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Standardizing Food Loss Measurement in EU Primary Production: A Methodology and Case Study from the Horticultural Sector in Spain

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Abstract

Food loss (FL) in primary production is often overlooked in studies and policy, largely due to scarce primary data and collection complexity. In the European Union (EU), this gap was intensified by the lack of a formal FL definition, which excluded discards occurring prior to the post-harvest stage from quantification. The issue's growing relevance (WWF, 2021), and EU policy interest – reflected in the latest EU Directive 2025/1892, which extends reduction targets to other supply chain stages – highlights the need for robust quantification methods. In response, this study proposes a new standardized methodology to quantify food loss for the horticultural sector in the EU. This research emerges from the EU FOLOU project (2023), for which on-field measurements were conducted from 2023 to 2025 in Catalonia (Spain). The objective was to quantify food losses in the fruit and vegetables sectors across the pre-harvest and harvest stages, while understanding their underlying causes. To identify potential points of food loss generation, the methodology applied the statistical classification of economic activities in the European Community (NACE Code), following the Delegated Decision 2019/1597, and the Classification of Products by Activities (CPA). Once the economic activities with the potential to generate FL were identified, the following data were collected for each crop type: the extent of the utilized agricultural area (UAA) in hectares, production volume, number of farms and economic value. These parameters enabled the identification and prioritization of the 10 most relevant crop types for quantification. In total, 41 on-field food loss measurements were conducted across different production systems (conventional, organic and agroecological). For each field, between 1-10% of its surface was sampled in accordance with the methodology. The sampling data were extrapolated to estimate total FL in each plot according to the following parameters: FL per plot (kg), FL per plot per ha (kg/ha), and FL index (FL/Yield + FL). Additionally, the analysis of FL causes allowed to distinguish three types of discarded products in each plot: edible and marketable; edible but not marketable; non-edible and non-marketable. The data across plots were then statistically analysed to identify differences in the FL magnitude and category by crop type and production system. The collected data also enabled an estimation of FL for Catalonia, providing a regional overview of potential losses for the fruit and vegetable sector. Ultimately, the results demonstrate the feasibility of measuring food losses occurring prior to the post-harvest stage, by providing data across different food commodities, providing robust information that improves understanding of the problem and supports actions aimed at its minimization. Furthermore, presenting figures according to international coding standards enables comparability of results and the

generation of synergies across studies, contributing to the transition towards more sustainable food systems.

Keywords: Food Loss, Methodology, Horticultural Sector, On-field Measurements, Agri-food Systems

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