Geophysical Research Abstracts
Vol. 19, EGU2017-18477, 2017
EGU General Assembly 2017

Advances in understanding of soil biogeochemical cycles: the mechanism of HS entry into the root interior

Olga Aleksandrova (1)

(1) Privat Firm, Berlin, Germany (olga_aleks@inbox.ru), (2) Ural Federal University, Ekaterinburg, Russia, (o.n.alexanderova@urfu.ru)

Humic substances represent the major reservoir of carbon (C) in ecosystems, and their turnover is crucial for understanding the global C cycle. As shown by some investigators [1-2], the phenomenon of the uptake of the whole humic particles by plant roots is a significant step of biogeochemical cycle of carbon in soils. The mechanism of HS entry the root interior remained unknown for a long time. However recently, the last one was discovered [3].
An advanced model [3] includes two hypotheses. These hypotheses are as follows: (1) each nano-size particle possesses a quantum image that can be revealed as a packet of electromagnetic waves; (2) the interaction of nano-size particle with the membrane (plasma membrane) of living cells, on which it is adsorbed, occurs via the development of the Rayleigh–Taylor (RT) instability on the membrane surface. An advanced model allows us to look insight some into some phenomena that were observed by experiments but remained not understood [2].
The authors [2] applied tritium autoradiography to wheat seedlings cultivated with tritium-labeled HS to consider the uptake of humic particles by plant roots. They found a significant increase in the content of some polar (monogalactosyldiacylglycerol (MGDG), digalactosyldiacylglycerol (DGDG), sulfoquinovosyl diacylglycerol (SQDG) and phosphatidylcholine (PC)) and neutral (free fatty acids, FFA) lipids which were detected in the wheat seedlings treated with humic particles. Authors [2] pointed that lipids MGDG, DGDG, SQDG are crucial for functional and structural integrity of the photosystem complex. Therefore, a stimulating action of adsorbed humic particles evoked phenomena like photosynthesis in root cells that can be interpreted using an advanced model: humic particles being nano-size particles become adsorbed on the plant roots in soils, and influence their micro environment, where they are located, with the specific electromagnetic exposure.
Another finding of authors consisted in the uneven partitioning of penetrated humic particles in the root interior as well as a dependence of the amount of penetrated particles on their size. The results showed that the cortex region was colored with the lower intensity of humic particles labeled with tritium, whereas both epiblema and endodermis were darkly colored [2]. An advanced model highlights the uneven partition of penetrated humic particles as a result of the development of RT instability. It seems that instability involves the whole cortex region that results in the delivery of humic particles from epiblema directly to endodermis. A decrease in the amount of penetrated humic particles in dependence on their weight is explained as a gradual loss of the specific quantum property by humic particles with an increase in their size that can be calculated using an approach of quantum biology.

References:
1. Smirnov A.I., Yaiumchenko O.E., Golovina H.A., Bekova S.Kh., Lebedev Y.S., EPR Imaging with Natural Spin Probes/ Journal of magnetic resonance, 1991, 91, 386 – 391.
2. Kulikova et al. 2016. Scientific reports | 6:28869| DOI: 10.1038/srep28869
3. Alexanderova O.N. 2016. An advanced model of the viral entry the cell of living organism and its prospect for the future biotechnology in healthcare and pharmaceutics. Conference SGEM, Vienna, November 2016.