



WSTA 15th GULF WATER CONFERENCE
Water in the GCC, The Role of Technology in Effective
Water Management
28-30 April 2024, Doha, Qatar

المؤسسة العامة للري
Saudi Irrigation Organization
المملكة العربية السعودية



Farmers' Attitude regarding the use of treated wastewater in agricultural irrigation, the case of Saudi Arabia

Abdulrahman S. Alablan, Mohammed A. Alomair, Ammar M. Ebrahim
,Randah M.Alqurashi , Salah M. Sidahmed, Mohamed M. El-Kafrawy, Fathi A.
Alnajim , Siddig H. Hamad, Rady Tawfik, Khalid G.Turk, Emad Al-Karablieh



KFU
جامعة الملك فيصل
KING FAISAL UNIVERSITY
جامعة ووطن..نماء..واستدامة..

Overview

- Introduction
- Objectives & Methodology
- Results
- Conclusion and Recommendations

Introduction



Vision

Leading the development and modernization of the irrigation sector in the Kingdom to achieve economic, environmental and social sustainability by enhancing efficiency and preserving natural resources.



Mission

Develop irrigation and drainage networks and improve irrigation efficiency while expanding the use of renewable and non-traditional water resources and promoting modern technologies to enhance the quality of services provided to farmers.



5 Strategic Objectives

Resource Sustainability

Providing farms irrigation needs, improving efficiency, preserving resources and expanding unconventional water resources

Quality and Accessibility

- Ensure that water quality meets local and global standards.
- Irrigation services should be approachable to farmers.

Social Well-Being

Support small-scale farmers through incentives, training and capacity building

Economic Contribution

- Maximizing irrigation resources (water, earth, energy).
- Improving irrigation infrastructure.

Awareness

Public awareness of the benefits of reusing the TSE and other non-conventional water resources



5 Strategic Programmes

1 | Irrigation Water Supply and Delivery

2 | Monitoring and Compliance

3 | Improving the economic sustainability of the irrigation sector and the legislative and institutional structure

4 | Capability and Capacity Building

5 | On-Farm Management

Challenges and Opportunities

The KSA is located in semi-arid/ arid regions where the rainfall is low

Challenges	Opportunities
Dependence on Groundwater (Depletion & unsustainable); agricultural sector consumes 84% of the total demand, while 90% of it is unsustainable resources*.	Adopting the reuse of TWW for irrigation
Limited use of TWW (22%)	Maximising the reuse of TWW for irrigation to reach about 75% by 2030
Concerns about the reuse of TWW in terms of expected chemical and microbial contaminations	Enhancing the TWW quality through adopting a strict monitoring programme from the source to end users
Lack of awareness regarding: <ol style="list-style-type: none">1. safety and efficacy2. Cultural beliefs conflicting with reuse.3. Unawareness of benefits like resource conservation.	Raise the awareness through different methods (questionnaires, extension programmes, workshops, etc...)

* National Water Strategy, 2019

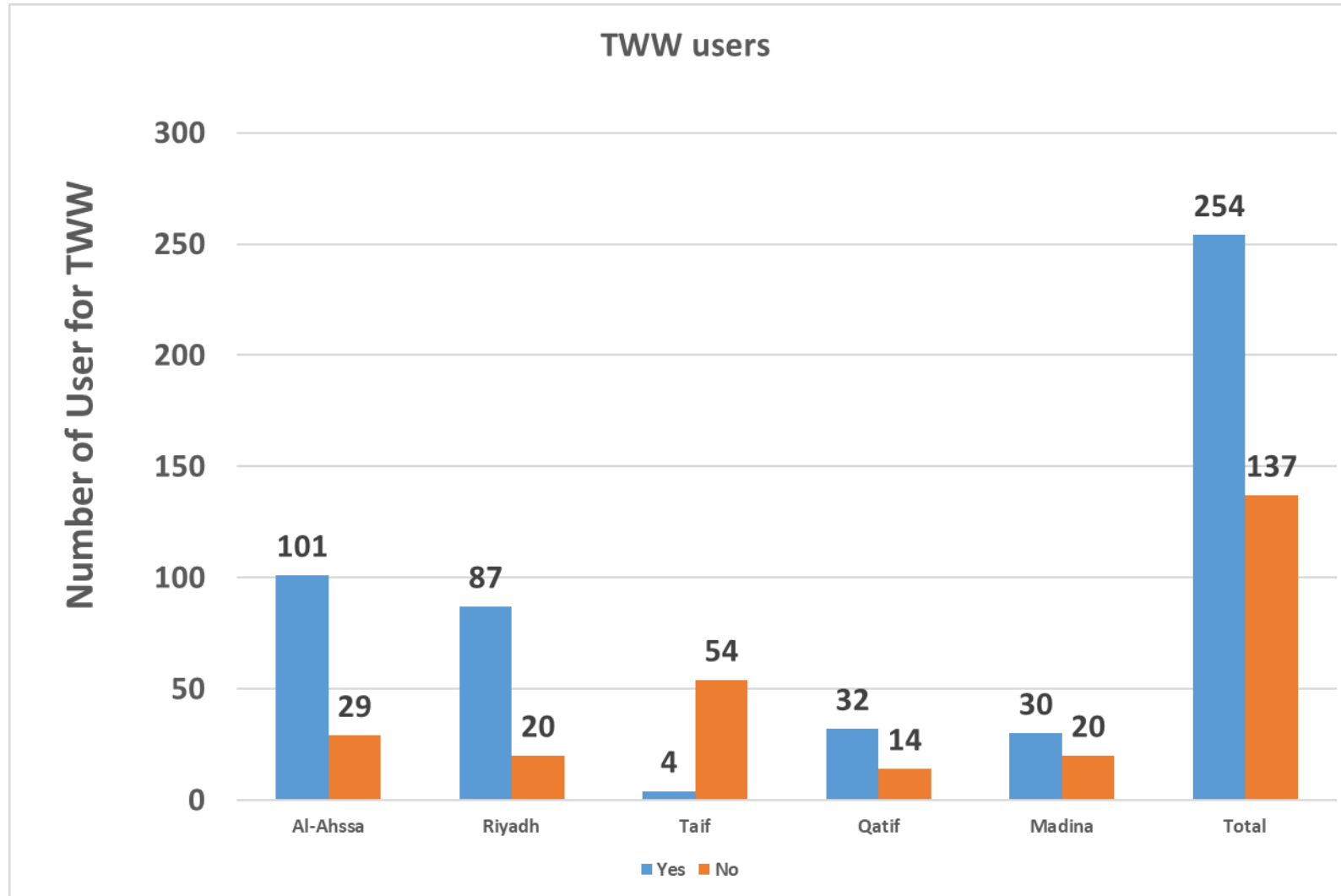
Objectives of the study

- **Assess Awareness and Perception via Gauge** farmers' awareness and perceptions of treated wastewater for agriculture.
- **Identify Concerns and Barriers**
- **Evaluate Information and Policy Awareness**
- **Examine Demographic Influences:** Analyze how Socioeconomic factors influence farmers' acceptance of treated wastewater use.
- **Develop Sustainable Recommendations**

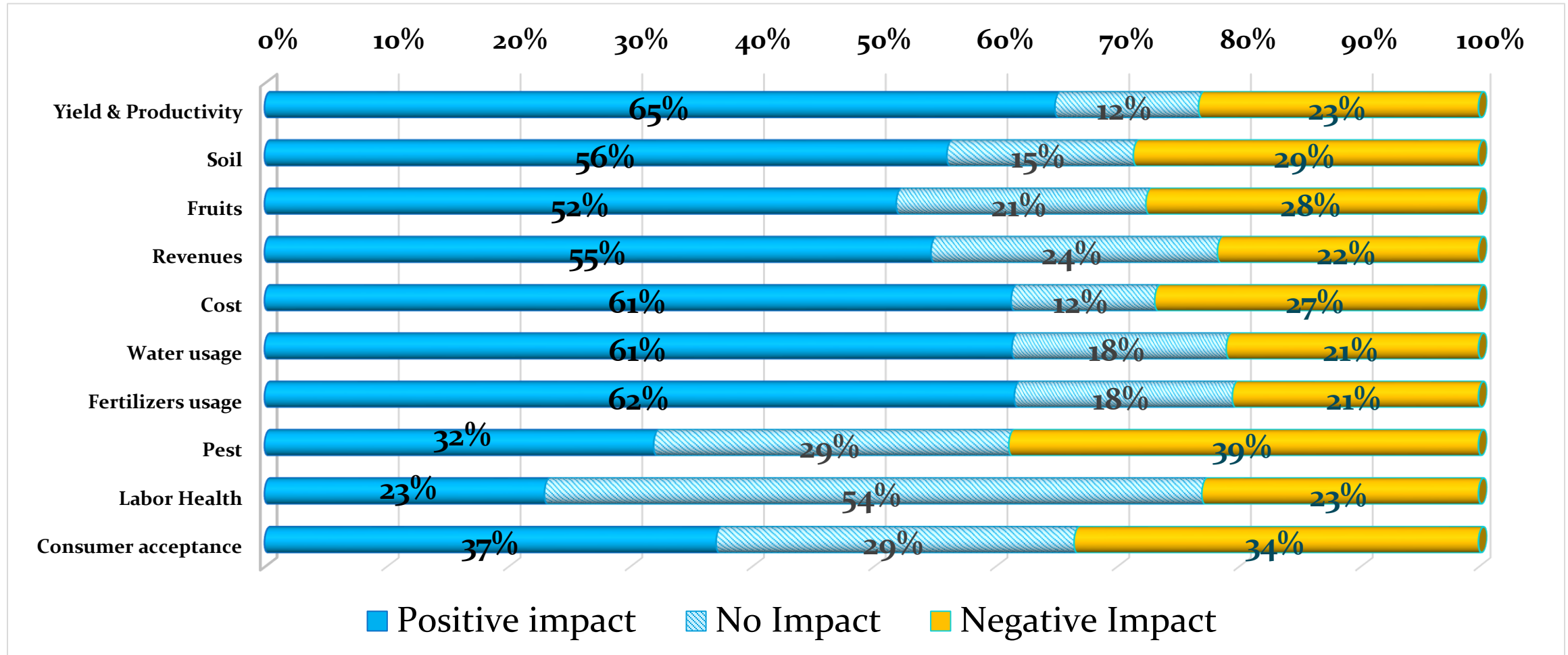
Methodology

- 1. Questionnaire Design:** A structured questionnaire with three sections (Social and economic characteristics, Farm data and irrigation method, Treated wastewater reuse options) was designed to collect data from four regions in Saudi Arabia (Al-Ahssa and Qatif, Riyadh, Taif, and Medina).
- 2. Sampling Strategy:** A stratified random sample of 391 farmers was collected from the study areas to ensure representation across diverse regions.
- 3. Bias Mitigation Strategies:** Various strategies were employed to address potential biases in data collection, including stratified sampling, mixed closed-ended and open-ended questions, and efforts to minimize self-selection and interviewer biases.
- 4. Statistical Analysis:** Statistical analyses were conducted using Stata12®, including descriptive analyses, limited dependent variable regression for farmers' perceptions, and Chi-square tests for associations between variables.
- 5. Probit Analysis:** Probit analysis was utilized to model binary outcomes related to farmers' acceptance or rejection of treated wastewater use in agriculture, considering socioeconomic variables and perception indicators.

Using of Treated wastewater for irrigation in the Sample



Farmers' Perception about the impact of using TWW



Benefits from Using Treated Wastewater from Farmers' Perspective

Reduced Reliance on Freshwater Sources

Utilizing treated wastewater reduces the pressure on finite freshwater reserves typically used for irrigation

01



Enhanced Soil Fertility and Crop Yields

Treated wastewater contains additional nutrients that enhance soil fertility and contribute to increased crop yields

02



Economic Benefits for Farmers

Farmers experience economic benefits through reduced water costs and increased crop productivity by using treated wastewater

03



key factors affecting farmers' attitudes towards treated wastewater usage in agriculture, both positively and negatively

Positive Influences	Negative Influences
Satisfaction with TWW	Education levels
Extension services	Additional costs impact
Increased Crop Yield	Increased occasional labor
Potential fertilizers savings	Water quality storing deterioration
Return impact	Impact of fruit quality
Soil Improvement	Potential health impact
Water Conservation	Spread of pests

Addressing Acceptance Barriers

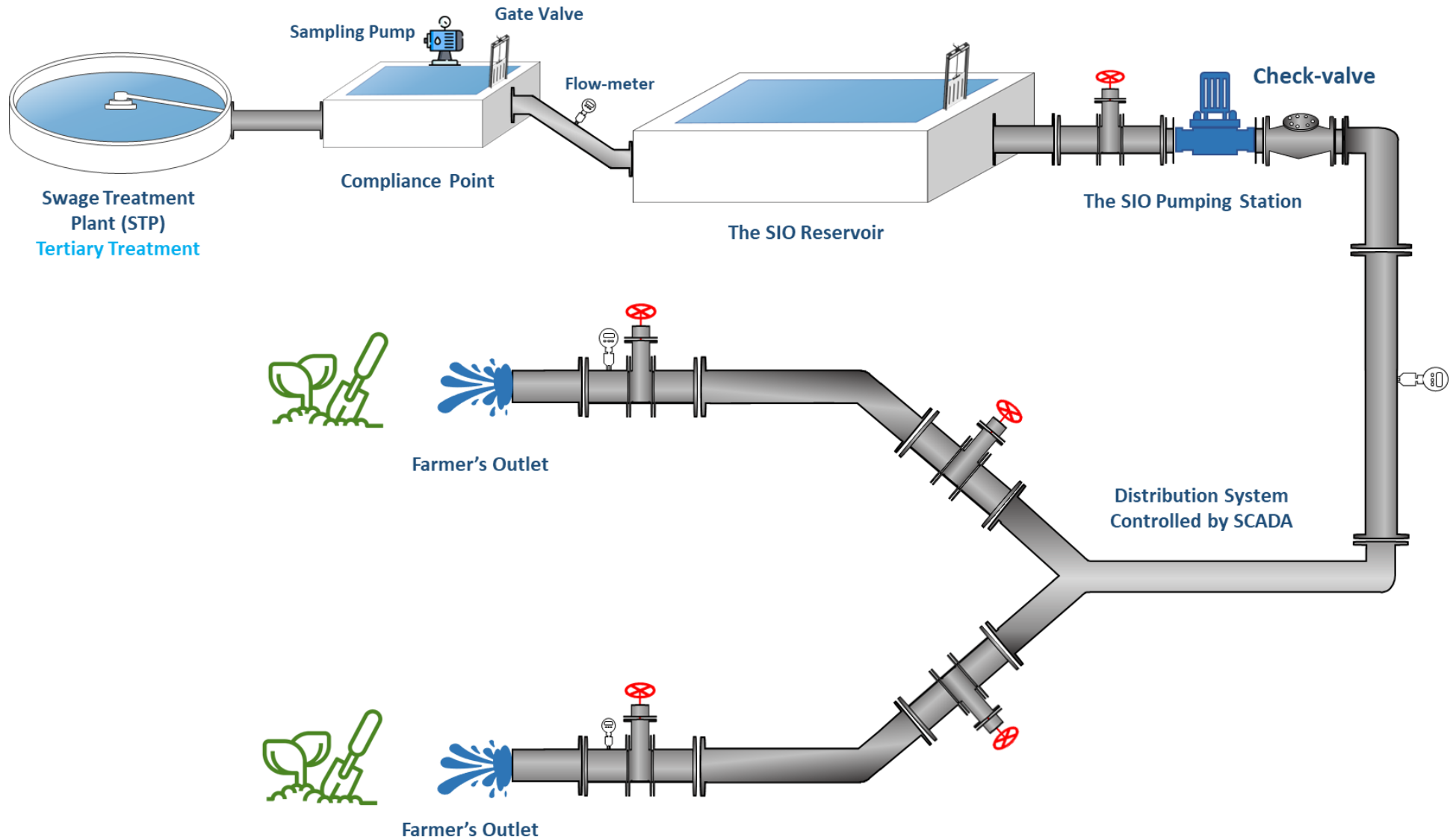
- **Education and Communication**
 - Public education campaigns (through schools and universities)
 - Dialogue between stakeholders (
- **Transparency and Monitoring**
 - Accessible data on water quality.
 - Ensuring compliance with regulations.
- **Demonstrating Success Stories**
 - Showcasing positive outcomes.
 - Dispelling myths and misconceptions.
- **Incentives and Regulations**
 - Introducing incentives for adoption.
 - Implementing robust regulations.

Conclusion

- The study's findings highlight the significant potential of utilizing TWW for irrigation in Saudi Arabia, offering opportunities to enhance water use efficiency and address water scarcity challenges.
- 391 farmers were involved in the study areas to ensure representation across diverse regions, where 65% of respondents are already using TWW.
- a majority of farmers perceive positive experience on certain aspects like cost reduction, water usage, and fertilizers.
- There are concerns about negative impacts on pests, soil quality, and consumer acceptance, due to the lack of awareness.

Recommendations

- Invest in infrastructure for expanding the use of TWW.
- Develop methods to comply with the local and global TWW regulations (smart monitoring system)
- Provide education on safe usage of treated wastewater.
- Conducted workshops and extension programmes for the farmers.
- Financial incentives for the farmers to encourage them moving to TWW.





Thanks