

Tverdokhlib V.S., Sokolova N.V., Sudak A.A., Limanska N.V.

Odessa National I.I. Mechnikov University

EFFECT OF *LACTOBACILLUS PLANTARUM* ON GERMINATION AND SOME GROWTH CHARACTERISTICS OF WHEAT

L. plantarum ONU 12 and *L. plantarum* ONU 311 positively effected on morphological characteristics of wheat seedlings germinated from seeds in a gel Aquasave S. Treatments of seeds with 1% of overnight cultures of these strains increased mean lengths of roots of seedlings in 72,2 - 75,0% and mean heights of the plants in 44-48,8%.

Key words: stimulation activity, plant growth, lactobacilli

Bacteria of *Lactobacillus plantarum* species, common in fermented foods, inhabit plant surfaces as a part of plant microbiota. Possessing one of the largest genomes among lactic acid bacteria, it presents many characteristics potentially applicable in different fields. Recently, the stimulating effect of lactobacilli on plant growth has been reported [Goffin et al., 2010].

The aim of our work was to study the effect of bacterial suspensions of *Lactobacillus plantarum* strains as well as their mixture on germination and morphological characteristics of wheat cv Odesska ozyma.

Materials and Methods

Overnight cultures of lactobacilli with concentration 10^8 cells/ml were used for preparation of 1% suspensions. Seed surface was sterilized by 25% of hydrogen peroxide for 1 min. Seeds were treated with the suspensions for 1 hour. Strains of *Lactobacillus plantarum* ONU 12 and ONU 313 used in this experiment were initially isolated from grape must. Control seeds were soaked in sterile distilled water instead of the bacterial suspensions. Germination was carried out under greenhouse conditions in a gel Aquasave S. Totally, 100 seeds of each variant were brought to three independent experiments.

Results and Discussion

We did not see any statistically significant differences in germination of wheat seeds soaked in lactobacilli or water (Fig. 1). But after germination, strong stimulation of morphological characteristics of seedlings was observed. Mean height of the seedlings treated with *L. plantarum* ONU 12 increased in 44%, treated with *L. plantarum* ONU 311 and with the mixture *L. plantarum* ONU 12 + *L. plantarum* ONU 311 – in 48,8% (Fig. 2).

Mean root lengths were also highest in case of *L. plantarum* ONU 311: it increased in 75% as compared to the control seedlings from seeds soaked in water.

If seeds were treated with *L. plantarum* ONU 12 and the mixture, almost the same increase was observed - 72,2% and 70,2% (Fig. 3).

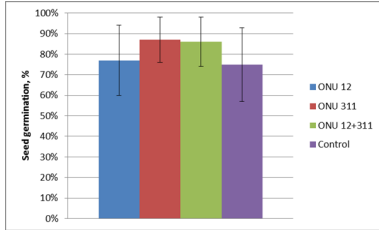


Fig. 1. Effect of *Lactobacillus plantarum* on seed germination

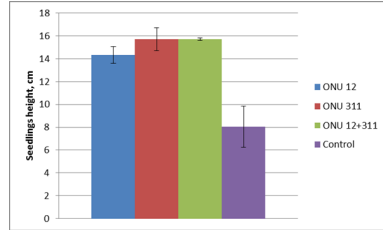


Fig. 2. Effect of *Lactobacillus plantarum* on seedlings height

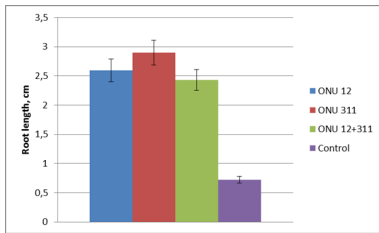


Fig. 3. Effect of *Lactobacillus plantarum* on root length

High percentages of increase in morphological characteristics of wheat seedlings indicate the stimulation potential of the strains. However, it should be taken into account that our experiments were carried out in gel and not in soil yet where the effect of soil microbiota could decrease the stimulation ability of lactobacilli.

Thus, in order to prove the positive effect of lactobacilli not only under laboratory conditions but also under natural field conditions, further experiments with germination of seeds in soil will be carried out.

Conclusion

Plant stimulation activity of the strains *L. plantarum* ONU 12 and *L. plantarum* ONU 311 make them the perspective microorganisms for biopreparation development.

Literature

1. Goffin P., de Bunt B., Giovane M., Leveaue J.H.J., Hoppener-Ogawa S., Teusink B., Hugenholtz J. Understanding the physiology of *Lactobacillus plantarum* at zero growth // Molecular Systems Biology. – 2010. – Vol. 6, № 431. doi: 10.1038/msb.2010.67.