

The Portuguese Nitrogen Footprint, a Challenge in a Mediterranean Country

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Abstract

The European Union (EU) agriculture is responsible for 80% of the total reactive nitrogen (N_r) emissions from all sources, especially animal-based food with beef and dairy products, for instance, responsible for 56% of EU's agricultural N_r emissions. Population growth and its individual dietary choices are intrinsically connected to the increase of N_r emissions. The Nitrogen Footprint concept was created to communicate the importance and the negative effects of nitrogen (N) to the general public. This concept needs to be disseminated worldwide to show how personal choices of consumption affect nitrogen pollution and become a serious problem to human health. In this regard, the N-footprint for Portugal was estimated and compared to other countries with different diets' patterns. Comparison between Portugal's diet and the recommended Mediterranean diet were also analysed. The N-footprint model is based on the N_r loss to the environment from food consumption and production, transport and housing consumptions. Virtual Nitrogen Factors (VNF) were estimated to each crop, animal and by-products. The VNF represent all N that was used in the food production process but is not contained in the final food product consumed. These factors allow us to estimate the N-footprint of food production. Preliminary results show a high N-footprint for food production followed by food consumption, transport and housing. A total of 25.46 kg N/cap/yr were achieved for Portugal's diet which is extremely high in protein meals - mostly meat, fish and eggs - further stimulating animal production and consequentially the increase of N-Footprint. In contrast, legumes also have a very high protein content but their N-footprint is very low due to its biological N fixation. Animal-based products have a much higher N-footprint compared to plant-based products: 15.08 and 4.37 kg N/cap/yr respectively. Portuguese N-footprint shows similar patterns to other EU countries. No significant differences were found. On the other hand, a decrease in the consumption footprint were highlighted when the Portugal's Mediterranean diet were analysed based on N recommendations. The Nitrogen Footprint is a valuable tool to increase awareness about our daily choices and promote the reduction of global N pollution.

Keywords: Mediterranean diet, nitrogen footprint, nitrogen loss, virtual nitrogen factor

Acknowledgments: NEP - high Nitrogen Efficient crop Production for better water management, Operacional Group nº PDR2020-101-031453; Fundação para a Ciência e Tecnologia (FCT) through the research grant 2020.06612.BD; CEF - Forest Research Center grant FCT UIDB/00239/2020