The last annual data evaluation was done by BGK in March 2017 for the recent year 2016. 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 was 6,96 million tons in 524 composting plants, means an average throughput per plant of 13.280 tons per year and plant.

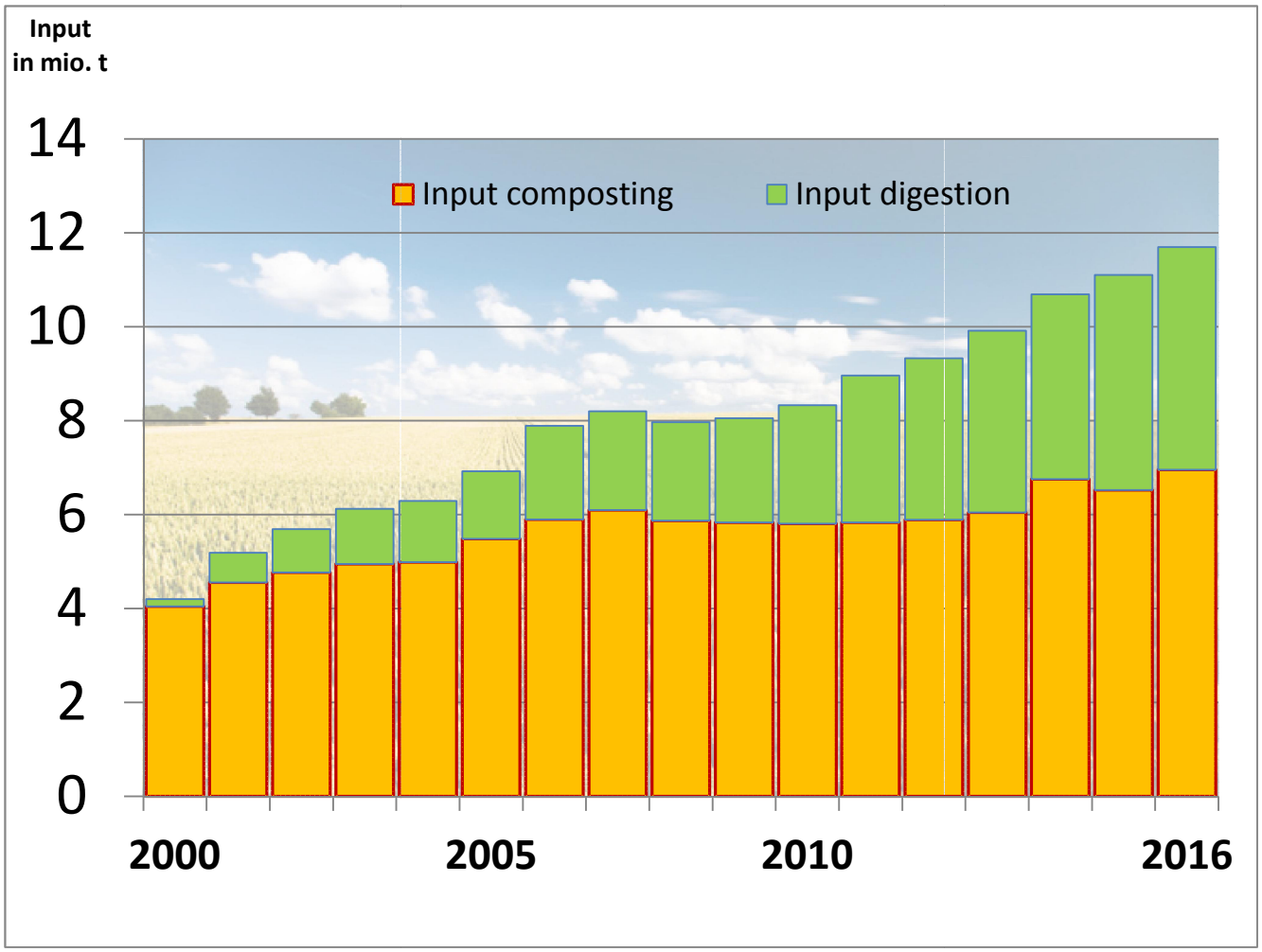

Figure 1: Development of input of compost and digestion plants with quality assurance from 2000 until 2016

Corresponding to the different input materials nearly 50 % of the composting plants treat only green waste. The other 50% of plants treat a mix of separately collected biowaste (usually content of biobins) and greenwaste for composting.

Usually the greenwaste composting plants are rather small ones. The average throughput is 8.000 tons per year 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 with an average throughput of 18.500 tons per year.

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 the different systems were described in the Hygiene Test System (HBPS) by BGK. Here we find composting systems divided in different categories called “Baumuster”. Category 6 for example describes the different open windrow systems.

Table 1: Overview composting systems

1	2	3	4	5	6		7
Boxes/ Container	**Briquets**	**Tunnel/ Line**	**Trommel**	**Windrows**	**Open Windrows**		**Windrow enclosed (Membrane-Cover)**
				enclosed	**open**	**Roofed over**	
1.1 Herhof Boxen	**2.1** Brikollare (42 days)	**3.1** Gicom-Tunnel	**4.1** Envital	**5.1** Horstmann/Kompo Plus/Sutco Kompoflex (7 weeks)	**6.1** Dreiecksmiete, belüftet	**6.7** Tafelmiete, belüftet	**7.1** GORE^{TM} Cover (6 Weeks)
	2.1 A Brikollare (21 days)			**5.1 a Horstmann/** Kompo Plus/Sutco Kompoflex (10 days)			
1.2 Biodegma		**3.2** Bioferm-Tunnel		**5.2** Bühler Wendelin	**6.2** Dreiecksmiete, unbelüftet	**6.8** Dreiecksmiete unbelüftet	**7.2** GORE^{TM} Cover (14 days)
1.3 ML-Container		**3.3 Geotec-**Tunnel (14 days)		**5.3** AE und Koch	**6.3 Tafelmiete (I),** unbelüftet		**7.3** Humivit/Plus
1.4 BRV-Boxen		**3.3 A** Geotec-Tunnel (7 Tage)		**5.4** Thyssen-Dynacomp	**6.5** Tafelmiete, belüftet		
		3.4 Linde KCATunnel		**5.5** Stratmann	**6.6** Tafelmiete (II), unbelüftet		
		3.5 Sutco-Biofix Zeile		**5.6** KNO Bremen	**6.9** WURM Komp-Aktiv		
		3.6 Horstmann WTT-Tunnel					

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 special contract.

List of approved labs

The actual lists of the 76 approved labs is published on the website of BGK under the heading: *Laboratories*
https://www.kompost.de/service/labore/?tx_dmdatalist_lab[%40widget_0][currentPage]=8&cHash=fe3e4e8fb606b08ae83d9ed81f60564d

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 be acknowledged for the quality assurance. Additionally they have to fill in a form to declare that they work according 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, independance from compost producer).

In 2017 the next national ring test for all laboratories will take place in Germany in co-operation with BGK.

Compost quality:

An overview about product quality in the year 2016 is given in the following table 2 with the average and range of values.

Table 2: Product quality of compost in the QAS in 2016 (n=3345 samples)

Criteria Compost 2016	Mean	25% quantile	Median 50% quantile	75% quantile	95% quantile
Nutrients:					
Nitrogen, total (N) [% DM]	1,38	1,1	1,36	1,62	2,07
Phosphate, total (P_2O_5) [% DM]	0,67	0,48	0,63	0,82	1,10
Potassium, total (K_2O) [% DM]	1,18	0,89	1,17	1,44	1,87
Magnesium, total (MgO) [% DM]	0,78	0,48	0,69	0,96	1,60
Nutrients soluble:					
Nitrogen, $CaCl_2$-soluble (N) [mg/l FM]	282,9	84,7	212,0	415,0	769,7
Ammonium soluble (NH_4-N) [mg/l FM]	220,19	20,93	132,0	332,3	724,0
Nitrate soluble (NO_3-N) [mg/l FM]	62,7	2,0	8,0	63,1	301,0
Phosphat, CAL-soluble (P_2O_5) [mg/l FM]	1123,7	767,8	1087,0	1430,0	1971,5
Potassium, CAL-soluble (K_2O) [mg/l FM]	3661,0	2520,0	3560,0	4615,5	6300,0
Physical criteria					
Bulk density [g/l FM]	645,5	553,8	645,3	736,0	860,0
Dry matter [%]	62,1	55,7	61,6	68,0	77,9
Impurities > 2 mm [% DM]	0,10	0,01	0,05	0,13	0,38
Biological criteria					
Plant response (25 % rel.) [%]	110	103	108	114	130
Plant response (50 % rel.) [%]	101	92	101	110	126
Chemical criteria					
Salt content [g/l FM]	4,3	2,3	3,6	5,7	9,3
pH	8,3	8,0	8,5	8,8	9,0
C/N ratio	17,6	13,8	16,2	19,6	27,,2
Hygiene:					
Seeds [per litre]	0,03	0	0	0	0
Loss of ignition [%]	39,3	32,1	38,9	45,6	56,6
Basic substances (CaO) [% DM]	4,9	2,9	4,3	6,2	10,6
Heavy metals:					
Lead Pb [mg/kg DM]	31,3	21,5	28,0	37,0	58,5
Cadmium Cd [mg/kg DM]	0,42	0,30	0,37	0,48	0,80
Chromium Cr [mg/kg DM]	20,5	15,0	19,1	24,0	34,5
Copper Cu [mg/kg DM]	39,5	29,0	36,6	46,0	66,5
Nickel Ni [mg/kg DM]	13,1	8,4	11,9	16,0	26,1
Zinc Zn [mg/kg DM]	160,1	130,0	154,0	184,0	240,0
Mercury Hg [mg/kg DM]	0,11	0,06	0,09	0,12	0,23

Market report:

Biodegradable waste products are used in quite different fields on account of their manifold characteristics. Statistical numbers of 2016 show marketing outlets for RAL quality assured compost products (figure 2):

Most of the compost products (59%) are used as organic fertilisers and soil improvers for agriculture. Not only the nutrients 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. As it is postulated in the EU Soil strategy 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.

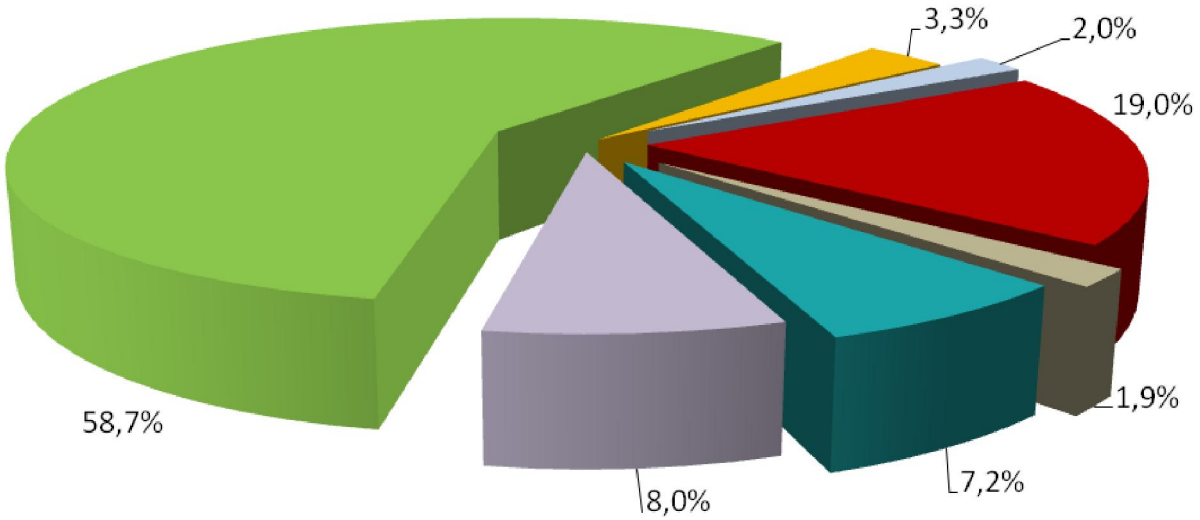

Figure 2: Market distribution of compost in 2016

Other areas of application like gardening or soil manufactory 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 N0. 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.