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RESEARCH ARTICLE

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Determining optimal values of performance indicators in different scenarios of on-farm water management*

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Abstract

In order to save water in the agricultural sector, the efficient use of irrigation water should be considered seriously by using appropriate performance indicators. In this research, the impact of on-farm water management factors (irrigation application efficiency [E_a] and water reduction fraction [WRF]) on the performance indicators net income (NI) and farm irrigation water productivity (WP) were assessed in different deficit irrigation scheduling scenarios (consists of deliberately applying irrigation depths smaller than those required), using response surface methodology. Pareto charts of the standardized effects showed that the factors of WRF and E_a were the most important predictors influencing NI and WP, respectively. Considering multiple response predictions for simultaneous optimization of NI and WP, the maximum optimal values of NI obtained were 62.1 million rials (WP = 1.12, WRF = 0.33), 113.2 (WP = 0.76, WRF = 0.02), 32.2 (WP = 0.8, WRF = 0.19), 65.5 (WP = 0.66, WRF = 0.17), and 84.0 (WP = 0.34, WRF = 0.48) for winter wheat, rapeseed, barley, maize, and cotton, respectively. These values were obtained in E_a = 90%, method 2 of deficit irrigation scheduling and sprinkler irrigation system. Using different deficit irrigation scheduling scenarios and irrigation systems resulted in on-farm water management packages for different conditions of water availability.

KEYWORDS

deficit irrigation scheduling, net income, response surface methodology, water productivity, water reduction fraction

Résumé

Afin d'économiser l'eau dans le secteur agricole, l'utilisation efficace de l'eau d'irrigation devrait être sérieusement envisagée en utilisant des indicateurs de performance appropriés. Dans cette recherche, l'impact des facteurs de gestion de l'eau dans l'exploitation (efficacité de l'application de l'irrigation (Ea) et fraction de réduction de l'eau (WRF)) sur les indicateurs de performance du revenu net (NI) et de la productivité de l'eau d'irrigation dans l'exploitation

*Détermination des valeurs optimales des indicateurs de performance pour différents scénarios de gestion des eaux à la ferme

