Overview on the certification of compostable products and results from German model trials

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Introduction

The benefits of compostable products preferably produced from renewable raw materials have been recognised by industry and consumers which is reflected in the growing interest in compostable products. The market for compostable products is growing and the production capacities for biodegradable polymers are rising (see Figure 1).

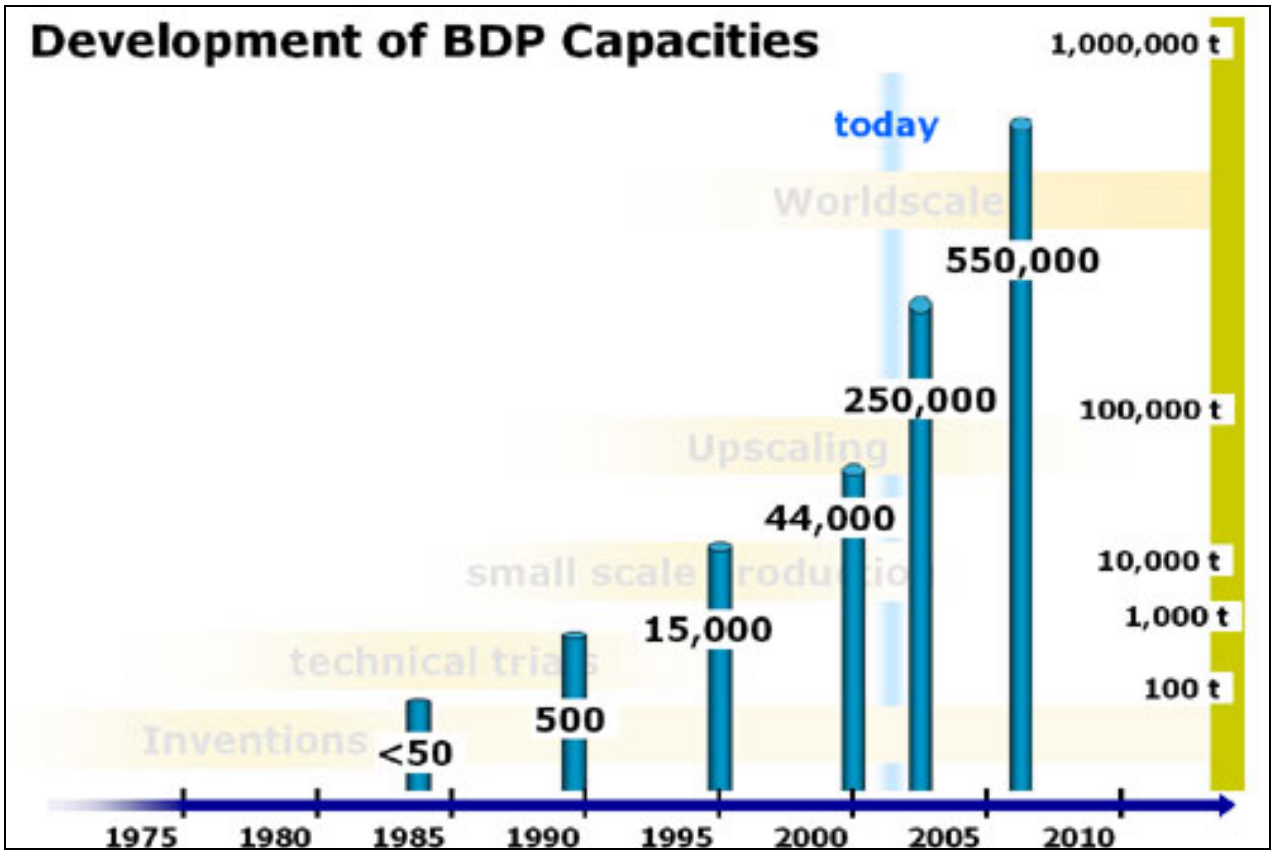

Figure 1 Developments of production capacities for biodegradable polymers (source: IBAW e.V.)

Requirements for this market developments are a good regulatory framework and of course a high acceptance by the conusmer. Therefore the current situation in standardisation and certification shall be described. Furthermore the results of two model trials which show the market acceptance of compostable products shall be described.

Certification of compostable products

Standards for the assessment of compostability

Likewise improving are the technical standards on the determination of compostability and the certification systems that are build upon them. Currently DIN V 54900, EN 13432 and ASTM D 6400 are the relevant standards for the determination of compostability. Each of these standards is being applied by a number of certification organisations in the testing and assessment of compostable products and materials. The above-mentioned standards are very similar in their general construction, the applicable tests and the necessary pass levels.
As a rule, the assessment of compostable materials and products comprises five different parts:

- Characterisation / Chemical Testing
- Determination of ultimate biodegradability
- Determination of compostability (disintegration)
- Analysis of the quality of the compost
- Determination of ultimate anaerobic biodegradability (not obligatory)

EN 13432 is currently the most relevant standard because it is a harmonised, mandated, European standard, which gives it a special legal relevance. It is assumed that if a producer fulfils EN 13432 he also fulfils the European packaging directive. DIN V 54900 is the oldest standard of its kind and still has some relevance in Germany, although most producers are now using EN 13432. ASTM D 6400 is an U.S. standard which is important for producers who are active in the U.S.A..

Experience has shown that because of the relatively limited knowledge about these standards, end users or buyers of compostable materials were confronted with lots of other standards. Among these were for example the following ones:

- BS 6642 “Specification for disposable plastics refuse sacks made from polyethylene”
- ASTM D 1238 “Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer (Melt Index)"
- BS 6085 “Methods for determination of the resistance of textiles to microbiological deterioration”

However, none of these standards allows an assessment of the compostability of these products. It is therefore needed that experts, leading manufacturers and also certification

bodies take the necessary steps to make the existing standards on compostability like DIN V 54900, EN 13432 or ASTM D 6400 known.
A detailed description of the standards can be found in Weber (2002 and 2001).

Benefits of certification

For compostable materials, having well accepted standards, is a valuable asset but just having these standards might not be enough. The difference between screws and compostable products is that the inherent characteristic of compostable materials is invisible to the normal eye. A potential buyer cannot see easily if a product is really compostable whereas a user of a screw can easily check if it fits or not. This example should make it clear that something more than just good standards may be needed for compostable products. These needed additional benefits can be obtained through certification:

- Easy recognition of products
- Trust into the new products
- More security in product liability
- Use of a known and recognised mark

Certification systems

The standards referred to in the previous section are used by various organisations offering certification schemes for compostable materials. Table 6 gives an overview of these. This table, which makes no claim to be complete, clearly indicates the large number of standards and procedures currently applied. In addition, all organisations implement various special arrangements which are not described here.

Table 6 Certification bodies and schemes for compostable materials

Organisation	**Mark**	**Used standards**	**Regional distribution**	**Number of certificates**
DIN CERTCO / IBAW		DIN V 54900 EN 13432 ASTM D 6400	Germany Switzerland Netherlands United Kingdom Poland	• Certificates: 174 • Materials: 55 • Intermediates: 10 • Additives: 36 • Products and Product Families: 73

				(as of 2003-10-31)
AIB Vinçotte		EN 13432	Belgium	• Certificates: 37 • Materials: 18 • Additives: 4 • Products and Product Families: 15 (as of 2003-11-06)
Biodegradable Products Institute / US Composting Council		ASTM D 6400	U.S.A.	• Certificates: 17 (as of 2003-11-06)
Jätelaitosyhdistys		EN 13432	Finland	unknown
Biodegradable Plastics Society		GreenPla certification scheme	Japan	• Certificates: 851 • Materials: 41 • Intermediates: 230 • Additives: 164 • Products and Product Families: 416 (as of 2003-11-06)
Norsk Renholdsverks-Forening		EN 13432	Norway	• Certificates: 1 (as of 2003-11-06)

Globally the Biodegradable Plastics Society of Japan is the market leader in the certification of compostable products (see Figure 2).

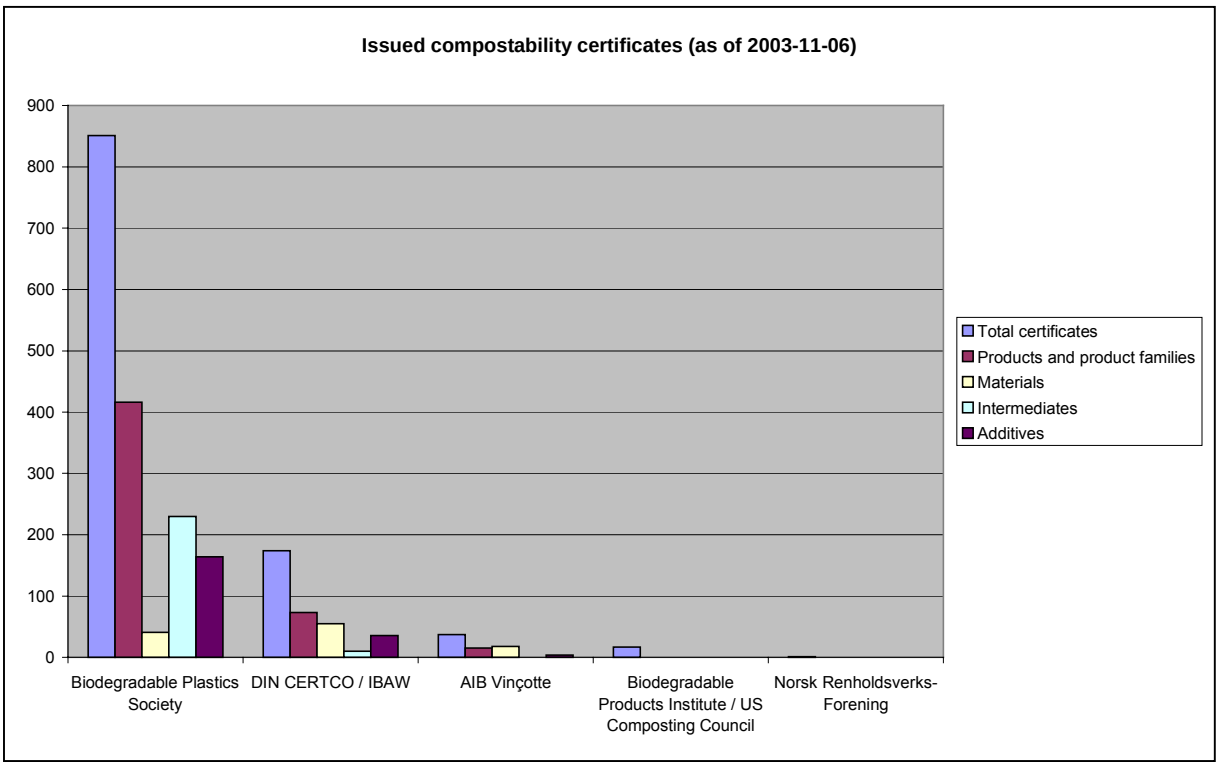

Figure 2 Total number of issued compostability certificates (as of 2003-11-06)

DIN CERTCO follows as the leading European certification organisation. To reach this aim and to further extend the acceptance of its certification system co-operation contracts have been signed with the Keurmerkinstituut in the Netherlands. Negotiations on co-operation agreements have been concluded with the Composting Association in the U.K. and the Polish state packaging institute (Centralny Ośrodek Badawczo-Rozwojowy Opakowań (COBRO)). Signing of the co-operation contracts is expected until the end of 2003. Negotiations with other potential co-operation partners are under way. Figure 3 shows a geographical representation of the acceptance of certification systems in Europe.

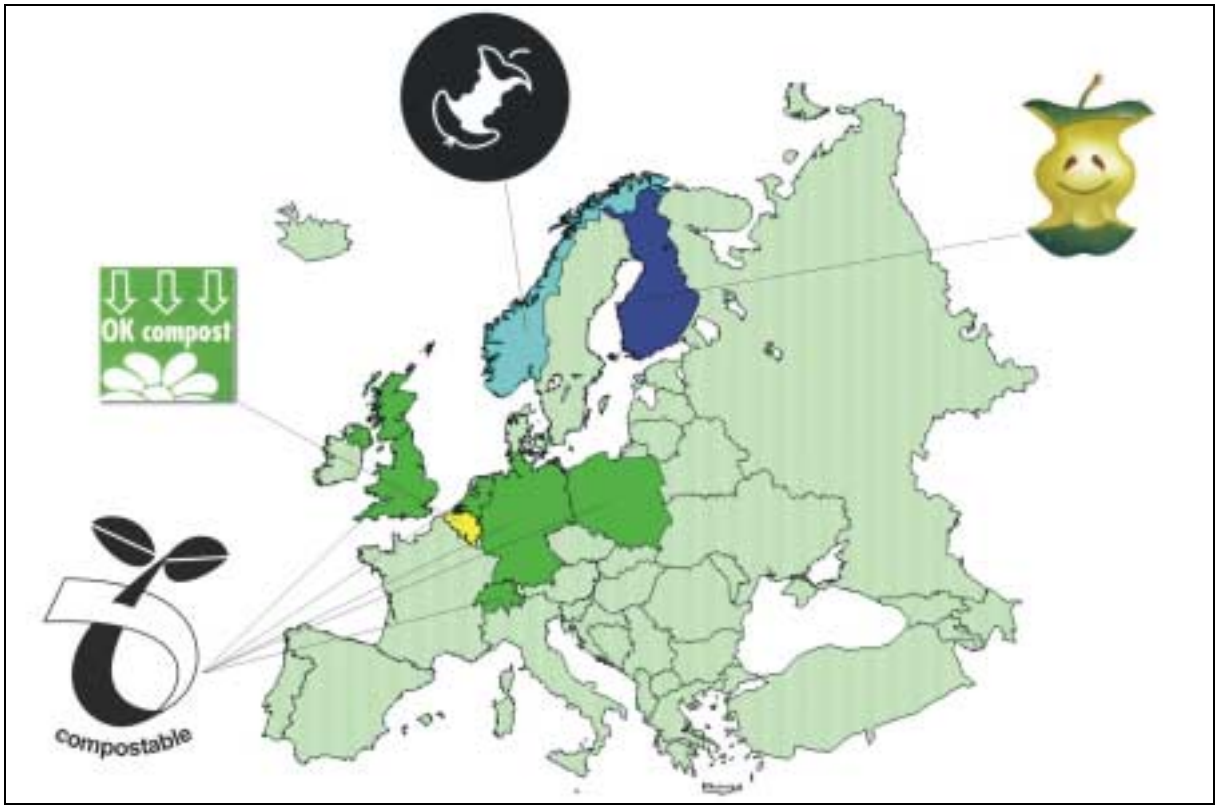

Figure 3 Geographical representation on the acceptance of certification systems in Europe

DIN CERTCO (Germany), BPI (USA), and BPS (Japan) have signed a co-operation on the acceptance of test results which significantly reduces the testing costs for producers who are active in all three major markets (Japan, Europe, and the USA).

Activities for the creation of certification systems for compostable materials are currently reported from Spain (Catalunia), Korea, and Taiwan.

Market acceptance of compostable products

Standards based certification systems are, of course, one needed factor for the success of compostable products. Others are the acceptance of the products by the consumer. For the operators of waste management systems especially the quality of the source separation of garbage has to be maintained. The consumer must be able to dispose the compostable products in the correct way, i.e. the bio bin, based on a clear marking of the products. In order to check the acceptance of the consumer numerous trials have been conducted. The results of two trials in Germany shall be presented in the following two chapters.

Acceptance of compostable bio bags in Remscheid

In winter 1998/99 a trial on the acceptance of compostable bio bags by the consumer and the effect of its introduction in the German city of Remscheid was conducted (IGW 1999). The test area encompassed 2000 households. 50 % of them received compostable bio bags (test area) and 50 % in the reference area did not receive compostable bio bags.
Research was conducted by questionaires and waste analysis. First of all the introduction of compostable bio bags heightened the acceptance of the biowaste collection (see Figure 4).

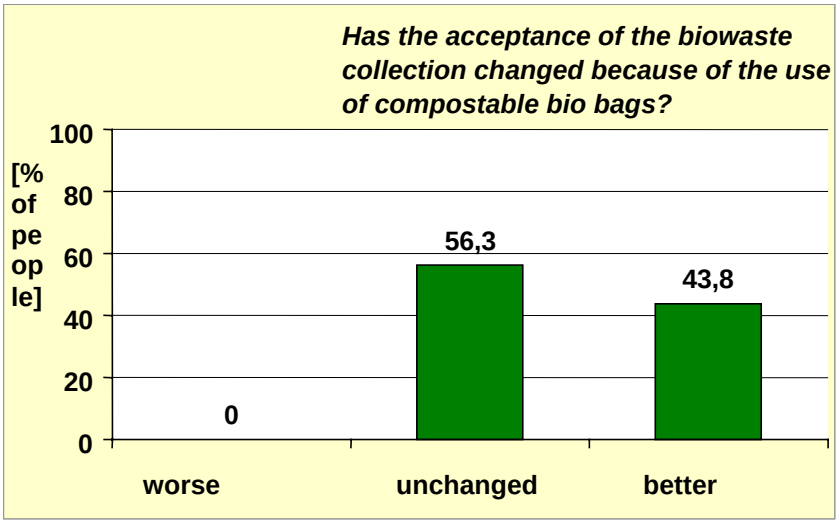

Figure 4 Change in the acceptance of biowaste collection in Remscheid because of the use of compostable bio bags (IGW 1999: 10)

Furthermore the households in the test area thought that they were collecting more bio waste than before (see Figure 5).

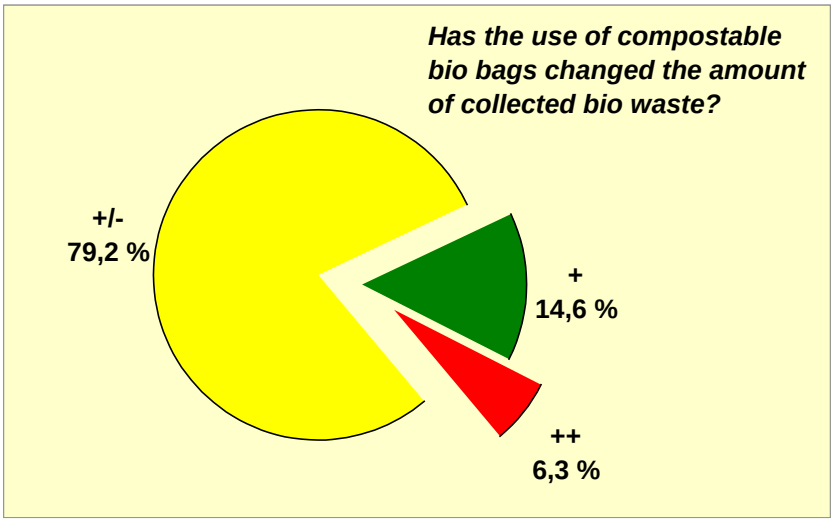

Figure 5 Change in the amount of collected biowaste in Remscheid (IGW 1999:11)

The most likely reason for this was that the biowaste collection with the help of compostable bio bags is much more hygienic and comfortable than without (see Figure 6 and Figure 7).

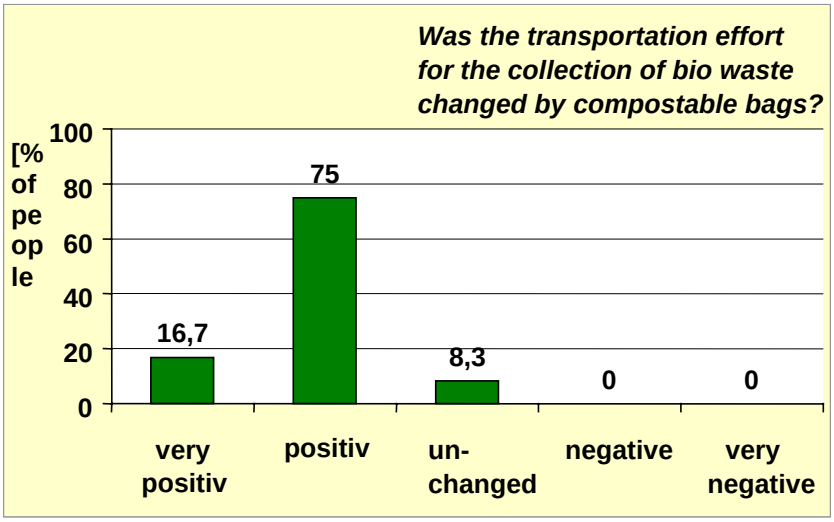

Figure 6 Change in the transportation effort of households in Remscheid (IGW 1999: 15)

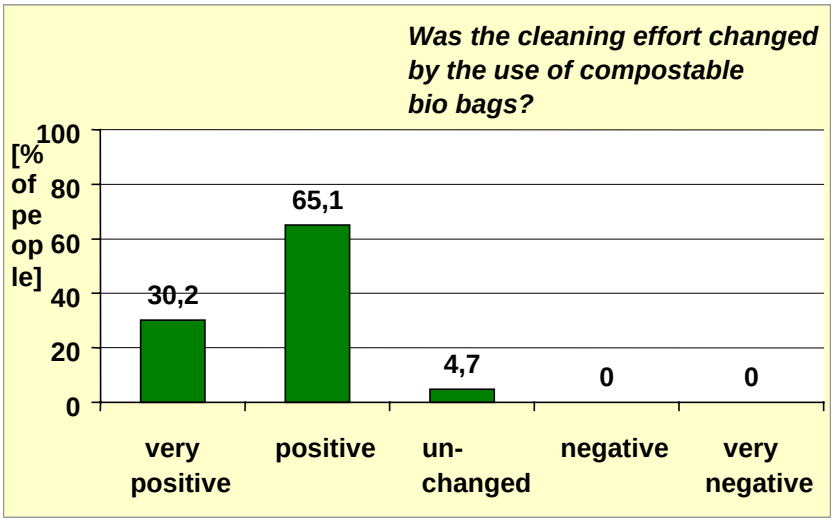

Figure 7 Change in the cleaning effort of households in Remscheid (IGW 1999: 17)

The results of the questionnaire were supported in the actual analysis of the collected biowaste. The amount of collected bio waste was indeed higher in the test area than in the reference area (see Figure 8).

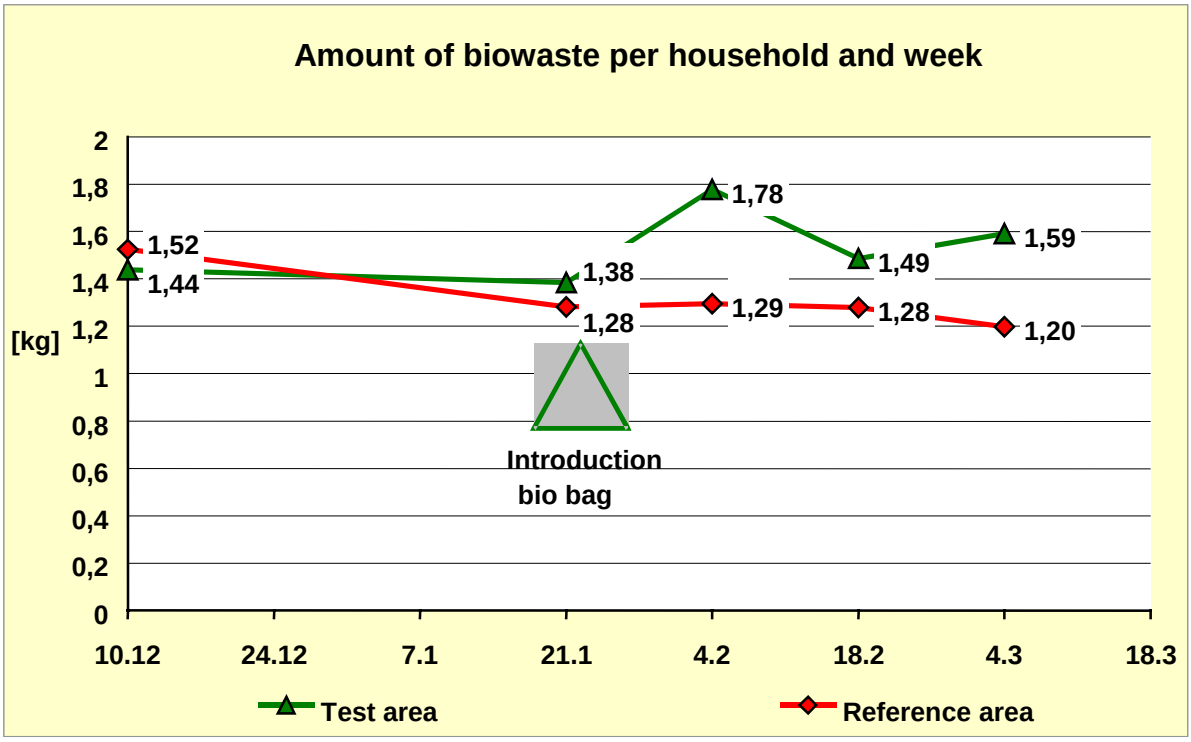

Figure 8 Change in the amount of collected biowaste because of the introduction of a compostable bio bag (IGW 1999: 23)

Furthermore the fear of the waste management organisations that the use of compostable products might increase the mis-throws because compostable polymers and conventional, non-compostable ones are looking so alike could be alleviated. The actual contamination in several different areas of the city (designated with BA1 to BA4) has decreased, probably because of the higher awareness of the consumer (see Figure 9)

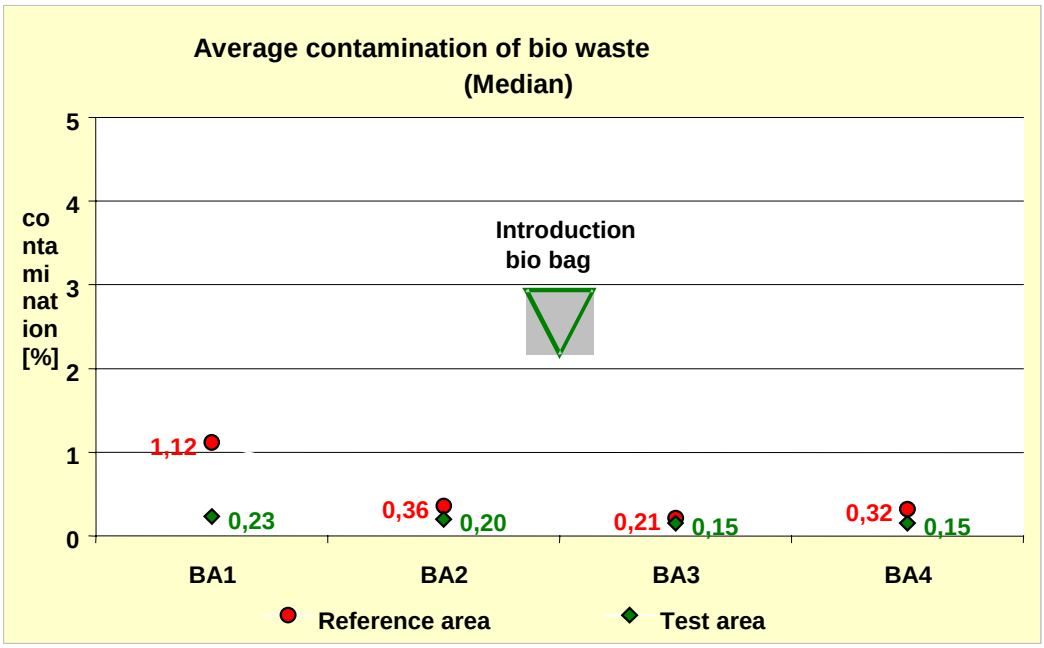

Figure 9 Average contamination of bio waste in Remscheid (IGW: 1999: 25)

Thus the trial in Remscheid could fully prove the beneficial effects of the introduction of compostable bio bags.

Acceptance of compostable packaging in Kassel

In Kassel another trial was conducted from 2000-2002. This time compostable packaging were in the focus. Detailed information on all aspects of the trial have been described by Lichtl (2003). Several different and certified products have been introduced into the market in Kassel among them:

- Dairy products
- Fruits and vegetables
- Poultry packaging
- Carrier bags and waste collection bags
- Food service items

All products were marked with the compostability mark. Obviously, one of the first questions for the consumer was if the mark was recognised. Market research date showed that this was the case (see Figure 10).

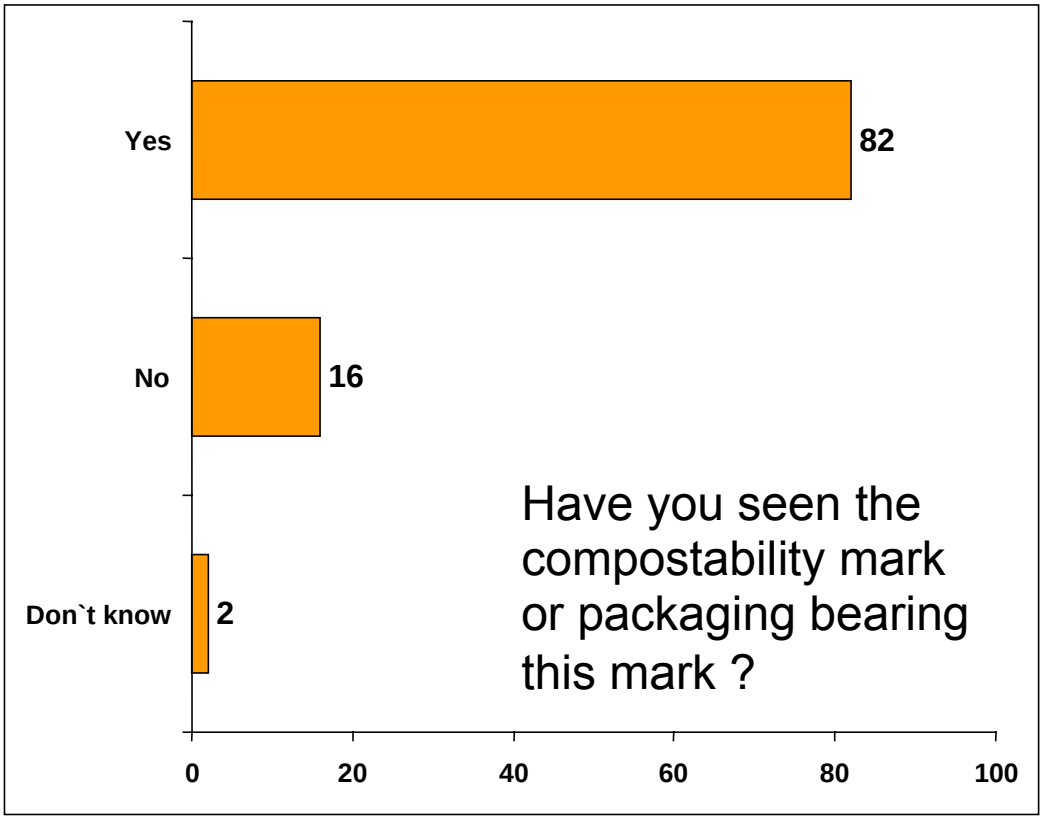

Figure 10 Recognition of the compostability mark in Kassel (Lichtl 2003: 74)

The consumer was also able to understand the basic idea and the benefits of compostable products (see Figure 11).

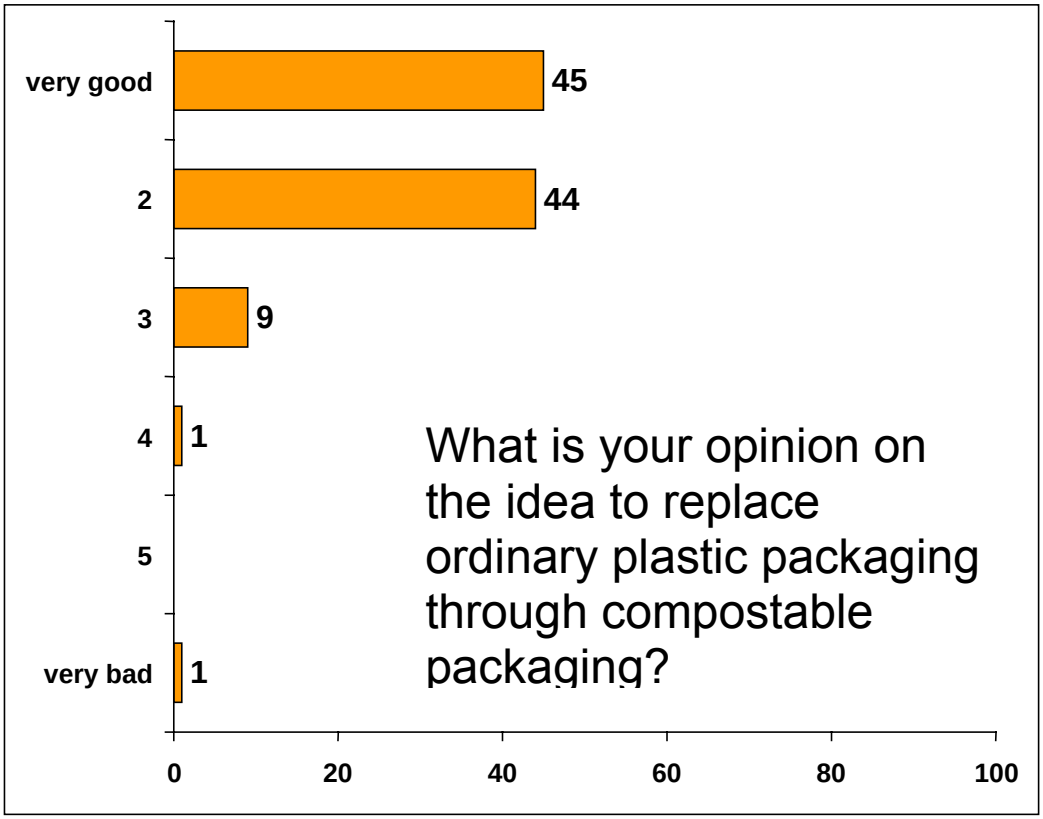

Figure 11 Opinion of the consumers in Kassel on compostable packaging (Lichtl 2003: 80)

The consumers thought that especially the packaging of organic produce in compostable packaging would make sense (see Figure 12).

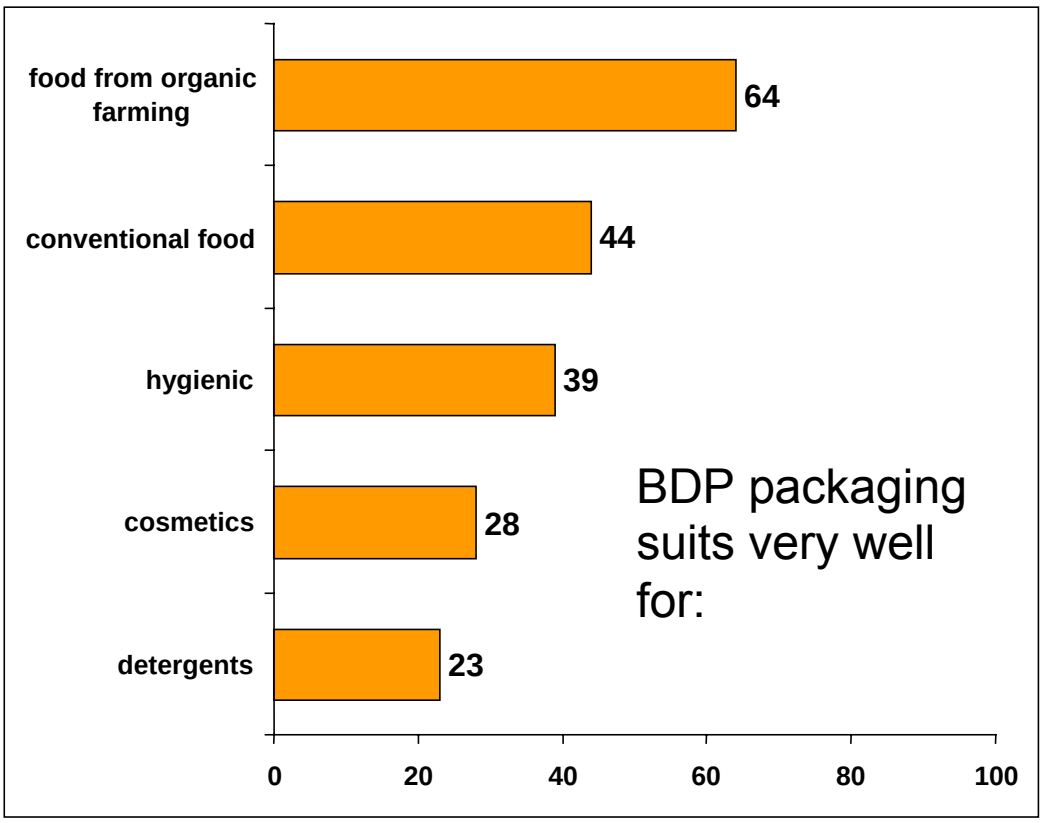

Figure 12 Opinion of the consumers in Kassel on the suitability of compostable packaging for certain applications (Lichtl 2003: 71-72)

Overall the consumer was happy with the quality of the products (see Figure 13).

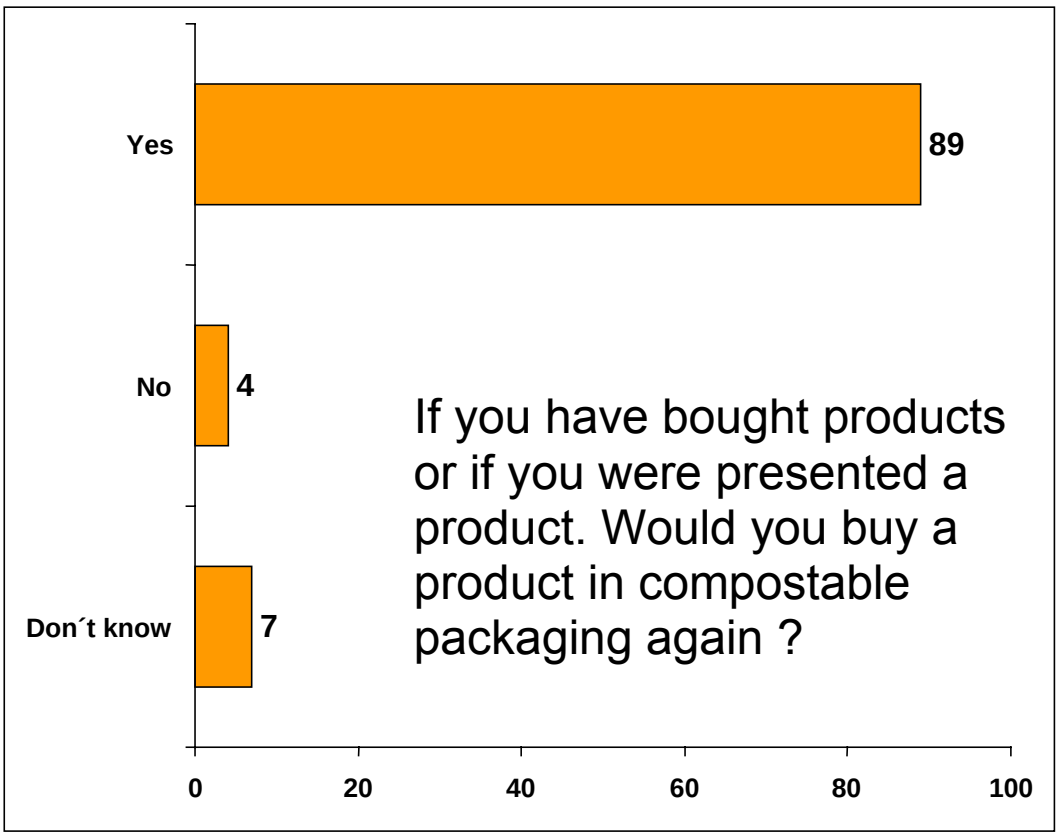

Figure 13 Satisfaction with the products in Kassel (Lichtl 2003: 78)

And he would even be willing to pay a higher price for products in compostable packaging (see Figure 14).

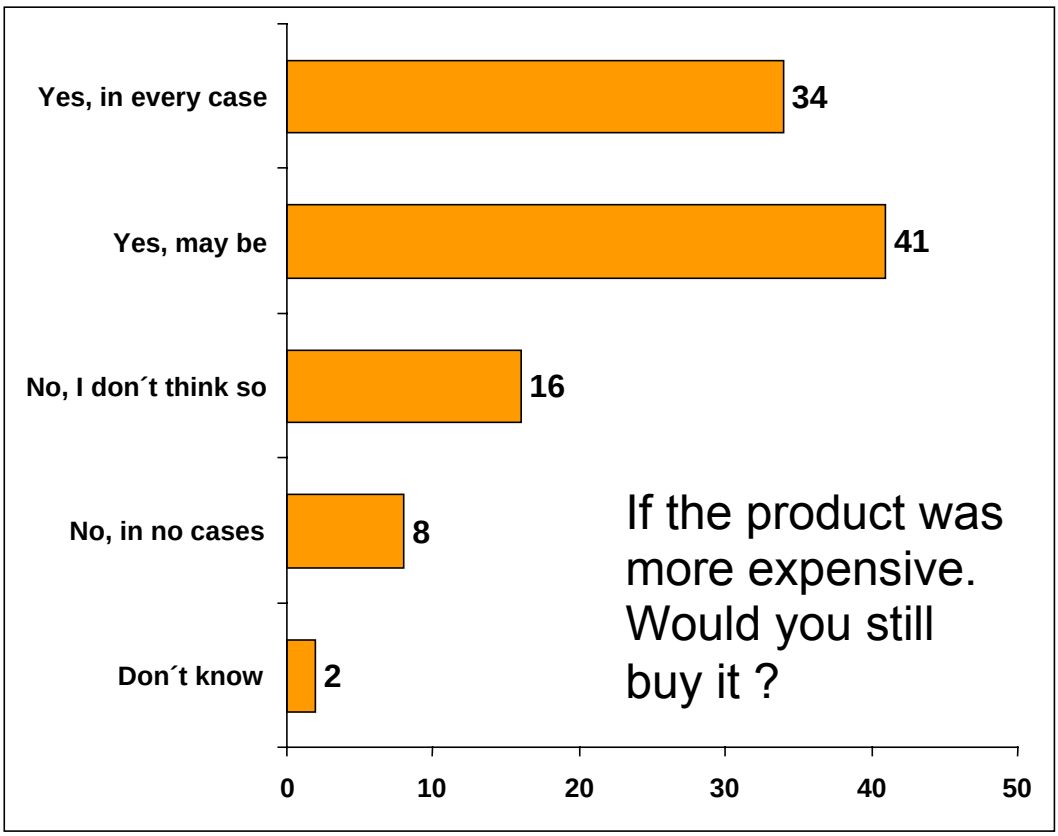

Figure 14 Price Acceptance of consumers in Kassel (Lichtl 2003: 69)

Positive effects for retailers were also observed. During a short period organic peppers in compostable packaging were sold by one retailer in the Kassel area. In other branches of the retailer the same organic peppers were sold in conventional packaging. Figure 15 shows the notably positive effect of the compostable packaging on the sales figures.

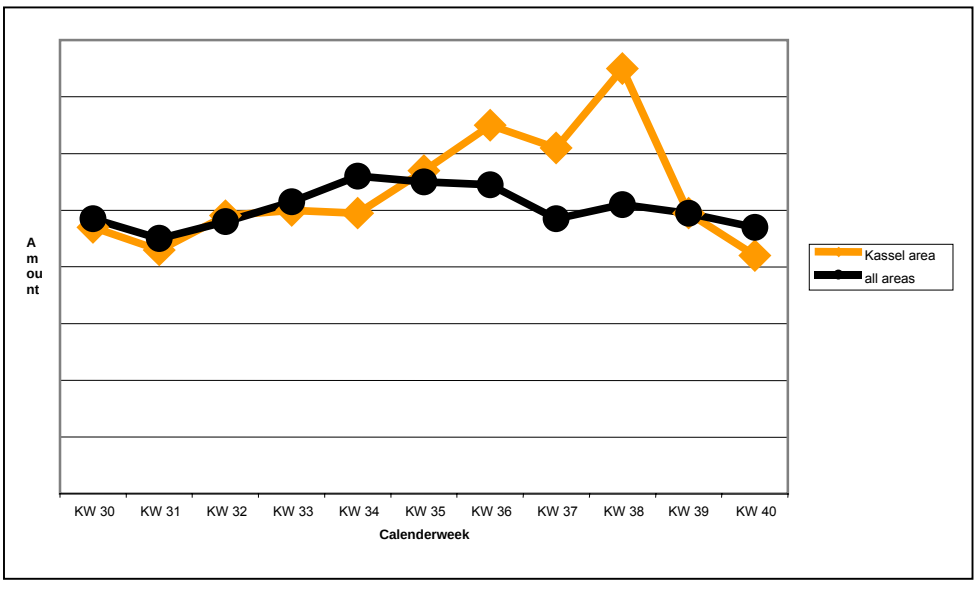

Figure 15 Sale figures for organic peppers in the Kassel trial (Lichtl 2003: 89)

So far the Kassel trial was the largest project on the use of compostable products. Intensive research in use, market acceptance and waste management showed very positive results. There was no negative effect on waste separation or compost quality and a high acceptance by consumers. The contamination of the bio waste stayed within the usual limits of between 0 and 2 %.

Summary

The results of the German model trials show that consumers recognise and like the basic concept of compostable products. Standards to determine the compostability of products are well developed and certification system to safeguard the market are existing and increasing in their coverage. This ensures one part of a good regulatory framework for compostable products. Thus enabling success for compostable products.

Literature

EU directives, laws and regulations

Directive 94/62/EEC on packaging and packaging waste, OJ No. L 365 of 31.12.1994

Standards

ASTM D 6400, Standard Specification for Compostable Plastics, May 1999

EN 13432 Packaging - Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging - December 2000

DIN V 54900-1 Testing of compostability of plastics - Part 1: Chemical testing, October 1998

DIN V 54900-2, Testing of the compostability of plastics - Part 2: Testing of the complete biodegradability of plastics in laboratory tests, September 1998

DIN V 54900-3, Testing of the compostability of plastics - Part 3: Testing under practice-relevant conditions and a method of testing the quality of the composts, September 1998

E DIN 54900-4 Testing of the compostability of polymeric materials – Part 4: Testing of ecotoxicity of composts, January 1997

Other Literature

IGW, Bewertung des Einsatzes von BAW-Abfallbeuteln für die getrennte Bioabfallsammlung - Pilotversuch Remscheid, Akzeptanz gegenüber der Biotonne Bioabfallmenge und -qualität Bioabfallverwertung und Kompostqualität, IGW, Witzenhausen, October 1999

Lichtl, Endbericht, Demonstrationsversuch zur Anwendung von kompostierbaren Verpackungen in Handel und privaten Haushalten unter besonderer Berücksichtigung der Fehlwurfproblematik bei der Erfassung und Verwertung über die kommunale Bioabfallsammlung - Durchführungsphase -, Hofheim, 2.4.2003

Weber, Global review of biodegradable plastics testing and standards, Biodegradble Plastics Conference, Frankfurt, 26.10.2001

Weber, Tackling standardization: What are biodegrdable polymers, Biodegradble Plastics Conference, Frankfurt, 4.-5.-12-2002