

## Mitigating Environmental Risks of Wastewater Reuse for Agriculture

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Low rainfall and overexploitation of conventional water resources present a critical problem in many regions of the Middle East and North Africa. Therefore, there is a dire need for judicious management of existing water supplies, including incorporating the use of non-conventional water resources. Treated wastewater has shown high potential for reuse in agricultural production, which can thereby contribute to the conservation of surface water and groundwater resources. Therefore, the aim of the study was to optimize treated wastewater reuse in conjunction with other available water resources by taking into consideration their quantity and quality, in addition to the agronomic, environmental, and economic components. It was a joint project between three countries (Oman, Jordan and Tunisia) and funded by USAID. In Oman, the study was done in open field at Sultan Qaboos University. Three types of crops (sweet corn, okra and maize) were grown and irrigated by four types of water (A: 50% groundwater and 50% treated wastewater, B: 100% groundwater, C: 75% treated wastewater and 25% groundwater, and D: 100% treated wastewater). Soil physicochemical properties did not show significant differences with treated wastewater irrigation as compared to groundwater. Heavy metals concentrations for both waters (treated wastewater & groundwater) were very close to each other. However, some significant differences were found between some treatments which could be an indicator for long term changes in soil chemical properties. On other hand, some chemical properties significantly increased ( $p < 0.05$ ) when treated wastewater was applied such as soil electrical conductivity, total carbon and some major elements (N, K, Mg). Soil biological analysis indicated that treated wastewater had no effect in contaminating soil horizons. Whereas, crop physical analysis showed significant increases in plant productivity when plants were irrigated with treated wastewater. The good supply of different nutrients from treated wastewater enhanced plant growth and improved plant productivity. Finally, treated wastewater is a good source of water and can supply soil and plant with many nutrients. However, to avoid any health or environmental problems, reuse of treated wastewater should be subjected to continuous monitoring and fruit qualities should be evaluated.