2 Compost types, feedstocks and composting methods

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In short:

- Compost types are characterized by feedstocks, composting processes and compost maturity.
- Feedstocks for composting differ greatly in carbon and nutrient contents, moisture and salinity.
- Mixing different feedstocks is necessary to obtain a good compost quality. Not only is the C/N ratio of the starting materials important to consider but also the C/P and N/P ratios.
- Different feedstocks also result in different structured starting mixes and different moisture contents, which is important for good aeration during the composting process.
- A wide range of composting methods has been developed. A broad division can be made between the level of technology used, e.g. with or without forced aeration, and if the system is open or closed to the environment.
- The degree of maturity is an important characteristic of compost, which is determined by the management and duration of the curing phase.

2.1 Compost types

The type of soil, the aim of the compost application and the availability of organic materials will influence the choices of a grower for the most suitable forms of organic amendments. There are limited possibilities for greenhouse growers to apply green manures or crop rotations with soil-nurturing and deep-rooting crops like grains, so the grower is dependent on the use of a variety of manure and compost types in order to sustain the organic matter content of the soil. The grower may needs to make important choices between the use of fresh manure, compost and digestate. Compost is the result of an aerobic transformation process, while digestate is the result of an anaerobic process. The differences between compost and digestate are discussed in Chapter 7.

***Figure 2.1** Manure (left) and compost (right) used for on-farm experiments on the effects of different organic amendments on soil structure and sealing.*

Different types of compost and manure have different chemical and biological properties. They will add different qualities of organic matter when mixed with the soil. Compost generally has more the character of a soil-feeding amendment, while fresh or slightly composted manure also has an important plant-feeding component.

In addition the fresh organic matter of manure will stimulate soil life in a different way when compared to organic materials that have been composted. Sometimes uncomposted crop residues are used, as in the use of lignin-rich crop-residues like wheat straw (Figure 2.2) to improve disease suppressiveness against soil-borne diseases. The most important constraint to the use of fresh instead of composted crop residues is the possible contamination with plant pathogens. There are no general rules that determine which kind of organic amendment to use. The biological, chemical and physical characteristics of the soil and the grower's experience of the soil determine the most appropriate choice. The regional availability of compost or manure may also play an important role in the final decision.

Figure 2.2 *Application of compost in organic greenhouse (left) and application of wheat straw in experimental plots (right). Straw has been traditionally used in cucumber cultivation to enhance soil temperatures in planting beds. It is experimentally used to stimulate lignin-degrading organisms in soil, and improve disease suppressiveness. As the materials are used on a very rich soil, the risk of nitrogen immobilization is limited.*

Several types of composts are available for organic greenhouse growers. The most common are traditional composts made of a combination of manure and plant residues. In this mix, the manure provides most of the nutrients, including nitrogen (N), phosphorus (P) and potassium (K). The abundant presence of microorganisms in manure also enables the onset of a fast decomposition process, once exposed to sufficient levels of moisture and oxygen. The plant material is much better aerated than the manure and thereby helps to enable air penetration (forced or by passive diffusion) to all parts of the compost pile, including its core. Other types of feedstocks are source-separated municipal waste (the organic fraction) and spent mushroom compost. Some feedstocks, like sewage sludge, are not allowed in organic agriculture. Input materials will influence not only the nutrient contents of the finished compost but also its salinity. They also determine, together with the process management, the stable humus content of the final product and the composition of the microbial population. In the following paragraphs, the main factors which distinguish between compost types are discussed: feedstocks, processes and maturity. Table 2.1 shows the influence of these three factors on specific compost characteristics.

Table 2.1

Relative importance of feedstocks, process management and maturity on specific compost characteristics.

Compost characteristics	Feedstocks	Process management	Maturity
Total nutrient content	+++	+	-
Available nitrogen	++	+++	+++
Salinity	+++	(+)	+
pH	++	+	+++
Humus content / water extract colour	++	+	+++
Stable humin content	++	+	+++
Phytotoxicity	+	++	+++
Disease suppressive potential	++	+++	++

- almost no influence; + little influence; ++ moderate influence; +++ strong influence

2.2 Compost feedstocks

Different feedstocks will add different amounts of carbon (energy) and nutrients to the compost. When composting on-farm, the availability of manure will influence the characteristics of the resulting compost. Some basic knowledge of manure types can be helpful in designing the right starting mixture for the composting process. The composition of manure is highly variable, according to animal type, animal diet, type of housing, and the amount and type of litter, and (spilling) water used. Storage conditions and the length of storage are important factors in the amount of gaseous losses. Treatment measures such as rotating the manure heap, aeration and the use of additives will also influence the loss of organic matter and nutrients. Analysis of solid and liquid manures from cattle and solid manure from pigs on German organic farms has shown that minimum and maximum values from these farms were often wider apart than corresponding ranges of conventional farmyard manures, and that mean nutrient values tended to be in the lower to mid-range of conventional manures (Table 2.2). Manure from deep-litter stables was found to be particularly rich in potassium, as this type of manure also contains the urine[1].

Manure from ruminants (cattle, goats, sheep) differs essentially from manure from non-ruminants (pigs and poultry). Ruminants have a four-compartment stomach, and are able to digest structured and cellulose-rich plant materials, with the aid of fermentation by anaerobic bacteria that reside inside the rumen. The nutrient ratio in the manure is comparable with the nutrient ratio of many crops. The ratio between protein and energy-yielding nutrition in the ruminant diet can significantly influence the nutrient contents of the manure. A low protein diet will result in lower total N contents of the manure, and in higher amounts of organic N[2]. Research on dairy farms on mineral soils in the Netherlands has shown that during the period 1997-2010, N-total, Total Ammoniacal Nitrogen (TAN) and K contents of dairy cattle manure significantly decreased, probably as a result of decreasing fertilizer inputs on the land. On the other hand, P and Mg contents in manure remained stable[3].

Table 2.2

Variability in chemical parameters and nutrient contents (mean, minimum and maximum) of solid organic cattle manure (n=96), solid pig manure (n=18) and liquid cattle manure (n=13), compared with conventional reference values (adapted from [1]).

Parameters	Solid cattle manure		Solid pig manure		Liquid cattle manure	
	organic	reference	organic	reference	organic	reference
DM	21.8 (10.4-39.3)	19.0-25.0	23.4 (13.6-38.4)	20.0-25.0	6.4 (2.4-13.8)	4.4-15.0
OM	14.7 (8.5-20.8)	15.0-20.3				
C/N	16.3 (8.4-30.7)	14.0	12.5 (9.0-19.4)	10.0	10.8 (6.3-18.1)	
pH	8.4 (5.9-9.2)		8.2 (7.1-8.9)		7.3 (6.9-7.5)	
N-total	0.49 (0.22-1.02)	0.40-0.60	0.61 (0.40-1.00)	0.55-1.1	0.22 (0.11-0.35)	0.20-0.69
P_2O_5	0.28 (0.05-0.66)	0.20-0.40	0.57 (0.21-1.08)	0.75-0.85	0.09 (0.04-0.21)	0.09-0.36
K_2O	0.80 (0.07-2.30)	0.37-0.70	0.61 (0.31-1.39)	0.50-0.80	0.30 (0.17-0.48)	0.28-0.90
MgO	0.13 (0.01-0.33)	0.10-0.19	0.16 (0.08-0.26)	0.20-0.26	0.05 (0.02-0.11)	0.04-0.11
CaO	0.26 (0.01-0.79)	0.41-0.64	0.27 (0.08-0.56)	0.40-0.84	0.11 (0.04-0.20)	0.13-0.39

Nutrient contents, *DM* (dry matter) and *OM* (organic matter) are given in % of fresh weight.

Figure 2.3 *Bulking agents which can be used when composting manure are crop residues (left: cucumber) or wood (right).When crop residues are used, sufficiently high temperatures have to be reached during composting, for a long enough duration to avoid survival of plant pathogens.*

Non-ruminants convert a diet rich in grains, into a relatively nutrient-rich manure, with high amounts of N compared to other nutrients[2]. The N/P and C/P ratios of these types of manure are a particular constraint to their application as organic fertilizers. Experiments in which chicken manure has been composted together with carbon-rich feedstocks (42.5 vol% bark), produced high quality organic amendments in terms of organic matter content, C/P ratio, C/N ratio and stability. The upper limit for the use of fresh chicken manure in small-scale on-farm windrow composting has been indicated to be 10 vol%. Nutrient losses become too high above this value and the N/P ratio of the obtained fertilizer becomes too low. Composting of chicken litter (with an initial C/N ratio of 14-15) without addition of bulking agents, can lead to N losses of as much as 58% of the initial N[4]. Table 2.3 gives an overview of the nutrient contents in different feedstocks[5].

Table 2.3
The composition of feedstocks used in combination with chicken manure, in order to improve the quality as an organic amendment for soil, notably the C/P and N/P ratios (adapted from [5]).

Feedstock	DM	OM	C/N	N/P	Ntot	P	K	Ca	Mg
wheat straw	92.4	95.1	117	7.6	4.5	0.6	2.6	2.9	0.7
grass hay	63.5	92.4	51	5.1	10.0	2.0	17.6	4	1.2
poplar bark	46.5	90.3	58	7.1	8.8	1.3	6.6	26.6	1.7
willow wood chips	46.9	96.7	85	6.8	6.4	0.9	2.8	7.5	0.6
chicken manure	62.7	42.8	8.3	1.9	29.0	15.5	21.7	73.9	4.9
grass clippings	8.9	88.2	24	4.9	20.3	4.1	35.4	4.8	1.7

Values are averages of 4 samples per feedstock. *OM* organic matter, *DM* dry matter, *Ntot* total nitrogen. DM is given in % of the fresh product, OM in % of DM. Nutrient concentrations are given in g/kg DM.

Composting will have an effect on the quality of the manure. Composted cattle manure will be more stable than fresh or only slightly composted manure. Composted manures will also add more effective organic matter to the soil, compared to the original material. On the other hand, they will provide less food for soil life, as part of the carbon (energy) source has already been utilized by bacteria and fungi during the composting process. Composted cattle manure has a stronger alkaline effect on amended soils compared to fresh manure. The alkaline effect of cattle manure is attributed to buffering by bicarbonates and organic acids in cattle manure[6]. Sheep manure from ewes that are kept in sheds during the lambing season, is generally dry, and rich in straw. It is very suitable for composting, although mixing with carbon-rich materials may be necessary to prevent nitrogen loss. Goat manure is also relatively dry and straw-rich. It may contain more N than cattle manure, and can be mixed with carbon-rich material during composting[2].

Not all fresh manures can be directly composted i.e. without the addition of bulking agents and carbon rich materials to increase the C/N ratio and provide sufficient oxygen transport during the composting process. Manure from laying hens is very nutrient rich, and is characterized by rapid mineralisation, and a low amount of effective organic matter. It is therefore mainly valued as a direct source of plant feeding manure, and often used in dried, pelleted form during the growing season. Composting this type of manure with the addition of carbon-rich materials increases the soil-building quality of the manure. Solid pig manure can be very variable in composition, depending on the amount of straw and the diet. Depending on the amount of straw, adding carbon-rich materials may be necessary for composting. Composting pig manure is preferred as it will increase the amount of organically bound nitrogen, and provide a more diverse source of micro-organisms[2].

2.3 Compost starting mixes

In the previous paragraph we discussed how the input materials influence the characteristics of the produced compost. The choice of input materials also influences the composting process, and the resulting compost quality. To obtain a high compost quality, it is first of all important that the organic input materials are of high quality. They should be free from pollutants and other undesirable materials like plastics, metal or glass. High-quality compost can only be produced with source separated organic materials. To guarantee a good composting process, the starting mixture has to have an adequate C/N ratio between 25 and 35. The mixture should also have an appropriate structure to allow optimal oxygenation of the material without too much loss of temperature. The higher the windrow is, the coarser the mixture has to be.

Lignin-rich material can be stored for a long time without loss of nutrients. In contrast, N-rich material has to be treated as soon as possible to avoid a decline of quality through gaseous emissions and odours. The supply of organic input materials to compost plants often varies significantly during the year. Lignin-rich materials are mostly supplied in winter while high quantities of N-rich materials are supplied in spring and summer. For this reason, supply and storage of input materials should be balanced throughout the year. Adequate amounts of lignin-rich materials should be stored, in order to be able to compose an appropriate starting mixture when high supplies of N-rich materials become available.

A useful rule-of-thumb to prepare a starting mix is:
• 1/3 rough wood (e.g. shredded wood, saving rest material from compost, snipped bark).
• 1/3 medium-fine, fibrous material (e.g. shredded branches, wood fibers, straw, foliage, switch grass, reed).
• 1/3 fine materials (kitchen waste, grass clippings, manure, vegetable waste).

To improve the composting process, clays such as zeolites (5-10 kg/m^3 starting mixture) or clay-rich soil (3-5 % of the starting mixture) can be added. These materials buffer the composting process, diminish odor emissions and improve the formation of stable crumbs during the curing phase of the compost. The technical preparation of the input materials also plays an important role in the decomposition of the material. This is especially important for wood. If wood is chopped into chips, microbial colonisation is inefficient and the capacity of the wood as a structure-adding material to improve the aeration of the windrow is low. If the wood is correctly shredded and well de-fibered, microorganisms have good access to the material and the aeration of the windrow is highly improved (Figure 2.4). Finally, it is essential that the starting mixture contains sufficient moisture to allow the microorganisms to become active.

Figure 2.4 *Wood chips (left) cannot be efficiently decomposed by compost microorganisms, whereas defibered wood (right) can. The use of defibered wood results in a better structure within the windrows and allows for a better aeration.*

Table 2.4

The C/N ratio of different organic materials is important in designing a good starting mixture.

Organic material	C/N	Organic material	C/N
Urine	0.8	Kitchen organic waste	15-25
Feathers	4-5	Ideal C:N of starting mixture	30-35
Pig bristles	5	Rumen*	25-30
Chicken manure	8-10	Garden waste	20-35
Food waste	14-17	Coffee grounds	20-30
Grass clippings	9-25	Fruit waste	25-40
Hay	15-25	Nut shells	35
Mature compost	12-15	Tree leaves	40-70
Young compost	15-18	Straw	50-100
Cow manure	15-20	Wood (sawdust)	200-500

*the rumen content of slaughtered cattle

Figure 2.5 *Example of input materials for compost production. From left to right, top to bottom: manure, chicken manure, grass; garden waste, leaves, vegetables waste, eggshells, cocoa husks.*

2.4 Composting methods

Many composting methods have been developed over time. In the Netherlands, there has been a long history of compost use. Cities were already composting refuse and selling it to farmers before the introduction of synthetic fertilizers around 1900. In 1929 the city of The Hague started operating a composting plant using a modified version of the so-called Indore process in which large windrows were used[7]. The Indore composting system was developed in India by Sir Albert Howard (1873-1947) during the 1920s. The method uses layered mixtures of high C/N feedstocks like plant leaves with low C/N feedstocks like animal manure in an approximately 3:1 ratio. Thick layers of crop residues are covered by thin layers of manure, and these are covered by very thin layers of topsoil and limestone. The waste is put into pits or trenches, or piled on open ground to a height of 1.5-1.8 m, and manually turned at 6-8 week intervals. The total composting time of the Indore method is 4-6 months[7,8]. In 1932 the Dutch government supported the establishment of a non-profit organization, which was entrusted with the composting of municipal refuse in Wijster: the VAM (Vuilafvoer Maatschappij) or Refuse Disposal Company. The manual process of the Indore method was adapted, and mechanical processes were introduced in some of the composting steps.

In the 1930s and 1940s mechanical processes were further developed, mainly involving initial shredding and mixing of materials to facilitate composting. Giovanni Beccari developed and patented a new composting method in the 1920s in Florence, Italy. The Beccari method starts with anaerobic fermentation, and has a final stage in which decomposition takes place under partially aerobic conditions. Another system was developed in the early 1930s in Copenhagen. Partial decomposition of the feedstocks was obtained by pre-treatment of refuse in a rotating silo or drum. The materials were mixed and grounded before they were composted using the Indore method[7]. In the 1940s Eric Eweson developed a rotary drum composting system in the US. Influenced by Sir Albert Howard, he designed a system in which the compost material is anaerobically fermented in a large rotary drum, for 3-6 days, followed by windrow composting. This system has been very successful, and is still being applied[8].

Figure 2.6 *Mechanization has made large-scale composting possible: a drum chipper (left) and windrow turner (right).*

Mechanization has gradually advanced, with the development of self-propelled turners which has greatly enhanced the efficiency of windrows[9]. Current composting systems can broadly be divided according to the level of technology used, and whether the facilities are open or closed to the environment. As the windrow system is unable to supply sufficient aeration to very moist feedstocks, the aerated static pile composting system was developed in the early 1970s in Beltsville, US. In this system, the windrows are located on top of an air distribution system, made of perforated pipes embedded in woodchips[8]. Aeration is forced through the static pile either by blowing (positive pressure) or by drawing (negative pressure). The forced aeration claims to shorten the active decomposition period from 40 days or more in the windrow system to about 21 days in the static pile system. The initial Beltsville system draws air into the pile through negative pressure. The drawbacks of this system were cooling of the outside of the pile, and high temperatures (>80°C) in the core of the pile.

Rutgers University developed the method of positive pressure (blowing), which allowed for both the right oxygen requirements and good temperature conditions[10]. Both the windrow system and the aerated static pile systems, are ‘nonreactor’ or open air composting systems.

Several closed reactor systems have been developed, such as the rectangular agitated beds system, where composting takes place between long walls that form narrow beds. Feedstocks enter at one end of the beds, and the compost turning machine moves the compost with each turning towards the end of the beds. The initial composting process is relatively short in closed systems and should be followed by a curing period to obtain sufficient maturity[8].

Composting is not the same process as vermicomposting, although the products are both called ‘composts’. Vermicomposting is a bio-oxidative process, in which litter-dwelling (epigeic), detritivorous earthworm species are involved in the decomposition of organic materials. Earthworms play a crucial role, as they fragment the organic matter and increase the surface area, but the actual decomposition is carried out by microbial organisms in the earthworm gut and their castings. The characteristics of vermicompost are thought to be highly influenced by these gut- and cast-associated processes. In Europe, 3 epigeic earthworm species are used for vermicomposting: *Eisenia fetida, Eisenia andrei* and *Dendrobaena veneta*[11]. One of the most employed earthworm species is *Eisenia andrei*, because of the high digestion rate of organic matter, its tolerance to environmental conditions, its high reproductive rate and short life cycle, and its resistance to handling[12]. In vermicomposting, two phases can be distinguished: (i) an active phase in which earthworms process the waste by physical comminution, ingestion and microbial decomposition, and (ii) a maturation-like phase when the earthworms move to fresher layers of undigested waste, and microbes provide further decomposition. The vermicomposting process differs from composting, in that the temperature remains in the mesophilic range. This enhances the chance of pathogen survival[13].

The choice of the preferred composting method depends on the quantity (production scale) and quality of the input materials, the geographical and climatic situation and on preferences of the compost producer regarding e.g. labor requirements. Important aspects also include the degree of mechanization and the labor intensity of the system. Most existing systems are capable of producing good quality compost, but it is also possible to produce poor quality compost with all the existing methods. The difference between producing high or low quality compost is determined by the management of the composting process. The crucial factor is the adaptation of the management according to the system. A simple example is the size of the compost pile. The bigger the pile, the coarser the structure of the starting mixture has to be. Figure 2.7 gives a simplified overview of the composting process in three phases. The duration of the three temperature phases will differ according to the composting method. In Table 2.5 an overview of the most common composting systems in Europe is presented. The list is not exhaustive, but gives an idea of the scope of composting possibilities.

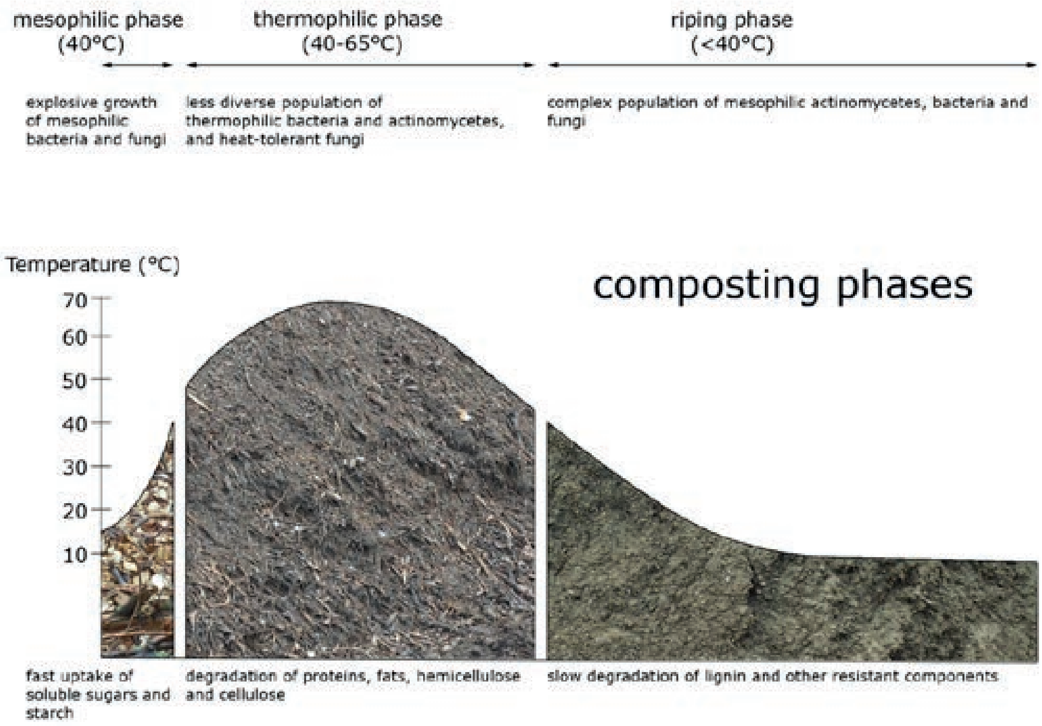

Figure 2.7 *General overview of the three composting phases and the degradation processes taking place. The length of the different phases will differ, according to the composting method applied.*

Table 2.5

Overview of common composting systems in Europe

Field edge composting

- Method appropriate for farmer with limited quantity of input material (up to 500-1,000 ton per year).
- Both solid manure and green waste can be treated with this method.
- No clear separation between environment and compost, it is difficult to assure weed free compost.
- Relatively low investment costs, but labor intensive.

Small windrows (up to 2 m high, 3-4 m wide)

- Method appropriate to treat solid manure and green waste up to 5,000-6,000 ton per year.
- Clear separation between environment and compost.
- Each pile can be managed individually (starting mixture, maturation degree), so that it is possible to produce different composts for different applications.
- Medium investment costs. Relatively labor intensive. Needs a relatively high surface area.

Large windrows (up to 3.5 m high, width not limited)

- Method appropriate to treat large quantities of solid manure and green waste. Enough coarse structure material is needed to assure a good circulation of the air in the pile.
- Can be implemented with forced aeration.
- Clear separation between environment and compost.
- No clear separation between different compost batches.
- Relatively high investment costs, but low labor demands compared to smaller piles.

Large windrows under roof (up to 3.5 m high, 5-6 m wide)

- Method appropriate to treated 5-6,000 ton of solid manure and green waste per year. Enough coarse structure material is needed to assure a good circulation of the air in the pile.
- With forced aeration.
- Clear separation between environment and compost.
- Clear separation between different compost batches.
- High investment costs and relatively labor intensive (piles have to be turned with a wheel loader).

Tunnel composting (approx. 2.5 m high, 5 m wide)

- Method appropriate to treat large quantities of solid manure and green waste.
- Compost turning is regulated automatically.
- Can be implemented with forced aeration.
- Clear separation between environment and compost.
- Clear separation between different compost batches.
- The frequency of turning for a compost batch is fixed (given by the system)
- High investment costs. Low labor intensity.

Box systems (approx. 3.5 m high, 6 m wide, 20 m long)

- Method appropriate to treat large quantities of solid manure and green waste.
- Compost turning, forced aeration and moisture control happen automatically
- Clear separation between environment and compost.
- Clear separation between compost batches.
- The distribution of the material over the box at the beginning of the process has to be homogeneous; otherwise the evolution of the composting process in a box will vary greatly from one part of the box to the other.
- High investment costs. Low labor intensity. Economic use of available surface area.

Hall composting (approx. 3.5 m high, 20 m wide)

- Method appropriate to treat large quantities of solid manure and green waste.
- Compost turning, forced aeration and moisture control automatically regulated.
- Clear separation between environment and compost.
- No clear separation between different compost batches.
- High investment costs. Low labor intensity.

Container composting (approx. 2.5 m high, 2.5 m wide, 12 m long)

- Method appropriate to treat 5,000-10,000 ton of solid manure and green waste per year.
- Several containers are used in parallel. The fill of one container corresponds to one compost batch.
- The material will not be turned during the process. This system can better be combined with a post-maturation system (e.g. windrow).
- Clear separation between environment and compost.
- High investment costs and relatively labor intensive, but flexible system, which is relatively location independent.

2.5 Compost maturity

One of the major factors that influences the type of compost is its degree of maturity. During the curing phase, several characteristics of the compost are changed, which greatly influence the effects of the compost on plant growth and soil fertility. A compost is considered to be 'young' at the end of the thermophilic phase, and 'mature' at the end of the curing phase. It is important to note that compost maturity cannot be expressed in terms of weeks or months. The time needed to reach a specific maturity level will vary greatly depending on the input material and the process management. The effective maturity level can be determined by the NO_3-N/N_{min}-ratio (see Chapter 4).

In a **young compost**, easily decomposable organic materials (young grasses, lettuce leaves) are no longer discernable, but fibers and wood pieces are still recognizable. The majority of the mineralized nitrogen is present as ammonium (NH_4-N). If the input material contains significant amounts of complex carbon compounds (lignin), this compost can immobilize the available nitrogen in the soil for a shorter or longer period of time. This type of compost still contains phytotoxic molecules (intermediate substances produced by the decomposition process), and can only be applied in moderate quantities when sensitive plants are cultivated or well in advance of planting.

In a **mature compost**, the degradation of organic materials is completed (except for larger pieces of wood that should be screened out), and a crumbly structure is formed, in which organic and mineral materials are clearly visible. The majority of the mineralized nitrogen is present as nitrate (NO_3-N). Mature compost is compatible with plant growth and can be used in large quantities, provided that the salinity is not too high. Mature compost is therefore well suited as a component of growing media (Figure 2.8).

Table 2.6 summarizes different characteristics of combinations of feedstocks (carbon-rich or nitrogen-rich input materials) and maturity. A final factor determining the choice of compost is the price. Mature compost undergoes a longer curing process than young compost, which generally makes it more expensive. Specific requirements for compost quality versus costs should be weighed up when making the final choice.

Table 2.6

Influence of the combination of feedstock (nitrogen-rich or carbon-rich input materials) and maturity on compost characteristics

Compost characteristics	Nitrogen-rich input materials		Carbon-rich input materials	
	young	mature	young	mature
Nutrient content	high	high	low	low
Risk of N-immobilization in soil	low	no	high	no
Risk of phytotoxicity	high	low	high	low
Stable humic acids content	low	high	low	very high
Color of the water extract (humus content)	medium dark	light	dark	medium light
Risk of salinity	high	high	low	low
Risk of leachate damage	medium	low	high	low

Figure 2.8 *Structure of different types of compost. Left: young, carbon-rich compost, right: mature carbon-rich compost*

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