccharose	A	–	A
Continued Table 2			
Xylose	A	A	A
Rhamnose, mannose	–	–	–
Galactose	A	–	A
Dulcitol	–	–	–
Glycerol	A		A
Fructose	A	A	A
Raffinose, mannitol	A	–	A
Oxalic acid	M	M	M
Hypersensitivity reaction	+	–	+

Note: "-" - no symptoms; "+" - Signs; A - the formation of acid; M - meadow.

As biochemical parameters allocated isolates can be identified as *Pseudomonas syringae* or *Pseudomonas savastanoi*. Isolated bacteria that can be assigned to *Xanthomonas* sp. as the sole carbon source of power only use xylose and fructose[4, 9, 13, 14, 16, 18].

For a more precise identification used molecular genetic techniques.

Galega as well as other representatives of the legume genus may be affected by bacterial pathogens of legumes, which include Xanthomonas axonopodis pv. phaseoli (brown spot) and Pseudomonas savastanoi pv. phaseolicola (angular spotting) - the most common pathogens that cause significant economic damage. Other: *Xanthomonas fuscans subsp. fuscans, Pseudomonas syringae* pv. *syringae, Pseudomonas syringae* pv. *vignae, Surtobacterium flaccumfaciens, Xanthomonas heteroceae, Agrobacterium tumefaciens.* There are also rare *Pectobacterium carotovorum and Pseudomonas putrefaciens.* The most harmful bacterial pathogens of legumes, often soybean *- Pseudomonas savastanoi* pv. *glycinea* (angular spotting) *and Xanthomonas axonopodis* pv. *glycines* (pustules bacteriosis) [4, 9, 13, 16]..

In addition to these pathogens are parasitic on legumes: *Pseudomonas syringae* pv. *tabaci, Pseudomonas syringae* pv. *syringae, Ralstonia solanacearum* and bacteria found some authors and in rare cases - *Pseudomonas viridiflava*, *Xanthamonas heteroceae*, *Pseudomonas savastanoi* pv. *phaseolicola, Xanthomonas axonopodis* pv. *Phaseoli* [12, 21, 26].

Cases are also known leguminous the defeat, in particular pea pathogens such as *Pseudomonas syringae* pv. *pisi, P.syringae* pv. *syringae, P.viridiflava, Ralstonia solanacearum, Pantoea agglomerans, Agrobacterium tumefaciens, Bacillus leguminiperdus, Bacillus megaterium.* [10, 15, 21].

All of these pathogens of bacterial diseases of legumes may be potential agents of galega disease. [15, 26, 27].

The composition of plant pathogenic fungi galega

Mushrooms are considered the most common diseases among cultivated plants. Firstly, due to the number of their agents, which has about 20 thousand, second - due to the relatively easy penetration into the host plant through natural openings and the ability to hit the plants during all phases of their development. Prevalence galega fungal diseases can be significant, reaching almost 30%. However, technological feature of fodder grasses, which include eastern galega (*Galega orientalis* L.) is their mowing, which during the growing season may be 2-3 when growing galega. This explains the prevalence of fire blight, pathogens which enter the plant tissues through the damaged surface[5, 8, 12, 24]..

The basis of the mechanism of pathogenic action of pathogenic fungi is a violation of the trophic chain, since the penetration into the plant host organism, these phytopathogens are acceptors vegetable assimilates creating their deficit, and secondly - they are able to produce toxins and numerous enzymes that destroy or liquefied hydrocarbon polymers cell walls. A negative consequence of this interaction becomes a distortion of plant metabolism. Parenchymal and vascular lesions, necrotic certain tissues or organs due to fungal infections plant turns to the source the spread of fungal infection. Dead plant residues pose an infectious background, contributes to the further spread of pathogens. And, although the mechanisms of pathogenic action of different types of mushrooms can differ significantly, they cause considerable damage to agricultural production, reducing the yield of economically valuable organs, the quality and shelf life [21, 22].

We have found that the most common fungal diseases galega is rust, brown spot, ramularia betae, cercospora blight, this despite the fact that the galega is considered sufficiently resistant plants[12, 24]. Our findings are consistent with the literature [10 ,21].

Rust

Pathogens are department - *Basidiomycetes*. Class - *Urediniomycetes*. Family - *Puccinia Ceae*, genus: *Uromyces*, view - *Uromyces galegae*.

The disease appears in late June - early July. Symptoms most often appear on the stems, sometimes on leaves in the form of brown dusting. At the end of the growing black defeat of uredospores are formed in places of defeats. With intensive development of the disease leaves wither and fall off. Urediniospores brown size 23 - 25 micrometers. Most strongly manifested disease after a heavy rain, spreads urediniospores via air currents. Is necessary for the development of about 2-3 decades, temperature 19 - 210C and high humidity. The fungus overwinters in the form teliospores (Fig. 1).

Fig. 1. Rust galega east

Brown spot

Activators are *Ascomycota Division*. Class: *Deuteromycetes*. System: *Botryosphaeriales*. Family: *Botryosphaeriaceae*. Genus *Phyllosticta*. View: *Phyllosticta galegae*.

On leaves appear elongated spots with a brown border and after a certain period of time on the affected surface appear black dots – pycnium – scattered, single, flat - spherical shape, approximately 150 microns in diameter. Pycnidiophore cylindrical, ellipsoidal, tapered at one end, straight or slightly bent, discolored (Fig. 2).

Fig. 2. Brown spot galega east

Ramularia

Activators are department: *Ascomycota*. Class: *Deuteromycetes*. System *Hyphomycetales* Family: *Mycosphaerellaceae*. Genus: *Ramularia*. View: *Ramularia galegae.*

The disease looks like ocher or brown small spots of 2-3 cm in diameter on both sides of the sheet. When wet, the spots are covered by conidia in the form of liquid white coating. Conidiospores slightly curved with a few teeth on the top and are collected in bundles on both sides of the sheet to form a white film. Conidia unicellular, elongated veretinovidnoi shape (Fig. 3).

Fig. 3. Ramularia galega east

Conidia spread the pathogen. However, a potential source of infection are crop residues. By the autumn the leaves formed sclerotia dense stroma and the like and at this stage of the fungus overwinters.

Cercospora blight

Department: *Ascomycota*. Class: *Deuteromycetes*. System: *Hyphomycetales*. Family: *Mycosphaerella Ceae*. Genus: *Cercospora*. View: *Cercospora galegae*.

Brown spots on the leaves which later turn white, with a brown border. Sporulation of the pathogen has a light smoky capsules on the surface of the affected tissue when high humidity. Conidiophores hilly, pale smoky collected in bunches. Conidia are rod-shaped, spindle-shaped, curved, pointed at tip, with many partitions, colorless (Fig. 4).

Fig. 4. Cercospora blight of galega east

In winter, the fungus persists in the form stroma-tographium on which the spring at high humidity and favorable temperature to 150C and above are produced conidiophores with conidia. The fungus spreads conidia on fallen leaves.

Influence of the dominant pathogenic bacteria and fungi in the galega east symbiotic system Rhizobium galegae - galega

Galega east - a perennial herb with polycarpic development cycle. Phase flowering begins in the second year of life, but individual plants under favorable conditions, blooms in the first year [24]. In the early stages of development of aerial organs galega grow faster underground. At this time the plants come into a period of intensive growth of shoots above ground and in the phase of the fourth true leaf begin to form side shoots, which are located in the axils of the first and the second true leaves. It strengthens the root system, increasing the number of root nodule bacteria. They appear on day 25-30 post-emergence, i.e. during the intensive growth of plants. Their number is 40-55 pieces with a weight of 150-200 mg per plant, when the stem is formed. The number and mass of bubbles depends on the phase of plant development. These rates reach a maximum in the budding phase under optimum conditions of symbiosis - early flowering (from 110 to 160 pieces with a weight of, respectively, from 320 to 450 mg per plant). In this phase is carried out mowing grass. Prior to the second mowing the number and biomass of nodule bacteria increases, respectively, to 310 and more pieces, 700-720 mg [24].

In the second year of vegetation (budding phase - beginning of flowering), the number of bubbles increases slightly to 330, and the biomass is almost doubled. In the third year of vegetation the number and biomass of plant does not increase, and the downward trend is visible in the fourth year.

Inoculation of seeds *Rh. galegae* L2 stimulated growth of above ground and underground. The data are presented in table 3.

Table. 3. The influence of inoculation of *Rhizobium galegae* L2 on plant growth of galega east of the second year of life, seecentimeter

Phase	The length of the roots		The height of the plant above ground	
	control - without inoculation	with inoculation	control - without inoculation	with inoculation
Full budding	25,4	33,1	91,0	101,5
Full bloom	46.7	55,9	142,1	163,9
HIP_{05}	11,1	14,0	15,8	21,5

As can be seen from table. 3 the roots of inoculated plants in the phase of full budding is 7.7 cm longer in comparison with control, full bloom - 9.2 cm. The height of the aerial organs in the phase of full budding 10, 5 cm longer in comparison with control, full bloom - 28.1 cm. This is due to the fact that the in inoculated plants were more 1.5 nodule bacteria, which provide plant nutrition in an environmentally sound biological nitrogen and stimulated the growth of the root and aboveground parts [2, 17, 19].

The presowing inoculation of seed by biologic nodule bacteria increased the seed yield (table. 4).

Table 4. Effect of presowing inoculation on green mass and seeds of galega east, g / m^2

Variant	Crop of seeds	Increase		Crop of green mass	Increase	
		g	%		g	%
Sowing seeds without inoculation (control)	61,1	–	–	4832	–	–
Sowing of inoculated seeds	93,3	32,2	52,7	7023	2191	45,3

As can be seen from the data of table 4 each square meter of sowing the inoculated seeds gave more yield - 32.2 g, or 52.7% higher than the control. The harvest of green mass received 45.3% more than the control. Our experiments confirm the data on the effectiveness of the inoculation of other researchers [1, 7, 23, 24].

The main function of *Rhizobium*-legume system is the process of nitrogen fixation, so it was important to clarify the influence of bacterial and fungal metabolites in the nitrogen-fixing activity of bubbles. Study of direct influence of the culture liquid filtrate of liquid of *Pseudomonas syringae* pv. *syringae*, *Xanthomonas* sp. P14 and *Uromyces galegae* P15 on symbiotic system of galega - nodule bacteria showed that under their influence varies nitrogen-fixing activity galega of bubbles. When soaking of bubbles in the culture fluid of said of phytopathogenic microorganisms significantly reduced their nitrogen-fixing activity compared with control variant (table. 5).

Thus the action of phytopathogenic bacteria and fungi in a symbiotic unit of galega depended on the type and aggressive strain [21]. For further our research we chose a strain of *Pseudomonas syringae* pv. s*yringae* and *Uromyces galegae* P15.

Effect of *Pseudomonas syringae* pv. *syringae* and *Uromyces galegae* P15. on legume-Rhizobium symbiosis galega sort Kavkazkiy branets studied in a pot experiment on a gray forest soil inoculated colonies of bacteria (107) and fungus spores (106).

Table 5. The impact of culture fluid of phytopathogenic bacteria and fungi on the nitrogen-fixing activity of nodules of galega east sort Kavkazkiy branets

Variant	Nitrogen-fixing activity, micromoles C_2H_4	
	per 1 plant in an hour	per 1 g nodules in an hour
Control (culture medium for bacteria)	4,45 ± 0,39	5.03 ± 043
Control (nutrient medium for fungi)	3.14 ± 0,28	3,57 ± 0,15
Culture fluid of *Pseudomonas syringae* pv. *syringae,*	0.09 ± 0,04	missing
Culture fluid of *Xanthomonas* sp. P14	0.29 ± 0.10	0,12 ± 0,01
Culture fluid of *Uromyces galegae* P15	0,04 ± 0.01	missing

From the above in table. 6 data shows, that the investigated phytopathogenic microorganisms significantly reduce the nitrogen-fixing activity and soaking of bubbles in liquid culture *Pseudomonas syringae* pv. *syringae* and *Uromyces galegae* P15 nitrogen fixation is absent. As the results of a pot experiment, plants galega that were grown from seed inoculation of *Pseudomonas syringae* pv. *syringae* and *Uromyces galegae* P15, significantly lagged behind the controls.

According to the data presented in table. 6 plant height decreased by 31.9% or more, above-ground mass of plants in terms of dry matter decreased by 25.7 and weight of the root system - by 24.6% compared with a control option. Inoculation of seeds galega by active strain of rhizobia Rh. galegae L2 somewhat mitigated the negative impact of pathogens on plants.

Investigating biological value of protein of green mass galega east we identified 18 amino acids including all essential.

Table 6. The structure of the crop galega east by inoculation with nodule bacteria and pathogenic microorganisms action

Variant	Plant height, cm	Quantity, pcs				Mass of 1000 seeds, g
		stems	buds on the stem	beans on stem	seeds on beans	
Control (inoculation *Rh. Galegae* Л2)	131,1	16	8	160	5	8,8
Culture fluid of *Ps. syringae* pv. *syringae,*	75,0	9	4	87	2	5,6
Culture fluid of *Ps. syringae* pv. *syringae+Rh. galegae* Л2	89,3	11	5	101	3	6,1
Culture fluid of X*anthomonas* sp. P14	69,8	7	6	79	2	5,7
Culture fluid of X*anthomonas* sp. P14 + *Rh. galegae* Л2	81,2	8	7	95	3	5,6

Culture fluid of *Uromyces galegae* P15	57,8	8	5	76	3	5,4
Culture fluid of *Uromyces galegae* P15 + *Rh. galegae* Л2	75,4	10	7	81	3	6,0
$HCP_{0,5}$	13,4					0,5

It is shown, that the presowing inoculated of seeds of galega east Rh. galegae L2 sharply increased the number of glutamic acid oll varieties studied, but the better stood of sort Kavkazkiy branets (tab. 7).

Presowing seed inoculation of galega east led to increased amounts of amino acids (especially the sort Kavkazkiy branets).

Table 7. Amino acid composition of the protein of different varieties of green mass galega east with presowing inoculation *Rh. galegae* L2 and for the actions of phytopathogenic bacteria *Ps. syringae* pv. *syringae*

Sort of galega east	Variant	Glutamic acid	Aspartic acid	Essential amino acids	The amount of amino acids
Kavkazkiy branets	control without inoculation	8,9	9,1	153,1	177,3
	inoculation *Rh. galegae L2*	29,8	23,4	167,7	195,1
	inoculation *Ps. syringae* pv. *syringae*	4,7	5,2	99,8	147,5
	inoculation *Ps. syringae* pv. *syringae + Rh. gale–gae L2*	11,6	10,7	140,6	161,3
Salute	control without inoculation	7,7	8,3	155,5	175,4
	inoculation *Rh. galegae L2*	22,4	21,1	161,0	187,6
	inoculation *Ps. syringae* pv. *syringae*	3,7	6,9	128,7	139,0
	inoculation *Ps. syringae* pv. *syringae + Rh. gale–gae L2*	14,2	14,7	119,8	145,4
Donetskiy 90	control without inoculation	8,5	7,6	135,4	151,2

	inoculation *Rh. galegae L2*	21,2	19,5	165,4	181,3
	inoculation *Ps. syringae* pv. *syringae*	8,1	7,3	122,0	143,5
	inoculation *Ps. syringae* pv. *syringae + Rh. gale–gae L2*	13,1	13,9	136,7	161,3

Researches of other sorts confirm this pattern, but in quantitative terms somewhat inferior sort Kavkazkiy branets. Number of glutamic acid, aspartic acid, and the amount of amino acids decreases sharply when a bacterial infection *Ps. syringae* pv. *syringae*. Presowing inoculation of seed of galega leveled the effects of phytopathogenic bacteria, but a full recovery of individual amino acids and their amount is not happening (table 7).

Conclusions

Pests and diseases, such as insects, fungi, bacteria, mycoplasma cause significant harmful effect of galega crops, their pathogenic effect leads to a decrease in the yield of green mass of galega in the 32-42% and 15-30% of seeds.

We have found that the main bacterial pathogen galega is *Pseudomonas syringae* pv. *syringae*, which affects all parts of terrestrial plants, defined a number of symptoms of plant injury that were caused by bacterial plant pathogens.

We conducted a bacteriological analysis of samples of affected galega. Revealed and described strains of *Pseudomonas sp* .. As biochemical parameters allocated isolates can be identified as *Pseudomonas syringae* or *Pseudomonas savastanoi*. We characterized also other potential pathogens of bacterial diseases of legumes, which can affect and galega.

We have also found that the most common fungal diseases galega is rust, brown spot, ramularia, cercospora blight, this despite the fact that the galega is considered sufficiently resistant plant. These diseases are characterized and illustrated by us.

The positive effect of inoculation on plant growth galega of the second year of life: the roots of the inoculated plants in the phase of budding on 7.7 cm longer in comparison with the control, and in the phase of full bloom - 9.2 cm. The height of the aerial organs in the phase of budding on 10.5 cm longer in comparison with the control, and in the phase of full bloom - 28,1sm. After all the inoculated plants had 1.5 greater nodule bacteria. Presowing inoculation of seed by biologic nodule bacteria also increased the yield of galega seeds by 52.7% relative to the control. The harvest of green mass is also received on 45,3% more than the control.

Study the direct influence of the culture liquid filtrate *Pseudomonas syringae* pv. *syringae*, *Xanthomonas* sp. P14 and *Uromyces galegae* P15 on symbiotic system of *Galega oritntalis* L. - nodule bacteria showed that under their influence decreased nitrogenase activity bubbles compared to the control variant.

Phytopathogenic microorganisms which we was studied, greatly reduced the nitrogen-fixing activity. And while soaking bubbles in liquid culture *Pseudomonas syringae* pv. *syringae* and *Uromyces galegae* P15 nitrogen fixation is absent.

Inoculation of seeds galega by the active strain of nodule bacteria *Rh. Galegae* L2 softened the negative impact of plant pathogens in the galega plants.

Studies to determine the biological value of protein of green mass of galega by us was identified 18 amino acids including all essential. It is shown, that in of preseeding seeds of galega by the *Rh. galegae* L2, dramatically increased the amount of glutamic acid, in all studied varieties, but the better sort of stood Kavkazkiy branets.

Thus, in a highly infectious load is observed to increase the spread and development of the disease and reducing the effectiveness of the *Rhizobium*-legume system. This led to the inhibition of plant growth, as evidenced by the reduction in aboveground mass galega, weight and quality of its roots in comparison with control variant.

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Lyudmyla KIRILENKO, Antonina KALINICHENKO, Volodymyr PATYKA

INFLUENCE PLANT PATHOGENIC BACTERIA AND FUNGI ON THE EFFICIENCY OF THE SYMBIOTIC SYSTEM RHIZOBIUM GALEGAE – *GALEGA ORITNTALIS* L

Summary:

The article highlights the impact of of phytopathogenic bacteria and fungi on the efficiency of the symbiotic system *Rhizobium Galegae* - galega (*Galega orientalis* L.). Established by us main bacterial pathogen galega - *Pseudomonas syringae* pv. *syringae* is characterized. Basic properties and diseases that it can cause, as well as the peculiarities of these diseases is described. Bacteriological analysis of the affected of galega samples that collected in the Vinnytsia region is given. The isolates which have been allocated is characterized. Physiological and biochemical properties of bacterial pathogens galega shown. The most common fungal diseases of a eastern galega, which us determined, illustrated and described. The most common fungal diseases of a eastern galega, which by us determined, illustrated and described. Influence of the dominant of phytopathogenic bacteria and fungi of eastern galega on symbiotic system *Rhizobium galegae* - galega is described.

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