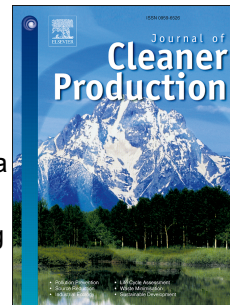


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Life cycle assessment of conventional and organic apple production systems in China

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1 **Life cycle assessment of conventional and organic apple production** 2 **systems in China**

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10

11 **ABSTRACT**

12 A life cycle assessment (LCA) was used to characterize the environmental performance and
13 potential improvement opportunities related to conventional and organic apple production
14 systems in two main apple production areas (Shandong Province and Shaanxi Province) in
15 China. Nine impact categories including Non-renewable energy depletion, Water depletion, Land
16 occupation, Global warming potential, Acidification potential, Eutrophication potential, Human
17 toxicity potential, Aquatic toxicity potential, and Soil toxicity potential were selected. The results
18 showed that, despite a lower productivity, organic apple production system versus conventional
19 system could help to reduce the environmental impacts for most of the examined impact
20 categories. Regardless of conventional or organic apple production system, the environmental
21 impacts in Shandong Province were lower than that in Shaanxi Province. A relevant share of the
22 primary non-renewable energy depletion and global warming potential were caused by the
23 agricultural materials input stage, meanwhile a significant share in acidification potential, aquatic
24 eutrophication potential, human toxicity potential, aquatic eco-toxicity potential, and soil eco-
25 toxicity potential were caused by the orchard management stage. Furthermore, a detailed analysis
26 of the farming step showed that the production and associated field-level emissions of fertilizers
27 (i.e. synthetic and manure), and inputs to pest and disease management were major contributors
28 to environmental impacts on conventional apple production system, whereas an important share
29 in the overall environmental impacts was due to the production and usage of organic manure in
30 organic apple production systems. In addition, more gasoline consumption due to long-distance
31 transport of fruits and higher water depletion and land occupation in organic production systems
32 were worth considering.

33 **Key words:** Life cycle assessment; Environmental impacts; Apple; Conventional; Organic

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