

# How does green waste compost affect soil fertility?

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**IOR**

THE INITIATIVE ON ORGANIC RESEARCH



**Why use compost?**

Composting is a method of stabilising organic wastes by the action of micro-organisms

- Volumes are reduced
- The material is sanitised
- Nitrogen is converted to a form less likely to be lost by leaching

# **The composting process**

Compost for agriculture can be made:

- At centralised sites (either outside or in enclosed vessels)
- On the farm itself (generally in open windrows)



The basic process is very simple

- Collection of suitably balanced feedstock materials
- Shredding
- Composting
- Maturation
- Screening
- Application of finished product

## A wide variety of materials may be composted

- Centralised municipal composting sites usually use 'green waste' from parks and gardens
- Farm-made compost usually includes a high proportion of animal wastes
- Waste from vegetable packhouses is often available
- Other materials may be used in certain areas (eg brewing waste or spent coffee grounds)

# **Characteristics of compost**

There will be some variation depending on the feedstock used – indeed it is possible to tailor composts for specific applications by varying the composting process

‘Typical’ green waste compost characteristics are presented here

## General properties of green waste compost

pH	8.6
Electrical conductivity ( $\mu\text{S cm}^{-1}$ )	773
Dry matter (%)	59
Density ( $\text{kg L}^{-1}$ )	0.5
Organic matter (%)	19

# Nutrient contents

Material	DM (%)	Total (kg/t fresh wt)			Readily available (% of total)		
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P	K
FYM	25	6.0	3.5	8.0	25	60	60
Cattle slurry	6	3.0	1.2	3.5	30-50	50	90
Sewage sludge	25	7.5	8.7	0.8	15	50	100
<b>Green waste compost</b>	<b>66</b>	<b>7.3</b>	<b>3.0</b>	<b>5.5</b>	<b>&lt;10</b>	<b>15</b>	<b>50</b>

# Contamination with PTEs (mg/kg dry weight)

	Cd	Cr	Cu	Pb	Hg	Ni	Zn
Green waste compost	0.49	19	44	105	0.18	18	185
Kitchen and garden waste compost	0.47	18	42	63	0.16	20	178
TCA compost standard	1.5	100	200	150	1.00	50	400

# PTE loading rates

(kg metal/ha/year when compost applied at 35t/ha/yr)

Material type	Cd	Cr	Cu	Pb	Hg	Ni	Zn
Green waste	0.01	0.44	1	2.47	0.004	0.42	4.27
Green and kitchen waste	0.01	0.42	1	1.46	0.004	0.46	4.11
FYM	0.001	0.01	0.1	0.02	--	0.02	0.6
UK sewage sludge regulations	0.15	NA	7.5	15	0.1	3	15

# Contamination with inert fragments (% by weight)

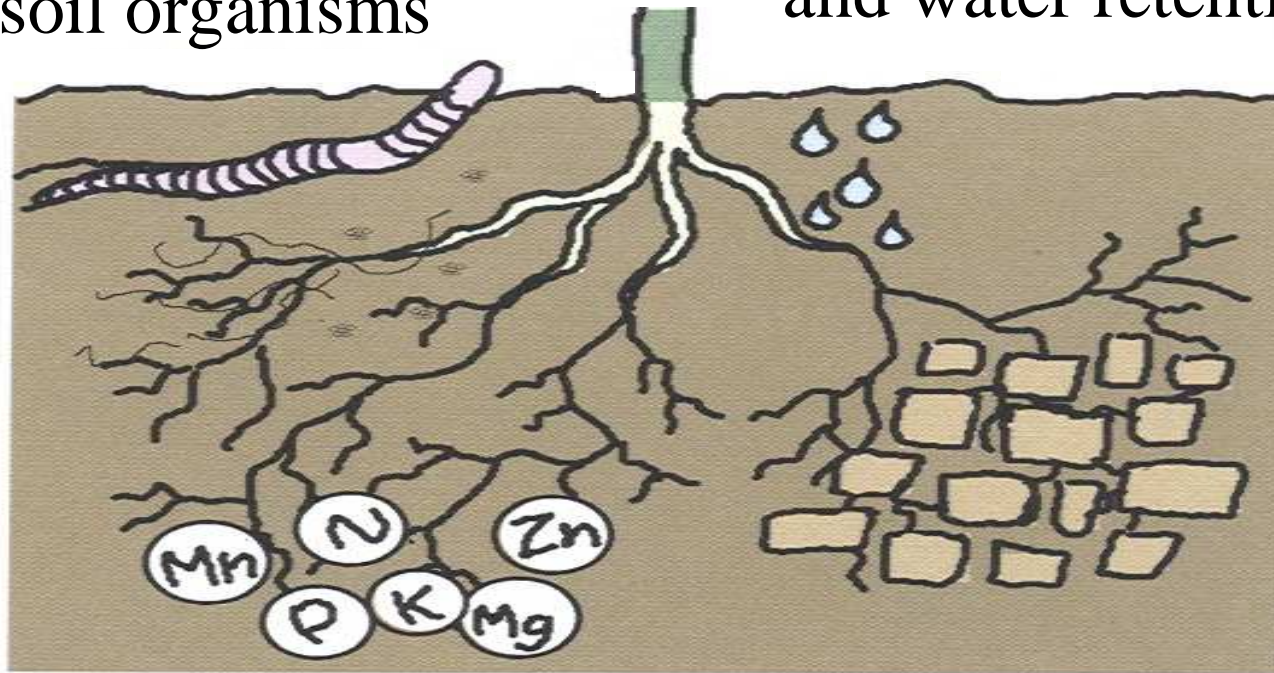
	<b>Glass</b>	<b>Metal</b>	<b>Plastic</b>	<b>Total</b>
Green waste compost	0.05	0.04	0.06	0.15
Acceptable limit level	--	--	<0.5	1.00

# **The effects of compost application**

# Some benefits of compost

Greater diversity of soil organisms

Improved soil structure and water retention



Supply of plant nutrients

Suppression of plant pathogens

# Effects on soil chemistry

- The nitrogen in compost is very stable and is only released slowly – there is therefore little risk of it being leached
- Compost is a good source of potassium (in a readily available form)
- Compost is a reasonably good source of phosphorous
- Trace elements are also returned to the soil

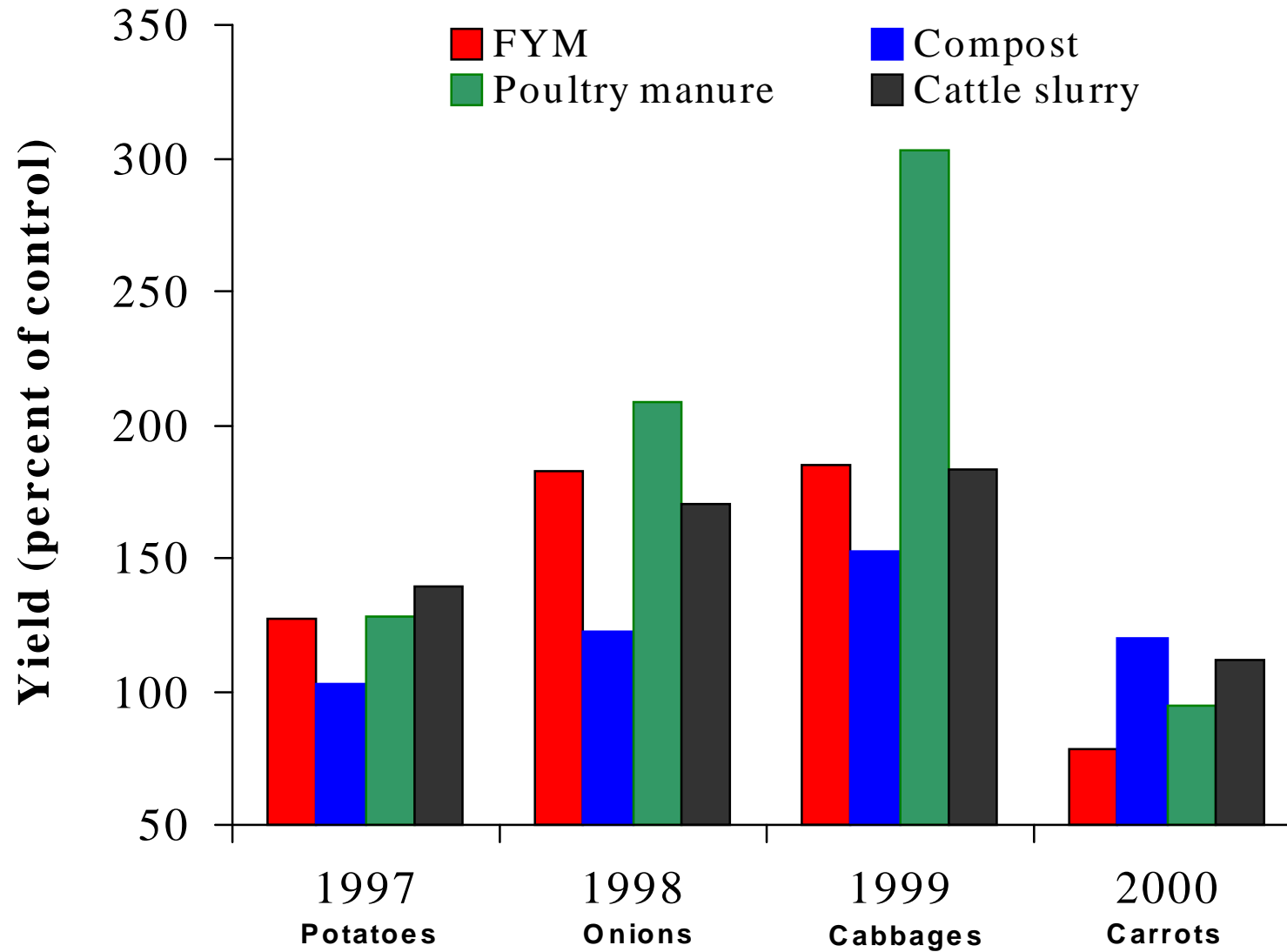
# Effects on soil structure

- Organic matter additions improve soil structure on both heavy and light land
- This has beneficial effects on water holding capacity, drainage, erosion and root penetration
- Cultivations are made easier

# Effects on soil biology

- Biological activity is stimulated by the addition of nutrients and by the improvement to soil structure
- Some evidence suggests that there can be inhibition of plant diseases

# An example of the effects on crop yields



# **Which farms are most likely to make use of compost ?**

- Farms local to composting facilities
- No livestock
- Soil structural problems
- Vegetable farms/protected cropping
- Organic farms
- Managed by farmers with an environmental conscience

# Conclusions

- Composting can be an effective way of managing organic wastes.
- On-farm composting is a useful technique for dealing with farm generated wastes - bringing in material from elsewhere can be a good business in itself.
- Application of compost adds to the organic matter in the soil
- Compost is a good source of available P and K. The nitrogen it contains is in a stable state and relatively unavailable in the short term.