

The annual data evaluation was done by BGK in February 2019 for the recent year 2018. The results are published as activity report 2019 by BGK. The following figure shows the development of the total throughput of composting and digestion plants with quality assurance since 2000. In the last year the total amount of input materials for composting was 7,46 million tons. For the 556 compost plants this means an average throughput of 13.400 tons per year and plant. Furthermore 5,34 million tons were digested in 170 biogas plants, means an average throughput of 31.400 tons per year and biogas plant.

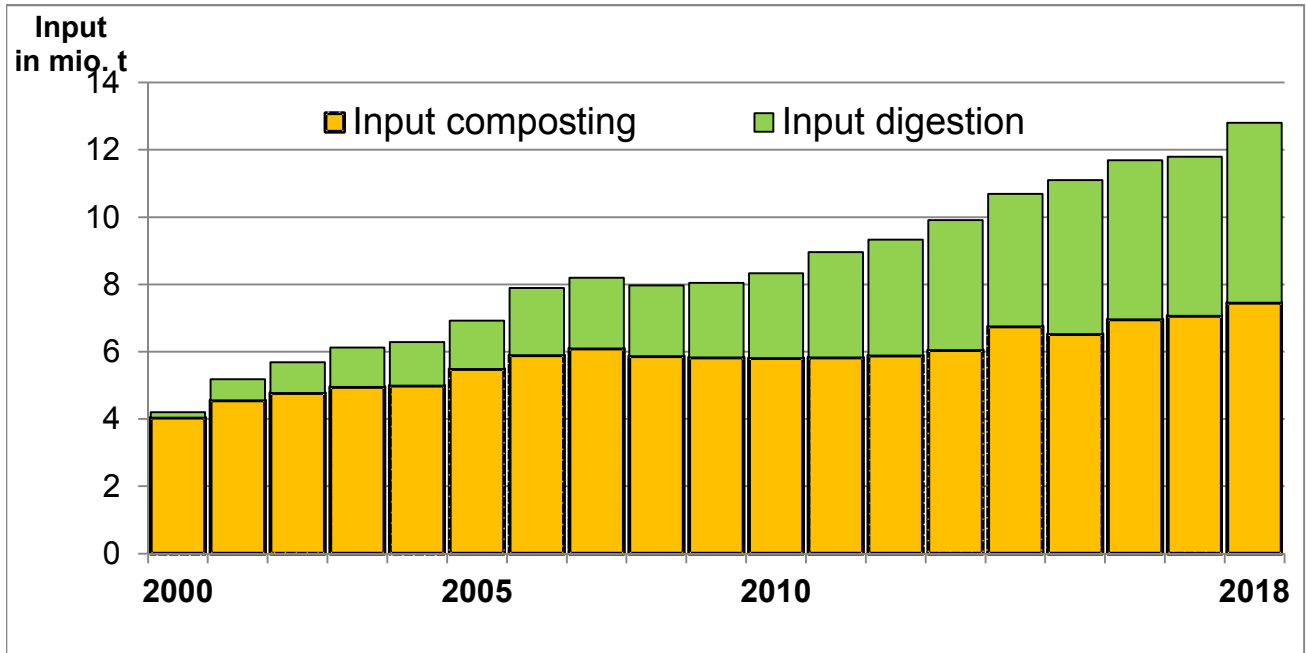


Figure 1: Development of the input of compost and digestion plants with quality assurance from 2000 until 2018

53 % of the composting plants treat only green waste. The other 47% of plants treat a mix of separately collected biowaste (usually content of biobins) with greenwaste for composting. Usually the greenwaste composting plants are rather small ones and the composting is usually done in open windrow composting systems. Separate collected biowaste in mixture with greenwaste is usually treated and composted in enclosed and larger composting plants. Beyond that differentiation between open and enclosed systems a wide range of different composting systems can be found in practice. For the quality assurance of BGK an overview about the different systems is given in the Hygiene Test System (HBPS) by BGK. Here we find the description of the different composting systems like boxes, tunnels, enclosed and different open windrow systems.

Plant inspection:

Each regional quality assurance organisation assigns a quality manager for visiting their members and for the inspection of the compost plants. The quality manager reports the result of his audit to the BGK office. For surveillance procedure the plant inspection has to be done every two years, for the recognition procedure every year if necessary. The work of the quality manager is based on a separate contract.

List of approved labs

The actual list of the 73 approved labs is published on the website of BGK under the heading: Laboratories. The laboratories have to be acknowledged for the quality assurance systems by BGK. For that they are obliged to take part successful in a ring test for biowaste every 2 years. With the certificate of the ring test they can get acknowledged for the quality assurance. Additionally they have to fill in a form to declare that they work according to the guidelines of BGK (Acknowledged sample taking, analyses according to the method book, report of results 20 work days after sample taking, reporting with special software to BGK (ZASLab) without preliminary information to the compost plant, independence from compost producer). The next national ring test for all laboratories takes place in May 2019 in co-operation with BGK.

Compost quality:

An overview about product quality in the year 2018 is given in the following table 1 with the average and range of values for compost and in table 2 with average and range of values for digestate.

Table 1: Product quality of compost in the QAS in 2018 (n=3.536 samples)

Criteria	Compost 2018	Mean	Median			
			25% quantile	50% quantile	75% quantile	95% quantile
Nutrients:						
Nitrogen, total (N) [% DM]		1,41	1,10	1,39	1,69	2,16
Phosphate, total (P ₂ O ₅) [% DM]		0,69	0,49	0,65	0,85	1,17
Potassium, total (K ₂ O) [% DM]		1,24	0,92	1,20	1,50	2,05
Magnesium, total (MgO) [% DM]		0,80	0,49	0,70	0,98	1,60
Nutrients soluble:						
Nitrogen, CaCl ₂ -soluble (N) [mg/l FM]		298	86	221	437	852
Ammonium soluble (NH ₄ -N) [mg/l FM]		230	19	137	343	786
Nitrate soluble (NO ₃ -N) [mg/l FM]		68	3	10	68	331
Phosphat, CAL-soluble (P ₂ O ₅) [mg/l FM]		1114	749	1057	1410	2046
Potassium, CAL-soluble (K ₂ O) [mg/l FM]		3683	2470	3480	4690	6545
Physical criteria						
Bulk density [g/l FM]		647	560	648	733	879
Dry matter [%]		63,2	56,1	62,9	70,4	79,9
Impurities > 2 mm [% DM]		0,08	0,01	0,04	0,11	0,29
Plastic foils as impurities > 2 mm [% DM]		0,008	0,000	0,003	0,010	0,030
Surface area of all impurities cm ² /litre FM		3,7	0,6	2,0	5,0	13,0
Biological criteria						
Plant response (25 % rel.) [%]		110	104	110	116	131
Plant response (50 % rel.) [%]		102	92	103	111	127
Chemical criteria						
Salt content [g/l FM]		4,4	2,4	3,8	5,9	9,5
pH		8,2	7,8	8,4	8,7	9,1
C/N ratio		16,7	13,2	15,6	18,9	26,0
Hygiene:						
Seeds [per litre]		0,03	0	0	0	0
Loss of ignition [%]		38,4	32,0	37,7	44,4	55,4
Basic substances (CaO) [% DM]		4,9	2,8	4,3	6,2	10,9
Heavy metals:						
Lead Pb [mg/kg DM]		30,2	21,0	27,0	35,0	56,0
Cadmium Cd [mg/kg DM]		0,43	0,32	0,39	0,49	0,85
Chromium Cr [mg/kg DM]		22,9	15,8	21,0	27,6	41,9
Copper Cu [mg/kg DM]		39,5	29,4	36,5	47,0	66,1
Nickel Ni [mg/kg DM]		14,0	8,9	12,8	17,1	27,9
Zinc Zn [mg/kg DM]		162,2	132,0	157,0	184,0	242,0
Mercury Hg [mg/kg DM]		0,10	0,07	0,09	0,11	0,20

Table 2: Product quality of liquid digestate in the QAS in 2018 (n=1047 samples)

Criteria	liquid digestate 2018	Mean	Median			
			25% quantile	50% quantile	75% quantile	95% quantile
Nutrients:						
Nitrogen, total (N) [% DM]		11,25	5,0	10,8	16,2	23,2
Phosphate, total (P ₂ O ₅) [% DM]		3,5	1,5	3,3	4,8	7,9
Potassium, total (K ₂ O) [% DM]		5,3	2,9	4,4	6,5	12,0
Magnesium, total (MgO) [% DM]		0,8	0,4	0,7	1,0	1,9
Nutrients soluble:						
Nitrogen, CaCl ₂ -soluble (N) [mg/l FM]		3348	2233	3161	4521	6156
Ammonium soluble (NH ₄ -N) [mg/l FM]		3333	2226	3160	4509	6108
Nitrate soluble (NO ₃ -N) [mg/l FM]		14,9	0,5	2	4,6	19,3
Physical criteria						
Bulk density [g/l FM]		989	1000	1000	1024	1100
Dry matter [%]		8,5	3,7	5,1	10,5	25,7
Impurities > 2 mm [% DM]		0,02	0,00	0,00	0,00	0,08
Plastic foils as impurities > 2 mm [% DM]		0,01	0,000	0,000	0,000	0,031
Surface area of all impurities cm ² /litre FM		1,3	0	0	0	8,0
Chemical criteria						
Salt content [g/l FM]		17,11	12,4	16,0	21,3	29,6
pH		8,4	8,2	8,4	8,6	8,9
C/N ratio		5	2,1	3,1	6,7	14,1
Hygiene:						
Seeds [per litre]		0,02	0	0	0	0
Loss of ignition [%]		57,9	50,9	57,2	64,6	79,7
Basic substances (CaO) [% DM]		5,3	3,4	4,9	7,0	10,4
Heavy metals:						
Lead Pb [mg/kg DM]		12,2	3,0	4,5	17,6	44,8
Cadmium Cd [mg/kg DM]		0,4	0,24	0,36	0,51	0,81
Chromium Cr [mg/kg DM]		18,5	10	16,2	24,7	38,9
Copper Cu [mg/kg DM]		61,3	37,4	54,4	77,2	120
Nickel Ni [mg/kg DM]		14,7	9,4	13,0	18,0	28,0
Zinc Zn [mg/kg DM]		277,4	190	250,3	335	522
Mercury Hg [mg/kg DM]		0,076	0,03	0,05	0,10	0,21

Market report:

Biodegradable waste products are used in quite different fields on account of their manifold characteristics. Statistical numbers of 2018 are shown in the following figure for RAL quality assured compost products (figure 2):

Most of the compost products (58,4%) are used as organic fertilisers and soil improvers for agriculture. Not only the nutrient content but also the organic matter of compost and considerable contents of alkaline material (lime) argue for compost use in agriculture. Especially the demand for compost for organic farming is increasing. The decline of organic matter in European soils as well as the soil degradation by erosion become more and more important. To improve soil properties by using the stable organic matter of high quality composts is seen as an appropriate solution for these problems.

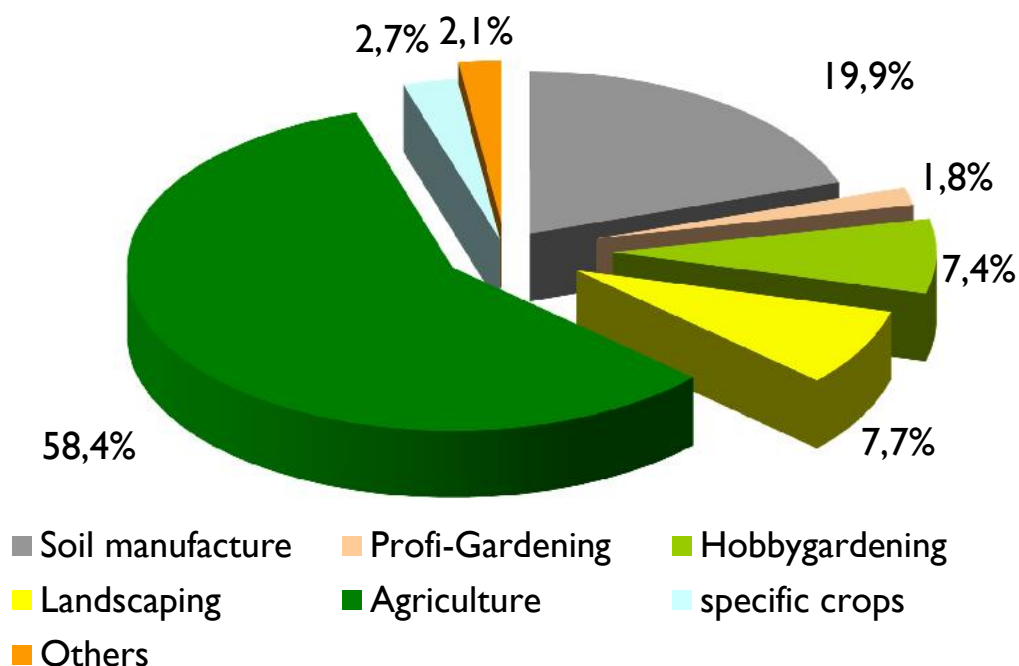


Figure 2: Market distribution of compost in 2018

Other areas of application like gardening or soil manufacture show a more favourable market situation because higher proceeds can be generated. But those fields compared with agriculture have distinctly smaller areas. But they are provided with a real demand in the sense of a free economy, based on the necessary use of humus which has to be bought as an additional means of soil improving. Especially the branch of horticulture and landscaping should be mentioned here. Also the use of compost as replacement for peat e.g. in potting soils is an interesting market in future.

Quality Assurance as a marketing tool

The consumer demand for quality assured products has increased considerably. This is reflected in the high amount of product quality labels of the food processing industry. According to this development the demands on the input materials of the foodstuff industry or of agricultural systems growth up, too. The experience has shown that without a well-established and acknowledged quality assurance system for compost products the market for waste-derived products is turning down. Today in several cropping systems only quality assured compost products are allowed. Furthermore in environmental risk areas (like water protection areas) the demand on controlled and certificated fertilisers and soil improvers plays an important role. Quality assured compost products which fulfil the requirements of the EU regulation on organic farming (EU Regulation NO. 834/2007) are listed in the official organic input material list of the research institute for organic farming (FiBL) and other organisations for organic farming like BIOLAND or NATURLAND opened their guidelines for certified compost regarding additional requirements.

Actual themes

According to the actual discussion about microplastics in the environment the BGK has published an information paper especially under the aspect of "Plastics in compost and digestate".

How to manage a good quality of separate collected biowaste is the focus of the BGK-Paper "Sortenreinheit von Bioabfällen gewährleisten".

In 2019 also the BGK-Paper about "Composting of bioplastics" will be novelled.

Additional different guidelines for good practise were published by BGK and are available on the website www.kompost.de

1. application and use of compost in agriculture
2. application and use of in water protection areas
3. good practice of composting in order to avoid emissions