Field study on the uptake, accumulation and risk assessment of perchlorate in a soil-chard/spinach system: Impact of agronomic practices and fertilization

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The application of excessive fertilizer represents a primary source of entry for perchlorate into crop systems and thus has raised widespread concern regarding food safety. Several studies have reported the occurrence of perchlorate in vegetables. However, limited information is available on the fate of perchlorate in the soil-plant system. In this study, we performed field experiments to evaluate the effects of the application rate of Chilean nitrate fertilizer and the type of fertilization (manual or fertigation) on the uptake of perchlorate by plants grown in open fields. Interestingly, in the control, chard and spinach accumulated 21.3 and 25.9 \( \mu \text{g kg}^{-1} \), respectively. For both agronomic practices, the content of perchlorate in chard and spinach increased as the fertilizer application rate increased, with fertigation promoting more significant accumulations. Spinach accumulated almost two times more perchlorate than chard for all treatments; however, the concentrations generally remained below regulatory values. The intake of spinach and chard presented a low risk to human health for all age groups. These findings enhance our understanding of the environmental impact of the use of fertilizers in agriculture and food safety. © 2020 Elsevier B.V.

Agronomic practices

Chard
Fertilizers
Perchlorate
soil
Chile
Beta vulgaris cicla
Spinacia oleracea
Agriculture
Beta vulgaris
Chile
Fertilizers
Perchlorates
Risk Assessment
Soil
Spinacia oleracea