World Academy of Science, Engineering and Technology
International Journal of Agricultural and Biosystems Engineering
Vol:10, No:04, 2016

Life Cycle Assessment to Study the Acidification and Eutrophication Impacts of Sweet Cherry Production

Authors : G. Bravo, D. Lopez, A. Iriarte

Abstract : Several organizations and governments have created a demand for information about the environmental impacts of agricultural products. Today, the export oriented fruit sector in Chile is being challenged to quantify and reduce their environmental impacts. Chile is the largest southern hemisphere producer and exporter of sweet cherry fruit. Chilean sweet cherry production reached a volume of 80,000 tons in 2012. The main destination market for the Chilean cherry in 2012 was Asia (including Hong Kong and China), taking in 69% of exported volume. Another important market was the United States with 16% participation, followed by Latin America (7%) and Europe (6%). Concerning geographical distribution, the Chilean conventional cherry production is focused in the center-south area, between the regions of Maule and O'Higgins; both regions represent 81% of the planted surface. The Life Cycle Assessment (LCA) is widely accepted as one of the major methodologies for assessing environmental impacts of products or services. The LCA identifies the material, energy, material, and waste flows of a product or service, and their impact on the environment. There are scant studies that examine the impacts of sweet cherry cultivation, such as acidification and eutrophication. Within this context, the main objective of this study is to evaluate, using the LCA, the acidification and eutrophication impacts of sweet cherry production in Chile. The additional objective is to identify the agricultural inputs that contributed significantly to the impacts of this fruit. The system under study included all the life cycle stages from the cradle to the farm gate (harvested sweet cherry). The data of sweet cherry production correspond to nationwide representative practices and are based on technical-economic studies and field information obtained in several face-to-face interviews. The study takes into account the following agricultural inputs: fertilizers, pesticides, diesel consumption for agricultural operations, machinery and electricity for irrigation. The results indicated that the mineral fertilizers are the most important contributors to the acidification and eutrophication impacts of the sheet cherry cultivation. Improvement options are suggested for the hotspot in order to reduce the environmental impacts. The results allow planning and promoting low impacts procedures across fruit companies, as well as policymakers, and other stakeholders on the subject. In this context, this study is one of the first assessments of the environmental impacts of sweet cherry production. New field data or evaluation of other life cycle stages could further improve the knowledge on the impacts of this fruit. This study may contribute to environmental information in other countries where there is similar agricultural production for sweet cherry.

Keywords : acidification, eutrophication, life cycle assessment, sweet cherry production
Conference Title : ICAE 2016 : International Conference on Agricultural Engineering
Conference Location : Boston, United States
Conference Dates : April 25-26, 2016