

The last annual statistical examination of compost quality and real throughput was done by the Bundesgütegemeinschaft Kompost e.V. (BGK) in March 2015 for the recent year 2014. The following figure shows the results for the total throughput. For the 483 composting plants the total amount of input materials was 6,7 million tons input and therefore the average throughput per plant nearly 13.870 tons per year.

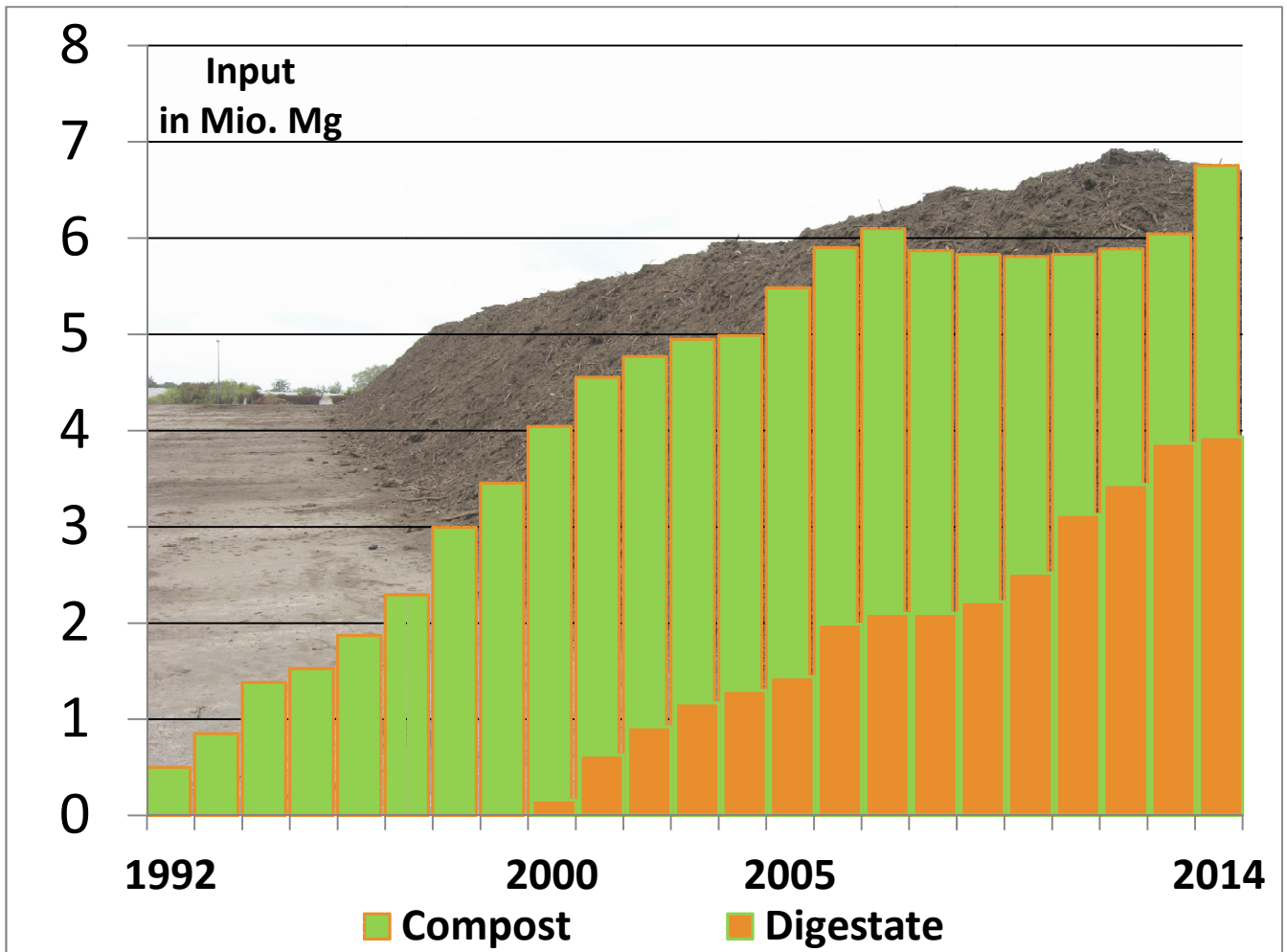


Figure 1: Input of compost and biogas plants with quality assurance from 1992 until 2014

Corresponding to the different input materials 45 % of the composting plants treat only green waste. The other 55% of plants treat a mix of separately collected biowaste (usually content of biobins) and greenwaste for composting. The different throughputs depending on size of plants is shown in the next figure.

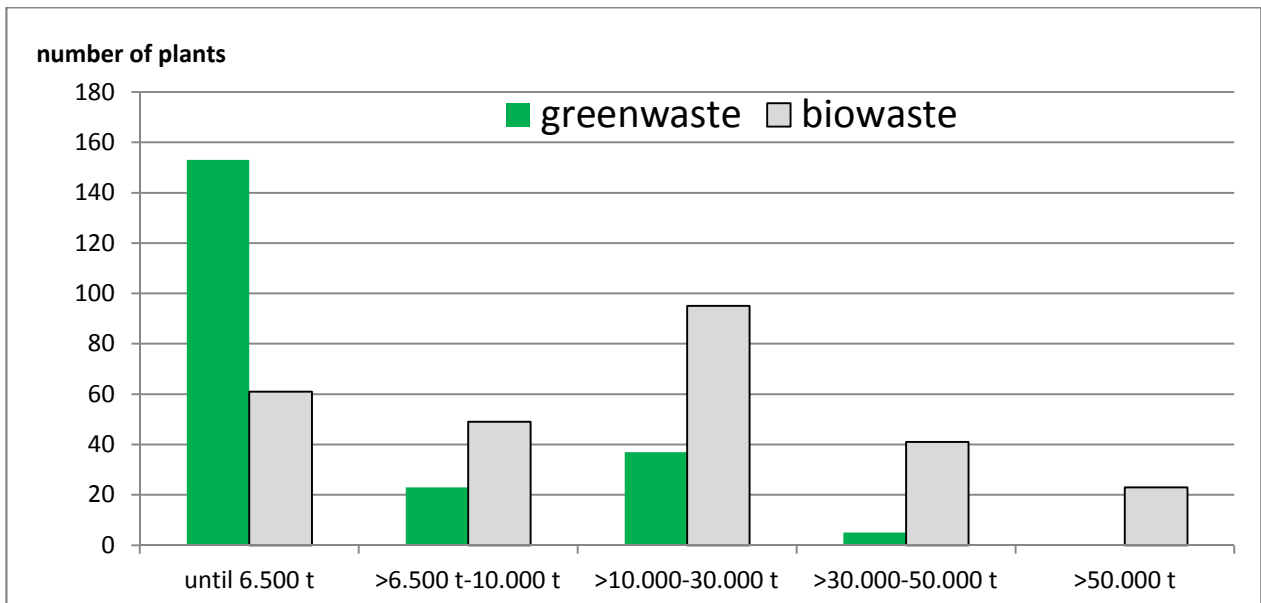


Figure 2: Throughout of compost plants according to input materials

Usually the greenwaste composting plants are rather small ones (70% of the greenwaste plants have less than 6.500 tons input/year) with open windrow composting systems. Separate collected biowaste in mixture with greenwaste is usually treated and composted in enclosed and larger composting plants (35 % of these plants have a throughput between 10.000 and 30.000 tons/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™ 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 Dreiecksmi ete unbelüftet	7.2 GORE™ 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 the audit based on a check-list for composting plants to the BGK office. During the recognition procedure there is an annual inspection and visitation. Afterwards every two years the inspection has to be done. The work of the quality manager is based on a special contract.

## List of approved labs

The actual lists of the 96 approved labs and 208 approved sample takers are published on the website of BGK under the heading of *Laboratories*

<http://www.kompost.de/index.php?id=96&L=0%2525253Cbr%2525252F%2525253E>

and *Sample takers*

[http://www.kompost.de/index.php?id=453&no\\_cache=1&tx\\_probennehmerlist\\_pi1\[sword\]=&plzVon=&plzBis=](http://www.kompost.de/index.php?id=453&no_cache=1&tx_probennehmerlist_pi1[sword]=&plzVon=&plzBis=)

## Laboratory qualification system

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 this 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, independence from compost producer).

In May 2015 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 2014 is given in the following table 2 with the average and range of values.

Table 2: Product quality of compost in the QAS in 2012

Criteria	Compost 2014	Mean	Median			
		25% quantile	50% quantile	75% quantile	95% quantile	
<b>Nutrients:</b>						
Nitrogen, total (N) [% DM]		1,37	1,1	1,36	1,62	2,01
Phosphate, total (P <sub>2</sub> O <sub>5</sub> ) [% DM]		0,69	0,49	0,65	0,84	1,15
Potassium, total (K <sub>2</sub> O) [% DM]		1,17	0,88	1,15	1,43	1,88
Magnesium, total (MgO) [% DM]		0,79	0,5	0,71	0,97	1,55
<b>Nutrients soluble:</b>						
Nitrogen, CaCl <sub>2</sub> -soluble (N) [mg/l FM]		298,6	110	239,1	426,5	786,8
Ammonium soluble (NH <sub>4</sub> -N) [mg/l FM]		228,2	21	150	346,8	730
Nitrate soluble (NO <sub>3</sub> -N) [mg/l FM]		70,5	3	14,6	85,9	315,2
Phosphat, CAL-soluble (P <sub>2</sub> O <sub>5</sub> ) [mg/l FM]		1168,4	799	1100	1470	2080
Potassium, CAL-soluble (K <sub>2</sub> O) [mg/l FM]		3633,7	2530	3478,5	4563	6385,5

Criteria	Compost 2014	Mean	Median		75% quantile	95% quantile
			25% quantile	50% quantile		
<b>Physical criteria</b>						
Bulk density [g/l FM]		655,5	570	660	741,5	860
Dry matter [%]		62,4	55,9	61,7	68,5	78,2
Impurities > 2 mm [% DM]		0,09	0,01	0,05	0,11	0,36
<b>Biological criteria</b>						
Plant response (25 % rel.) [%]		110,6	103	110	117	131
Plant response (50 % rel.) [%]		101	91	101	112	127
<b>Chemical criteria</b>						
Salt content [g/l FM]		4,48	2,38	3,8	5,9	9,7
pH*		8,3	7,9	8,4	8,8	9
C/N ratio		16,9	13,7	15,8	18,7	25,8
<b>Hygiene:</b>						
Seeds [per litre]		0,03	0	0	0	0
Loss of ignition [%]		38,1	31,4	37,6	44,1	55,3
Basic substances (CaO) [% DM]		5,1	3,0	4,34	6,31	10,9
<b>Heavy metals:</b>						
Lead Pb [mg/kg DM]		32,5	22,2	29	39	61
Cadmium Cd [mg/kg DM]		0,4	0,3	0,37	0,47	0,75
Chromium Cr [mg/kg DM]		21,8	16	20,2	25	38,2
Copper Cu [mg/kg DM]		39,9	29	37	48	68
Nickel Ni [mg/kg DM]		13,9	8,8	12,6	17,1	27
Zinc Zn [mg/kg DM]		166	131	158	191	260
Mercury Hg [mg/kg DM]		0,1	0,07	0,09	0,12	0,21
<i>Number of analyses</i>			<i>N=3039</i>			

\* changed method since July 2013

### Market report:

Biodegradable waste products are used in quite different fields on account of their manifold characteristics. Statistical numbers of 2014 show marketing outlets for RAL quality assured compost products (figure 3):

Most of the compost products (60%) are used as organic fertilisers and soil improvers for agriculture. Not only the nutrients content but also the organic substances in compost and considerable contents of alkaline material (lime) make compost use in agriculture an increasingly popular and effective means of soil cultivation. 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.

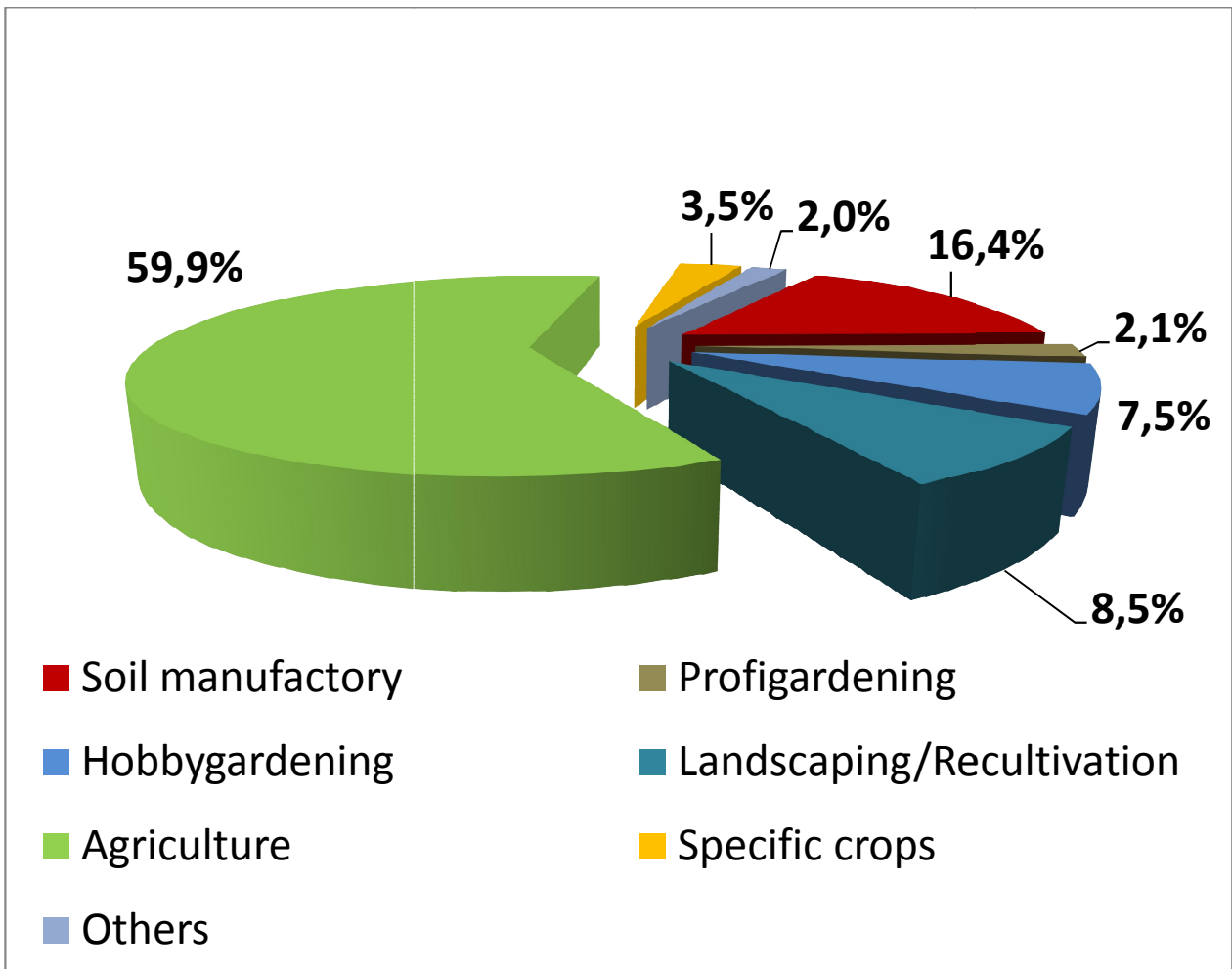


Figure 3: Market distribution of compost in Germany 2014

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 in the last ten years. 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 e.V. 2015).