

Situation of the Source Separate Collection of Biowaste in Germany

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The fifth questioning considering the state of the art and development of separate collection of biowastes in Germany has been carried out in the first half of the year 2003 by the TU Braunschweig and the ANS e.V. This lecture compiles the results of the study "**Separate Collection and Recycling of Biowaste in Germany - Survey 2003**" (K. Fricke et al., 2003) which is based on this questioning.

The study and the questioning covers all administrative waste management units responsible for the management of organic wastes in Germany. In total 419 administrative units have been questioned.

1. System "BioBin"

Separate collection of biowaste was started in Germany in 1982 in Witzhausen. After several years of experiments and experiences the "**collection at the door-step**" (fetch-system) by the municipalities for the **Germany type of "Biowaste"** established itself as most common using wheelie **bio-bins** in green (green bin) or brown (brown bin) colours for identification of their purposes. Systems based on biodegradable or on paper bags for the collection are the very exception.

German biowaste mostly contains an essential amount (up to 60 % volume) of green residues (**green or yard waste**) from gardens, so only in rare cases it is "pure biowaste" material.



For the surplus of **green waste** especially in spring, autumn or for the wet grass in summer the inhabitants deliver ("**bring-system**") the green waste to municipal recycling centres respectively civic amenity sites (CA sites) or directly to the composting plants.



Paper bags are only common in the household as a liner in the so called small pre-sorting bins in the kitchen in order to make the collection more comfortable (no dirt, leachate, smell). Wrapping the organics in newspapers is cheaper and provides a similar service, so most recommendations by the municipalities include this as a hint.



Collection is done exclusively done by wheelie bins from **80 to 240 litres** where the **120 litre volume** is the most common. In high rise building several household use small containers (> 1 cbm) together.



Fortnightly intervals for the collection are favoured on account of cost reasons. The collection days are mentioned in "Recycling Calenders" for the households which often include lists what is allowed to be put in the biobin and what is forbidden.

Fears that a 14-day standing time of the bins might create an intolerable amount of smells, maggots, flies and create health problems have so far not been confirmed in Germany. Experiences show that after a certain period the inhabitants get accustomed to the biobin and learn to manage it, even in the hot summertime where some odour, maggots and flies occur e.g. by adding newspaper. Nevertheless a lot of local authorities try to avoid complaints by the inhabitant and organise a weekly collection in the summer months.



Packer trucks (revolving-drum or compression-plate vehicles) are standard for the collection of biowaste at the doorstep. Revolving-drum vehicles have the advantage that the compost material is thoroughly mixed during collection which is advantageous for subsequent decomposition and for a smaller amount of odorous leachate in the vehicle.

Side-loaders become more and more common. Reduced costs for staff and a lower burden for the collection personnel are the main advantages.

2. Status quo

In 2002 the separately biowaste collection was introduced in 81 % of the administrative units 4 % more compared with 1997. Related to the population equivalent in the areas of the biowaste collection an average **participation rate** (= amount of inhabitant with theoretical access to separate collection) of approximately 61 % could be registered in 2002. The not that high participation rate in Germany proves a considerable potential of the development of the separate collection of biowastes in Germany.

Most of the administrative units established the biowaste collection between the years 1991 and 1997. Only in nine units new introductions took place between 1998 and 2002. Only 10% of the administrative units questioned showed an interest in increasing their biowaste collection activities in the next years.

Table 1: Status quo separate collection of organic waste in Germany – Status 12.2002

	1997	2002
Participation rate of the administrative units in separate collection of biowaste	ca. 77 %	ca. 81 %
Average participation rate of the inhabitants in the administrative units with separate biowaste collection	ca. 54 %	ca. 61 %
Average capture rate (= amount of biowaste collected in reality compared with potential)	ca. 54 %	ca. 59 %
Inhabitants connected to source separation	ca. 37 million Inh.	ca. 39 million Inh.
Collected amounts of biowaste	4.060.000 t/y	4.525.000 t/y
Collected amounts of green waste		3.807.000 t/y
Inhabitant related biowaste quantity based on the connected part of the population	ca. 109 kg/ Inh + y	ca. 110 kg/Inh + y
Inhabitant related bio and green waste quantity based on the total population		ca. 98 kg/ Inh + y

The differences between the participation rates in the biowaste collection between the administrative units are based on their differing waste management strategies visible in their municipal waste regulations when it comes to the bin fees and the degree of obligation to participate in the biobin system.

In 59 % of the administrative units a participation in the separate biowaste collection is obligatory. In nearly all administrative units (90%) a release of the obligation of participation in the biobin system is given after providing proof of home composting of all organic wastes.

82 % of the administrative units promote home composting by giving advice in its management and a reduction of the organic waste fees between 30 and 100 %. Only in very rare cases the buying of home composting equipment is sponsored.

3. Waste quantities and composition

The total amount of 4,5 million t/y of bio and 3,8 million t/y of green wastes were collected in 2002 in Germany - in total more than 8 million t/y.

Distinct differences exist at the inhabitant-specific quantities between the new and old Federal Countries. An average of 52 kg/Inhabitant/y are collected in Germany, approx. 60 kg/Inh/y (23 to 46 kg/Inh/y) in the old Federal Countries and in the new Countries only 22 kg/Inh/y. Green wastes have a collection rate of 46 kg/l/a, 54 kg/l/a (between 29 and 85) in the old Countries and 17 kg/Inh/y in the new Countries.

The quantities in the administrative units with introduced biowaste collection are at 110 kg/inhabitant/y biowaste which reflects a capture rate of approx. 59 % (table 1).

The quantities of residual wastes from households (including waste from offices) shows 14.6 million t. This corresponds to a quantity of 177 kg/per inhabitant and year.

If the organic part in the residual waste quantities, momentarily collected, is taken as a basis an ascertainable collectable biowaste potential of 9.1 million t/y can be calculated..

The low capture rates compared with other systems of separate collection, as e.g. for paper and glass, where values of about 80 % are achieved, show a large development respectively optimisation potential in the system of biowaste collection in Germany. Distinctly higher capture rates could be realised with the help of organisational measures (e.g. local municipal waste regulations) together with high-level purposeful public relations work. This is demonstrated by biowaste collection capture rates between 70 and 81 % in several administrative units.

4. Impurities

Only around 10 % of the administrative units stated **impurities (on account of wrong sorting)** above a level of 5%. These data often don't correspond to usual statements, that the collected biowastes are massively contaminated (table 2).

Table 2: Frequency distribution of impurity loads in biowastes, values standardised to 100%

Impurity loads	Frequency (Status 2002)
< 1,5%	20,4%
1,6 bis 3%	35,8%
3,1 bis 5%	32,8%
> 5%	11.0%

The composition of the impurities shows that they are preponderantly caused by kitchen wastes in the biowaste, in densely populated areas (e.g. *high rise buildings*) and by socially weak groups. Therefore should measures for optimisation concentrate in the first instance on these groups.

An extraordinary role among the measures for the decrease of impurities is to be seen in public relations work. Other measures are the visual control of the biobins in areas with a high amount of impurities, the distribution of "red cards" to "dirty bin" owners, stop of clearance of contaminated bins, stop of the collection at problematic locations and the introduction of metal detection systems at the collection vehicles.

5. Compost quality

Regarding the quality problems of the composting plants the administrative units claimed problems with impurities and achievement of the decomposition degree.

The development of the compost quality regarding the heavy metal loads from 1989/90 to 1999 shows that, except from copper, the heavy metal load has decreased. Reasons for the increase of the copper load are momentarily examined by the Federal Environmental Agency.

The most significant source for harmful inputs in the compost raw material is to be seen in the input via air which contaminate the vegetable compost raw material directly or indirect over the soil (primary source). These input sources can not be influenced by waste management measures.

Table 3: Success of separate collection of biowaste concerning the reduction of heavy metals in composts, in mg/kg DM (KEHRES, 2003)

	Mixed waste compost (1984)	Biowaste compost / Sep. collection (2003)	Hobby garden compost
Lead	513	46,4	40 - 60
Cadmium	5,5	0,47	0,3 – 0,6
Chrom	71,4	25,3	25 - 40
Copper	274	57,7	40 - 60
Nickel	44,9	16,3	15 - 25
Mercury	n.s.	0,16	0,1 – 0,2
Zink	1.570	203	180 - 240

Mixed waste compost: LAGA Nr. 8, Merkblatt M 10, status 10/1984.

Biowaste compost: Mean values in Germany, results of UBA/BGK-Study 2003.

The measures for a reduction of the heavy metal loads can be directly influenced by source separation (table 3), the selection of suitable compost raw material and the minimisation of the impurity contents. Qualities comparable to those of hobby garden composts can be reached. Suitable original material is quoted in annex 1 of the German biowaste ordinance. Only these must be used. The concentration of heavy metals contained in German compost corresponds to the inevitable natural background contents. The authors of the study state that an effective - control of that intakes which can be operated in daily practice, e.g. exclusion of unsuitable biowastes, cannot be realized.

6. Summary

After 20 years the "biobin" collection system for separately collected organic waste from household and gardens has shown its effectiveness and is established in German municipal waste management and in the society.

The collected quantity of biowastes could be increased by an extension of the separate collection in further administrative units, increase of the participation rate in the administration units with existing biowaste collection and especially through a purposeful and qualitative high-level public relations work. If one takes the capture rate of 80 % as a basis, like this is the case with glass and paper, an additional quantity of up to 3 million t/y of biowastes could be collected. That this is possible demonstrate actually achieved capture rates of more than 80 % in some municipalities.

The questioning showed, however, that at present an increase of the biowaste collection in Germany cannot be achieved. To what extent endeavours will be undertaken in future, will strongly depend on the developing costs for waste recycling compared to waste disposal and on policy.

Considering compost, it can be said, that the avoidance potential for heavy metal minimization controllable through waste management measures is by far exhausted. A decrease of the heavy metal load in Germany in the source material for composting can only be guaranteed in the long run through closure of primary sources for harmful matter intake, like e.g. airborne heavy metal inputs.

The majority of the German population shows high commitments to take the waste problem "in their own hands" and to provide valuable material through the separate collection for reuse - this is an executed environmental conscience.

7. References

- Fricke, K., H. Goedecke., U. Einsmann, 2003: Die Getrenntsammlung und Verwertung von Bioabfällen - Bestandsaufnahme 2003, Schriftenreihe des ANS, Braunschweig (in printing)
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