Composts from biowaste: a tool for organic production

4. Application of compost (and digestate)

Jacques G. Fuchs (FiBL)

Application techniques

- Compost and solid digestate in open field: a spreader with plates is recommended

Application techniques

- Compost and solid digestate in open field: a spreader with plates is recommended
- Liquid digestate: application with a digger is recommended; application in the evening or early in the morning is advantageous

Application techniques

- Compost and solid digestate in open field: a spreader with plates is recommended
- Liquid digestate: application with a digger is recommended; application in the evening or early in the morning is advantageous
- Rapid incorporation of the compost / digestate in the upper 10 cm of soil
- Equipment with large tyres
- Attention to the conditions of soil should be paid

Risks in relation with compost / digestate application

- Plastics, glass, iron
  - Selection and sorting of input materials
- Organic pollutants, heavy metals, antibiotics, pesticides
  - Selection of input materials
- Weeds, pathogens
  - Process management
- Nitrogen immobilization
  - Type and maturity stage of the compost
Risks in relation with compost / digestate application

› Nitrogen immobilization: evaluation of risks

Young compost

Risks in relation with compost / digestate application

› Nitrogen immobilization: evaluation of risks

Digestate

Risks in relation with compost / digestate application

› Nitrogen immobilization: evaluation of risks

Risks in relation with compost / digestate application

› Nitrogen immobilization: evaluation of risks

Choosing a compost/digestate and the application strategy

› Target use / desired effects
  › Short term fertilization effect
  › Improvement of soil structure (porosity, water holding capacity, reduction of erosion, …)
  › Effect on soil pH
  › Suppression of plant diseases
  › Component of culture substrates
  › Field culture / vegetables / trees / culture in pots / …
Choosing a compost/digestate and the application strategy

- Parameters to consider when choosing the product depending on the target use / desired effects
  - Nutrient contents (macro and trace nutrients)

<table>
<thead>
<tr>
<th>Nutrient contents (kg/m³)</th>
<th>Liquid digestate</th>
<th>Solid digestate</th>
<th>Compost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrates</td>
<td>6,6</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Phosphates</td>
<td>9,5</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Potassium</td>
<td>4,0</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Calcium</td>
<td>10,0</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0,4</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Sodium</td>
<td>0,2</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Sulfur</td>
<td>0,3</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Copper</td>
<td>0,02</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Zinc</td>
<td>0,02</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Manganese</td>
<td>0,02</td>
<td>1,3</td>
<td>2,8</td>
</tr>
<tr>
<td>Iron</td>
<td>0,02</td>
<td>1,3</td>
<td>2,8</td>
</tr>
</tbody>
</table>

- Availability of nutrients (nitrogen)
- pH, salinity

Choosing a compost/digestate and the application strategy

- Parameters to consider when choosing the product depending on the target use / desired effects
  - Nutrient contents (macro and trace nutrients)
  - Availability of nutrients (nitrogen)
  - pH, salinity

Choosing a compost/digestate and the application strategy

- Damages caused by too high salinity
- Damages caused by too high pH

Choosing a compost/digestate and the application strategy

- Parameters to consider when choosing the product depending on the target use / desired effects
  - Nutrient contents (macro and trace nutrients)
  - Availability of nutrients (nitrogen)
  - pH, salinity

Choosing a compost/digestate and the application strategy

- Ways to influence product characteristics
  - Selection of input materials
  - Treatment system (for example composting / anaerobic fermentation)
  - Process management (post-treatment and storage included)
  - Maturity stage

Evaluation of input materials (contamination with plastics, glass, ...)

Ways to influence product characteristics

- Selection of input materials
- Treatment system (for example composting / anaerobic fermentation)
- Process management (post-treatment and storage included)
- Maturity stage
Choosing a compost/digestate and the application strategy

- Choice of application strategy
  - Application timing
  - Total application quantity
  - Quantity of product used at each application
  - Application technique (broad, concentrated, ...)
  - Combination of products

Choosing a compost/digestate and the application strategy

- Correct application strategy
  - Adapted to the target culture
  - Broad application
  - Application under the rows or in the mounds
  - Sensitivity of the crop to salt or high pH (horticulture)
  - Phytosanitary risks (e.g. powdery scab of potatoes)
  - Adapted to the season
  - Adapted to the target effects
    - Improvement of soil structure on the middle/long term
    - Short-term fertilization
  - Adapted to the season

Compost for vegetable crops

- Annual application of compost, adapted to fertilizers’ balance
- Application of liquid digestate in spring to boost the crop
- Application of mature compost (to avoid nitrogen immobilization) to improve the plant health and the soil structure
- Depending of the crop, broad or concentrated application on the row or in the plantation hole (mixed with soil)
- Application at sowing or at planting
- Incorporation of the compost in the upper 5-10 cm of soil

Correct use of compost (and digestate)

Swiss guideline 2010

Available in french and german on www.biophyt.ch

Aspects of composting under (sub-)tropical conditions
Aspects of composting under (sub-)tropical conditions

General conditions
- What is the available organic matter?
  - Quality
  - Quantity
- What is the expected utilization of the compost?
  - Culture
  - Soil
- What are the available resources?
  - Human resources
  - Technical resources

Aspects of composting under (sub-)tropical conditions

Plan a collection system

Aspects of composting under (sub-)tropical conditions

Plan a composting system

Aspects of composting under (sub-)tropical conditions

Plan a composting system

Aspects of composting under (sub-)tropical conditions

Plan a composting system
Aspects of composting under (sub-)tropical conditions

Plan a composting system

Aspects of composting under (sub-)tropical conditions

Organize compost management

Aspects of composting under (sub-)tropical conditions

Preparation of the final product

Aspects of composting under (sub-)tropical conditions

Quality control

Aspects of composting under (sub-)tropical conditions

Specificity of composting under tropical conditions

- Difficulty to find enough appropriate organic waste
- Difficulty to find good balanced organic waste (C:N ratio)
- Low technology
- Compost use: salt is problematic

Conclusions
Conclusions

› Positive effects of composts et digestats
  › On the chemical characteristics of the soil
  › On the physical characteristics of the soil
  › On the (micro) biological characteristics of the soil
  › Phytosanitary effects

› Getting a positive effect from compost/digestate is only possible with good quality products and a correct application

New publication on biology, production quality and use of composts (and digestates)

To be downloaded on www.biophyt.ch

Composts et digestates:
A real help for the plant grower!

www.fibl.org
www.biophyt.ch