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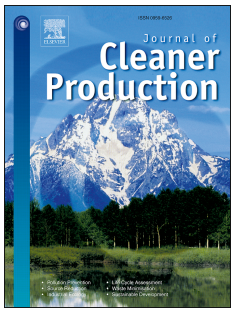

Life cycle perspectives on the sustainability of Ontario greenhouse tomato production: benchmarking and improvement opportunities

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Life cycle perspectives on the sustainability of Ontario greenhouse tomato production: benchmarking and improvement opportunities

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Abstract

Globally, there is a shortage of vegetables to meet the requirements of a healthy diet. Greenhouse production can help meet demand for vegetables, but under certain conditions it can be very energy intensive and unsustainable, particularly in cold climates, such as in Canada. Greenhouse producers in Ontario, Canada, which has the highest concentration of greenhouses in North America, have been actively improving the industry to reduce costs and address environmental concerns, but very little is known about the environmental sustainability of the industry. This study not only addresses the gap in life cycle environmental performance of Canadian greenhouse tomato production, it also provides a broader sustainability analysis that could be applied to other regions when considering improvements in the industry. Life cycle assessment (LCA) was used to benchmark Ontario greenhouse tomato production relative to other regions using data from 8 growers. Heating with fossil fuels contributed between 50 and 85% of the total impact for ozone depletion, global warming, smog, acidification, and respiratory effects. Using willow biomass produced in Ontario could reduce global warming impacts of tomato production by 72%. This solution requires approximately 50,000 ha of land to produce the biomass needed for the annual production of 165,000 t of tomatoes in this region, which is about 10 times more land than field tomato production. However, field tomatoes can be up to 50% more water intensive than greenhouse tomatoes. To mitigate these trade-offs, the industry needs to consider both growing biomass on degraded land and industrial symbiosis to recover wastes so that

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