The influence of fertiliser and pesticide emissions model on life cycle assessment of agricultural products: The case of Danish and Italian barley

Barley is an ancient crop and a great source of nutrients. It is the third largest agricultural commodity produced in Denmark and represents a relevant crop in Italy too. Due to the increasing customers awareness of sustainability issues, it has become essential to evaluate the environmental impact and the use of resources in food production and distribution systems. However, especially in agriculture, difficulties are encountered when emissions from fertilisers and pesticides need to be modelled, due to a variety of modelling options and their dependency on the availability of site-specific information. How to address these difficulties might affect the results reliability. Hence, this study aims to evaluate, using the life cycle assessment (LCA) methodology, the influence of different models for estimating emissions from fertilisers and pesticides on the environmental impacts of barley cultivation in Denmark and Italy. Two models for fertilisers and pesticides' emissions have been applied; these differ on the extent of data requirements and complexity of calculation algorithms, which might increase the results accuracy and robustness. The results show that the modelling options do affect the environmental impacts of barley production, in particular climate change, eutrophication categories, acidification and freshwater eco-toxicity. This study estimates that the variations for such categories range from 15% in the case of climate change to 89% in the case of marine eutrophication. These findings highlight the importance of the emission modelling options as well as the constraints of data requirements, critical aspects when a LCA study on agricultural products is carried out.

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