



## Estimation of Food Waste in Hydroponic Food Production Systems

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### DESCRIPTION

As social and government interest in more environmentally friendly and circular food production systems grows, waste management efforts are increasingly focusing on maximizing resource recovery. To improve food security, it is essential to decrease food loss; yet, doing so is challenging since losses happen across the whole production and supply chain. According to the report, food loss is mostly caused by food waste from home usage. In addition to efforts to lower food waste output, approaches for its vaporization are crucial. Urban farming is an example of an alternate food production method that produces food close to home, reducing the need to carry food across vast distances into urban areas. Alternative production techniques with minimal space requirements are required for efficient food production in cities, where opportunities for soil cultivation are limited. Turning to hydroponic farming, where the food crop is grown directly in a nutrient solution, minimizes the area needed for growth, is one way to get over this restriction. These production systems are appealing and promising to investigate further in an urban setting since they make it possible to farm in a variety of system designs, such as horizontal, vertical, or in numerous layers, and in different places, such as basements, on rooftops, and in containers. Over the past three to four decades, hydroponics has been used in conventional large-scale vegetable production; however, the nutrient supply is almost entirely based on industrially manufactured, mineral (inorganic) fertilisers, which pose a challenge to the pursuit of sustainable and renewable nutrient and resource flows.

The various valorization techniques that have been outlined can

be used to food waste. Selected organic wastes, including food waste, are mostly used in Sweden for the manufacture of biogas, leaving behind a nutrient-rich liquid digestate as a by-product of the anaerobic digestion process. This anaerobic digestate might pave the door for a circular urban food production system and help to value food waste by being used as the nutrient solution in hydroponic growing systems. Evidently, using recycled and biobased fertilizer has advantages over mineral fertilisers used in traditional hydroponic production from an environmental point of view. The intimate contact between the crop and the nutrient solution in hydroponic production methods is one important point of focus, nevertheless. Therefore, it is crucial to first look into and determines if the Use of the anaerobic digestate for food production is microbiologically safe.

### Fertilizers

The two types of fertilizer products: nitrified bio fertilizer (also known as anaerobic digestate) and inorganic (mineral) fertilizer. The bio fertilizer is the by-product of anaerobic digestion of organic waste that is generated after biogas. Anaerobic digestate certified to SPCR 120 was procured for this investigation from a nearby Swedish biogas facility. Organic household waste made up 37% of the feedstock that was sent to the biogas reactor initially, followed by manure (31%), slaughter residues (19% of the feedstock), other organic food waste (13%), and iron chloride (0.03%), which was added to speed up the anaerobic fermentation process. The majority of the mineralized nitrogen is in the form of ammonium (NH<sub>4</sub><sup>+</sup>), which can be phytotoxic in large amounts, in the subsequent nutrient-rich anaerobic digestate.

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**Received:** 02-Sep-2022, Manuscript No. JFPT-22-18240; **Editor assigned:** 05-Sep-2022, PreQC No. JFPT-22-18240 (PQ); **Reviewed:** 19-Sep-2022, QC No. JFPT-22-18240; **Revised:** 26-Sep-2022, Manuscript No. JFPT-22-18240 (R); **Published:** 03-Oct-2022, DOI: 10.35248/2157-7110.22.13.952

**Citation:** Zhihua P (2022) Estimation of Food Waste in Hydroponic Food Production Systems. *J Food Process Technol*.13:952

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