

Development of Technologies and Biopreparations for Revegetation and Remediation of Technogenically and Anthropogenically Disturbed Land

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Biopreparations for Remediation

Kyrgyzstan exhibits degraded soils in conditions similar to those found in Canada:

- Obsolete pesticides – POPs;
- Obsolete agricultural techniques;
- Strip mining, pit mining;
- Tailings dumps; and
- Oil-and-gas industry contamination.

Our solutions can apply to Canada.



Biopreparations for Remediation

KRILVP seeks solutions that combine various techniques:

- Disinfecting xenobiotics with microorganisms – destructors;
- Biofertilizers developed from strains of soil-specific agri-beneficial microorganisms; and
- Plants-remediants.

Resulting in accelerated re-cultivation and simultaneously-forming grass ground cover.



Biopreparations for Remediation

Microorganisms – Destructors:

- Break down herbicides, such as:
 - Cotoran
 - Dalapon
 - Sodium trichloroacetate
- Decompose oil products
- Decompose industrial lignin



Biopreparations for Remediation

Combination of processes

- Acceleration of hydrocarbon biodegradation due to an increase in air access;
- Crops of selected cereal and leguminous cultures contribute to aeration; and
- Fodder grasses can be selected to provide ground cover and reduction of toxins in soil.



Biopreparations for Remediation

- Proposed scheme accounts for local conditions. Accounts for soil types and adaptable grasses
- Plants meeting requirements in Kyrgyzstan:
 - Lucerne “Manas” (*Medicago sativa*)
 - Sainfoin “Belek” (*Onobrychus*)
 - Cereal cultures “Maria” (*Dactylis glomerata*)



Medicago sativa

- A long-term grassy plant with a powerful root system, which provides accumulation in ground 350 kg of nitrogen , 80 kg of phosphorus, 210 kg of potassium on 1 hectare.
- Cultivation of Lucerne improves agro physical properties of ground, increases the maintenance of humus, promotes foliation of ground, destroys bitumen.
- 3-4 hay crops give up to 15 tons of hay per hectare.



Onobrychis arenaria Hb «Belek»

- A long-term grassy bean plant, accumulates up to 400 kg of nitrogen per hectare
- Cultivation of sainfoin is possible on uranium tailing pit, promotes pickling of the ground, improves the fertility and structure of ground soil
- 2-3 hay crops give 17-18 tons of hay per hectare



Dactylis glomerata

- Dactylis glomerata– Long-term loose-bunch grass, accumulates in ground 10-12 tons of fossils
- Cultivation of Dactylis glomerata fixes eroded soil, in a mix with bean grasses promotes increased fertility, clears ground of superfluous amount of zinc
- 2-3 hay crops gives 7-8 tons of hay in pure crops, in mixed grass crop with Lucerne and sainfoin 17-20 tons



Biopreparations for Remediation

Biodegradation of oil and mineral oil differs favorably from chemical or physical methods:

- Small capital investments;
- Low power consumption;
- Absence of secondary waste products;
- Self-sustaining; and
- Ecologically safe.

The Institute is currently undertaking a range of experimental and theoretical research.



Biopreparations for Remediation

- Development of the composition of biological products
- Development of the parameters for distribution of products
- Research of Lucerne sowing Medicago on remediation ability and use in common with biological products
- Studying dynamics of recultivation and remediation in field conditions
- Results expected to be tailorable for specific Canadian remediation challenges



Thank you for your attention!

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