

TRAINING MATERIAL

Title:

The use of **compost** in **Southern Europe**.

Training:

Main features of the subcategory

Composts significantly increase soil organic matter (SOM) contents, a key soil quality indicator that is on the contrary declining in many regions of the world. There are many compounds within compost that influence the biological process in soil, improving the physical and chemical characteristics. Humates improve the soil structure and then the plant roots could easier penetrate. Improving root growth, the stability of trees increases and the water stress decreases. Additional benefits of compost addition to soil are promoting soil biological activity, reducing erosion losses, decreasing bulk density, improving structural stability, nutrient availability and plant uptake, increasing the water holding capacity. The use of compost is also interesting as a peat substitute, in particular after recent increasing concern on peat extraction and the damage of peat lands natural habitats by the horticulture industry that lead to the adoption of alternative substrates. However, composts can hardly be used alone as a growing media; it is necessary to do a germination test or compost analysis to determine the suitability because will be often kill or damage plants due to excessive salinity.

Input material

Organic wastes, including organic fraction of municipal solid waste, green residue from separate urban collection, dehydrated effluent from wastewater treatment plant, food wastes, s green wastes, farms' manures, straw and algae.

How to produce?

Composting is the decomposition process of organic waste by the action of aerobic bacteria, fungi, and other organisms. To obtain a good composting process, it is necessary to have a good ratio of carbon-rich input materials and N-rich input materials. Also the temperature, CO₂ and moisture content are important parameters. To aerate and homogenise the pile it is necessary to turn it over from time to time. At farm level this can be done with a windrow turner. The follow-up and turning of the pile requires extra time and labour for the farmer. Farm-level composting could be used for optimisation of the quality of the solid fraction of manure as fertilizer/soil improver, and reduce nutrient losses during storage. Composting (self-heating) of the product at temperatures exceeding 70°C is only possible if a maximum of 30 wt% of solid fraction of pig manure is used. This can then be combined with the solid fraction of cattle slurry, cattle manure with straw, horse manure or poultry manure to obtain enough structure and an optimal C/N ratio. Some sites also add vegetal biomass or vegetable, fruit and garden (VFG) waste or green waste compost. This mostly occurs in a closed shed consisting of several tunnels which can be closed off and aerated separately (large capacity). It can also be done by use of an aerated drum (feasible at farm scale level). The material can also be placed in rows on the floor and is turned over manually (extensive composting).

Typical nutrient content and availability for plants

The compost usually contains 0.8-2.4% N (d.m.), 0.7-2.3% P₂O₅ (d.m.), 1.3-1.8% K₂O (d.m.) with a 40% of humidity.

Examples for compost products available on the NUTRIMAN Farmer Platform

- https://nutriman.net/farmer-platform/product/id_210 (Italy)
- https://nutriman.net/farmer-platform/product/id_260 (Italy)
- https://nutriman.net/farmer-platform/product/id_540 (France)

Some composts selected in the NUTRIMAN project are available in Southern Europe.

The compost from green waste and digested mixed-waste by "ACEA Pinerolese" process (ID:210 – Figure 1) is made starting from de-hydrated effluent from the anaerobic digestion of organic fraction of municipal solid waste, green residues from separate urban collection and dehydrated effluent from the wastewater treatment plant. It contains 2.4% N (d.m.), 2.3% P₂O₅ (d.m.), 1.3% K₂O (d.m.) with a 40% of humidity.

The compost from green and food wastes by "Biociclo" process (ID:260 – Figure 2) is made starting from biowaste, food waste collected door to door and green waste; and it contains about 2.4% N (d.m.), 1.2% P₂O₅ (d.m.).

In France the compost from algae and cattle manure by local composting process is available (ID:540 – Figure 3). It is made starting from cattle manure, equine manure, straw and algae and contains 0.8% N (d.m.), 0.71% P₂O₅ (d.m.), 1.82 K₂O (d.m.).



Figure 1. ACEA compost (ID:210).



Figure 2. BIOICLO compost (ID:260).



Figure 3. French compost (ID:540).

Fields of application in agriculture: crop, dosages, application method and practical recommendations.

The composts (ID:210-260-540) are used at 5-30 t/ha according to soil quality, season and crop uptake. They could be used to improve the production of a lot of cereal and horticulture crops, such as potato, wheat, corn, soybean, sunflowers, cabbage, pumpkin, cucumber, tomato, leafy vegetables, celery, leek, and also used in floriculture, horticulture and vineyard.

Benefits for farmers

Compost provides a good amount of organic matter and the slower release of nutrients had positive effects on plants development, demonstrating demonstrated to be able to substitute, at least partially, mineral fertilizers.

The composts (ID:210-260-540) are all usable in organic farming. They are odorless product thanks to temperature monitoring and maturation time.

Composts have a low C/N ratio: the products are well-stabilized but able to increase soil fertility.

They have a good effect on acidic soils.

Composts are closing material and nutrient cycle: secure source of carbon, nitrogen, phosphor, and other macro-/microelements.

Composts contribute to improve soil biodiversity by increasing microbiological fauna & flora Increases soil fertility.

They are characterized by a low release of nutrients and increase cation exchange capacity of soil.

Moreover, composts reduce leaching and increase water retention capacity and thereby decrease vulnerability to erosion and desiccation (droughts).

Furthermore, ID 210 is produced from pre-digested selectively collected organic waste streams, and the integrated anaerobic digestion process allows producing biomethane.

Bottlenecks of application. Potential risk or limitation.

The main bottleneck for the application of compost is when you have to apply the product in an area sensitive to nitrogen or phosphorus, according to the local regulation from directives 2000/60/CE and 91/676/CEE. Consequently the application dosage must be chosen according to soil availability and crop uptakes.

Finally, for correct spreading, remember that it is necessary to use a manure spreader equipped with reinforced chains. In fact, given the finer texture of the product compared to manure, it is possible that using a common manure spreader the product slips under the chains, generating a pressure that breaks them.

Legal framework for usingSpecific national legal conditions

ID:540 respect the French standard NF U44-051.

ID:210 is registered to "Registro Fabbricanti" n° 00218/07 for the fertilizer market, and it is authorized to sell 5 conventional products ("Registro uso convenzionale") and one biological product ("Registro uso biologico"), according to the Italian legislation (D.Lgs. 75/2010).

ID:260 holds a "Quality certificate" assigned by CIC (Consorzio Italiano Compostatori), according to the Italian legislation (D.Lgs. 75/2010).

EU Fertilising Products Regulation

ID:210 is a PFC 3 A 'Organic Soil Improver'. Furthermore it is eligible to be categorised as Component Material Category (CMC) 3 'Compost'

ID:260 is a PFC 3 A 'Organic Soil Improver', which can also re-enter into PCF 4 as 'Growing medium'. Furthermore it is eligible to be categorised as Component Material Category (CMC) 3 'Compost'

ID:540 is a PFC 3(A) : organic soil improver.

All these products (ID:210-260-540) are applicable in organic farming.

Economic evaluation of the application of the products

Usually compost (ID:210-260-540) costs about 2-20€/t ex works depending on required volume and packaging. Considering improved yields and quality, these costs are generally sustainable (about 50-200€/ha).

Unlike other fertilizer, which could be easier transported and distributed because of their lower water content, composts are more feasible when applied nearest to the manufacturers' plants because high quantities (5-30t/ha) are applied.

Best management practice guideline, taking into account of specific conditions of the given territory, for the use of the product to the specific applications (soil improvers, growing media, organic fertilisers etc.).

Application doses

- Soil improvers:
 - ID:210 → from 10 to 30 t/ha (according to soil quality, season, crop uptake,...)
 - ID:260 → from 20 to 35 t/ha (according to soil quality, season, crop uptake,...)
 - ID:540 → from 10 t/ha up to 25 t/ha (according to soil quality, season, crop uptake,...)
- Growing media:
 - ID:210 → 5-20% (v/v) mixed to other components; 0% on acid loving plants.
 - ID:260 → 5-20% (v/v) mixed to other components; 0% on acid loving plants.
 - ID:540 → 5-20% (v/v) mixed to other components; 0% on acid loving plants.
- Organic fertilizers:
 - ID:210 → from 10 to 30 t/ha (according to soil quality, season, crop uptake,...)
 - ID:260 → from 20 to 35 t/ha (according to soil quality, season, crop uptake,...)
 - ID:540 → from 10 t/ha up to 25 t/ha (according to soil quality, season, crop uptake,...)

How to store, apply to land, machinery needs.

Composts should be stored in dry place and not directly exposed to the sunlight. Particularly if the compost is not packaged one of the simplest methods of compost storage is on the ground covered with a tarp or plastic sheet. This will prevent excess moisture from rain and snow runoff, but will allow some moisture to seep through and keep the mound moist. Remember that composts have a higher content of water (about 40%) compared to mineral fertilizers, which increases transport costs, makes it necessary to distribute high dosages per hectare and difficult to spread. In fact it could get stuck under the chains of the manure spreader risking breaking them. It is necessary to be very careful when spreading.

For more information:

- https://nutriman.net/farmer-platform/product/id_210 (Italy)
- https://nutriman.net/farmer-platform/product/id_260 (Italy)
- https://nutriman.net/farmer-platform/product/id_540 (France)