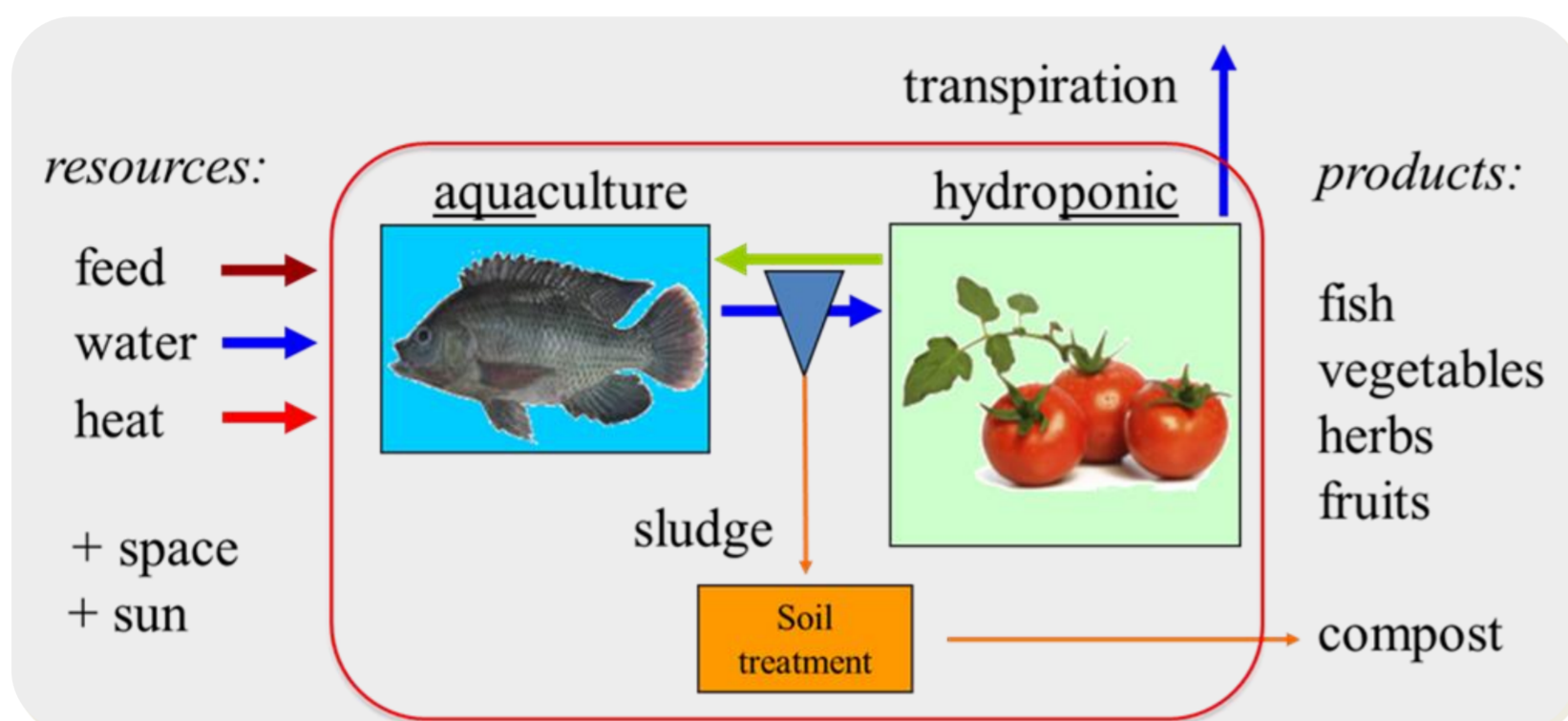


# Utilization of biogenic residuals in an urban farm

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## 1. Introduction

In the Urban rooftop Farm UF001, nutrients cycles are closed to a large extent through the use of **aquaponics technology**. Nutrients in the runoff from the fish basins are used as plant fertilizer. However, some nutrient-rich residuals (fish manure, plant cuttings) **can't be avoided**. Their reuse is mandatory in the context of the «zero waste» concept of UF001



### Aims

- Stabilization of biogenic residuals
- Making nutrients available for reuse  
→ Closing of nutrient cycles
- No emissions of odours
- Zero Waste: only products leave the roof

## 5. Vermicomposting step

### Vermicomposting at UF001

1. The vermicomposter is **continuously** charged from the top.
2. Worms inside the composter transform the matter. They eat the amount equivalent to their body weight per day.
3. Steered by a **thermostat**, the vermicomposter is heated inside, in order to create an optimal temperature for the worms.
4. The finished vermicompost can be harvested at the bottom of the device.



### Advantage

- Fast composting process and continuous conversion of organic matter by the worms.
- Possible with a great deal of technical effort
- Automation possible

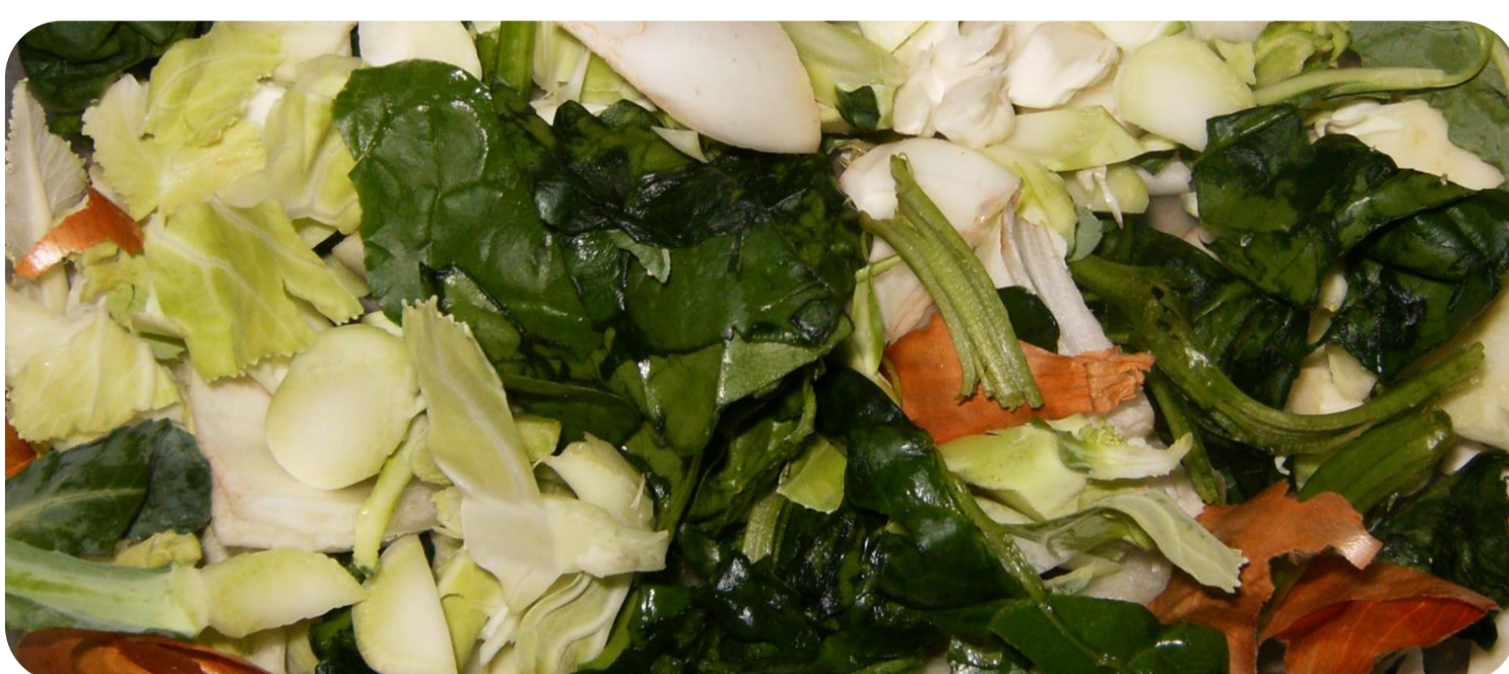
## 2. Waste materials

### Fish manure

Fish manure is collected by filtrating the runoff water from the fish basins. This is necessary to remove particles from the water before entering the hydroponic cultures. The fish manure consists of **fish excreta and food pellets that haven't been eaten**. It is rich in **phosphorus and nitrogen**.

### Plant residuals

The largest amount is produced when tomato plants are removed at the end of the growing season. Some plant residuals incur continuously throughout the growing season: plant cuttings, died-off leaves, vegetables that can't be sold for quality reasons etc.



## 6. Vermicompost

### Final product

- **High-quality vermicompost, «Terra Preta»-like**



### Characteristics

- Stable structure (**crumbs**)
- Populated by **useful microorganisms**
- High **water storage capacity**
- Improved **cation-exchange-capacity**

## 4. Pre-composting step

1. Biogenic residuals and **additives** are mixed in a tray or directly in a twin composting bin.



2. This substrate is composted in the **twin composting bin** → good final product

### Functions of additives

- Regulation of humidity and C:N ratio
- Prevention of odour emissions
- Pre-digestion of substrate for the following vermicomposting step
- Prevention of ammonia generation
- Support of the formation of clay-humus-complexes

## 3. Stabilization step

1. Fish manure is collected in buckets
2. Addition of lactic acid: this **lowers the pH**, the growth of microorganisms is inhibited
3. The bucket is closed and can be stored. Due to the **inhibition of microorganisms** all fermentation processes are stopped and no gas is generated.
4. Tomato plants are **chopped and dried**, in order to be stored. Alternatively, a plant «bokashi» can be produced.
5. The remaining plant material is directly conveyed to the pre-composting step.

