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EFFECT OF LACTOBACILLUS PLANTARUM ON GROWTH OF SOME
ORNAMENTAL PLANTS

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Summary. Mixture of strains *L. plantarum* ONU 12 and *L. plantarum* ONU 311 could improve growth of lawn grasses, clove and matthiola increasing root length and height of seedlings.

Key words: lactobacilli, growth characteristics, stimulation of plant growth

Introduction. *Lactobacillus plantarum* can be used to protect and stimulate plant growth [2, 3, 4]. These microorganisms have stimulating effect on growth of some plants, namely, wheat, tomatoes, lettuce, lettuce and radish [2]. That is why our goal was to check the activity of the mixture of these strains in a wider spectrum of plants, namely, on some monocotyledonous and dicotyledonous ornamental plants.

The **aim** of this work was to study the effect of a mixture of strains *L. plantarum* ONU 12 and *L. plantarum* ONU 311 on growth of some ornamental plants.

Materials and Methods. The materials of the study were two strains of bacteria of the species *Lactobacillus plantarum*: *Lactobacillus plantarum* ONU 12 and *Lactobacillus plantarum* ONU 311, isolated from grape must (Ukraine). Lactobacilli were cultured overnight in MRS liquid nutrient medium [1] at 37 °C until a concentration of $2 - 3 \times 10^9$ CFU/ml was reached. Then from the obtained cultures a mixture was prepared in a ratio of 1:1, and it was further diluted in sterile distilled water in following concentrations: 1%, 0,1%, 0,01%, 0,001%, 0,0001%. As test plants, the following decorative plants were selected:

- Lawn grass mix "Sportivnaya" 50% - perennial ryegrass *Lolium perenne* L. Gator, 20% - red fennel *Festuca rubra* L. Coral, 30% - thin meadow *Poa pratensis* L. Evora;

- Lawn grass mix «Universal» (20% - perennial ryegrass *Lolium perenne* L. Newman, 30% - red fescue *Festuca rubra* L. Gerald, 25% - fine meadow *Poa pratensis* L. Evora, 15% - fennel red *Festuca rubra* L. Kazan, 10% - fennel red *Festuca rubra* L. Samantha);

- lawn grass mix "Golf" (45% - reed cane *Festuca arundinacea* Schreb. Mustang, 40% fennel reed *Festuca arundinacea* Schreb 1771 Frsc1, 15% - meadow *Poa pratensis* subsp. *pratensis* Tzvel (Balin);

- clove pink double blend *Diáanthus plumárius* L.

- Matthiola bicolor *Matthiola bicornis* W.T. Aiton

It was these test plants that were chosen because they grow better in conditions of acidic pH of the soil (5.5 - 6.5), namely, such, with an excess of peat, traditionally used in greenhouse complexes.

Seeds of ornamental plants were soaked in suspensions of lactic acid bacteria for one hour and then transferred to the soil. In control, the seeds were soaked for an hour in water. 1 g of seeds of each of the lawn variants; 0,4 g of mathiols; 0,1 g of cloves were sown. The treated seeds after the exposure were sown in 2,5 liters of pots with a substrate, which were subsequently placed in greenhouse (Fig. 1).



Fig. 1. Test plants in the greenhouse.

The room temperature was 25 ° C, the light was within 12 hours. Commercial peat substrate "Polissky" was used. After 7 days of germination, the length of the

roots and shoots of plants were measured. Mean values and confidence intervals were evaluated.

Results and Discussion. Treatments of seeds with a mixture of strains *L. plantarum* ONU 12 and *L. plantarum* ONU 311 resulted in improvement of morphological parameters of seedlings, but the positive effect varied depending on the concentrations of the mixture and the type of test plants (Fig. 2).



Fig. 2. Improvement of the morphological indexes of the seedlings of lawn "Universal" after the treatment of seeds by lactobacilli (left) compared with the control (right).

The difference was noted even for various lawn grass mixtures. Thus, the slightest influence was found for the lawn "Golf". The average root length after treatment with lactobacilli remained unchanged, and the height of seedlings increased by 15,7 – 19,6% when treated with *L. plantarum* ONU 12 and *L. plantarum* ONU 311 mixture at concentrations 0,1% and 0,001%.

In case of "Sportivny" lawn, an improvement in root lengths and heights of seedlings was observed for the majority of cases, with the exception of treatment with a concentration of lactobacilli 0,0001%, which had no effect on seedling growth. Treatment of seeds of this lawn mixture with concentrations of lactobacilli from 1,0% to 0,001% caused an increase in average height 3,8 – 8,0%, and in root length – 13,7 – 18,1%.

For the grass mixture of the lawn "Universal" a positive effect was found for almost all tested concentrations. The average length of the above-ground part increased in 5,2 – 11,8%, and the root - in 5,6 – 12,8%.

Lactobacilli influenced even more positive on dicotyledonous plants – cloves and matthiola: mean height of plants increased in 28,3 – 68,7 % and mean root length – in 14,9 - 68,7%.

Conclusion. Mixture *L. plantarum* ONU 12 and *L. plantarum* ONU 311 positively influenced growth of lawn grasses, clove and matthiola. The best dilutions were 0,1 - 0,001 % from overnight culture that was equal to concentration of bacterial cells 10^5 - 10^7 CFU/ml.

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