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RESEARCH PAPER

Sustainable crop production planning in irrigated agriculture under different alternative planning strategies: A multi-criteria decision making approach

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ABSTRACT

The present study aimed to develop the sustainable crop production plans under different alternative scenarios and to evaluate the sustainability status of developed plans. Lexicographic goal programming was employed to develop the sustainable crop production plans under alternative scenarios. In the present model, goals were ranked according to their priorities and the higher priority goals were satisfied first before the attainment of lower priority goals. To ensure the sustainable crop production, goals were grouped in to economic, ecological and social components. The present study considered income, production and cost of cultivation as economic goals, usage of farm yard manure, nitrogen, phosphorus and potash as the ecological goals and employment generation as the social goal to indicate overall sustainability of the existing and optimum plans. Accordingly six plans were proposed by altering the priorities of economic, ecological and social components one after another. Sustainable Livelihood Security Index was used to evaluate the sustainability of existing and derived plans. Results of the all optimum plans indicated that there was an increased profit and reduced cash requirement over existing plans while there was conservation of ecology of agriculture through minimizing the chemical fertilizer usage. Also, the optimum plans such as plan 1, plan 2, plan 4 and plan 6 had more overall sustainability index score when compared to the all other plans. It was concluded that such normative agricultural planning through mathematical programming techniques could be helpful to undertake the crop production planning at farm and regional level to minimise environmental problems from intensive agriculture without worsening the economic benefits of farmers.

KEY WORDS : Farm planning, Sustainable indicators, Economic efficiency, Social equity and Optimum production plan

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