



Spot test analysis of microbial contents during composting of kitchen- and garden biowaste: Sampling procedures, bacterial reductions, time–temperature relationships, and their relevance for EU-regulations concerning animal by-products

P.B. Bijlsma, D.H. de Wit, J.W. Duindam, G.J. Elsinga, W. Elsinga   

Elsinga Policy Planning and Innovation Ltd., Horsterweg 127, 3853 JA Ermelo, The Netherlands

Abstract

This study was aimed to collect data and develop methodologies to determine if and how Dutch biowaste composting plants can meet the microbiological requirements set out in EU-Regulations (EC) 1774/2002 and (EC) 1069/2009, and to provide the European Food and Safety Authority (EFSA) with data and analysis for evaluation of these regulations. We examined twenty plant locations and four types of composting technologies, all with forced aeration and without an anaerobic digestion phase. Raw biowaste, material after sanitation and compost were sampled by spot test analysis according to a standard protocol, and according to an additional protocol with enhanced hygienic precautions. Samples were analyzed for *Escherichiacoli*, *Enterococcaceae* and *Salmonella* content. The latter protocol resulted in improved bacterial reductions after sanitation, whereas in compost *Enterococcus* levels but not *E. coli* levels increased substantially with both protocols, due to more thermo-resistant regrowth. *Salmonella* presence in compost coincided with low temperatures and increased levels of *E. coli* and *Enterococcus*, absence of *Salmonella* was associated with absence of *E. coli* (74%), but not with absence of *Enterococcus* (17%). In compost, *E. coli* and *Salmonella* showed a comparable time–temperature inactivation pattern. A pilot study with co-composting of biowaste and poultry manure indicated a similar inactivation pattern for ESBL-containing bacteria. We conclude that the abundance of *Enterococcus* in compost is caused by regrowth and not by (re)contamination, and that *E. coli* is a

more reliable indicator species for the absence/presence of *Salmonella* in compost. Compliance with current EU-regulations concerning biowaste composting can be shown by spot test analysis at all examined plants, provided that adequate hygienic precautions are taken during sampling.

Highlights

► We evaluated Dutch biowaste composting plants for compliance with EU-regulations. ► We used spot test analysis to detect bacterial reductions in the composting process. ► Thermo-resistant regrowth of *Enterococcus* in compost was large compared to *E. coli*. ► *Salmonella* in compost coincided with low temperatures and increased levels of *E. coli*. ► This may be relevant for reduction of ESBL-bacteria in poultry manure by composting.

Keywords

Biowaste composting; *Escherichia coli*; *Enterococcus*; *Salmonella*; Temperature; ESBL-containing bacteria

Figures and tables from this article:

