

## Enhanced fodder production using treated wastewater from a pilot constructed wetland system

Riyad Abusamra<sup>a</sup>, A. Rasem Hasan<sup>b,c,\*</sup>, Abdallah Alimari<sup>d</sup>, Muhannad Alhajhussein<sup>d</sup>, Mohammed Saleh<sup>d</sup>, Rashed Al-Sa'ed<sup>e</sup>, Raed Alary<sup>d</sup>

<sup>a</sup>Faculty of Graduate Studies, Palestine Technical University Kadoorie, Tulkarem, Palestinian Authority, Tel. +970569569666; email: r.r.abusamra@students.ptuk.edu.ps

<sup>b</sup>Water and Environmental Studies Institute, An-Najah National University, P.O. Box 7, Nablus, Palestinian Authority, Tel. +970597511514; email: mallah@najah.edu

<sup>c</sup>Civil Engineering Department, An-Najah National University, P.O. Box 7, Nablus, Palestinian Authority

<sup>d</sup>National Agricultural Research Center (NARC), Ministry of Agriculture, Jenin, Palestinian Authority, Tel. +972599394855; email: omari\_abd@yahoo.com (A. Alimari), Tel. +972598999768; email: alhajhussein@yahoo.com (M. Alhajhussein), Tel. +972599132786; email: muh.saleh89@gmail.com (M. Saleh), Tel. +972597033110; email: raedalary@yahoo.com (R. Alary)

<sup>e</sup>Institute of Environmental and Water Studies, Birzeit University, Birzeit, Palestinian Authority, Tel. +97259999820; email: rsaed@birzeit.edu (R. Al-Sa'ed)

Received 13 April 2022; Accepted 13 August 2022

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### ABSTRACT

Constructed wetlands (CWs) are nature-based systems used to treat and reuse recycled water in beneficial applications. This study investigated a pilot system of horizontal and vertical surface flow constructed wetlands and monitored its efficacy in treating domestic wastewater and the effluent quality for reuse in fodder crops irrigation. Treated wastewater was used to irrigate three fodder crops: barley (*Hordeum vulgare*), vetch (*Vicia sativa*), and clover (*Trifolium*). Each crop was planted in 18 pots, 9 irrigated with treated wastewater and 9 irrigated with freshwater. The results showed that CWs achieved more than 75% organic material removal and 18% nitrogen removal, with treated effluent complying with the legal requirements for effluent reuse in fodders irrigation. In addition, irrigation with treated wastewater can produce a fresh weight of fodders with protein content (9%–14%) almost similar to those irrigated with freshwater (8%–16%). Crops irrigated with treated wastewater showed an enhanced water use efficiency (WUE) compared to those irrigated with freshwater. WUE (kg/m<sup>3</sup>) increased from 10.2 to 14.3 for barley, 9.9 to 22.8 for vetch, and 31.5 to 49.8 for clover. CWs as low-cost treatment solutions contribute positively to the economy and enhance food production's value chain in Palestinian rural communities.

**Keywords:** Constructed wetlands; Rural wastewater; Food security; Fodder production

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\* Corresponding author.

Presented at the 1st Palestinian-Dutch Conference on Water, Sanitation and Hygiene (WASH), and Climate Smart Agriculture (CSA), 5–6 September 2022, Nablus, Palestinian Authority

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