Organic soil amendments; the effects on of composts and manures on soil fertility and crop performance

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Garden Organic
Types of amendments

- Farm yard manure (various species and bedding types)
- Slurry
- Composted farm wastes
- Green waste compost (bought in or made on site)
- Digestate (from anaerobic digestion)
- Sewage sludge!
Reasons for using soil amendments

- Addition of organic matter to improve soil structure
- Addition of plant nutrients
- Modifying the availability of nutrients
- Disposal of wastes
Potential problems

- Oversupply of plant nutrients (possible nitrate leaching risk)
- Pest and disease issues
- Issues with regulations
- Contamination issues (heavy metals, inert fragments, gm residues)
## Characteristics (can be very variable)

<table>
<thead>
<tr>
<th>Material</th>
<th>DM (%)</th>
<th>Total (kg/t fresh wt)</th>
<th>Readily available (% of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>P$_2$O$_5$</td>
</tr>
<tr>
<td>FYM</td>
<td>25</td>
<td>6.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Cattle slurry</td>
<td>6</td>
<td>3.0</td>
<td>1.2</td>
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<tr>
<td>Sewage sludge</td>
<td>25</td>
<td>7.5</td>
<td>8.7</td>
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<tr>
<td>Green waste compost</td>
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<td>7.3</td>
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</table>
Contamination issues

• Compost acceptable for use in organic agriculture must be produced according to PAS 100 specifications
• These lay down maximum limits for heavy metals, glass, metal, plastic and weed seeds
• There are difficulties with using food derived composts because of their potential gmo content
Effects in the field

Many trials have been done over the years but there is a lack of information about the long term effects of repeated applications. This is particularly the case with regard to organic matter changes and nitrogen supply.
Effects on soil nutrients - nitrogen

- All amendments increased available nitrogen immediately after application
- The increased nitrogen concentrations last for around 5 months
- Poultry manure had the most pronounced effect
• Poultry manure is a good source of phosphorus

• FYM is a reasonable source of potassium

• Green waste compost is a good source of both P and K
Effects on soil organic matter

Measurements made after four annual applications which supplied nitrogen at the rates indicated below (kg/ha)

<table>
<thead>
<tr>
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<th>0.0</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
<th>2.5</th>
<th>3.0</th>
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<tr>
<td>Low compost</td>
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<tr>
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<tr>
<td>High compost</td>
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</tr>
<tr>
<td>FYM</td>
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<td></td>
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<tr>
<td>Poultry manure</td>
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<td></td>
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</tr>
<tr>
<td>Cattle slurry</td>
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</tbody>
</table>
Effects on yield – single applications

Trial on an organic sandy silt loam

Trial on a sandy loam
Effects on yield – repeated applications

Trial on a sandy loam soil in a field vegetable rotation; annual applications containing 250kgN/ha
Conclusions

• Manures and composts can be a valuable source of organic matter and plant nutrients to help maintain soil fertility
• Overuse can cause problems with environmental pollution
• There can be a range of issues when these materials are brought onto an organic farm from outside
• There may be occasions when similar benefits can be gained from using a fertility building crop
Acknowledgements

Findings from a variety of projects were described in this project. These were funded by Defra, WRAP and Wyvern Waste Services Ltd. We are also grateful to the various farmers on whose land we conducted trials.