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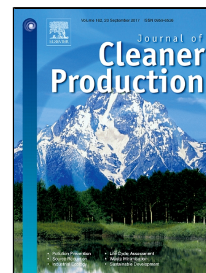
Thermodynamics Analysis For A New Approach to Agricultural Practices: Case of Potato Production

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

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8 **Highlights**

9 - Thermodynamics analysis for a new approach to agricultural practices.

10 - Energy, exergy and CO_2 emission assessment of potato production.
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12 - The effects of inputs used in potato production on exergy, energy and CO_2 emissions.
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14 - Eventing in potato production, cumulative degree of perfection was found to be 1.09.
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17 **Abstract**

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