



FAO European Cooperative
Research Network



Recycling of Agricultural, Municipal and Industrial Residues in Agriculture

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RAMIRAN 2002

**Proceedings of the 10th International Conference
of the RAMIRAN Network**

General Theme: Hygiene Safety

**Štrbské Pleso, High Tatras, Slovak Republic
May 14 - 18, 2002**

Edited by Ján Venglovský and Gertruda Gréserová

ISBN 80-88985-68-4



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RECYCLING OF ORGANIC WASTE IN GERMANY

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INTRODUCTION

Recycling of organic waste in agriculture is in the time of several food scandals and animal epidemics a widely discussed subject in Germany. The German government is planning to change the current legal regulations. This paper give an overview over the most important current regulations and describes the aim of the planned changes.

BIOWASTE COMPOST

The use of compost-products in Germany is increasing in the last years because of the expanding collection of organic kitchen-waste (biowaste) from the households. At the moment approx. 6.8 Mio tons of organic waste from households are treated in composting plants. In 1995 it were 4.1 Mio tons. Today the plants produce 3-4 Mio tons of compost products annually. Agriculture is the most important user of these composts from biowaste. 36% of all compost products 1998/1999 were used in agriculture. 21% were used in landscaping, 14% in private gardens and 10% were used to produce soils. The German ordinance on biowaste from 1998 contains requirements for the production and the use of compost-products. Annex 1 contains a list of biowastes suitable for producing composts. In annex 2 hygiene tests for the safety of human, animal and plant health are specified. Annex 3 describes requirements concerning the analysis of biowaste. In § 4 of the ordinance limiting concentrations for heavy metals in compost are defined. In table 1 these limiting concentrations are compared to limiting concentrations of the EC working document on biowaste, second draft from February 2001. In the last column real average concentrations of composts from German composting plants are shown.

Table 1: comparison of different heavy metal limits in German ordinance on biowaste and the EC working document on biowaste and the average concentrations in German composts, concentrations in mg/kg dm

Element	EC working dokument on biowaste, second draft			German ordinance on biowaste	German compost 1999
	Compost/digestat Class 1	Compost/digestat Class 2	Max. apply 20 tons/3 a	Stabilised biowaste	Average concentration
Cd	0,7	1,5	1,5	5	0,51
Cr	100	150	100	600	25,60
Cu	100	150	100	600	49,60
Hg	0,5	1	1	5	0,16
Ni	50	75	50	150	15,90
Pb	100	150	150	500	52,70
Zn	200	400	400	1500	195,00

In § 9 of the ordinance on biowaste are also limiting concentrations for heavy metals in different soil types (clay, loam, sand) defined. These limiting concentrations are considered to be precaution values. If these concentrations are exceeded in a certain soil no compost is allowed to be used.

Table 2: Precaution values for soil according to the German ordinance on biowaste and the soil protection ordinance, concentrations in mg/kg dm

Element	Precaution value		
	sand	Loam	clay
Cd	0,4	1	1,5
Cr	30	60	100
Cu	20	40	60
Hg	0,1	0,5	1
Ni	15	50	70
Pb	40	70	100
Zn	60	150	200

There are no limits for organic pollutants in the ordinance on biowaste, because it doesn't seem to be necessary.

The field of hygiene is ruled very explicit in the German ordinance (annex 2). The following tests have to be realised:

- Direct process validation test
- Indirect process validation test
- End-product validation test

These tests are very similar to the regulations suggested in the second working document on "Biological Treatment of Biowaste" of the European Commission from 2001.

Experiences with the Hygiene tests in the German ordinance brought up:

- There are problems in the practical use of these tests.
- It must be realised that the organisms used in the test are not the only possible. It must be considered that other organisms are perhaps better suited for an use in the ordinance.
- Especially for anaerobic digestion plants there are not enough experiences in the use of these tests.

For the amendment of the ordinance on biowaste it is planed to eliminate these problems. For this reason the Federal Environmental Ministry and the Federal Environmental Agency started a research project which will be taken through by Prof. Böhm and Dr. Philipp at the University of Hohenheim.

SEWAGE SLUDGE

In the year 2000 860.000 tons of sewage sludge were recycled in agriculture in Germany. These were approx. 37 % of the whole amount of sewage sludge. The average

concentrations of heavy metals in the recycled sludge are indicated in table 3. There are also shown the limiting values from the ordinance on sewage sludge from 1992. The ordinance contains also limits for PCB and PCDD/PCDF. These limits and the current concentrations in German sewage sludge are also indicated in table 3. Hygienic test are - according to the ordinance on sewage sludge - not necessary to do.

Table 3: Heavy metal limits of the German ordinance on sewage sludge from 1992 and average concentrations in recycled sewage sludge in 2000, concentrations in mg/kg dm

Element	Limits of the ordinance on sewage sludge	Average concentrations in 2000
Cd	10	1,3
Cr	900	41
Cu	800	302
Hg	8	0,9
Ni	200	28
Pb	900	60
Zn	2500	826
PCB [µg/kg TS]	200	85
PCDD/PCDF [ng TE/kg TS]	100	9

MANURE

There are no legal obligations concerning the concentration of pollutants or the hygienic properties of manure.

PERSPECTIVE

The recycling of organic waste especially of sewage sludge in agriculture is very controversial discussed in the German public at the moment. In the centre of the discussion stands the aim of soil protection. It is planned to create consistent regulations for the use of all kinds of fertilizers on soil, including sewage sludge and compost but also farm manure and chemical fertilizer. The regulations will include limits for heavy metals on a high level, which are orientated on the precaution values of the soil protection ordinance (see table 2). For the new regulations it is also planned to have limiting concentrations for organic pollutants like PCB (polychlorinated biphenyls), PCDD/PCDF (polychlorinated dibenzo-*p*-dioxins /polychlorinated dibenzofurans), PAH (polycyclic aromatic hydrocarbon) and DEHP (di(2-ethylhexyl)phthalate). Thirdly the regulations will include hygienic tests, which have to be realized before the fertilizer is allowed to use on soil.

The exact level of the concentration limits is not yet decided at the moment. But it must be expected that a big part of the sewage sludge and also a part of the biowaste composts and some types of chemical fertilizers are not allowed to use as a fertilizer on soil in the future.

The planned regulations in all likelihood won't come in this legislation period (elections in

Germany in autumn 2002). We will see, if and in which way the new government will realize the current plans.

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