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Acceleration of petroleum degradation in soil using plant-microbial associations

Z Aleschenkova, L Kartyzhova and A Fedorenchik
National Academy of Sciences, Belarus

An extremely relevant phytoremediation trend is degradation of hydrocarbon pollutants in soil (petroleum and refining products). Perennial legume grasses *Galega orientalis* Lam. and alfalfa (*Medicago sativa* L.) were used as phytoremediants restoring biological activity of soil affected by petroleum or its fractions. Plant productivity is grounded on symbiosis with nodulating bacteria *Sinorhizobium meliloti* and *Rhizobium galegae*. The latter is able to consume oil as the sole carbon source. Petroleum content in liquid mineral medium (0.5 and 1 %, v/v) fell in 3 months under the impact of nodulating bacteria by 97.4% and 97.8%, respectively. Successful 5-month performance of plant-microbial association *R. galegae*-*Galega orientalis* Lam. in trials with 0.5% oil concentration reduced its soil level by 86%, whereas in variants with 1% oil concentration the pollutant load dropped by 61%. Presowing treatment of alfalfa seeds with microorganisms promoted 1% oil decomposition in sod-podzol soil during cultivation of the legume crop. Inoculation of alfalfa seeds with nodulating bacteria *S. meliloti* intensified oil degradation by 13.8% as compared to the control. Seed exposure to phosphate-mobilizing bacteria *Serratia plymuthica* increased oil detoxification rate in soil by 28.4%. Maximum efficiency of oil disposal was recorded upon application of plant-microbial association *S. meliloti* + *S. plymuthica* + *Medicago sativa* when 58.47% acceleration of the process was achieved.

Biography

Z Aleschenkova is the Head, laboratory of soil microorganisms, plants interactions, Institute of Microbiology, Belarus National Academy of Sciences. She completed her PhD degree in Microbiology. Her Scientific interests: Soil microorganisms-plants interactions, phytoremediation of contaminated soil, development of microbial preparations stimulating growth of cultivars and decomposition of xenobiotics. She is the author of 250 publications and 18 patents. During the last 5 years she coordinated development of 5 biotechnological products promoting plant growth and contributing to environmental protection.

aleschenkova@mbio.bas-net.by