

Zero Waste Live!

17 March 2020 - 02.00 p.m. CET



DECENTRALISED MANAGEMENT OF ORGANIC WASTE



Florian Amlinger

Founder and Director
Compost Consulting & Development

Zero Waste Europe WEBINAR
**Decentralised management
of organic waste**
17 March 2020



**Decentralised collection
and on-farm composting
the Austrian Model**

Florian Amlinger

Compost – Consulting & Development

‘100 - 1st Zero Waste
& Organic Cycle Organisation’, Austria





- Plants provide up to 25% of the photosynthesis process for their symbiotic microorganisms in the rhizosphere –
 - guess the evolution did not make a mistake with this interaction?!
- The root sphere contains 50-times the microbial colonisation than the environment soil !

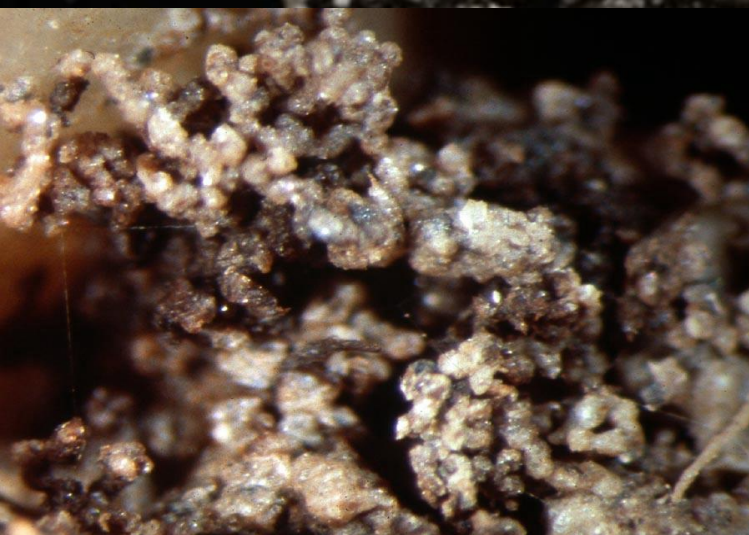
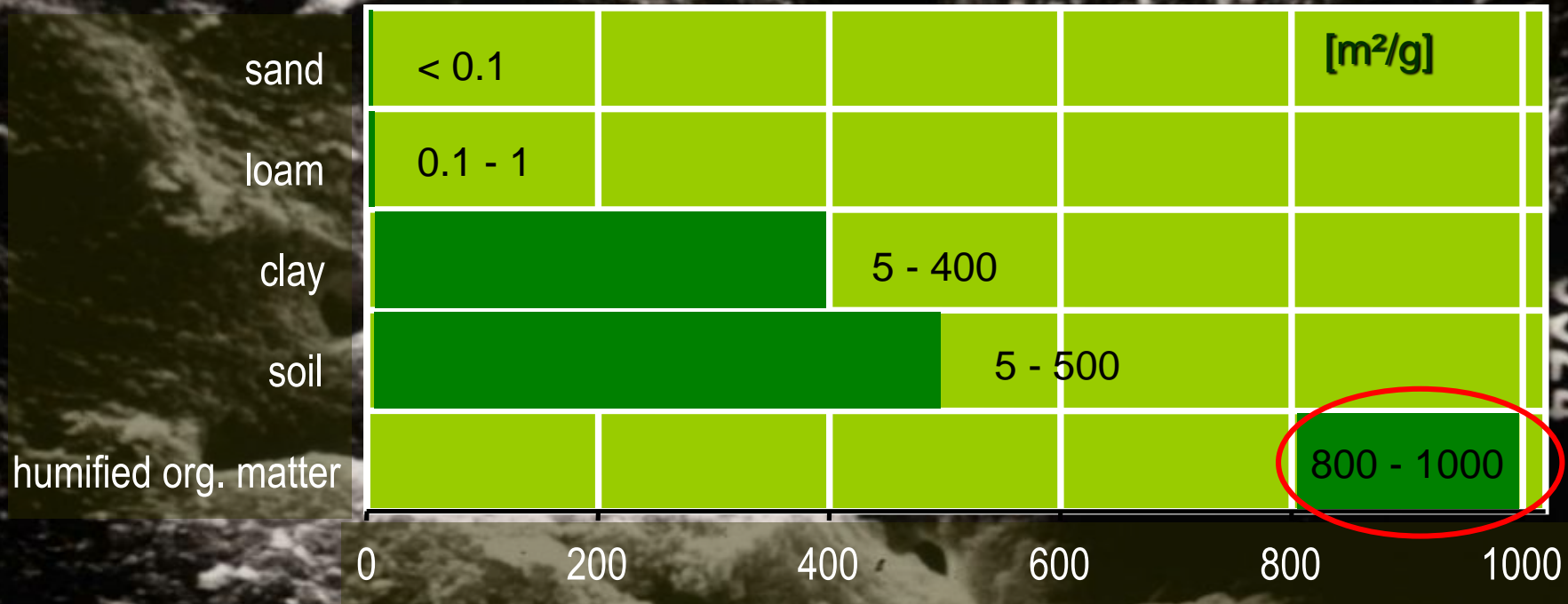
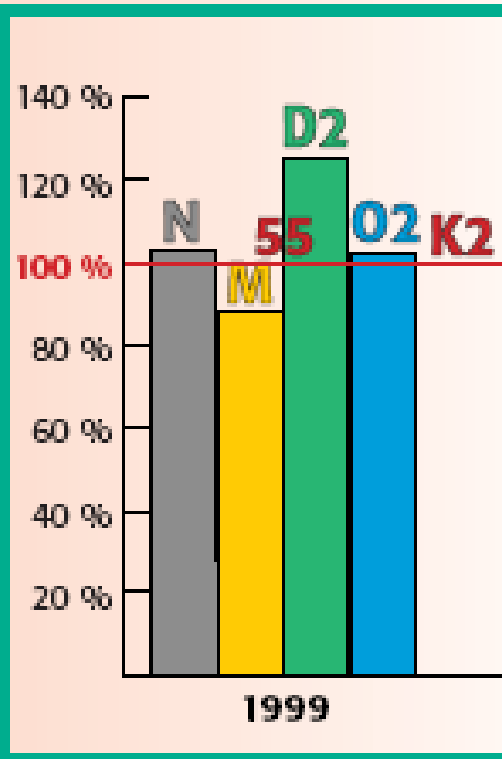


Bild-up of Stable Aggregates

21 Jahre
DOK-
trial
FiBL, CH

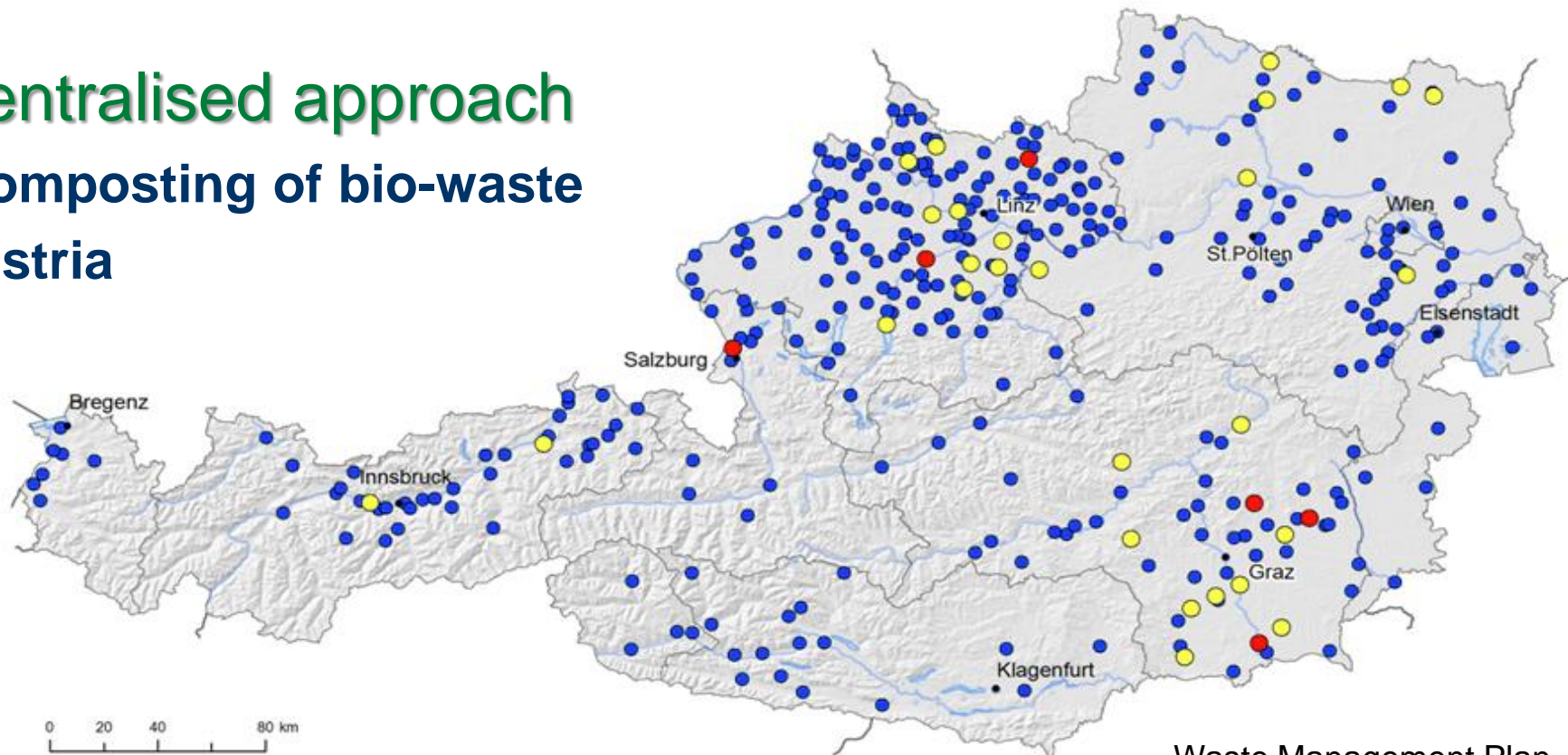
Alföldi et al.
2000

Krümestabilität
(% stabile Aggregate
> 250 µm)



„In soils treated with
bio-dyn **Manure**
Compost stable macro
aggregates are increased
by 20 to 30 % “

The decentralised approach for composting of bio-waste in Austria



Waste Management Plan
2017; Data from 2015

8.6 mio inhabitants

Number of plants	406
Treated bio-waste & sludge	1.24 Mt
Average treatment/plant	3 050 t

= 284 / **70%** with **KBVOe-QAS**

= 132kg/INH ... = 300 kg/HH



~ 21 000 INH or 9 500 HH per plant

The characteristics of organic waste materials show a wide variability:

.... Structure/porosity Bulk density C/N ratio
Humidity Fermentability



Collecting system for biowaste



15 Liter paper-bags (3 layers on bottom)
Convenient to fix and open with a metal frame



15 Liter corn-starch-biobags
with the „AirMax“ bucket (certified according to

→ numbered bags for backtracking in case of
abuse is a helpful instrument further clearing



46 Liter biobins for groceries



80 Liter biobags for
Fine garden waste

Biowaste collection scheme



+



+



- Households receive 10 litre buckets with 52 certified compostable bags as liners, provided by the association. Price for the *Bio-Bags* is included in the waste fee)
- Kerbside / door-to-door collection at every house.
- Delivery of the bio-waste directly to the composting plant.



Clean solutions at the collecting points



Quality management by controlled transfer





9,3 tons of biowaste

19 kg (0,2%) of contaminant materials





Collection of surplus of FINE GARDEN WASTE in 80 to 120 l paper bags [*grass, leaves, flowers*]



Garden Waste BRING Sites – *Good Examples*



Key elements of the **CONTROLLING THE PROCESS**



- Organic feedstock & additives
- Humidity
- Oxygen
- Temperature

09/09/2009

Minimum STANDARDS for Open Windrow composting



- Minimum bulky/structure material

- BIO-WASTE**

Origin of Bio-waste	Min % shredded wood per year	By Volume (v/v)
RURAL	15% + oversize screenings	1 : 0,5
URBAN	25% + oversize screenings	1 : 1

- Bulk density Bio-waste URBAN: $\sim 0,75 \text{ t/m}^3$.
- Bulk density Bio-waste RURAL: $\sim 0,5 \text{ t/m}^3$
- Volume reduction composting: ca. $\sim 40 - 70 \%$

- SEWAGE SLUDGE**

Type of structure material	Min % structure material By MASS	By VOLUME
STRAW	20%	1 : 2,5 – 3
SHREDDED WOOD	30%	1 : 1,5 – 2

- Bulk density shredded wood: $0,25 - 0,35 \text{ t/m}^3$.
- Bulk density Sewage sludge: $0,8 - 1,0 \text{ t/m}^3$
- Volume reduction composting: ca. $\sim 50 \%$

The main task: create and maintain the the optimum environment for the transformation & humus build-up process



- C : N ratio 25 - 35 : 1
- Kitchen waste < 30 %
- Fresh ,green‘ residues min. 15 %
- Bulking agents 30 – 40 %
 - ligneous /hemi-celluloses /C source
 - Structure .. Air filled pore space
- Humidity 55 – 65 %
- Addition of **clay SOIL** ~ 10 %
[1 – 2% clay dust]
- Addition of **COMPOST** ~ 10 %



Foto: Urs Landmanagement



Foto: Urs Landmanagement



Fotos: Hildebrandt, Amlinger

Mixing the „Ingredients“



Fotos: Angelika Lübke-Hildebrandt, Urs Hildebrandt / Urs Landmanagement



Foto: Urs Landmanagement

**Watering with a hose pipe or
water tank mounted to the
turning machine:
the water is sprayed directly
into the turned material**

OR

**by spraying on top of the
compost piles with a vacuum
water tank before turning**



Foto: Urs Landmanagement



Foto: B. Gamerith; Compost Systems, Austria

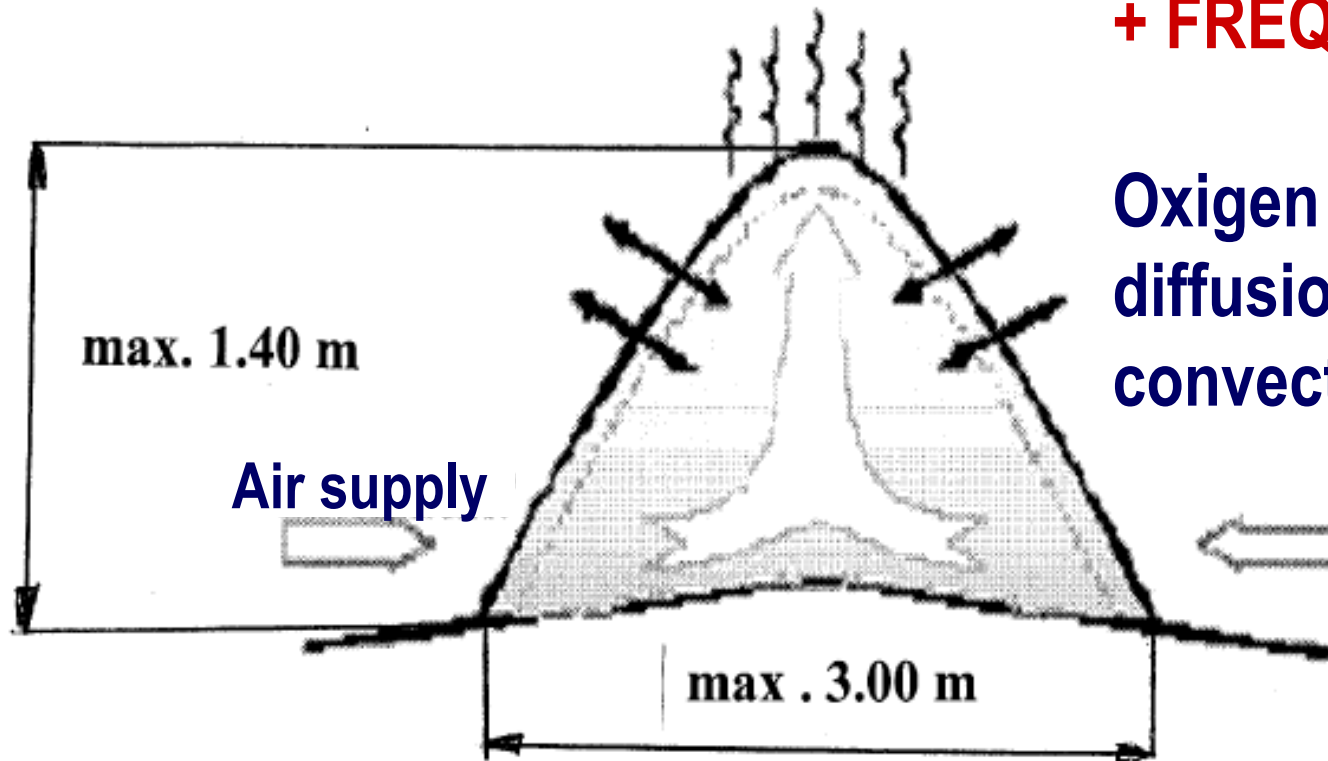




Windrow Composting Natural Aeration

Sufficient material
structure & pore volume
+ **FREQUENT** turning

Oxygen supply by
diffusion &
convection



Drawing: Urs Landmanagement, Austria



• BIO-WASTE & SEWAGE SLUDGE Composting

Height	Cross Section	Width	Turnings/ week	Minimum total rotting time	
				Bio-Waste	Sewage Sludge
< 1,5 m	3 m ³ /m	3 m	2 -5	7	8
			1	8	10
1,5 – 1,8 m	3 - 4 m ³ /m	3,5 m	2-5	8	9
			1	10	12
1,8 – 2,2 m	4 - 6 m ³ /m	4,5 m	2-5	9	10
			1	only with aeration	only with aeration
2,2 – 2,5 m	6 - 7,5 m ³ /m	5 m	2-5	10	only with aeration
			1	only with aeration	only with aeration



Sedimentation shaft



Percolation bed



Shelter for machines



Roofed compost storage



Main rotting - paved



Maturation - mechanically compacted



Percolation / evaporation area

**Sealed /paved surface for the main rotting area
draining of rain and waste water**

2 to 5 % slope





Composition

- 40 % shredded bush and tree cuttings
- 30% fine garden waste
- 10% rotted cattle manure
- 10% loamy soil

ON-FARM FIELD COMPOSTING



Composting

- 8 to 12 weeks (summer)
- 12 to 20 weeks (winter)
- Turning : 5 to 3x/week
- Screening: 10 to 20 mm



Foto: Urs Landmanagement



On-Farm Composting II



Foto: Urs Landmanagement



Foto: Urs Landmanagement





Fotos: Amlinger





Foto: Courtesy of Seiringer
Umwelttechnik GmbH

Optimum Temperature Ranges

for Different Requirements

of the Composting Process



Process Optimum for	Temperatur Range
Hygienisation ... [Ordinance: 10 days]	$> 55^{\circ}\text{C}$
Maximum Decomposition Start of formation of fomic substances	$45 - 55^{\circ}\text{C}$
Max. Biodiversity + decomposition of microbial biomass; max. Formation of humic substances	$35 - 40^{\circ}\text{C}$

Monitoring of Temperature & CO₂

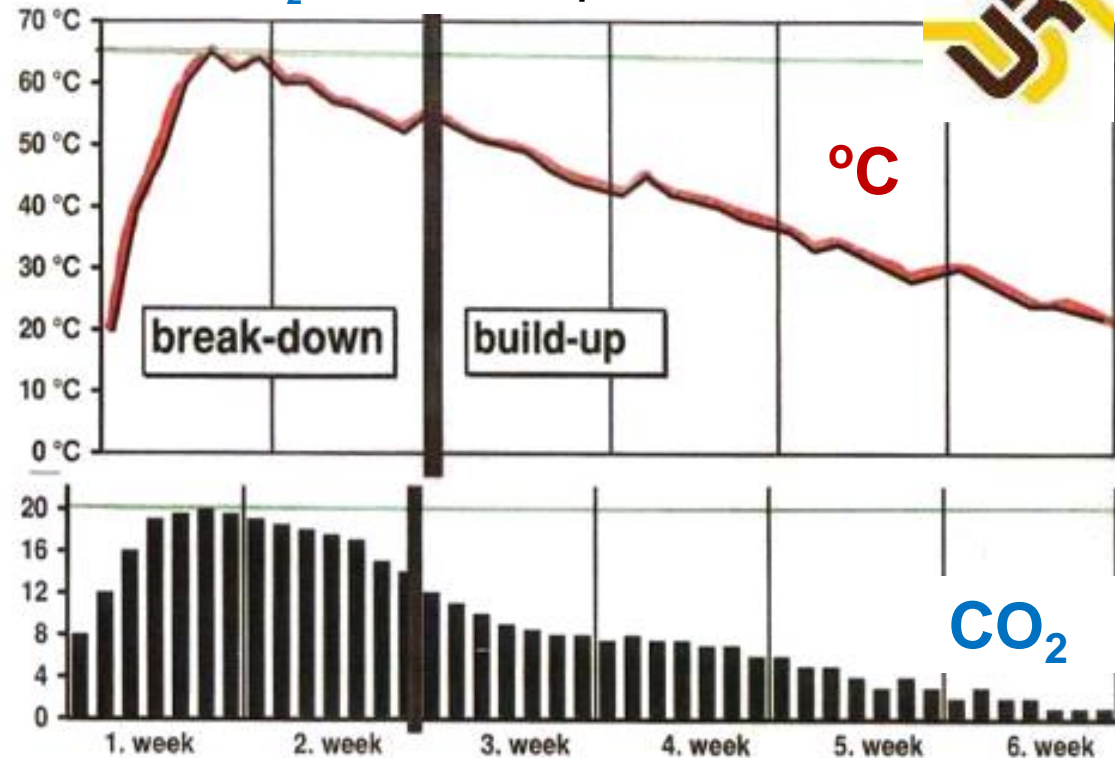


- Temperature max. 60-65 °C
- Sufficient OXIGEN min. 5 (1)%
- Maximum CO₂ max. 10 – 15 %



Maximum 65 °C

°C & CO₂ in a controlled process



Practice Training





Compost quality: ... Key parameters for quality testing



Criteria for the
„KompOscar“
Award

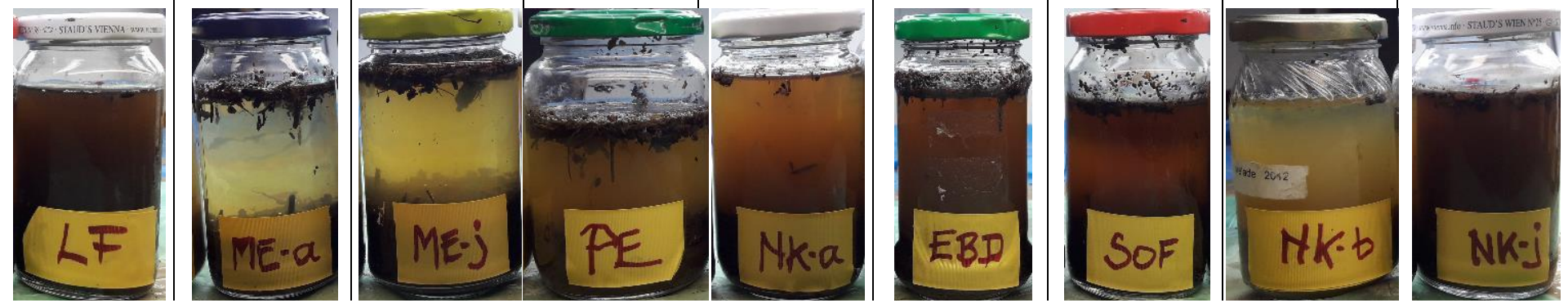
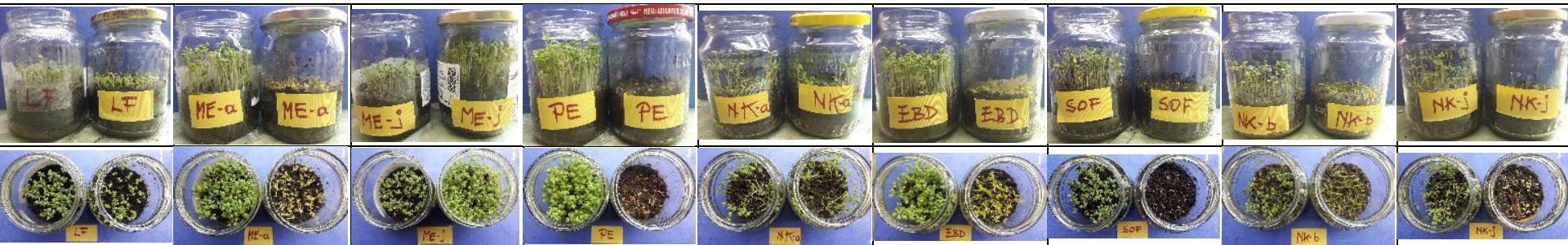
Quick tests for practice and learning

• NO ₂	0
• NO ₃	200 – 300 mg/kg
• NH ₄	<2 mg/kg
• pH actual (in H ₂ O)	7 – 8
• pH potential (in 1 N KCl)	7 – 8
• Difference pH act. – pH pot.	< 0,3
• Sulfid	0
• El. Conductivity	< 3 mS /cm
• Cress Test	positive !

Additional Laboratory tests and requirements

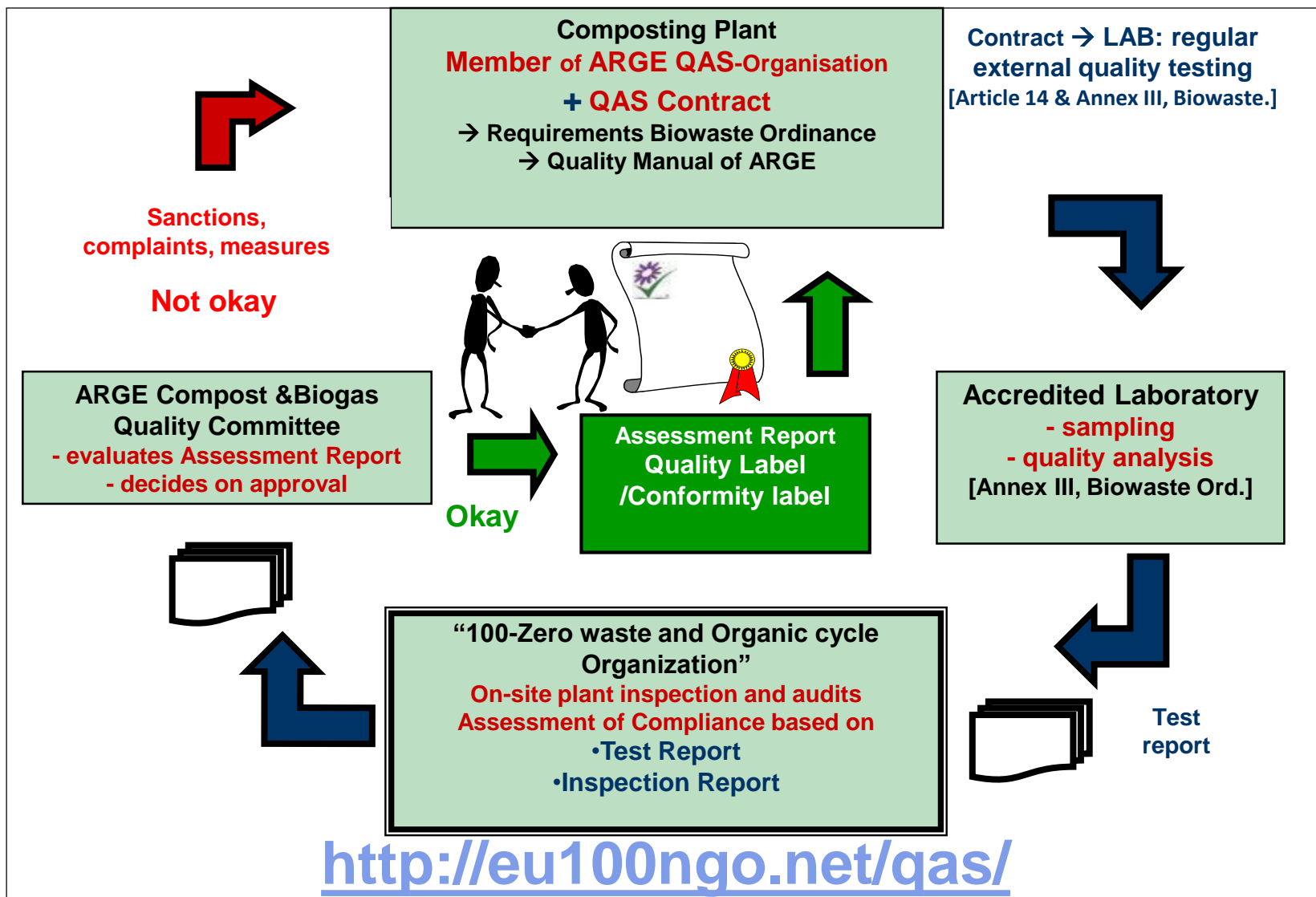
• Organic matter	20 – 35 % d.m.
• Impurities	< 0,5% d.m.
• Heavy metal limits for agricultural use	
• Salmonella:	0
• Pathogenic E. Coli	0
• > 55 °C for 10 days and 2 – 3 turnings	

Closed & Open Cress Test Stability of Organic Matter & Aggregates





External quality approval and QAS for compost





International QAS

“100 NGO” / “Compost & Biogas Association Austria Austria”



kompost
& biogas
verband

Federal Ministry
Republic of Austria
Agriculture, Regions
and Tourism



ZERTIFIKAT
Quality Management and Control System
for Compost Austria

MUNICIPAL ENTERPRISE FOR WASTE TREATMENT - SOFIA

Compost Plant Han Bogrov
Gorni Bogrov village, Malo livade

on behalf of arge kompost & biogas has been inspected and controlled by its partner organisation

“100 – First Zero Waste & Organic Cycle Organisation”
for compliance with:

Ordinance on the Treatment of Biowaste from 15 October 2013, Technical Regulation ONR 192206 Implementation of quality assurance on composting plants; ONORM S 2206-1: Requirements for a quality assurance system for the production of composts – Part 1: Principles for quality assurance of a company and of the internal technical processes; ONORM S 2206-2: Requirements for a quality assurance system for composts – Part 2: Determination of tasks and conditions for a quality assurance organisation

The enterprise is eligible to refer to this certificate in the declaration and labelling of compost products that have been tested in compliance with the Ordinance on the Treatment of Biowaste from 15 October 2013 and to use the label „Kompost Qualitätsbetrieb“ as sign at the facilities premises and official documents issued by the composting plant in electronic and printed format.

Last inspection: 03.06.2016

Validity: until the next inspection, at maximum until 31.12.2016

Conditions of the validity of the certificate:

- Compliance with all relevant legal obligations, including the plant's permits
- Fulfilment of the requirements of arge kompost & biogas

Vienna, Sofia, 04.11.2015

Reinhold Hubert

Für das Qualitätszertifikat-Kollegium
Vorsitzender Reinhold Hubert

QAS AKRO zertifiziert
by EDN-QAS



kompost
& biogas
verband



Successful Bio-Waste Recycling

4th 5-Day Practitioner Study Tour & Training Course

Austria, 13 to 18 September 2020

Site visits + B2B meeting with operators and authorities

- **Compost** (150.000 tpa) and **biogas** (25.000 tpa) plants of the **City of Vienna**
- The practice of **separate collection of all types of bio-waste**: Organisation, responsibilities, partners, economics, information & education work
- **Open windrow composting** of food waste, garden& park waste, quality approved sewage sludge
- Innovative **separation techniques for impurities** (plastics, metals, glass, stones)
- Biogas plant – bio-methane fuel production and CO2 recovery, digestate use
- Composting: **Quality & process management** and monitoring, with and without aeration
- **Inter-municipal cooperation** for recycling
- **Mechanical-Biological Treatment** of residual waste



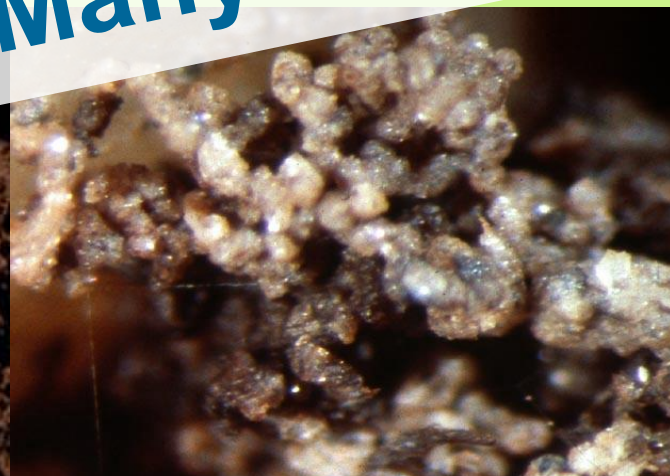
The Key = BIODIVERSITY !



Fotos: Bioforschung Austria, Hildebrandt, Hedl, Amlinger



Many thanks !!!



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