

MAGNETIC PROPERTIES OF BIOLOGICAL SYSTEMS UNDER STRESS FACTORS

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In our previous works, we studied the EPR spectra of leaves and seeds of various trees and shrubs growing in ecologically polluted areas of the Absheron Peninsula of the Azerbaijan Republic. We also studied the EPR spectra of seedlings of various types of plant seeds exposed to various doses of ionizing gamma radiation in the RHUND-20000 device. As a result of EPR studies, we found the formation of magnetic nanoparticles of iron oxide - magnetite (Fe₃O₄) and maghemite (γ -Fe₂O₃) in plants under stress and the generation of abnormal magnetic properties in them [1, 2]. We have shown that these nanoparticles lead to the formation of magnetic properties in biological systems and the formation of a broad EPR signal, which was first discovered by us in plants [1, 3].

Studies of one of the valuable plants of the Absheron Peninsula (Mardakan settlement and Nardaran settlement) - fig leaves (*Ficus carica* L.) - showed that under stress conditions, as result of biomineralization, they form magnetic iron oxide nanoparticles. The high intensity of the broad EPR signal characteristic of nanophase magnetic particles found in fig leaves in Mardakan indicates that the plant system in this area is more susceptible to pollutants and that the area is more environmentally polluted than Nardaran. In addition, to study the specific characteristics of the broad EPR signal of fig leaves, which characterize iron oxide nanoparticles, we studied the EPR signals of the leaves of these plants by changing the parameters of the radio spectrometer and determined that this signal has magnetic anisotropy.

Experiments have shown once again that stress factors cause the formation of nanophase particles of biogenic origin in living systems. These nanoparticles lead to the formation of magnetic properties in biological systems and the formation of a broad EPR signal. Studies using EPR spectroscopy have shown that this method can provide new information in determining the degree of pollution of natural systems, in assessing the state of the environment and biomonitoring.

Literature

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