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## The Periodic Table of Food: Metadata Harmonization from Point-of-Production to Plate

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The Periodic Table of Food Initiative (PTFI) is a global initiative to create an open, publicly accessible database, not only to catalog the world's edible biodiversity but to understand the association between food composition, human health, and planetary health. Yet food composition data are rarely interoperable, making it difficult to aggregate, analyze, and draw conclusions from data drawn from disparate sources. The successful implementation of the PTFI initiative, which relies on decentralized collection and analysis of food, hinges on ensuring a standardized description of all food items and associated metadata. Thus, we have adopted in-house and two widely recognized, community-maintained ontologies: the Food Ontology (FoodOn) and the NCBI Taxonomy. The PTFI Core metadata encompasses 35 metadata elements, each serving to describe the collection event (i.e., when the food was collected), the collected food specimen itself (e.g., Food Product Internationalized Resource Identifier or IRI), and the derived sample(s). The elements are organized in 3 modules: collection event, specimen and sample. Fields contain either single-select or multi-select values. The PTFI Core metadata are captured at the point-of-production through a simple user interface, and then stored in the PTFI sample management system. By leveraging FoodOn, the PTFI can establish a standardized framework for data representation, enabling effective data sharing and interoperability across food systems from point-of-production to plate. Reflecting on the reciprocal nature between the PTFI and FoodOn, we envision a positive feedback loop shaping the evolution of FoodOn toward the betterment of food systems research. For future extension metadata, to include regenerative agricultural practices, we again consulting existing ontologies combined with our own framing to capture agricultural practices that may be influencing food composition and health.

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