

# Sewage sludge, pharmaceuticals and composting – an extract of recent studies in Estonia

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Recent decades have shown intensive work in studying the fate of pharmaceuticals in the environment. One of the major sources of their residues are sewage and its sludge. The amount of sewage sludge generated by mankind is increasing rapidly and due to this it has become one of the major global environmental problems. Besides incineration, one of the most reliable ways of sewage sludge management is its composting and the application of compost in fertilizing abandoned mining areas and agricultural soils [1]. Sewage sludge may contain a large number of different organic pollutants, including the residues of pharmaceuticals. Due to this, its treatment should lead to the formation of a product which could be safely used.

As a result of composting, organic pollutants may undergo degradation [2–5]. Still, the rates of degradation are strongly individual, and some of the studied pollutants, were extremely persistent both during composting and in soils [2]. Recent studies have involved the degradation of fluoroquinolones, sulfonamides and tetracyclines during sewage sludge composting and their possible plant uptake from soils fertilized with this compost [5–9]. In addition to this, degradation experiments were composed with diclofenac, triclosan, metformin and carbamazepine [2; 3]. Reliable tools for the simultaneous determination of the named compounds were developed and applied [10–12]. The conducted work showed that in the case of most pharmaceuticals plant uptake readily takes place. Composting may ensure an efficient degradation of several pharmaceuticals present in sewage sludge, as for the elimination of others, as for example carbamazepine, different means should be used. Interestingly, in agricultural soils biodegradation of pharmaceuticals is faster than in freshly prepared compost mixtures probably due to the fact that the formation of microbial communities in the latter takes time.

## References

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