The effect of possible sources of closed ecosystem atmosphere pollution on the growth of test microorganisms

L.S. Tirranen, A.P. Puzyr, E.V. Borodina, G.S. Kalacheva, M.P. Shilenko.

Institute of Biophysics (Russian Academy of Science, Siberian Branch), Krasnoyarsk, Russia (tiran@ibp.ru / Phone: +7-3912-494398)

Volatile products of plants, microorganisms and other system elements: human beings, technological equipment within the closed ecosystem etc. influence on formation of microbial communities and on the gas composition of system atmosphere, which, in its turn, influences on the state of plants. We estimated the effect of possible sources of pollution of closed ecosystem atmosphere on the growth of a set of 96 test microorganism strains, the sensitivity of which to various volatile products had been previously assessed. It was revealed that the gas composition of the atmosphere of separate system elements (technological equipment, plants etc.) didn't cause negative effect on the state and productivity of plants, but influenced on the growth of several test microbes, which proves that microorganisms are more sensitive to changes in the gas composition than plants. It was established that it was mostly ozone and ethylene that affected the growth of plants and microorganisms among all gas emissions polluting the atmosphere. However, the effect of the atmosphere of each element (without system closing) and separate sources of pollution on the growth of microbes was weaker in terms of efficiency and action spectrum, than the effect of atmosphere pollution in long-term experiments with the closed system including human beings and higher plants. Apparently, in the closed system with crew of 2-3 persons and plants it wasn't one factor, but a complex of factors that caused influence. It is possible to advocate using a set of sensitive microorganisms for monitoring organic pollutants in the atmosphere. The effect of the investigated sample on the growth of test cultures can testify to the presence of volatile bioactive substances, and the reaction of the set of several sensitive test cultures of microorganisms allows to identify these substances. In each particular situation it is necessary to select sensitive test microorganisms.