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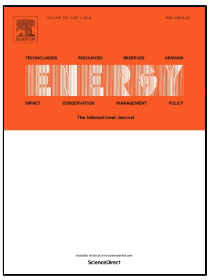

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Assessment of tomato production process by cumulative exergy consumption approach in greenhouse and open field conditions: Case study of Turkey

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Abstract

Cumulative exergy consumption is an innovative method that can help to evaluate different energy use problems in crop production process. In this study, cumulative exergy approach was applied for evaluate the tomato production process. In this context, open field productions in South Marmara and Tokat, and also greenhouse structures in Antalya were assessed by cumulative exergy consumption for tomato production in Turkey. The results showed that, Tokat is the best region for tomato production in open field. Cumulative degree of perfection and renewability indicator for tomato production in this region were 1.62 and 0.38, respectively. In this study, cumulative exergy consumption showed that water consumption in open field and also electricity consumption in greenhouse conditions are high. Fossil fuel is the main sources in these regions for pumpping water and also electricity generation. As a new case, hydroelectricity energy supply is provided instead of fossil energy source for irrigation system and electricity generation. The results showed that when the hydroelectricity source was applied for irrigation system and electricity generation, the best region based on renewability indicator is Antalya (greenhouse condition). As a result, the cumulative exergy consumption approach is an effective method for increasing the renewability of crop production processes.

Keywords

Tomato production, Cumulative exergy consumption, Renewability indicator, Turkey