METHODS OF SPRINKLER IRRIGATION IN CONDITIONS OF SOILS PRONE TO SALINITY OF NAVOI REGION

Qodirov Zayniddin Zaripovich
Doctor of Philosophy in Agricultural Sciences, docent,
Bukhara Institute of Natural Resources Management
Gulomov B. H.
PhD student, Bukhara Institute of Natural Resources Management
Salimov M.U.
Researcher, Bukhara Institute of Natural Resources Management

Annotation. *Navoi region, situated in the heart of Uzbekistan, is renowned for its arid climate and prevalence of saline soils. This poses significant challenges for agricultural production, particularly for wheat cultivation, a vital crop for the region's economy. Sprinkler irrigation, a widely practiced technique in arid and semi-arid regions, holds immense potential for enhancing wheat production in Navoi's salt-prone soils. This article explores various methods of sprinkler irrigation, their advantages and disadvantages in the context of Navoi's unique environmental conditions, and provides insights into optimizing their application for sustainable wheat cultivation.*

Key words: *environmental conditions, soil salinity, wheat cultivation, chlorides and sulfates.*

Introduction. The Navoi region is located in central Uzbekistan, has a size of 110,800 km2 , and a population of 0.9 million, 60% of which live in rural areas (MAWR, 2015). Large areas of the region are covered by the Kyzyl-Kum desert, so that only 4.7% of the territory is used for farming and the main population and economic centers are located in the southern part of the province, near the Zarafshan River (Fig. 1). That is also where the irrigated areas are located and the Zarafshan irrigation scheme (which is shared by the three provinces Samarkand, Navoi, and Bukhara) is, with a total size of 540,000 ha, one of the most important agricultural centers in Uzbekistan (Groll et al., 2015). The share of this irrigation scheme located in the Navoi province is with 131,800 ha smaller than in the other two provinces (MAWR, 2015, Fig. 1), but still a sizeable amount. Through continued research, innovation, and collaborative efforts, Navoi region can effectively address the challenges of soil salinity and harness the power of sprinkler irrigation to ensure a thriving agricultural sector and a sustainable future for its wheat-producing communities. The northern and central parts of the Navoi region are dominated by sandy desert soils which are grey-brown in color and mostly alkaline (Calcic Yermosols and Calcic Xerosols, FAO, 2003; Pankova and Konyushkova, 2013). These desert soils are characterized by a low humus content of about 0.5% and due to overgrazing, they are prone to erosion. Clayey and loamy takyr soils and sandy areas without any pedogenesis intersperse this area of the region (Fig. 2). The southern part of the Navoi region, on the other hand, is dominated by hydromorphic soils of the irrigation zone (Calcaric Gleysols,

FAO, 2003, Pankova and Konyushkova, 2013). They vary in texture and color and have humus contents of 1.2e1.8% in the irrigated areas close to the Zarafshan River and of 0.6e0.9% near the periphery of the irrigated area. As the amount of water used for the irrigation is not based on the actual demand, but rather excessive, a considerable surplus of water accumulates in the soils and needs to be drained and discharges from the irrigated areas in order to prevent water logging and the loss of soil productivity. The balance between irrigation water input and drainage output is sustained by a network of drainage water collectors. In the Navoi region, 107,300 ha (81.4%) of the irrigated lands are supplied with a drainage network. Open drains amount to 93,200 ha, closed drains are less frequent (1890 ha) and vertical wells and ditches (combined 12,200 ha) complement the drainage network with a total length of 2692 km. 1045 km of these are major collectors, 1647 km are smaller interfarm collectors and a small number are closed horizontal drains.

Saline soils in Navoi region are characterized by high concentrations of soluble salts, mainly chlorides and sulfates. These salts accumulate due to factors like:

- **Center Pivot Irrigation:** This method utilizes a large, rotating boom with sprinklers positioned along its length. It offers uniform water distribution over large areas, making it suitable for large-scale wheat production.
- **Linear Move Irrigation:** Similar to center pivot, but the boom moves linearly across the field, allowing for more flexibility in coverage and irrigation patterns.
- **Lateral Move Irrigation:** Sprinklers are mounted on a lateral pipe that moves across the field, providing efficient water application for smaller areas.
- **Solid Set Irrigation:** Sprinklers are permanently fixed in the field, often with multiple lines and spacing variations. This method is suitable for smaller fields or areas with irregular terrain.
- **Traveling Gun Irrigation:** A high-pressure nozzle mounted on a traveling gun, providing a targeted and localized application of water. This method is ideal for smaller fields or localized irrigation.

Optimizing Sprinkler Irrigation for Saline Soils in Navoi Region

- **Water Management:**
  - **Water Quality:** Utilize irrigation water with low salt concentrations to minimize salt accumulation.
  - **Application Rate:** Apply water at a rate that allows for adequate infiltration without causing surface runoff.
  - **Frequency:** Irrigate frequently with smaller water depths to prevent deep percolation and salt accumulation.
- **Soil Management:**
  - **Salt Leaching:** Periodically flush the soil with high-quality water to leach out accumulated salts.
  - **Organic Matter:** Increase organic matter content in the soil to improve its water-holding capacity and reduce salinity.
- **Crop Management:**

- **Salt-Tolerant Varieties:** Select wheat varieties that demonstrate resilience to salinity stress.
- **Nutrient Management:** Apply balanced fertilization to compensate for nutrient imbalances caused by salinity.

Conclusion. Sprinkler irrigation, when implemented strategically and with proper management practices, offers a promising solution for mitigating salinity and improving wheat production in Navoi's challenging environment. By optimizing water application, incorporating salt leaching strategies, and adopting salt-tolerant varieties, farmers can unlock the full potential of sprinkler irrigation and secure a sustainable future for wheat cultivation in this vital agricultural region.

REFERENCES:

1. Dubovyk, O., Menz, G., Conrad, C., Kan, E., Machwitz, M., Khamzina, A., 2012. Spatiotemporal analyses of cropland degradation in the irrigated lowlands of Uzbekistan using remote-sensing and logistic regression modeling.
2. “Recommendations on cotton husbandry agrotechnology’s” (A case study from Navoi region), Tashkent- 2017.
3. Recommendations of Ministry of Agriculture and Water Management of the Republic of Uzbekistan on "Irrigation procedures of agricultural crops". T. 2006