



Hygienisation at the composting of biogenous waste

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Customer: Styrian Provincial Government - Specialised Division 1c

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1. Summary

In the last few years, composting has become particularly important in the fields of municipal waste management and agriculture, different techniques being used.

In corresponding standards, thermal treatment of the rotting material in situ is required for hygienisation. The duration of this thermal treatment, the temperature to be reached as well as the water content required during hygienisation are decisive variables influencing the rotting process, the decomposition of organic substances and the overall duration of the project. However, the standards do not specify the positioning of this treatment in the course of this process.

For compost products, the Austrian Standards ÖNORM S 2200 ("Gütekriterien für Komposte aus biogenen Abfällen" - "Quality Criteria for Composts from Biogenous Waste") and ÖNORM S 2023 ("Untersuchungsmethoden und Güteüberwachung von Komposten" - "Investigation Techniques and Quality Monitoring of Composts") give hygiene related specifications, a hygienically perfect state not being defined sufficiently.



2. Starting Position

The following process variants have participated in the investigation programme:

- Agricultural composting (intensive rotting and subsequent rotting on stacks with transplanting) - operator Johannes Dietmaier
- Municipal composting in stacks (intensive rotting and subsequent rotting on stacks with transplanting) - operator "Stadtwerke Trofaiach"
- Rotting plate ventilated mechanically (rotting filter technique; subsequent rotting on stacks) - operator Saubermacher Co.
- Closed reactor (system MUT; subsequent rotting on stacks) - operator "Stadtwerke Judenburg".



3. Goals

By studying the 4 Styrian composting facilities mentioned above, the following questions were to be answered in the course of this project:

- Standard of hygienisation at composting
- Hygienic state of the final rotting products
- Influence of the hygienisation phase on the rotting process
- Feasibility of the hygienic specifications according to ÖNORM in practice
- Definition of a useful assessment of the final rotting products



4. Procedure

Samples were taken from the material used as well as from the rotting products from 2 rotting stations:

- finished intensive rotting, in which the hygienisation phase corresponding to the standard should, as a rule, take place,
- finished subsequent rotting.

Furthermore, samples were taken from processed finished compost in order to assess product quality.

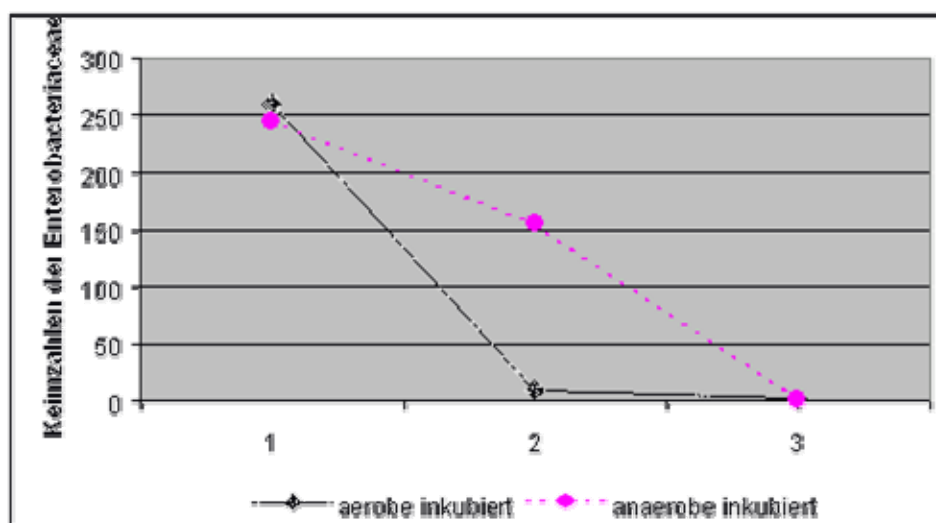


5. Result / Benefits

The results of the investigation have shown that the conditions for process technology that are specified in ÖNORM S 2200 are kept in all the 4 facilities:

- In the intensive rotting ventilated mechanically, the increased process temperature can be kept perfectly. In stacks that are not ventilated, however, very high "hygienisation temperatures" partly have to be put up with.
- The duration of the increased process temperatures can also be controlled quite well when mechanical ventilation is used. In processes without mechanical ventilation, the reduction in the rotting temperature takes relatively long after "hygienisation".
- Processes without subsequent humidification (closed reactors) tend to cause the rotting product to dry prematurely. In ventilated stacks and on ventilating rotting plates, the water content of the rotting material can be controlled perfectly.

Detailed evaluations of the results of the investigation have shown that the entire rotting process - intensive rotting and subsequent rotting - is dominated by mesophile microorganisms independently from process management. Therefore, the massive development of microbial biomass during intensive rotting also comprises Enterobacteriaceae and thus a majority of the pathogens. The rotting process, which is dominated by mesophiles, does not even offer the environment in which these germs can be decimated considerably in the temperature range from 65°C to 75°C.



- 1 = Rotting material after intensive rotting with "hygienisation phase"
 2 = Rotting material after subsequent rotting has been stopped
 3 = Product

Figure: Number of germs relating to Enterobacteriaceae in unit 109 KBE/g FS; mean value of the test batches

The minimum water content of 40%, which is required for the hygienisation phase in ÖNORM S 2200 (ÖNORM - Austrian Standard), is much too low to enable a favourable mass ratio between material humidity and organic substance to be kept. The effects on product quality and, in particular, on the germ compatibility of the material, are correspondingly unfavourable.

- In the first process phase - intensive rotting - the organic substance that is easily decomposable should be decomposed as completely as possible by keeping process temperatures between 42°C and 48°C and optimal material humidity.
- In order to make better use of the time consuming process of subsequent rotting in the sense of effective hygienisation, this rotting should be done with screened material - at least in the second half of the scheduled rotting time.

If a check of compensation in terms of epidemic related hygiene is to be useful, it should not be oriented towards studying the germ compatibility of the product but towards reviewing whether applications of the product are justifiable. It should not jeopardise compensation with almost unachievable requirements in terms of epidemic related hygiene - in a clearly principal way. Instead it should facilitate handling the material in different qualities.

For the studied guidelines, it would, in this sense, be necessary to fix

- the extent of investigations aiming at showing justifiable quality in terms of epidemic related hygiene
- the list of the target organisms (both in terms of the potential of risk and in terms of the possibility of the process increasing virulence)

in a binding way

standardise

- the methods for determining germs, (in particular for the preparation of samples required for this)

