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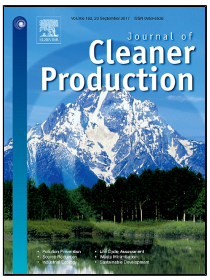

Thermodynamics Analysis For A New Approach to Agricultural Practices: Case of Potato Production

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Thermodynamics Analysis For A New Approach to Agricultural Practices: Case of Potato Production

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Highlights

- Thermodynamics analysis for a new approach to agricultural practices.

- Energy, exergy and CO_2 emission assessment of potato production.

- The effects of inputs used in potato production on exergy, energy and CO_2 emissions.

- Eventing in potato production, cumulative degree of perfection was found to be 1.09.

Abstract

Nowadays, studies are focused on the effective use of energy resources in sustainable agricultural applications. These studies include the use of less energy resources and less environmental pollution in agricultural applications. However, in order to optimize the use of energy resources in sustainable agriculture and to provide less environmental pollution, a thermodynamic analysis of crop production is needed as a more comprehensive analysis. In this study, thermodynamics analysis was performed as a new approach model according to the inputs of potato production. Cumulative energy consumption, cumulative exergy consumption, cumulative carbon monoxide emissions and cumulative degree of perfection occurring in potato production process were determined and interpreted within the scope of thermodynamics analysis. The total energy and exergy utilization and total CO_2 emission for production of one ton of potatoes were found as 2206 MJ, 4832.5 MJ and 67.3 kg, respectively. Along with that the cumulative degree of perfection in potato production was found to be 1.09. To increase the cumulative degree of perfection in potato production, the use of manure must be reduced. Reducing manure use will increase the cumulative degree of perfection of potato production. In addition, use of manure must be reduced to reduce cumulative carbon monoxide emissions occuring in potato production.

Keywords: Thermodynamics, energy and exergy utilization, CO_2 emission, cumulative degree of perfection, potato