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EFFECT OF *LACTOBACILLUS PLANTARUM* ON AGENT OF DAMPING-OFF OF PINE SEEDLINGS

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Effect of some *Lactobacillus* strains and their combinations on agents of fusariosis of pine *Fusarium sp.* 17 has been studied. Bacteria of *L. plantarum* species could be studied as perspective microorganisms for improving germination of Scots pine seeds and protection of seedlings under the certain condition of soil treatment.

Key words: *Lactobacillus plantarum, Fusarium, damping-off, micromycetes, survival, antagonists.*

Introduction

In natural environment Scots pine trees often suffer from various stresses of biotic and abiotic nature. The most dangerous biotic stressors during all ontogenesis of these plants are *Fusarium, Alternaria, Botrytis, Pythium, Rhizoctonia, Phytophtora*. Damping-off of pine seedlings causes 33,0-40,0 % death in young plants in nurseries of forest cultures of Ukraine and other countries around the world [*Cherkis, 2015*].

One of the most effective biological methods of struggling against soil micromycetes – agents of root decays, is application of antagonistic bacteria and preparations based on them. Among perspective antagonists of phytopathogenic fungi bacteria of *Lactobacillus* genus can be mentioned out. Lactobacilli strains are characterized by high antagonistic activities including activity against agents of fusariousis [*Okorski, 2014*]. Lactobacilli have GRAS status ("Generally Recognised as Safe"), which means that they are absolutely non-dangerous for human and animal

health [*Gordon, 2015*]. No evidences of influence of lactobacilli on agent of damping-off of pine seedlings was found yet.

Aim of this work was to study the effect of some *Lactobacillus plantarum* strains and their combinations on fusariosis agent *Fusarium sp.* 17.

Materials and Methods

Fungi were isolated from damped pine seedlings by prints methods when a diseased seedling was laid down the dish with Saburo medium and left incubated at 25-28°C until the mycelium appeared.

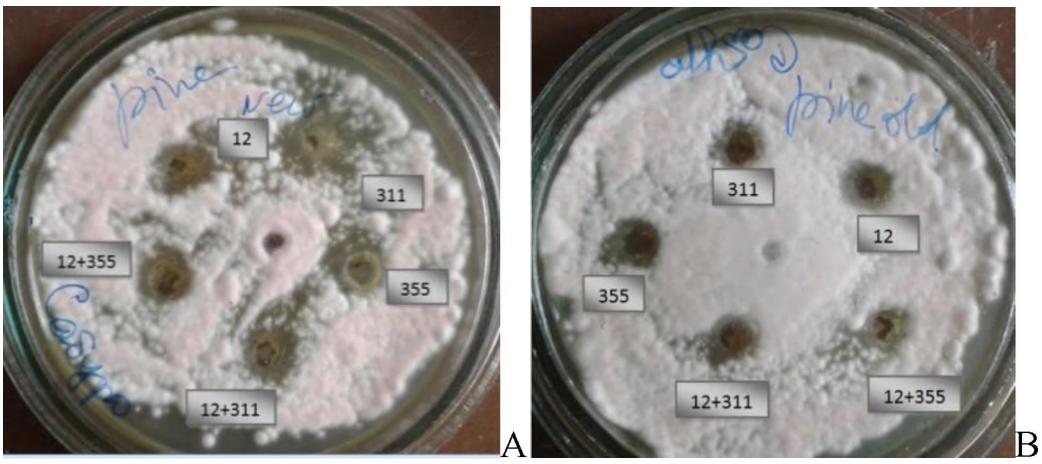
Bacteria of *L. plantarum* ONU 12, ONU 311, ONU 355 from collection of Department of Microbiology, Virology and Biotechnology of ONU and their consortia were cultivated in MRS medium at 37°C overnight and during 3 days [*De Man, 1960*].

The effect of the cultures and cell-free supernatants obtained after centrifugation at 10000g for 20 min, on micromycetes growth was studied by well-diffusion method. In freshly inoculated lawns of *Fusarium* sp. 17 well were cut. Culture of lactobacilli or cell-free supernatant were poured into the wells. Petry's dishes were incubated for 7-10 days until mycelium of a fungus appeared [*Ahangar, 2011*].

Results and Discussion

Morphological features of a mycelium (pinkish white, well developed, on some parts – dipped into the substrate, stroma coloured in wine-red colour) and that of conidia (microconidia are elipsoid-like, macroconidia – spindle-like, with 3 septa, with slightly formed stalk) allowed us to identify micromycetes as that belonging to *Fusarium* genus [*Bilai, 1977*]. Strain was named as *Fusarium* sp. 17.

The study of effect of lactobacilli culture on *Fusarium* sp. 17 growth showed that overnight cultures *L. plantarum* ONU 12, ONU 311, ONU 355 and their consortia caused zones of inhibition of mycelium growth (Fig. 1, А). Three-days cultures were less effective (Fig. 1, Б).



A B

Fig. 1. Zones of inhibition of *Fusarium sp.* 17 growth on Saburo medium under the influence of *Lactobacillus plantarum* cultures (central well – negative control without addition of lactobacilli; A – influence of overnight cultures, B – effect of 3-days cultures).

Cell-free cultural supernatant of lactobacilli caused less effect and less inhibition zones (not more than 2 mm). Bacteria of *L. plantarum* ONU 311 strains inhibited fusariosis agent better than other strains (inhibition zone 5 – 6 mm).

Conclusion

Strain *L. plantarum* ONU 311 showed the most effective antagonism against damping-off agent *Fusarium* sp. 17 as compared with other strains and their consortia. *L. plantarum* ONU 311 strain is a perspective agent of biological control of fusariosis. Further investigations on more cultures and more pathogenic strains should be carried out.

References

1. *Bilai V. I.* Fusarii. - K.: Naukovadumka, 1977. - 442 p. (in Russian).

2.*Cherkis T. M.* Rezultaty izucheniia effektivnosti nekotorykh protravitelei dlia zaschity seianzev sosny ot porazheniia vozbuditeliami fusariosa // Nauchnieve domosti BelGu. Seriia Estestvennie nauki. - 2015. - 15(32). - P. 53-60 (in Russian).

3. *Ahangar M. A., Dar G. H., Bhat Z. A., Sofi N. R.* Fungi associated with root rot of Pinuswallichiana seedlings in Kashmir // Plant Pathology Journal. – 2011. – V. 10 (1). – P. 42–45.

4. *Gordon T. R., Swett C. L., Wingfield M. J.* Management of *Fusarium* diseases affecting conifers // Crop protection. - 2015. - 73. - P. 28 - 39.

5. *De Man J.C., Rogosa M., Sharpe M. E.* A medium for the cultivation of lactobacilli // Journal of Applied Bacteriology. – 1960. – № 23. – P. 130-135.

6. *Okorski A., Oszako T., Nowakowska J. A., Pszsolkowska A.* The possibilities of biologically protecting plants against diseases in nurseries, with special consideration of Oomycetes and *Fusarium fungi* // Forest Research Papers. – 2014. – Vol. 75 (3). – P. 301–321.

7.*Sergeeva Zh.U., Krylova K.D., Limanska N.V. et al.* Influence of bacteria *Lactobacillus plantarum* ONU-87 and autolysate of bacteria *Erwinia carotovora ZM1* on soft rot disease infectious process// Microbiology and Biotechnology. – 2012. – № 4.– P. 18–28.