

INFLUENCE OF BIOLOGICAL PREPARATIONS ON MELIORATION OF SALINE SOILS: CASE STUDY FROM UZBEKISTAN

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Soil salinity is widespread on ca. 50% of irrigated land in the Republic of Uzbekistan and generates a negative impact for productive agriculture. Therefore, this research aims to identify measures for combating soil salinity and maintaining the fertility of saline soils in Uzbekistan when using the biologics "SERHOSIL", "RIZOKOM 1", "BIOSOLVENT" and others. The current research refers to and follows up on research studies carried out in the Khorezm region by the Center for Development Research (ZEF) on salt processes and irrigation techniques under salinity conditions. Furthermore, this work is the result of the German-Uzbek scientific-technological cooperation funded by the BMBF.

RIZOKOM 1



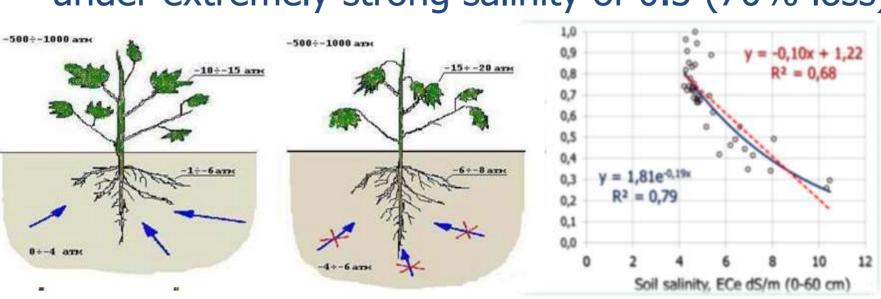
Soil-improvement effects of "RIZKOM 1" based on bacteria:

- Strengthens p-fixation process by plants
- Reduces the pH of saline soil
 Stimulates root development of cotton due to soil salt

absorption by microalgae **How to apply:** soaking cotton seeds before planting

Factors of cotton yield decreasing (damages from soil salinity) are:

- under low salinity of 0.85 (15% loss)
- under middle salinity of 0.6 (40% loss)
- under high salinity of 0.4 (60% loss)
 under extremely strong salinity of 0.3 (70% loss)





BIOSOLVENT

The locally produced (Uzbekistan) chemical "BIOSOLVENT" is a polymer compound based on an ionic polymer with an adhesion agent.

- Transforms insoluble salts of polyvalent ions Ca+2 and Mg+2 into soluble form
- Improves soil structure

How to apply: sprinkling of soil with 10% solution before leaching

The research experiments were carried out from 2015 under different conditions: laboratory column, cultivation pot and in the field. Loam and sandy loam soil with a salinity ranging from 6 to 10 dS/m from the middle reaches of the Syrdarya River were used in the experiments.

METHODOLOGY



Experiments in soil columns: leaching and irrigation simulations, dose-finding and application technology



Experiments on moisture, salinity and chemical composition of soil before and after the treatment with preparations



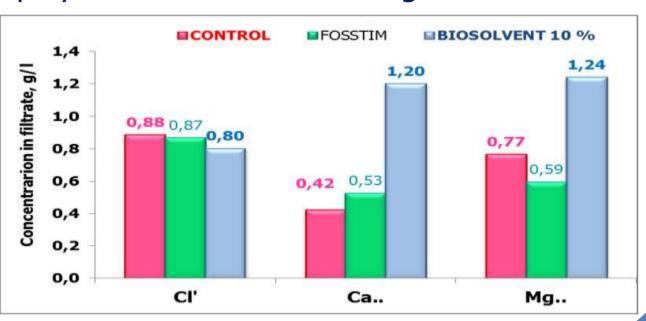
Experiments in cultivation pots (soil tanks): refinement of quantity changes in soil

RESULTS

Effects of biologics (FOSSIM, SERHOSIL) on moisture accumulation in soil SEE AG OF SERHOSIL SERHOSIL FOSSTIM FOSSTIM FOSSTIM BIOSOLVENT 10 % 24,6 23,9 24,6 23,9 24,8 EXC CONTROL FOSSTIM BIOSOLVENT 10 % FOSSTIM BIOSOLVENT 10 % FOSSTIM BIOSOLVENT 10 % FOSSTIM FOSSTIM FOSSTIM BIOSOLVENT 10 % FOSSTIM BIOSOLVENT 10 % FOSSTIM FOSSTIM BIOSOLVENT 10 % FOSSTIM BIOSOLVENT 10 % FOSSTIM FOSSTIM BIOSOLVENT 10 % FOSSTIM FOSSTIM BIOSOLVENT 10 % FOSSTIM FOSSTIM

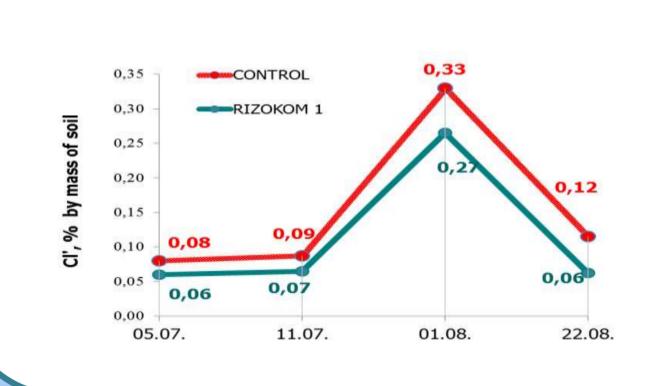
Effects of BIOSOLVENT

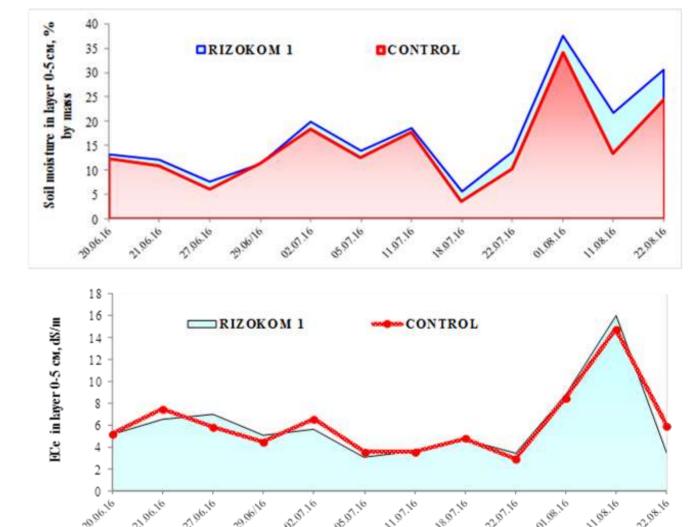
"BIOSOLVENT" cleans a larger amount of salt in the extremely saline soil with filtrates than distilled water. Increasing the concentration leads to more leaching of polyvalent ions Ca⁺⁺ and Mg⁺⁺



Effects of RIZOKOM 1

"RIZOKOM 1" showed the best results on soil salinity reduction while leaching





Test of efficiency in soil leaching with

Test of efficiency in soil leaching with "BIOSOLVENT" application (2000 m3/ha) under field conditions

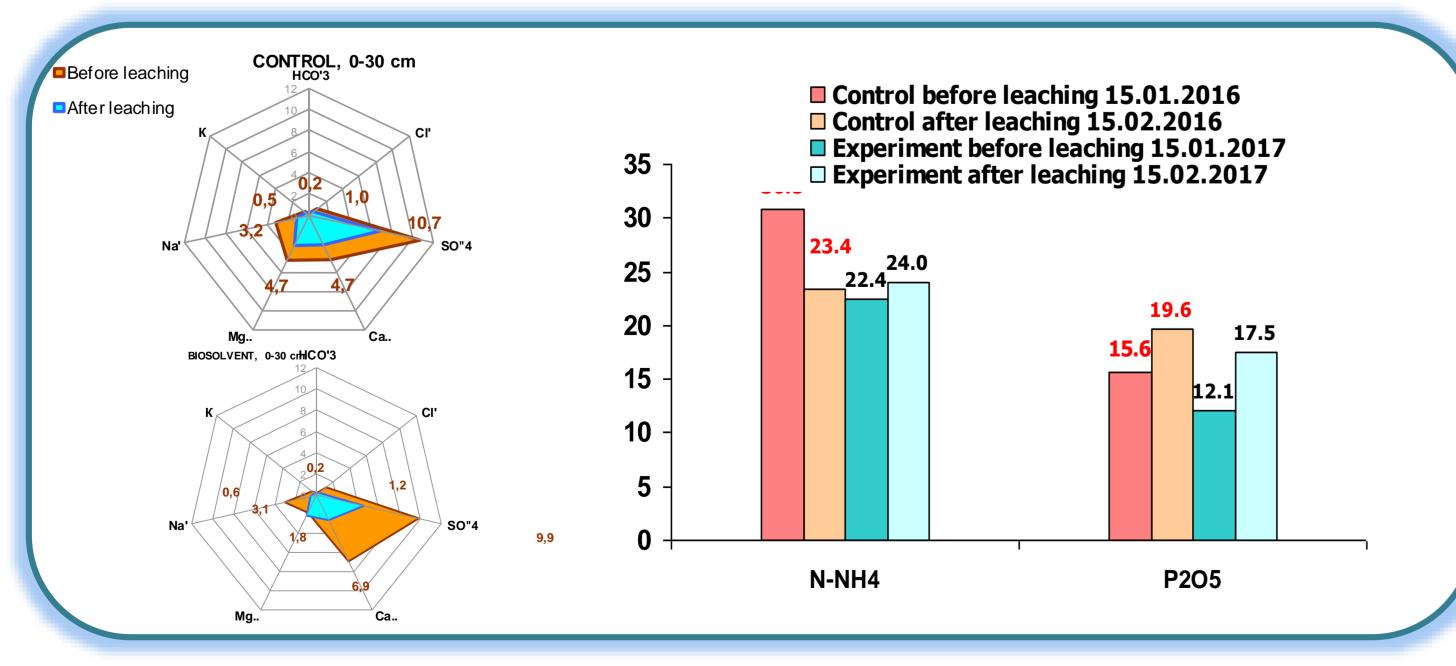
Effects of BIOSOLVENT

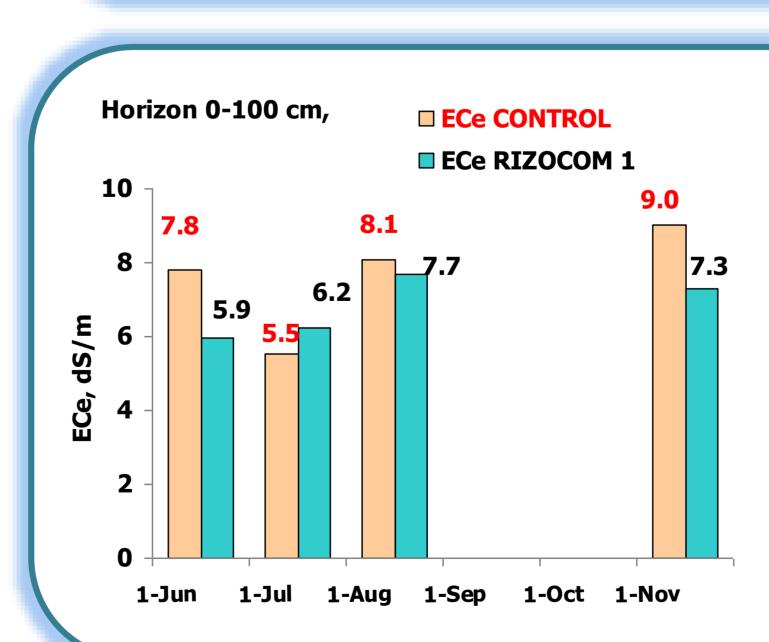
Large amounts of harmful ions

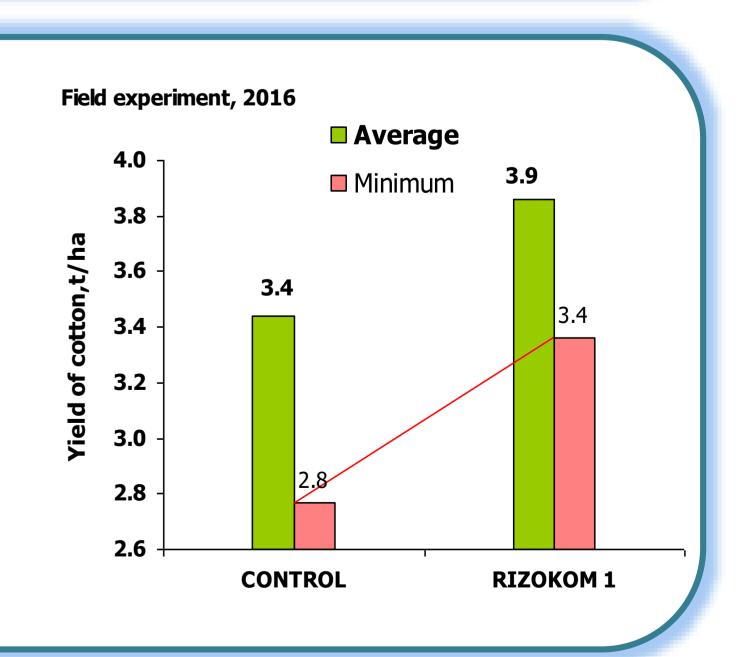
- were leached:Chlorine -35-42%
- Sulfate -13-16%
- Calcium -21-28%Sodium -21-23%
- No adverse effects on nutrients were observed.

Horizon 0-30 cm, ph RIZOKOM 1 9.0 ph CONTROL 8.5 8.2 7.9 8.4 8.0 7.5 7.3 7.6 7.0 1-Jun 1-Jul 1-Aug 1-Sep 1-Oct 1-Nov









KEY MESSAGES

- The findings of the current research show that the application of the biologic "BIOSOLVENT" during leaching contributes to saving irrigation water (2000 m3/ha) in saline soil.
- The application of the biologic "**RIZOKOM 1**" during the vegetation phase indicates moisture saving of about 2% (irrigation water saved during the cotton vegetation: 1000 m3/ha), a reduction of salt accumulation by 2 dS/m (irrigation water saved during leaching: 2000 m3/ha) as well as a cotton yield improvement (0.5-0.7 t/ha) Therefore both biologics can be recommended for application by Uzbek farmers.