Humic Acids – A Quality Criterion for Composts

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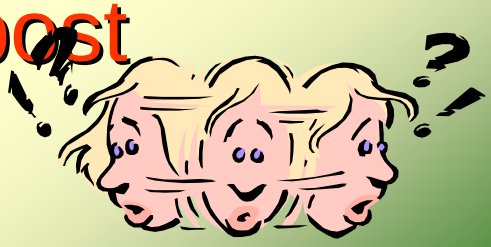
Quality of Compost

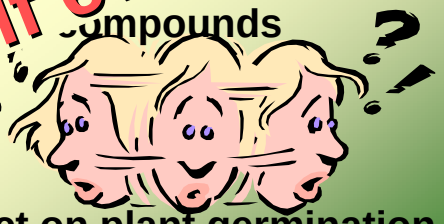


Quality of Compost

low contents

- **of heavy metals**
- **hazardou… …ompounds**
- **…ties**
- **no negative effect on plant germination**

That's self evident !!



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Quality of Compost

Benefits of compost:

- addition of stable organic substance !!
- source of steadily released nutrients
- growth-promoting and yield increasing effects on plants under suboptimal conditions
- aggregate stability and structure of soil
- phytosanitary effects
- increase of filter and puffer-capacity
- …..and many others

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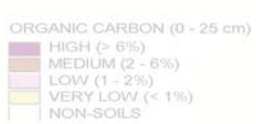
Quality



Benefits of compost:

- **addition of stable organic substance !!**

75 % of soil in southern Europe is poor (TOC < 2%)

45 % of soil in whole Europe is poor

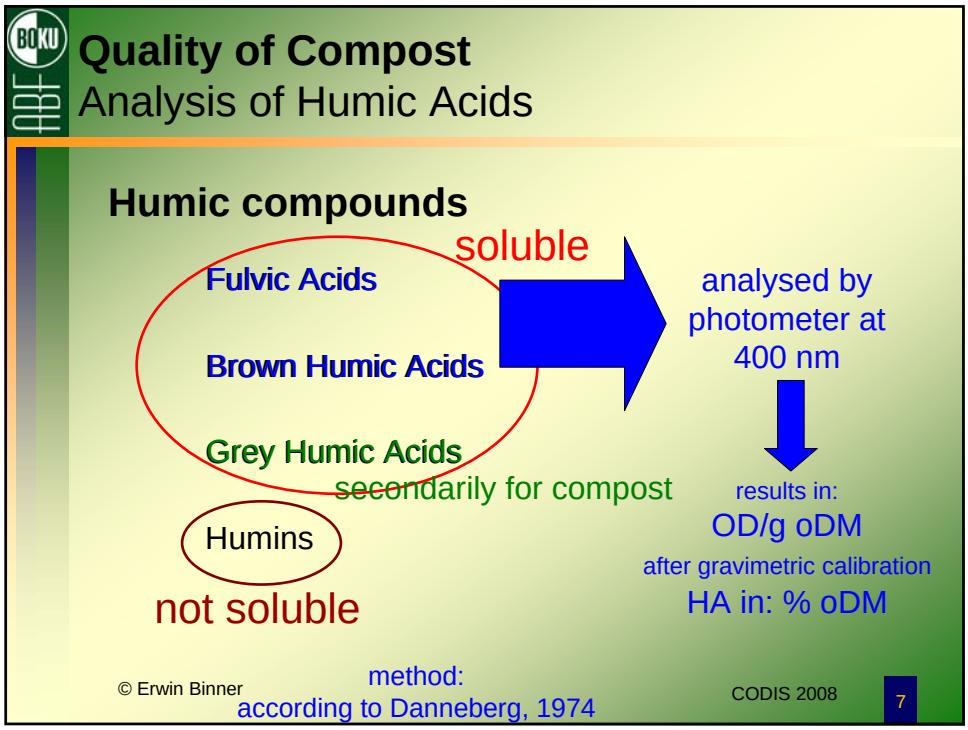
farmyard manure and compost is seen as a promising possibility to increase TOC

source: L. Montanarella, 2002

Quality of Compost

Our definition for Compost-Quality

high content of stable humic compounds


Quality of Compost
Analysis of Humic Acids
Humic compounds
soluble
Fulvic Acids
Brown Humic Acids
Grey Humic Acids
secondarily for compost
Humins
not soluble
analysed by photometer at 400 nm
results in:
OD/g oDM
after gravimetric calibration
HA in: % oDM
method:
according to Danneberg, 1974
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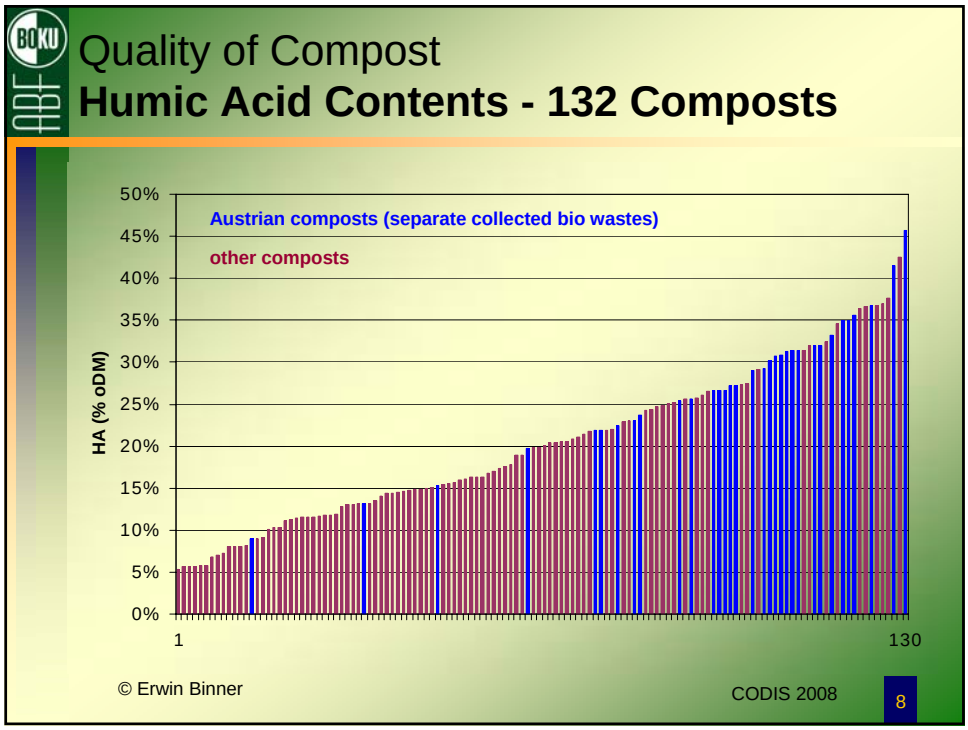
Quality of Compost
Humic Acid Contents - 132 Composts
Austrian composts (separate collected bio wastes)
other composts
HA (% oDM)
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1
130
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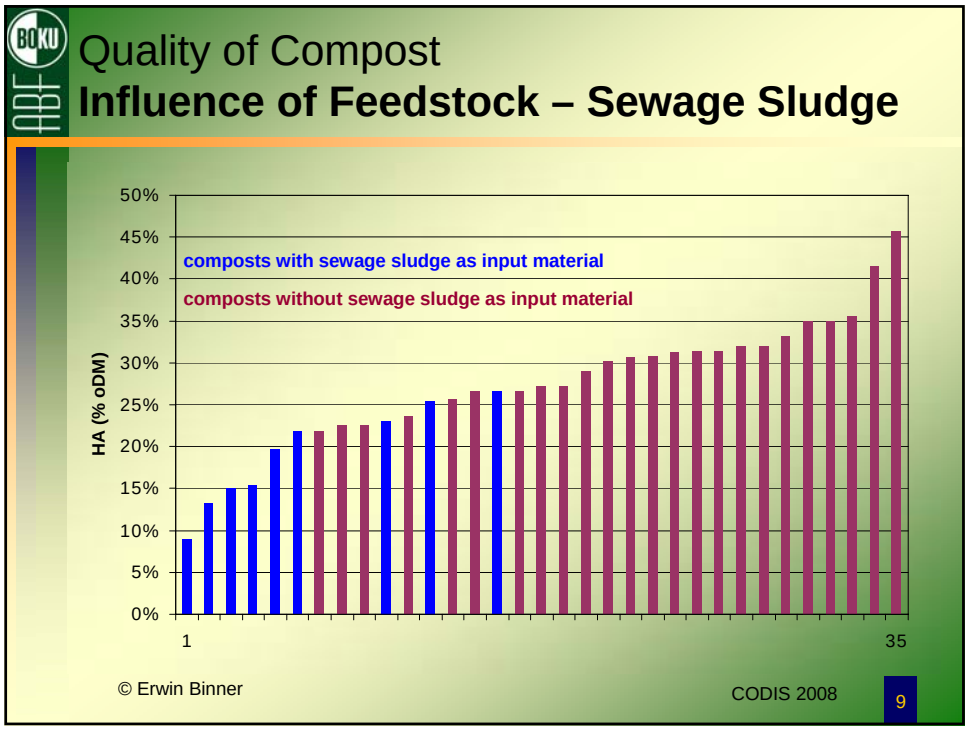
Quality of Compost
Influence of Feedstock – Sewage Sludge
composts with sewage sludge as input material
composts without sewage sludge as input material
HA (% oDM)
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1
35
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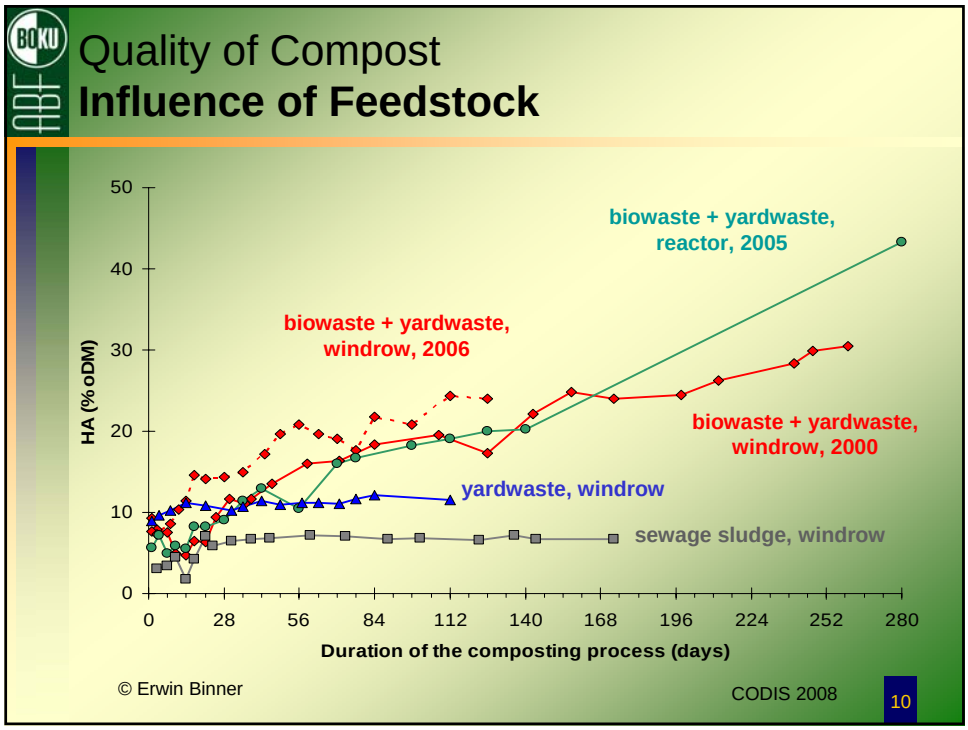
Quality of Compost
Influence of Feedstock
biowaste + yardwaste, reactor, 2005
biowaste + yardwaste, windrow, 2006
biowaste + yardwaste, windrow, 2000
yardwaste, windrow
sewage sludge, windrow
HA (% oDM)
50
40
30
20
10
0
0
28
56
84
112
140
168
196
224
252
280
Duration of the composting process (days)
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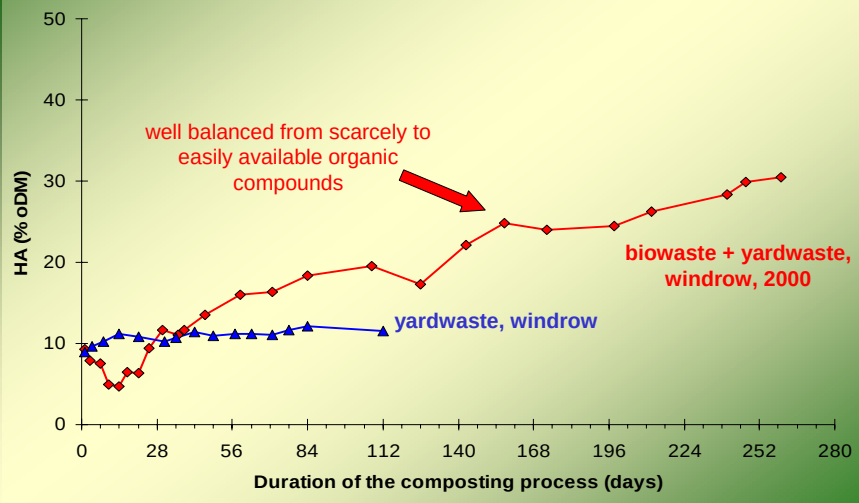
Quality of Compost
Influence of Feedstock / Humic Acids



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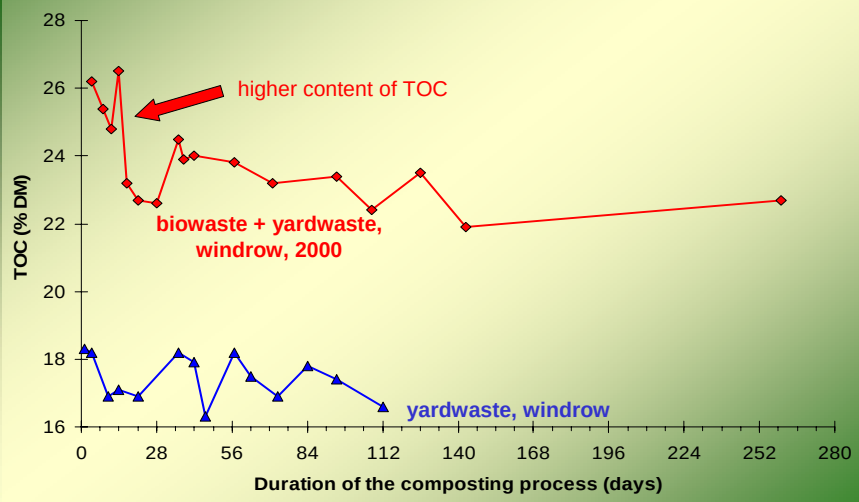
Quality of Compost
Influence of Feedstock / Total Org. Carbon



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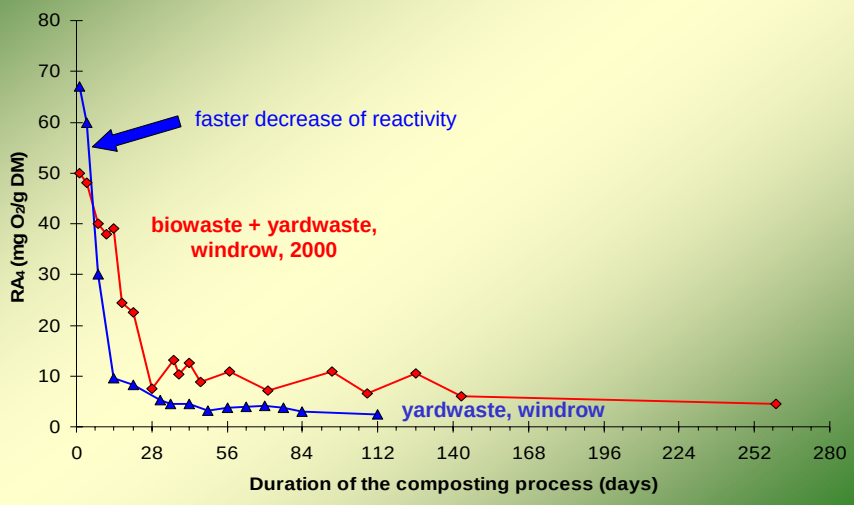
Quality of Compost
Influence of Feedstock / Oxygen Uptake



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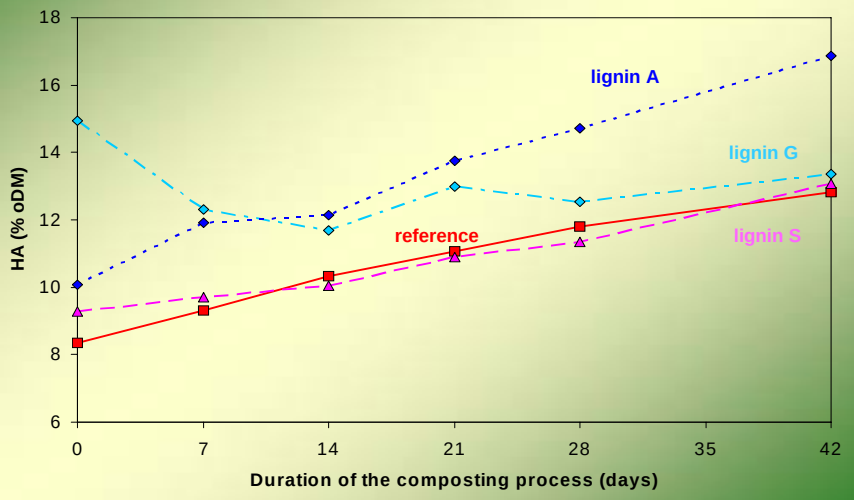
Influence of Feedstock
Addition of Lignin



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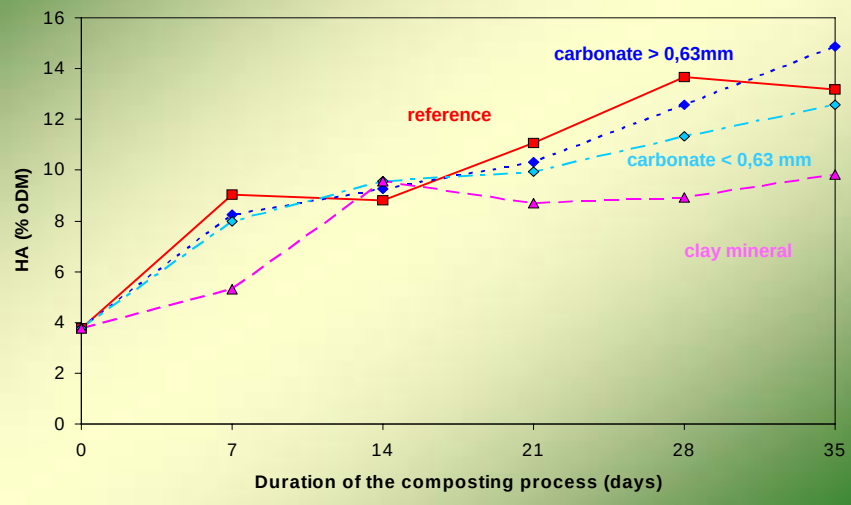
Influence of Feedstock
Addition of Minerals



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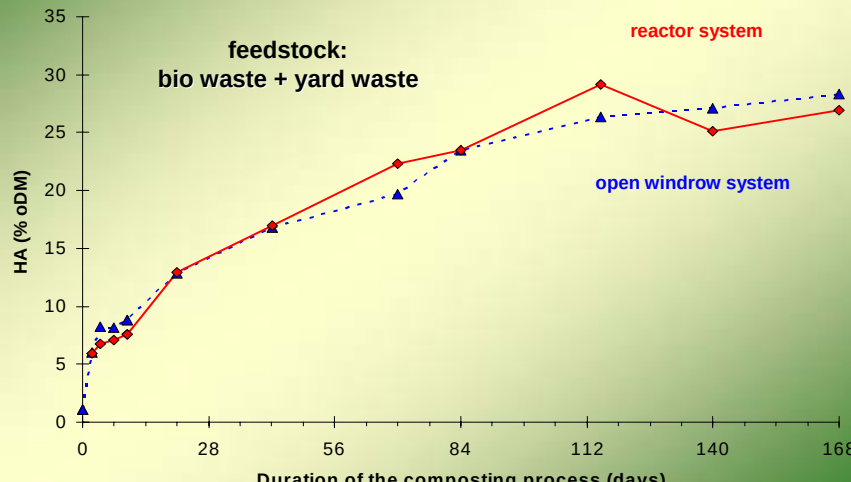
Influence of Processing
Windrow System versus Reactor System



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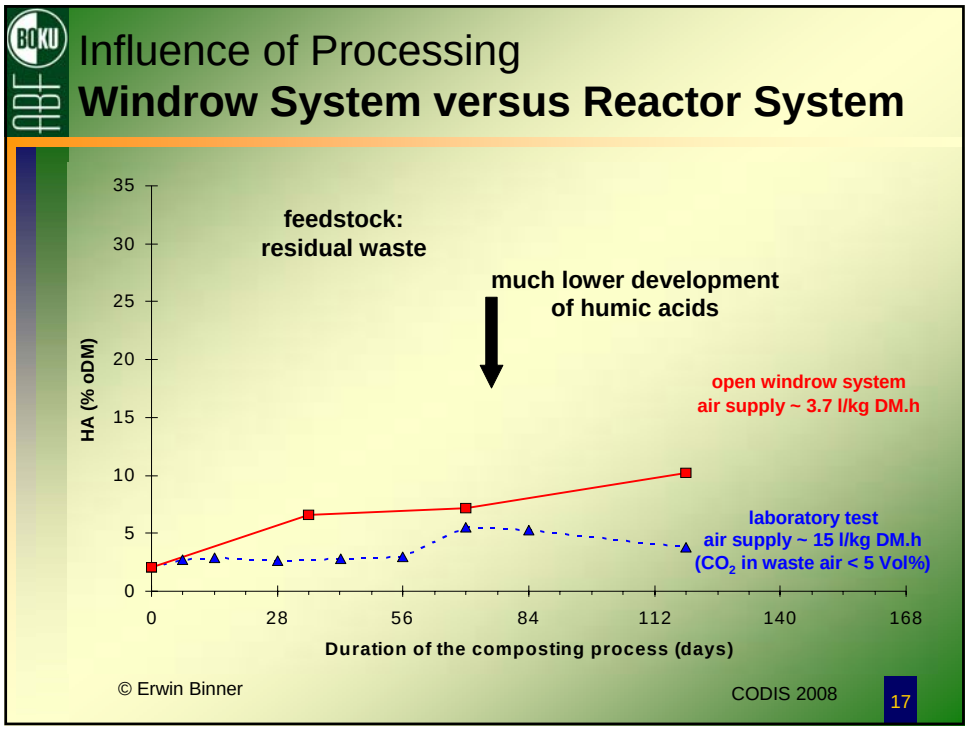
Influence of Processing
Windrow System versus Reactor System
feedstock:
residual waste
much lower development
of humic acids
open windrow system
air supply ~ 3.7 l/kg DM.h
laboratory test
air supply ~ 15 l/kg DM.h
(CO2 in waste air < 5 Vol%)
HA (% oDM)
0
5
10
15
20
25
30
35
0
28
56
84
112
140
168
Duration of the composting process (days)
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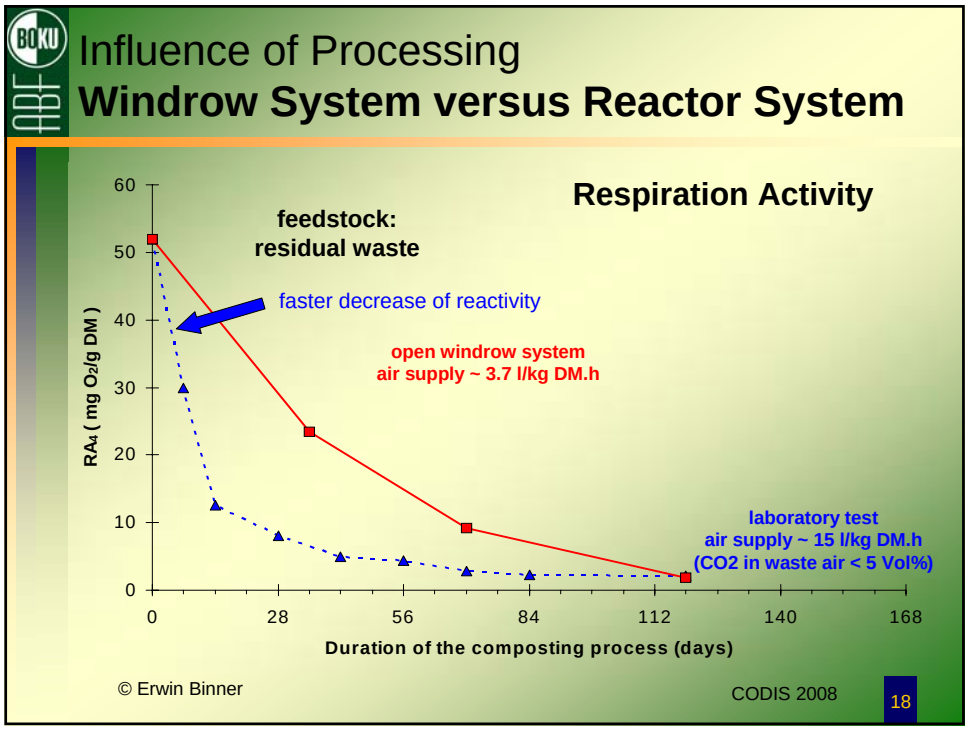
Influence of Processing
Windrow System versus Reactor System
Respiration Activity
feedstock:
residual waste
faster decrease of reactivity
open windrow system
air supply ~ 3.7 l/kg DM.h
laboratory test
air supply ~ 15 l/kg DM.h
(CO2 in waste air < 5 Vol%)
RA4 (mg O2/g DM)
0
10
20
30
40
50
60
0
28
56
84
112
140
168
Duration of the composting process (days)
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Conclusions

with the objective of carbon-increase in soils:

high compost quality

↓

high content of stable humic compounds

↓

high content of humic acids !

Conclusions

development of humic acids is enhanced by:

impact of feedstock:

- **well balanced from scarcely to easily available organic compounds (kitchen + yard wastes) pure sewage sludge is adverse**
- **lignin (depends on production-process) may enhance compost quality**
- **clay and carbonate minerals do not enhance humic acids during intensive rotting phase**

Conclusions

impact of processing:

- **open windrow process is equivalent to reactor process**
- **unhurried process,**
  long-lasting biological reactivity,
  too intensive aeration ➡ enhances mineralisation
- **aerobic conditions,**
  but not strict ➡ change between sufficient and insufficient oxygen supply

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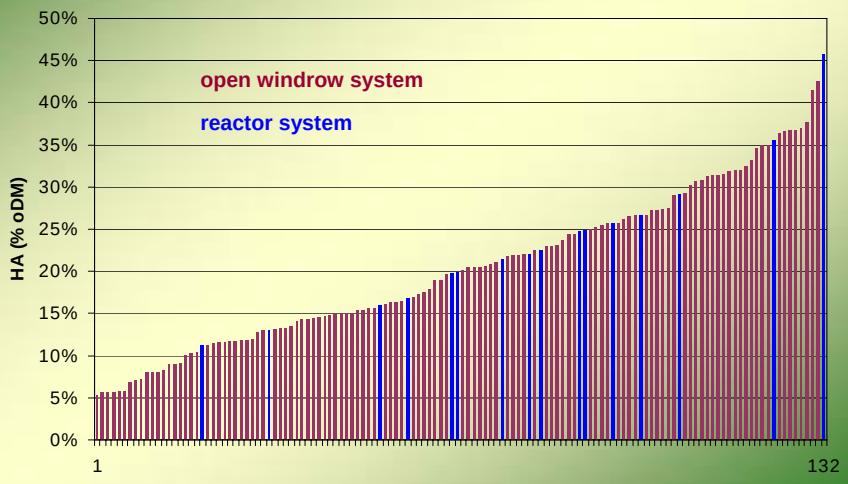
Thank You for Your Attention

Influence of Processing
Windrow System versus Reactor System



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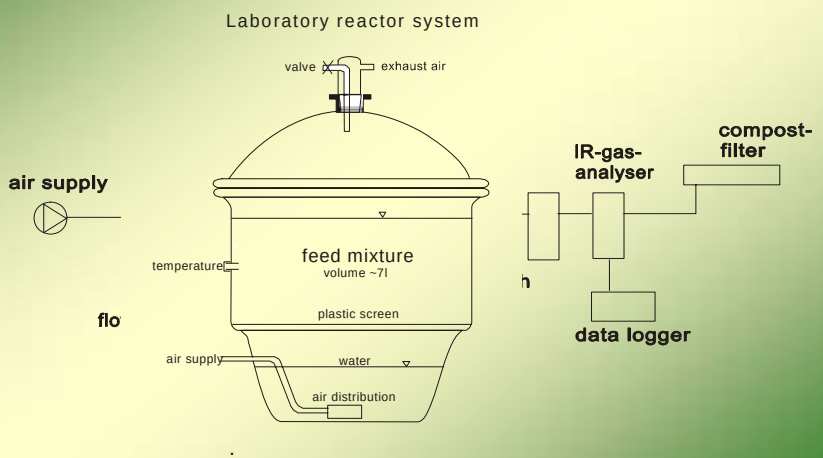
Odour Emissions
Laboratory Tests



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