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Household compost as good for soil as conventional fertilisers

Since 2005, conventional disposal of organic waste has been prohibited in Sweden. Instead, this waste is incinerated or separated at source, processed (composted or anaerobically digested) and recycled as fertiliser on crop land. A new study has investigated the use of organic waste from different sources as a fertiliser and found that residue from biogas production is an effective fertiliser.

Household waste (compost), residue from biogas production[1] and sewage sludge can be used as fertilisers on crop land, along with more traditional fertilisers such as pig slurry, cow manure and NPS[2] mineral fertiliser. Using compost made from organic waste on crop land is a cheap alternative to mineral fertilisers and improves soil structure and water-holding capacity. In addition, organic waste applications increase levels of microorganisms, reduce the need for chemical weed control and suppress plant diseases. Microbial activity in soil is thought to be a better indicator of soil quality than chemical properties. The combination of soil and waste management contributes to carbon capture strategies, as carbon from the organic waste becomes incorporated into the soil.

In this study, researchers investigated changes in soil microbial and chemical properties following applications of compost, residue from biogas production, and sewage sludge, as well as pig or cow manure and NPS fertiliser. The compost and biogas residue performed equally well as or better than the other fertilisers in improving soil health. Key changes in the chemical properties of soil following fertiliser application included:

- A rise of 0.2 units in pH using compost and pig manure, compared to NPS
- An increase of 20 per cent in phosphorous levels using compost and sewage sludge, compared to biogas residue and NPS
- An increase of 9 per cent in potassium levels using all fertilisers, apart from NPS

However, plots treated with compost exceeded the Swedish Environmental Protection Agency's threshold for all heavy metals, with lead and zinc being especially high, and plots treated with sewage sludge exceeded copper threshold values, although this did not have a negative impact on soil microbial activity.

The majority of microorganisms living in soil are heterotrophs, which depend on carbon for survival. Increased microbial activity was observed in plots treated with residue from biogas production, which contains high concentrations of easily degradable carbon. The highest proportions of active microorganisms were found in plots treated with residue from biogas production (mixed 50/50 with mineral N) or NPS and these treatments produced the highest crop yields. However, the rate at which microbes release minerals for use by plants following treatment with compost were too slow to meet the nitrogen requirements of agricultural plants, consequently lower crop yields were observed in these plots. This suggests that compost may need to be used in combination with other fertilisers.

Soil is a non-renewable resource that is vital for ecosystem survival. The European Commission has put forward a communication and framework directive[3] for soil protection. It states that soil is subject to a series of degradation processes including erosion, decline in organic matter, local and diffuse contamination, sealing (the loss of soil resources due to the covering of land for housing, roads or other construction work and compaction. In combination, these threats can ultimately result in arid or desert conditions.

1. The by-product of biogas production. Biogas is a type of biofuel formed from fermentation of organic matter such as manure.
2. Mineral fertiliser containing sulphur (S) instead of potassium (K) as the soil in this experiment was rich in potassium, but poor in sulphur
3. The EC communication on soil protection (2006) http://ec.europa.eu/environment/soil/pdf/com_2006_0231_en.pdf and the accompanying framework directive http://ec.europa.eu/environment/soil/pdf/com_2006_0232_en.pdf

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