

## Agricultural Humus Management Using High Quality Composts

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Bundesgütegemeinschaft Kompost e.V.

Compost and digestate; sustainability, benefits, impacts for the  
environment and for plant production

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## BGK and RAL

**Bundesgütegemeinschaft Kompost e.V. (BGK) is a self-  
obligatory measurement of the industry and is  
recognised by the responsible legal authorities.**

**BGK was founded in 1989.**

**The RAL quality assurance for compost was  
established in Germany in 1991.**

**RAL-quality labels identify a standardised and regularly  
checked product.**

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## Compost from biodegradable waste

Currently about 50 % of German households are involved in the separate collection of biowaste (bio-bins/bio-containers).



Approximately 8 million tons of biowaste are treated in 800 composting plants to produce 5 million tons of compost.



70 % of the produced compost is labelled with the quality label RAL-GZ 251



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## Benefits of compost application

**Increase of water holding capacity in soils**

=> reduction of climatic impacts (heavy rain falls)

**Facilitate reworking**

=> reduction of fossil fuels

**Decrease of soil loss**

=> Reduction of erodability

**Increase of soil warming**

=> To enhance crop production in spring

**Benefits of compost application**

**Increase of soil activity**

=> Better soil structure and higher delivery potential for nutrients

**Stabilise soil structure**

=> better infiltration  
=> better trafficability

**Increase the potential to save nutrients**

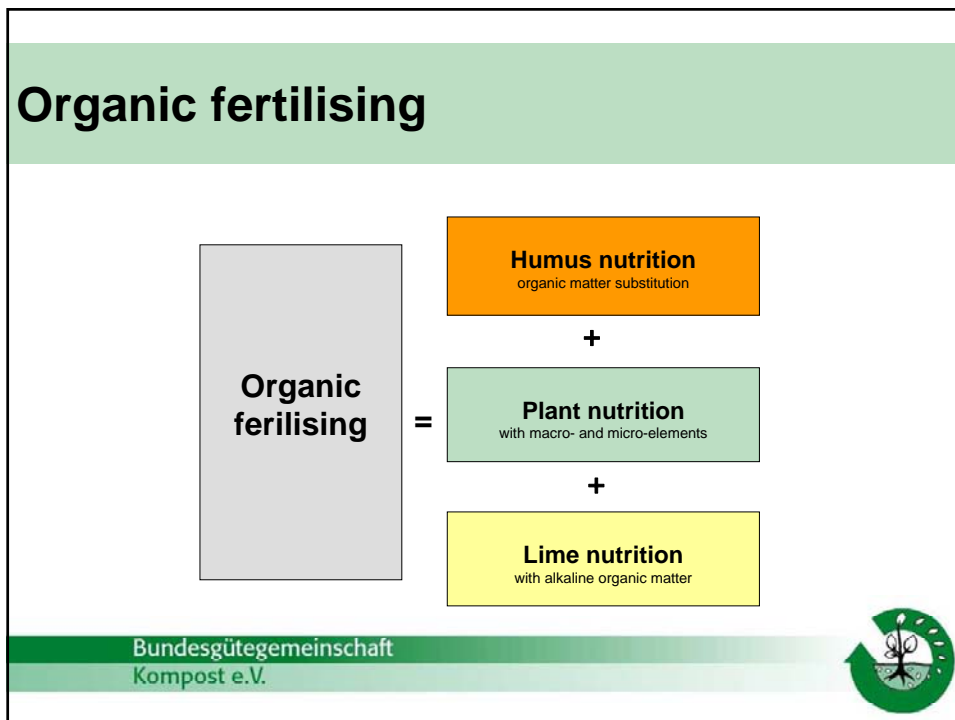
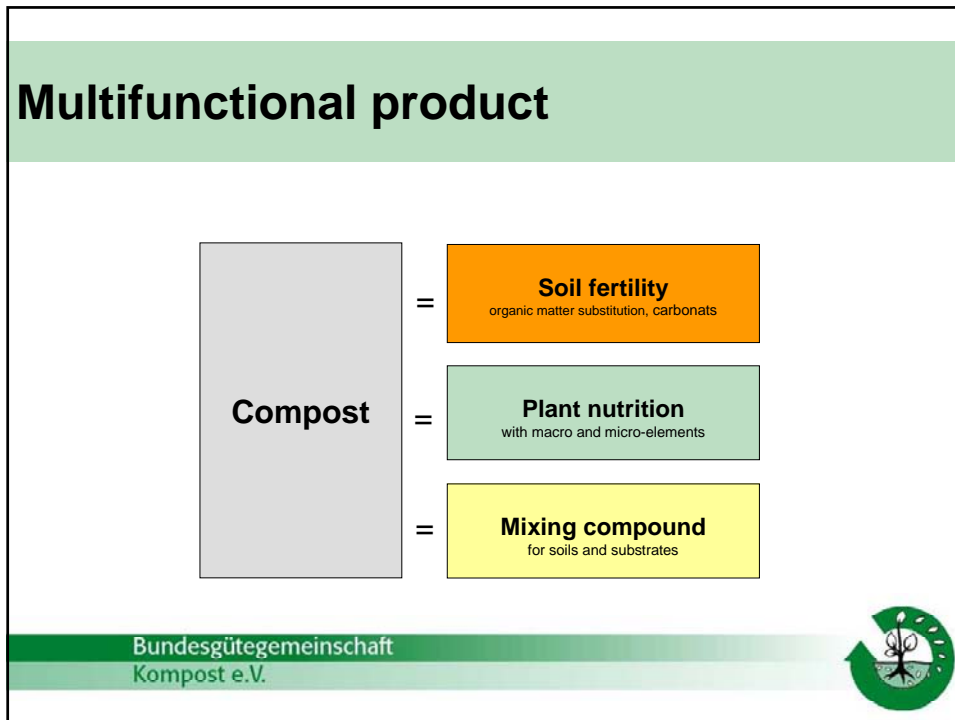
=> Increase of the nutrient delivery potential

**Phyto sanitary effects**

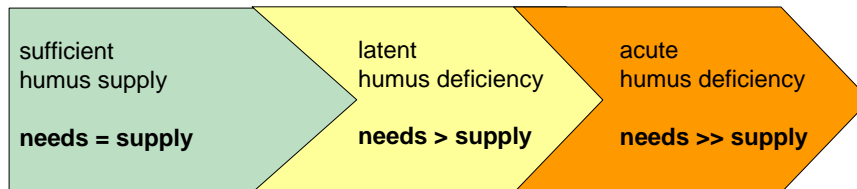
=> Reduction of soil disease

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## Organic matter decline



- Intensive crop rotation
- Export of crop residues
- Cultivation of „energy plants“
- Reduction of live stocks

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## Humus management in arable soils

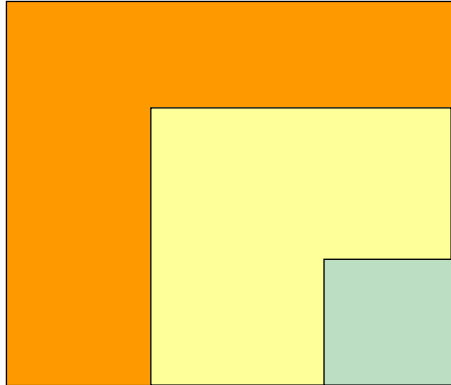
### Suitable measures for producing humus:

- Crop rotation management
- Crop residues management
- Organic fertilisation with manure and soil improvers from separate collected biowaste

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## Humus reproduction in agriculture



**Agricultural humus management**

Crop rotation


**Internal biomass production**

Manure and slurry

**Exogenous biomass production**

Secondary fertiliser

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## Legal frame in EU: Cross Compliance


**Regulates the direct payments in compliance with binding standards**

**These obligations concern**

- 19 already existing EC Regulation or Directives in the fields of environmental protection, food and feed safety, animal health and animal welfare,
- the obligation of the Member States to adopt new provisions on the **maintenance of agricultural land in good agricultural environmental condition.**



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## Implementation at national level (D)

The provisions on the maintenance of agricultural land in good agricultural environmental condition is implemented with the help of the so-called „Direktzahlungen-Verpflichtungenverordnung“ in Germany.



**Ordinance on direct payments**

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## Ordinance on direct payments

**Central role of soil fertility is to maintain the organic matter content in soils.**

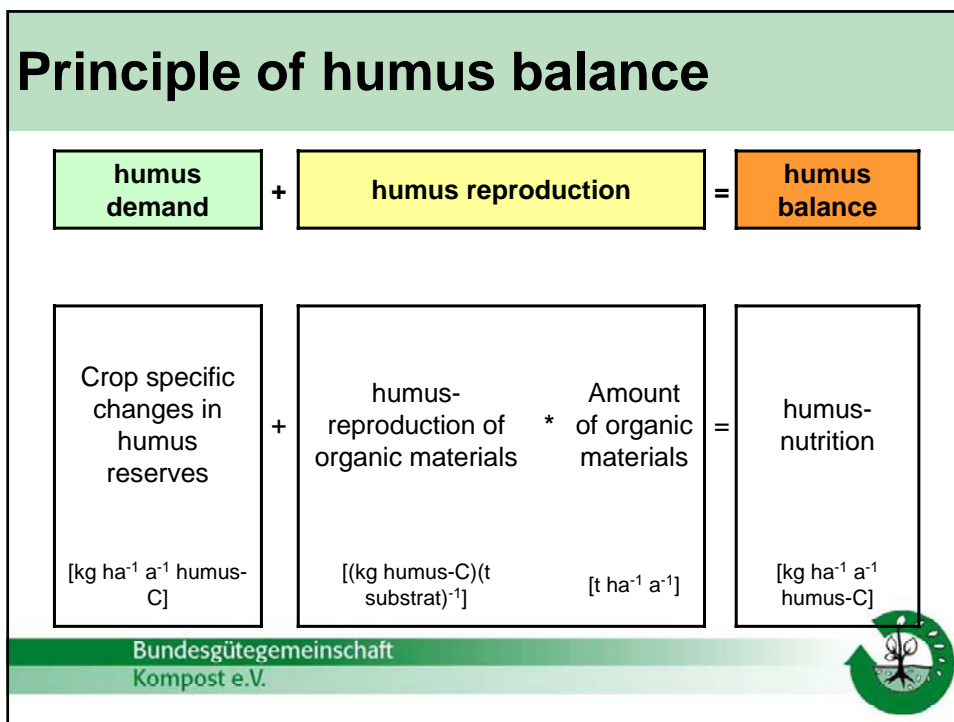
**For the estimation of an adequate soil organic matter soil, it is proposed to calculate the humus demand of a crop rotation.**



**Humus balance**

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## Humus balance of a crop rotation<sup>2</sup>

Humus demand <sup>1)</sup>	kg Humus-C/ha
sugar beet	-760 bis -1.300 kg
winter wheat (export of straw)	-280 bis -400 kg
winter wheat (export of straw)	-280 bis -400 kg
sum	-1.320 bis -2.100 kg
<b>Humus supply</b>	
80 t beet leaves	640 kg
<b>Humus balance (in 3 years)</b>	<b>-760 bis -1.420 kg</b>

<sup>1)</sup> The lowest value of humus demand belongs to soils with optimal soil organic matter content, the upper value of humus demand belongs to soils with suboptimal organic content.  
<sup>2)</sup> Evaluation per anno according to VDLUFA position Humus balance

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## Humus production efficiency of different organic fertiliser

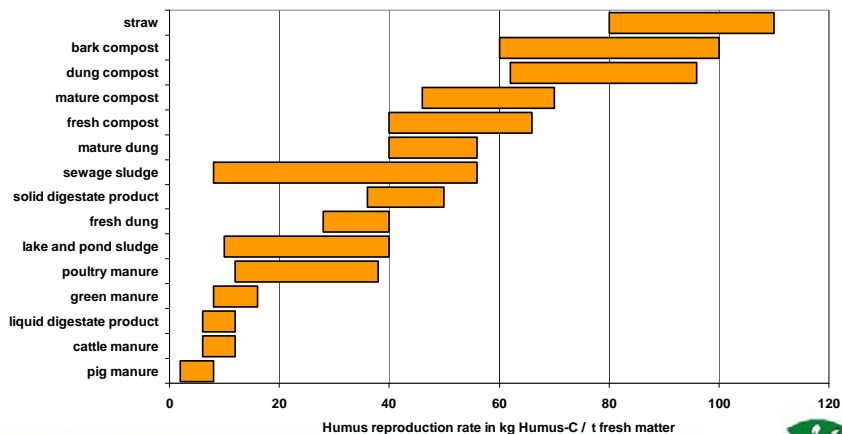
	Organic matter 1)	Organic carbon 2)	humus-C 3)	humus-C reproduction 4)
compost	35 %	20 %	51 %	2 t/ha
liquid manure	75 %	43 %	21 %	0,2 t/ha
straw	85 %	49 %	21 %	0,7 t/ha
sugar beet leaves, green manure	90 %	52 %	14 %	0,6 t/ha

- 1) Loss of ignition (organic dry matter)  
 2) C organic (LOI/1,742)  
 3) Percentage of humus reproductable carbon of TOC (reproduction index)  
 4) Humus reproduction by suitable application rates: compost 21 t DM/ha (in 3 a), liquid manure (pig) 2 t DM (30 m<sup>3</sup>, in 2 a), straw 7 t DM/ha and green manure 8 t DM/ha (p.a).

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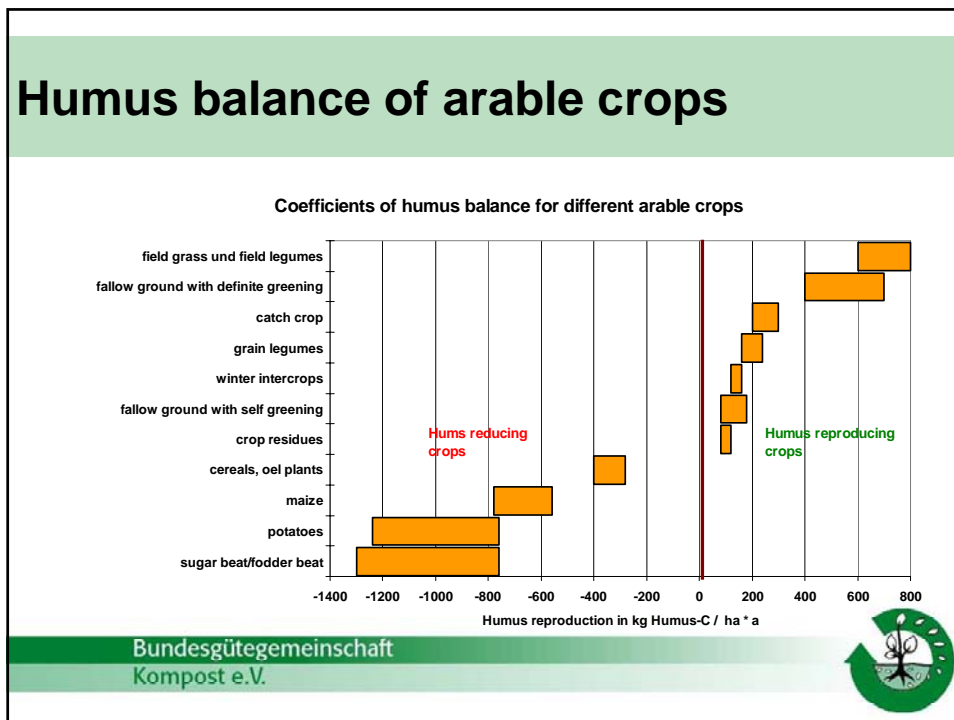


## Humus reproduction of organic fertilisers



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## Humus balance<sup>2</sup> of a crop rotation with compost

Humus demand <sup>1)</sup>	kg Humus-C/ha
sugar beet	-760 bis -1.300 kg
winter wheat (export of straw)	-280 bis -400 kg
winter wheat (export of straw)	-280 bis -400 kg
sum	-1.320 bis -2.100 kg
<b>Humus supply</b>	
25 t dm compost	2.600 kg
<b>Humus balance (in 3 years)</b>	<b>500 bis 1.280 kg</b>

1) The lowest value of humus demand belongs to soils with optimal soil organic matter content, the upper value of humus demand belongs to soils with suboptimal organic content.  
2) Evaluation per anno according to VDLUFA position Humus balance

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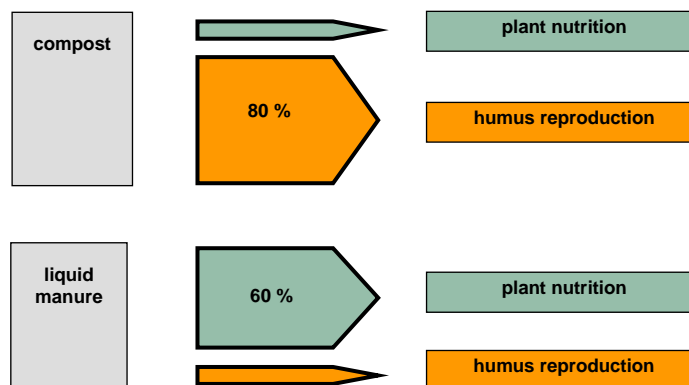
## Compost as a fertiliser in a crop rotation

Crop rotation	N kg/ha	P <sub>2</sub> O <sub>5</sub> kg/ha	K <sub>2</sub> O kg/ha
Sugar beet	180	55	138
Winter wheat	200	86	149
Winter barley	180	48	36
Sum of nutrient demand	560	189	323
Organic fertiliser			
Compost (30 t dm)	30	198	327
Residual nutrient demand	- 530	+ 9	+ 4

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## Double function of nitrogen




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## Compost as lime fertiliser

soil types	Target: pH-value	Maintenance liming CaO	Compost application <sup>1)</sup> t dm/ha	Effect of compost liming CaO
sands	5,6	600 kg/ha	15 t TM	675 kg/ha
clayey sands to silts	6,0	900 kg/ha	20 t TM	900 kg/ha
strongly sandy clay to clayey silts	6,4	1.100 kg/ha	25 t TM	1.125 kg/ha
sandy, silty clays to clays	6,8	1.300 kg/ha	30 t TM	1.350 kg/ha
Silty-clayish clay to clay	7,0	1.600 kg/ha	30 t TM	1.350 kg/ha

1) compost with an average content of 4,5 % effective alkaline matter in dry matter. Application limited to 30 t DM/ha in 3 years.

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## Compost as organic fertiliser

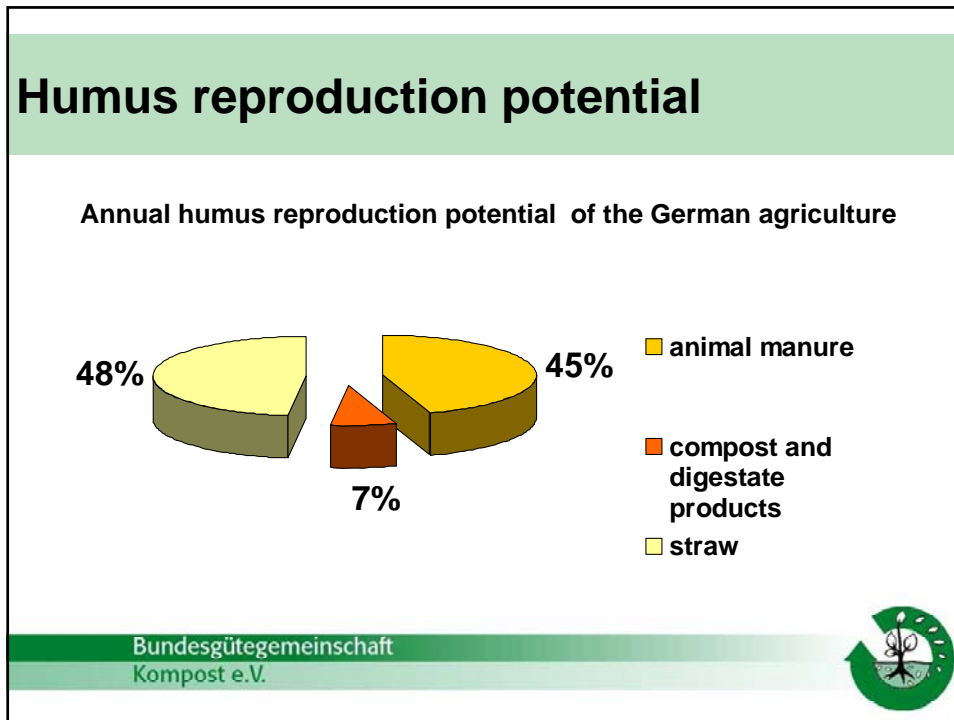
The application of high quality compost main-  
tains the nutrient and lime content in soil

➡ Conservation of natural basic soil elements

Compost has a high potential of humus  
reproductive matter to maintain and increase  
soil organic matter

➡ Improvement of soil fertility

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## Information

**Publications**  
Humuswirtschaft & Kompost *Aktuell* – online version monthly

Organic fertilising in cropping systems

**Website**      [www.kompost.de](http://www.kompost.de)

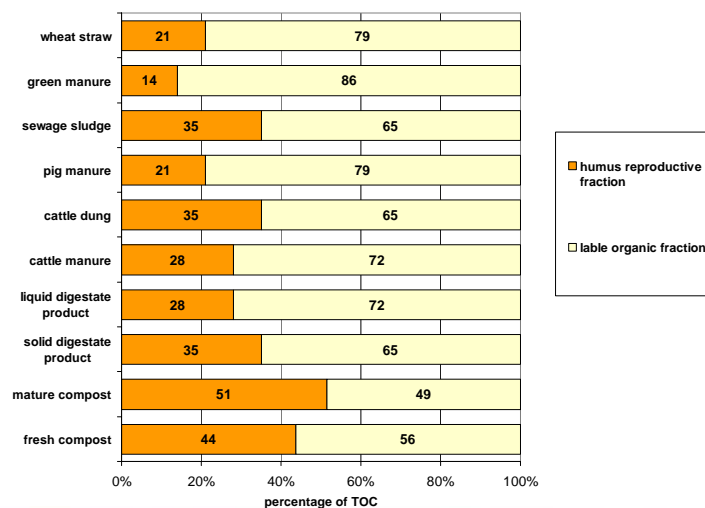
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**End of presentation**

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**Humus fractions of the organic matter from different organic fertilisers**



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