

**EFFECT OF AQUACULTURE EFFLUENT AND TREATED WASTEWATER ON WATER USE EFFICIENCY OF WHEAT CROP IN SAUDI ARABIA**

Ali A. Al-Jaloud\*\* and Ghulam Hussain

*Natural Resources and Environment Research Institute (NRERI)  
King Abdulaziz City for Science and Technology (KACST)  
P. O. Box 6086 Riyadh 11442, Kingdom of Saudi Arabia.*

**ABSTRACT**

Field investigations were carried to determine yield and water use efficiencies of wheat crop with and without nitrogen fertilizer under different types of irrigation waters. The treatments involved three types of irrigation waters [well water, aquaculture effluent (drainage water from aquaculture facility) and treated wastewater (effluent from Sewage Treatment Plant)] and five nitrogen fertilizer doses (0, 75, 150, 225 and 300 kg N ha<sup>-1</sup>). Depending upon different fertilizer treatments, mean biomass yield (expressed as Mg ha<sup>-1</sup>) was between 4.29-13.96 (well water), 6.46-14.87 (aquaculture effluent) and 15.41-16.34 (treated effluent). The mean grain yield ranged between 0.77-5.01 (well water), 2.14-5.79 (aquaculture effluent) and 6.19-6.87 (treated effluent). The water use efficiency (WUE) expressed as kg ha<sup>-1</sup> mm<sup>-1</sup> based on grain yield was 2.67-12.24 (well water), 4.29-10.64 (aquaculture effluent) and 11.32-12.56 (treated effluent). Mean grain yield and WUE obtained in T-4 and T-5 irrigated with well water and receiving 225 and 300 kg N ha<sup>-1</sup> nitrogen requirements were comparable with T-4 and T-5 irrigated with aquaculture effluent and receiving 75 and 150 kg N ha<sup>-1</sup> nitrogen requirements. In conclusion, application of 150-225 kg N ha<sup>-1</sup> for well water irrigation and 75-150 kg N ha<sup>-1</sup> for aquaculture effluent irrigation containing 40 mg N L<sup>-1</sup> would be sufficient to obtain optimum grain yield and higher WUE. Similarly, under treated effluent irrigation, a higher grain yield and WUE of wheat crop can be achieved with low rates of nitrogen application if the crop is irrigated with treated effluent containing nitrogen in the range of 20 mg L<sup>-1</sup> and above. Overall, there exists a great potential for better water resources management if an optimum dose of nitrogen fertilizer is applied under different types of irrigation waters containing varying amounts of nitrogen.