Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

EPOK – Centre For
Organic Food & Farming

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Precious Plant Nutrients

– digestate from Swedish biogas production

- **Liquid digestate can be applied using precision technology.** It often has a higher content of plant available nitrogen (NH_4-N) than liquid animal manures.
- Digestate gives opportunity to **apply nutrients according to crops demands**, thus increasing yields and resource use.
- **Nitrogen** and other plant nutrient contents from the digestate **should be taken into account** when planning fertilizer management – based on **up-to-date analysis.**
- **The plant nutrient content** of digestate is influenced by the **composition of the organic materials** that are digested and the **system for handling** the digestate.
- Roofed storage of digestate decreases the **risk of gaseous nitrogen and methane losses.**
- **Knowledge of animal manure management systems** designed to reduce losses of nitrogen, phosphorus and methane **can also be applied to digestate.**
- **Technology development is needed** to manage pretreatment of **fibrous and heterogeneous organic material** for digestion.

Turn the page!

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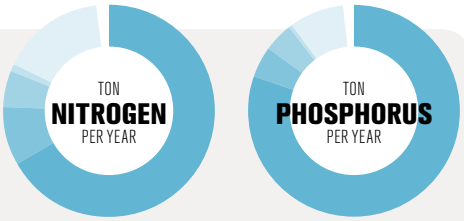
– digestate from Swedish biogas production

From digestion of animal manures, plant materials, feed and food residues we can produce bioenergy. By using the digestate in organic agriculture we also contribute to closing the plant nutrient cycle between animal and crop production farms, and between agriculture and society.

1. The high content of plant-available nitrogen (NH_4-N) in digestate gives the opportunity to apply the digestate according to crop requirement at the right time, thus increasing yields and resource use.
2. To increase yields, crops sown in autumn can be additionally fertilized with digestate the following spring.
3. Mixing liquid manure with a small amount of solid poultry manure in the biogas plant can increase the nitrogen content of the digestate four times, compared with digestion of liquid manure alone.
4. Analyze the digestate! In farm-scale biogas plants the plant nutrient content of digestate can vary between 2–4 kg plant-available nitrogen per ton and 0.5–1.7 kg phosphorus per ton. Furthermore, dilution with water can cause low plant nutrient contents per ton digestate.
5. The pH of digestate is about 8. In combination with a high content of plant-available nitrogen there is a high risk of gaseous ammonia (NH_3-N) losses during storage and spreading. Closed storage and direct incorporation of the digestate in soil at spreading decrease this risk. Applying digestate to growing crops with a vegetation height of about 15 cm also decreases gaseous ammonia losses.
6. Co-digestion of solid and liquid animal manure is a way to convert solid organic material into liquid, which in turn increases the technical feasibility of applying nutrients according to crop requirements.
7. In Sweden almost a quarter of the total energy potential from animal manure is available in solid manures. The challenge is to develop technology that is sufficiently robust, energy efficient and resilient to be able to digest solid manures.
8. Sweden has a certification system whereby it is possible to certify digestate for use on organic farmland. The certification system guarantees that the digestate is not contaminated with harmful amounts of undesirable substances. It also provides additional assurance of the quality of the organic materials to be be digested.

There are untapped nutrients



Amount per year of nitrogen (N) and phosphorus (P) in Swedish organic waste products that today have the potential to be digested and recycled as certified digestate.

	ton N/year	ton P/year
Manure: livestock + horses	40 994	10 641
Human manure	5 530	616
Food waste	3 351	568
Food industry	660	105
Plant material	9 746	1 078
Other	1 150	210

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