

Compost, biogas slurry, and fermentation residues
Contribution to soil protection and build-up of humus in Lower Austria

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From a practical point of view, there are two perspectives on build-up of humus. One is the position of **operators of compost and biogas facilities**. The second is the position of **users of products from the above facilities, referred to as compost, biogas slurry, or fermentation residue**.

Compost and biogas facilities differ from one another concerning use of technics and technology. Thus also the appearance, the costs of installation, and the operational costs differ.

The compost facilities make use of waste from a separated collection of households, green waste, sewage sludge etc. Composting is an aerobic process. The bacteria need oxygen for decomposition. The open layered heap system with digging and an additional device for aeration is the most commonly used method in the German-speaking countries. In Austria, there are around 350 such facilities. The operators are farmers.

The biogas facilities (rotting facilities) in turn use regrowing raw materials and farm dung (slurry, dung) as ecological electricity facility. The biogas facilities for making use of waste are fed by staff canteens, canteens, gastronomic waste and so on.

The production of biogas is an anaerobic process. The relevant bacteria need no oxygen at all. They produce methane as a biogas. In Central Europe the method of wet rotting prevails, which is also called anaerobic technology. Around 280 biogas facilities are operated by farmers in Austria.

The user of products of these facilities has another point of view. Mainly, compost goes back from the operator to agriculture. This therefore closes the cycle. Some also sell compost. However, there are strict regulations on producing compost. They safeguard quality. We

distinguish between two qualities for use in agriculture: quality compost for biological agriculture, and quality compost (conventional agriculture).

The final product in case of rotting facilities is designated under the superior term „fermentation residues“. If the original materials are regrowing raw materials and farming dung, this is called “biogas slurry”. If waste is made use of, this is called “fermentation residues”. Users are again the operators of the biogas facilities (farmers). In addition, due to crop rotation, biogas slurry and fermentation residues are also delivered to other farmers. In both cases, the observation of the strict relevant regulations for the application of biogas slurry and fermentation residues guarantees an environment-friendly and soil-protective circular flow economy.

In case of composting biogenic waste by farmers as well as in production of ecological energy by means of biogas facilities, a long-term, sustainable added value for the farmer is placed at the centre. It is a matter of soil protection, protection against erosion, capability of water retention and storage of heat in the soil, and thus of **build-up of humus**. For dealing with the consequences of climate change and thus for the coming generations, **the protection and build-up of humus is the central topic**.

On a global scale, compost, biogas slurry, and fermentation residues contribute to climate protection. After short distances of transport, making use of the material takes places locally, in rural areas without any contamination of the environment. The added value occurs in the countryside. Location, cultivation of landscape, and preservation of culture are safeguarded.

For the time being, economic considerations of farmers effect that demand for organic dung is increasing. The high rise in prices for mineral dung lead to an additional boom concerning the demand for compost, biogas slurry, and fermentation residues.

Current situation in Lower Austria

In Lower Austria, there are **67 compost facilities**, locally distributed, which have voluntarily united into the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ). The respective operators are farmers, who engage in agriculture as an additional

income or as a main income. Some key data regarding compost sites and the heap capacity, respectively, in the year of registration 2005:

Compost site	Size in m ²	Amount in t	Increase / decrease	Compost Output	Compost sale
Total	17,911	13,858	+12%	85,038	42,665

The above table shows that around two thirds of the compost produced out of waste are used for the farmer's own demands and for creating layers of dung, respectively, and thus for the build-up of humus.

These operators have submitted themselves within the framework of their membership to strict **principles of association**. A **Quality Management System** safeguards proper operation of the facility and production of standardized compost. Entitlement to distinction with a quality mark is annually only prolonged after a positive examination. A good quality of compost is a *conditio sine qua non* for the image of the operators and for the trust of consumers and users of compost, respectively, in the sense of a responsible build-up of humus.

The above mentioned compost facilities are approved of by waste legislation. The operators have made a standardization and declaration, respectively, within the meaning of the federal compost provision. They are subject to examination by the waste authorities, and produce **compost** as a product of standardized and examined quality suited for unlimited trade, which also takes into consideration the input materials used (biological waste, green loppings, sewage sludge) as well as nutrients and heavy metals. For application, a distinction is made between "compost suitable for biological agriculture", "quality compost" and "quality sewage sludge compost".

The **physiological tolerance in plants** and the period of maturity are the most important biological parameters for application in agriculture and in households, such as flower gardens, vegetable gardens and so on. Annually, a competition takes place, where the three best types of compost with the highest physiological tolerance in plants are distinguished.

In case of application of their own compost by farmers, the quality demands for the build-up of humus have to be regarded within the context of widespread build-up of humus. The measure of laying dung is a mutual effect of quality of compost, plant cover, and soil at the location.

In the private sector, this is an entirely different matter. In the garden there are quite distinct requirements for plants. Compost, as a rule, is mixed up to 60 % with earth and additional substances, respectively. The buyers of compost should therefore inform the producers concerning their intended use, in order to receive the required quality (for instance through mixing with earth, quartz sand and so on).

Increasingly, mixings with earth for special flower beds, bush groupings, or lawn qualities are required.

A great advantage of the types of compost described above is safeguarding hygiene. A proper cultivation of the location, such as sieving in time and covering in case of need, additionally guarantee the quality, so that no seeds of weeds let them grow among the plants.

Among the 88 Lower Austrian **biogas facilities**, 61 facilities are run by single persons or by capital companies as members of the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ). They have 73 block heat and power plants for power generation with biogas. Their electrical supply shortfall performance is around 25 MW, this is around 80 % of the power generation with biogas in Lower Austria.

In biogas facilities, as final products there occur fermentation residues. Facilities, which use farming dung and silage (of around 12,500 ha) as input materials, produce **biogas slurry** as a residue. This applies to 54 operators of biogas facilities within the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ). The seven biogas facilities, however, which make use of around 90,000 t of biogenic waste, produce **fermentation residues**.

Biogas slurry is at least once per year analyzed by examination institutions authorized by the members of the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ), in order to register the main nutrients and their amounts for fertilization

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measures. The fermentation residue, however, is by law to be analyzed annually. In the course of this analysis, beyond the scope stated above also heavy metals and chemical pollutants are analyzed. The brochure of the technical advisory board for soil fertility and soil protection in the Austrian Ministry of Life under the heading “**A well-founded use of biogas slurry and fermentation residues in farmland and grassland**” contains precious hints for their application in agriculture. A large majority of analyses behind these findings stem from member companies of the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ).

Furthermore, the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ) runs a **soil protection project**. The aim of this project over some years is the examination of the effect of biogas slurry and fermentation residues on soil concerning build-up of humus and life in special habitats. This project is subsidized by the Office of the Lower Austrian government.

The topic of build-up of humus and recirculation of organic matter through compost, biogas slurry, and fermentation residues has been a main topic for the Compost and Biogas Consortium of Lower Austria (ARGE Kompost und Biogas NÖ) for 20 years. This persistence and sustainability in working eventually also led to the awarding of the Lower Austrian soil plate at the location of Rodingersdorf (politically within the Horn district). It will be unveiled within the coming weeks at the educational workshop of Mold of the Lower Austrian Chamber of Agriculture. The solidarity of the Office of the Lower Austrian government with the Lower Austrian Chamber of Agriculture is thus expressed relative to decentrality and regionality. Small distances of transport, responsible recirculation of organic matter for build-up of humus are their common approach.