

soil humus in transformation processes within agroecosystems, favoring organic matter conservation. Conversely, a K_p value > 1 indicates active development of the autochthonous soil microbiota and accelerated decomposition of mobile organic compounds (leading to a decrease in their content), as well as – depending on accompanying coefficients and agrochemical parameters – an intensification of either humification or dehumification. A K_p value of 1 reflects an equilibrium between the decomposition of fresh organic matter and the transformation of soil humus.

Thus, the selected set of indicators comprehensively reflects the architecture and functional potential of the soil microbial complex, determining the direction of microbiological processes. This ensures objective and detailed monitoring of the soil microbiocenosis while achieving an optimal balance among informational value, methodological relevance, and labor efficiency – which is particularly crucial for large-scale agroecosystem analysis.

<https://doi.org/10.30970/apmicro.2026.46>

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AGENT OF CROWN GALLS – *AGROBACTERIUM TUMEFACIENS* OF BLUEBERRIES (*VACCINIUM CORYMBOSUM* L.)

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Abstract. As a result of monitoring epiphytobia on the territory of the blueberry nursery, damage was detected in 60-80 % of planting material. Bacterial strains were isolated in pure cultures from the affected blueberry tissues and characterized for their complex of morphological-cultural and physiological-biochemical and pathogenic properties. It was established that the *Agrobacterium* spp. strains isolated by us are related to typical representatives of the genus *Agrobacterium*, in particular the species *A. tumefaciens*.

Keywords: blueberry, crown galls, *A. tumefaciens*.

Blueberry (*Vaccinium corymbosum* L.) is a low-calorie berry of the heather family, which contains many antioxidants, vitamins C and K, and also improves brain and heart function. It is believed that due to the high content of anthocyanins, it reduces the number of free radicals in the body and slows down the aging and tumor formation processes, which is why, in recent years, it has gained real popularity among consumers. According to the International Blueberry Organization (IBO), over the past 5 years, the world's volume of cultivated blueberries has doubled – to almost 2 million tons. The volume in the countries of South and North America did not increase significantly (about 20 %), while steady growth was observed in Asia, the countries of the European region and Africa (over 100 %). According to the literature, in 2026 Ukraine ranked 10th in the world and 1st in Eastern Europe in terms of blueberry area. The total area is about 6 thousand hectares (of which 5 thousand hectares are already bearing fruit). In 2025, the gross harvest was 14.33 thousand tons. However, the average yield of this berry still lags behind the world average and is only 2.87 t/ha, while the world average is 9.05 t/ha. One of the factors that prevents increasing the yield of this crop and achieving world values is damage by pathogens of various etiologies, including bacterial ones (Patyka V. P., 2017). According to world literature, blueberries can be affected by the following types of phytopathogenic bacteria: *Agrobacterium tumefaciens* – the

causative agent of crown galls (Alippi et al., 2012), *Xylella fastidiosa* – the causative agent of bacterial leaf blight (Chang et al., 2009), *Pseudomonas syringae* pv. *syringae* – the causative agent of bacterial canker (Kałużna et al., 2013), *Xanthomonas arboricola* – the causative agent of irregular leaf spot – (Kałużna et al., 2022). According to some data, blueberries can also be affected by *Ralstonia solanacearum* (Erarslan et al., 2026) causing wilt. Despite the widespread cultivation of blueberries, the causative agents of bacterial diseases of blueberries in Ukraine have been almost unstudied. That is why the purpose of our research was to establish the cause of epiphytotia in a blueberry nursery in Ukraine.

In 2026, the researchers of the Department of Phytopathogenic Bacteria, D. R. Zabolotny Institute of Microbiology and Virology the National Academy of Sciences of Ukraine received an appeal from a private enterprise regarding the establishment of epiphytotia of blueberry seedlings in a nursery in Ukraine. The seedlings were previously obtained from a Ukrainian producer by microclonal propagation. The researchers selected samples of affected blueberry plants and conducted their phytopathological and bacteriological analysis. The cultural characteristics of bacterial strains isolated from affected blueberry plants were evaluated by colony morphology and growth rate on nutrient media. Cell morphology was examined after Gram staining. Artificial infection was performed on host plants and indicator plants with a bacterial suspension at a concentration of 10^8 CFU/ml. The tumor-inducing ability of strains isolated from blueberries and collection strains was tested on carrot explants and Kalanchoe leaves. A bacterial suspension was applied to the surface of previously damaged tissues and the material was incubated in a humid chamber at a temperature of 22–25 °C. The results were evaluated after 14–28 days for the presence and intensity of tumor formation. The assessment of tumor development was carried out according to the following scale: 0 – no tumors; 1 – single small tumors are formed at the inoculation site; 2 – medium-sized tumors are formed; 3 – intensive tumor formation is observed at the inoculation site; 4 – massive tumor formation or fusion of tumors is noted (Patyka, 2017). For identification by biochemical activity associated with the fermentation of some carbohydrates, amino acids and proteins, API 20E strips of a commercial test system (bioMérieux, France) were used as an express method. The counting was carried out for 20–24 hours. The results were evaluated for the presence or absence of a reaction according to the manufacturer's recommendations.

As a result of monitoring the blueberry nursery, the total percentage of damage ranged from 60–80 %. Visual inspection of blueberry samples revealed that most of them had the following symptoms of damage: large hard brown growths formed on the root neck. This symptom indicates the long-standing development of the tumor formation process, since young tumors have a yellow-white color and are small. Bacterial strains were isolated from the tumors described above in pure culture. On solid agar nutrient media, they formed raised, moist, shiny cream colonies with even edges and a smooth surface. Under microscopy, the cells had the appearance of gram-negative motile rods, which is consistent with the typical morphological features of representatives of the genus *Agrobacterium* (Patyka, 2017). Physiological and biochemical studies showed that the isolated strains produced catalase and oxidase, coagulated milk, diluted gelatin and metabolized certain carbohydrates. At the same time, indole and hydrogen sulfide were not formed. The general biochemical profile of the isolated strains, determined by API testing, was similar to the collection strains of *A. tumefaciens*. The pathogenicity of *Agrobacterium* spp. isolates was confirmed in experiments on artificial infection, which was accompanied by the formation of typical tumors on Kalanchoe leaves and carrot explants. Therefore, according to the complex of pathogenic, morphological-cultural and physiological-biochemical properties, the strains isolated by us are related to typical representatives of the genus *Agrobacterium*, in particular the species

A. tumefaciens. The systematic position of the *Agrobacterium* spp. strains isolated by us from blueberries requires further clarification based on the analysis of genotype characteristics, which we plan to do in the future.

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<https://doi.org/10.30970/apmicro.2026.47>

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MICROBIOTA OF Highbush BLUEBERRY RHIZOSPHERE ON GREY SANDY LOAM SOILS

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Abstract. The local growth conditions were analyzed and the number of agronomically valuable groups of microorganisms in the rhizosphere of high-growing blueberries Duke variety was investigated. Blueberry bushes were planted on a typical substrate and gray sandy soil as well. The most optimal conditions for the development of oligotrophic microorganisms ($52.27 \cdot 10^6$ CFU/g ADS) and microscopic fungi ($2.07 \cdot 10^6$ CFU /g ADS) were formed in the experimental gray sandy soil.

Keywords: rhizosphere microbiota, highbush blueberry, *Vaccinium corymbosum* L. cultivar Duke, ecological-trophic groups of microorganisms.

High-growing blueberry (*Vaccinium corymbosum* L.) is one of the most promising berry crops due to its high content of antioxidants, anthocyanins and vitamins. However, its growing is associated with significant difficulties: the main problem – is the need for acidic soil with a pH level 3.5–5.0. Blueberry root system is devoid of root hairs and feeds exclusively on symbiosis with ericoid mycorrhiza, which is formed only in an acidic environment.