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Study on Promising Strains of Nitrogen-Fixing Actinomycetes Belonging to the Genus *Frankia*Under Laboratory Conditions

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Aim of the study: At present, sea buckthorn is a plastic plant in relation to various unfavorable environmental conditions in the south-east of Kazakhstan. In other words, it can be said that sea-buckthorn has a high ecological valence. The ability to tolerate frosts and elevated air temperatures, reconciliation with edaphic conditions of the growth site, including soil salinity, and a wide range of production areas where sea buckthorn can be successfully applied, give it significant advantages over other shrub species. The sea-buckthorn plantations contribute to the environmental improvement of the distribution areas for this crop and provide many other useful properties to the population and the soil cover, as well as to the wild fauna. The aim of the paper was to study the nitrogen-fixing ability of actinomycetes belonging to the genus *Frankia*.

Material and Methods: Isolates of *Frankia* actinomycetes, obtained from the floodplain of the Bolshaya Almatinka river - *Frankia* spp., and from the foothills of the Ile-Alatau nature reserve - *Frankia* spp., were used as the objects of the study. Nitrogen-fixing (nitrogenase) ability of the *Frankia* actinomycetes was studied with the acetylene reduction assay. To determine the ability to acetylene reduction in pure cultures of *Frankia* spp., biomass grown on rich medium A (QMod) for 21 days at 29^0C and washed from the medium with saline was used. To test the ability to nitrogen fixation, the nitrogen-free medium (BS) was used. The amount of formed ethylene was determined with the Agilent GC 7890/5977 MSD gas chromatograph and calculated from the ethylene peak value versus the reference mixture (10 nmol of ethylene in 1 ml of air).

Results: The nitrogen-fixing activity of actinorhizal bacteria is one of the most important criteria for selecting promising commercial strains of microorganisms to develop a biological preparation on their basis. Currently, a great number of strains of actinorhizal sea buckthorn (*Hippóphaë rhamnoídes*) bacteria have been isolated, selected, and maintained in artificial conditions in the world, which can be used in developing biopreparations.It was established that in the studies on the nitrogen-fixing activity, all the 11 isolates of actinorhizal bacteria of *Frankia* spp. strains obtained from the sea buckthorn plants (*Hippóphaë rhamnoídes*) possessed nitragenase ability. Of all the examined samples, the highest nitrogenase activity was found in the actinomycete *Frankia* spp. isolate KF3, obtained from the floodplain of the Bolshaya Almatinka river - 12.0±0.10 nmol C_2H_4/protein per hour, and isolate KF7 obtained from the foothills of the Ile-Alatau nature reserve - 11.9±0.12 nmol C_2H_4/protein per hour. A promising actinomycete *Frankia* spp. strain KF3 with the highest nitrogenase activity has been selected.

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