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Shevchenko L.[1,2], Volkogon K.[1], Sasina T.[1]

SELECTION OF MICROORGANISMS CAPABLE OF MINERALIZATION OF ORGANIC MATTER AND DEVELOPMENT IN COMPOSTED SUBSTRATES

[1]Institute of Agricultural Microbiology and Agro-Industrial Production,
97 Shevchenko St., Chernihiv, 14027, Ukraine
[2]Chernihiv Polytechnic National University, 95 Shevchenko St., Chernihiv, 14030, Ukraine
e-mail: shevchenkolyubov@ukr.net

Abstract. Bacteria, which are active cellulose destroyers *Bacillus amyloliquefaciens* ssp. were selected and identified. *B. plantarum* 201, *B. amyloliquefaciens ssp. plantarum* 293, *B. megaterium* 362, *B. amyloliquefaciens* 348, *B. amyloliquefaciens* 425, which, in addition to high cellulolytic ability, are producers of auxin substances, non-phytotoxic and compatible with the active cellulolytic micromycete *Trichoderma harzianum* PD3. The obtained results are important for the development of technologies for biocomposting of organic substrates based on bird droppings with a phased introduction to composted mixtures of active strains of *Trichoderma* and bacteria of the genus *Bacillus.*
Keywords: cellulolytic microorganisms, *Trichoderma*, *Bacillus*, chicken droppings, composting.

Composting of organic substrates occurs due to the functioning of microorganisms in them, therefore, optimization of microbiological processes during their production is crucial for obtaining high-quality composts. It is considered promising to create technologies for composting organic matter on the basis of microorganisms useful from an agronomic point of view introduced into compost mixtures. In fact, such composts can be a kind of complex microbial preparations. For example, various types of microscopic fungi and bacteria are used to compost organic substrate based on bird droppings and cattle manure (Shevchenko et al., 2023). Micromycetes of the genus *Trichoderma* and bacteria of the genus Bacillus are encouraging in this aspect, since individual representatives of these taxonomic groups have a number of valuable agronomic properties, in particular, they are powerful biodestroyers of organic matter, antagonists of a number of pathogens of cultivated plants and producers of phytohormones (Avdeeva et al., 2016; Baldrian et al., 2008).

The purpose of our research was to search for agronomically valuable microorganisms with their subsequent introduction into composted mixtures in order to speed up the process of biofermentation of the organic substrate and improve the quality indicators of the obtained composts.

At the first stage of our work, we selected the active cellulose destructor micromycete *Trichoderma harzianum* PD3, showed its ability to actively develop in a composted substrate based on bird droppings, and investigated a number of other agronomically useful properties of the strain. At the second stage of research, the selection of cellulolytic strains of spore-forming bacteria of the genus Bacillus was carried out due to the fact that the representatives of this genus are mostly non-pathogenic, stable during storage and technological in production, which, in combination with high hydrolytic activity, makes them promising for use in composting technologies of organic mixtures containing straw.

The selection of spore-forming bacteria – cellulose destroyers was carried out in laboratory conditions using a mineral medium in which the only source of carbon is cellulose (Volkogon et al., 2010). The identification of isolated bacteria to the genus was established according to Bergey's determinant. The species identification of the selected strains was carried out by the taxonomic identification method of MALDI-TOF.

From various substrates (chicken droppings, hay, straw, rhizosphere soil, plant roots, etc.), 240 isolates of spore-forming bacteria were isolated, which were selected based on their ability to destroy cellulose (a mineral nutrient medium with a single source of carbon in the form of filter paper and winter wheat straw was used). The cellulolytic ability of the isolates selected in this way was also tested during cultivation on a minimal glucose-salt medium with carboxymethyl cellulose. Among the isolated bacteria, *Bacillus* sp. 201, *Bacillus* sp. 243, *Bacillus* sp. 293*, Bacill*us sp. 348, *Bacillus* sp. 362, *Bacillus* sp. 392 and *Bacillus* sp. 425, which were selected for further research (Bondar et al., 2024).

According to the results of the compatibility study of the micromycete *T. harzianum* PD3 and isolates of active cellulolytic bacteria of the genus *Bacillus*, it was found that strains of *Bacillus* sp. 243 and 392 are incompatible with *T. harzianum* PD3 due to the fact that the micromycete completely inhibited the growth of bacillus strains, which excludes the possibility of their simultaneous use in further studies. The combined use of *T. harzianum* PD3 with strains of *Bacillu*s sp. 201, 293 and 425. Strains of *Bacillus* sp. 348 and 362, the effect of which on *T. harzianum* PD3 consisted in a slight limitation of the development of the micromycete, can also be used in further studies, but with some caveats, for example, with the phased, time-separated introduction of trichoderma and the specified strains of bacilli into composted substrates.

As a result, 5 strains of bacteria – active cellulose destroyers – were selected and identified: *Bacillus amyloliquefaciens* ssp. *plantarum* 201, B. *amyloliquefaciens* ssp. *Plantarum* 293, *B. megaterium* 362, *B. amyloliquefaciens* 348 and *B. amyloliquefaciens* 425. It was established that the selected strains of bacilli do not have phytotoxic properties and produce phytohormonal substances of auxin nature. Strains of bacteria *Bacillus amyloliquefaciens* ssp. *plantarum* 201, *B. amyloliquefaciens* ssp. *plantarum* 293, *B. megaterium* 362, *B. amyloliquefaciens* 348, *B. amyloliquefaciens* 425 are compatible with the micromycete strain *T. harzianum* PD3 and can be used in further research on the development of technologies for biocomposting of organic substrates based on bird droppings with the introduction of active cellulolytic strains of *Trichoderma* and bacteria of the genus *Bacillus* into composted mixtures.

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