

## Preface

Agricultural productivity in Central Asia increased dramatically during the middle of the 20th century due to the large-scale development of irrigated land. The government of Uzbekistan has dedicated additional funding and resources to enable farming in arid and semi-arid regions. However, inadequate water management and poor drainage had led to widespread salinization of soil in Uzbekistan, causing serious damage to agricultural production over a large area.

Several measures can be taken to mitigate soil salinity, including water-saving technologies (e.g., drip or sprinkler irrigation), leaching, flushing, laser leveling, dredging of open drainage systems, installation of sub-surface drainage, and removal of salinized surface soil. Most of these measures, however, involve a high initial cost, which is the main barrier of their application. As a result, the only low-cost measure that is available to farmers is leaching during the winter after crops (e.g., cotton) have been harvested; yet even the efficacy of leaching has declined due to compaction or hardening of soil layers resulting from the long-term use of heavy agricultural machinery. Therefore, affordable and efficient countermeasures are needed to enhance the leaching effect to reduce the salinity.

From 2008 to 2012, the Japan International Research Center for Agricultural Sciences (JIRCAS) conducted research that focused on identifying methods by which farmers could mitigate secondary salinization in the Syrdarya Region of Uzbekistan. As a product, JIRCAS compiled the technologies in **“On-farm Mitigation Measures against Salinization under High Ground Water Level Conditions Guideline”**. This guideline was distributed throughout Uzbek regions, where the lands were most severely affected by salinization, and published also in the JIRCAS website.

([https://www.jircas.go.jp/ja/publication/manual\\_guideline/28](https://www.jircas.go.jp/ja/publication/manual_guideline/28))

From 2013 to 2017, JIRCAS implemented the research project **“Measures against Farmland Damage from Salinization”** under the Joint Research Agreement with the Farmers’ (or *Fermer*) Council of Uzbekistan. It focused on low-cost drainage technologies such as the ‘Cut-drain’, developed by the Institute for Rural Engineering, National Agriculture and Food Research Organization (or NARO) in Japan, to improve the efficacy of leaching operation.

In 2017, the information necessary for understanding and implementing this technology was described and compiled into a technical manual titled **“Shallow subsurface drainage for mitigating salinization”**. This study was conducted under the research project, titled **“Research on Measures against Salinization in Uzbekistan”**, which was financially supported by the Ministry of Agriculture, Forestry and Fisheries of the Government of Japan. The manual was translated into Japanese, English, and Russian. An abridged version was also translated into English, Russian, and Uzbek for field use.

([https://www.jircas.go.jp/ja/publication/manual\\_guideline/mitigating\\_salination\\_en](https://www.jircas.go.jp/ja/publication/manual_guideline/mitigating_salination_en))

This Working Report consists of ten articles, which are not described in the technical manual, but based on the results obtained in the field surveys and laboratory experiments and most of the articles have been already published in scientific journals. The Working Report has two main subjects -- “Water Utilization” and “Mitigation of Soil Salinization”. Subject 1 (Water Utilization) deals with the methods to prevent salinization such as water-saving furrow irrigation and the vertical drainage system, and

Subject 2 (Mitigation of Soil Salinization) describes strategies to remediate salinization using the Cut-drain system and the furrow irrigation method.

Finally, on behalf of JIRCAS, I would like to express my gratitude and appreciation to the Farmers' Council of Uzbekistan and the project members of the Scientific Research Institute of Irrigation and Water Problems of the Republic of Uzbekistan. I extend my appreciation to the Ministry of Agriculture, Forestry and Fishery (MAFF), Japan International Cooperation Agency (JICA), and the Japanese Embassy in Uzbekistan for their kind cooperation and meaningful advice during the implementation of the project. To end, I thank all those who contributed to the papers in this Working Report.

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