UDK 582.282.23.045

Palamarchuk A., Rusakova M.

Department of Microbiology, Virology and Biotechnology, Odessa National I. I. Mechnikov University
Dvoryanska str. 2, 65082 Odessa, Ukraine
E-mail: anastasia.pdl.09@gmail.com

THE RHIZOSPHERE MICROBIOTA INFLUENCE ON THE *FUSARIUM* FUNGI

The influence of bacterial cultures *(B. megaterium* ONU 500, *B. subtilis* ONU 410, *P. fluorescens* ONU 303, *P. chlororaphis* ONU 305) on the *Fusarium (F. oxysporum, F. graminearum)* growth was determined by the methods of agar block and well co-cultivation. The most expressed anti-fusarium effect was characterized for *P. chlororaphis* ONU 304.
Key words: *Pseudomonas* sp., *Bacillus* sp., *Fusarium* sp., rhizosphere.

The rhizosphere is the zone of soil surrounding a plant root where the biology and chemistry of the soil are influenced by the root. This zone is about 1 mm wide, but has no distinct edge. Rather, it is an area of intense biological and chemical activity influenced by compounds exuded by the root and by microorganisms feeding on the compounds [1]. Bacteria, actinomycetes, fungi, protozoa, slime moulds, algae, nematodes, earthworms, millipedes, centipedes, insects, mites, snails, small animals and soil viruses compete constantly for water, food and space. Soil chemistry and pH can influence the species mix and functions of microbes in the rhizosphere [2].

In the natural environment, microbial root colonization leads to multiple types of physical and chemical interactions between microorganisms and plants. These interactions can vary from neutral to beneficial on the one side, and deleterious on the other side when plant pathogenic microorganisms are involved To complicate matters, microorganisms can transition between pathogenic and symbiotic states depending on environmental conditions [1]. Many non-pathogenic soil bacteria have the ability to promote the growth of plants and, therefore, are often designated as plant growth-promoting rhizobacteria.

Soil suppressiveness is the phenomenon that in spite of the presence of a virulent pathogen and a susceptible host plant, disease does not occur [4].

Specific suppression of plant pathogens has been found for representatives of a wide variety of bacterial genera, including *Agrobacterium, Alcaligenes, Arthrobacter, Bacillus, Enterobacter, Erwinia, Pseudomonas, Rhizobium, Serratia, Streptomyces* and *Xanthomonas.* Efficient root colonization and establishment of biocontrol bacteria is of key importance for effective suppression of deleterious organisms [3].

The work was carried out on the basis of Biotechnological Scientific Educational Center of I. I. Mechnikov Odessa National University. The studied strains were representatives of the genera *Bacillus (B. megaterium* ONU 500, *B. subtilis* ONU 410), *Pseudomonas (P. fluorescens* ONU 303, *P. chlororaphis* ONU 305) and *Fusarium (F. oxysporum* BSEC I, *F. graminearum* BSEC I). The influence of bacterial cultures on the fungal growth was determined by the co-cultivation of microorganisms on Nutrient Agar surface by the methods of agar blocks and wells.

The pre-cultivation of *Bacillus* strains was on Nutrient Agar, *Pseudomonas* ones – on King B agar. *Fusarium* spp. were cultured on Potato Dextrose Agar for 5 days. The applied media were containing all the necessary nutrients for microbial growth.

The plates with the studied co-cultivated microorganisms were incubated at 22 °C for 8 days. Every 24 hrs the fungal growth inhibition zone diameter (in mm) around the bacterial strains (wells or blocks) was measured. The antifungal zone diameter was calculated as the average of 3 replications of randomly chosen diameter measurements.

The mutual microbial influence studying by the agar block method detected the presence or absence of common nutrient needs and also takes into account the microbial growth rate that influence on colonization speed of ecological niches, including rhizosphere. It was determined that the antagonism of the studied bacterial species to fungi have species and strain specific characteristics (fig. 2). The maximum antifungal effect of the most strains increased during the first two days. But *F. graminearum* was more stable than *F. oxysporum* to *P. chlororaphis* and *P. fluorescens* influence.

During the research by means of the second method the wells in the dense medium allowed to distinguish exometabolite contribution to the microorganism interaction development. It was possible to take into account the different nutritional needs of the consortium members by means of two media: liquid – in holes and dense – plate layer.

The most expressed anti-fusarium effect was characterized for *P. chlororaphis* ONU 304 on the fourth day of incubation. The determination

of the sensitivity of fungal cells to *P. chlororaphis* showed that the largest area of the growth delay was noted for *F. oxysporum* and was 25.0 mm on the eighth day of cultivation. As for the genus *Bacillus*, the maximum antifungal effect was observed for *B. megaterium* ONU 500 also to F. oxysporum.

Thus, the study of the microbial group functioning, including the rhizosphere microbiota, will improve the understanding of their formation and to develop approaches to create new therapeutic and prophylactic biological products.

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