

# The Current Status of Bioplastics Development in Japan

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Fig 1: Envelopes with a biomass-based plastic window

Fig 2: Packaging of fresh food



## Introduction

Today global warming is a major concern for many people all over the world. That is why bioplastics is the subject of a good deal of attention. Bioplastics are the key material which will contribute to the sustainable supply of useful plastics for everyday life without increasing carbon dioxide concentration in the air (Carbon Neutral Concept). In various business sectors in Japan many companies have undertaken efforts to utilise biomass-based plastics in their product lines.

Japan BioPlastics Association (JBPA) was established in 1989, initially as biodegradable Plastics Society (BPS). With about 240 member companies JBPA today continues to promote the recognition and the business activities of biodegradable plastics and biomass-based plastics.

JBPA is working hard on a global networking cooperation with other areas in the world. Cooperation already started with BPI (USA) and European Bioplastics e.V (Europe) in 2001, with BMG (China) in 2004, and with TBIA (Thailand). One declared goal is to establish a globally harmonised standard and certification system for biodegradable plastics and biomass-based plastics.

## The definition of bioplastics

Bioplastics in JBPA's definition comprises both biodegradable plastics and biomass-based plastics. As in many other countries, there is still some confusion in Japan about the different concepts of Biodegradable plastics and Biomass-based plastics.

Basically the two concepts are completely independent of each other. Some bioplastics are biobased and others are biodegradable. Many bioplastics however, such as PLA or PHA meet both criteria.

The group of biomass-based plastics is constantly growing and, because of the recent developments in biochemistry, many monomer chemicals for plastics will be able to be manufactured from biomass resources at a similar cost to petroleum based plastics in the near future.

The development of polyolefins from bio-ethanol, so-called bio-polyethylene and bio-polypropylene, is a typical example and their market relevance will significantly increase in the future.



Fig 4: Kids' shoes: mixed PLA/PET fabric (upper) and soft PLA compound (sole)

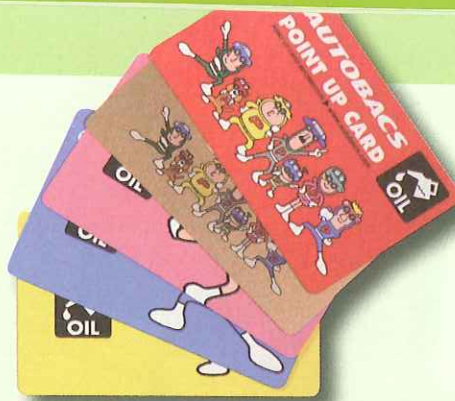


Fig 3: membership cards



Fig 5: wrapping film cutter

### Big concern of Japanese government about the bioplastics

In 2002 the Japanese government decided on two strategic policies called 'Biotechnology Strategy Guidelines' and 'Biomass Nippon Strategy'.

In the 'Biotechnology Strategy Guidelines' the Japanese government set down a clear target for a remarkable increase in the demand for biomass-based plastics. In response to this strategy many products were launched onto the market.

Many producers are now using biomass-based materials, especially for everyday packaging products, and are confident of finding a high level of consumer acceptance. For example, a postal envelope with a biomass-based plastic window (Fig. 1) was the first registered biomass-based plastic product to be listed in the 'Green Purchasing Law' of the Environment Ministry of Japan. It is now widely used by municipal offices and companies in Japan that have a high level of environmental concern.

The packaging of fresh food (Fig. 2) however, is one of the ideal fields of applications for biodegradable plastics. Here compostability can be used as just one of their end of life options. On the other hand, due a lack of sufficient composting infrastructure in Japan, preference is given in many cases to the concept of biomass-based products.

Some of the products, such as shrink sleeves and cap seals, have succeeded in utilising the characteristic properties of biomass-based plastics. These are the results of an improvement in the material itself as well as the processing technology of the biomass-based plastics. Most of the technological development has been done to utilise PLA as the base plastic.

### BiomassPla certification systems

To respond to market concerns and the requests from the industry, JBPA started the BiomassPla certification system in 2006 to clearly distinguish between products on the market made from biomass-based plastics and those

made from petroleum based plastics, and to promote BiomassPla product development (see BM 02/2008, p. 38/39).

In this system the definition of biomass-based plastics is:

"High-polymer materials produced from raw materials which can be obtained by chemical or biological synthesis and that contain substances derived from renewable organic resources. [Excludes chemically unmodified non-thermoplastic natural organic high-polymer materials.]"

The most important aspect of JBPA's definition is to utilise the biomass resources as raw materials for their production, not for simply compounded mixtures.

JBPA's system is based on:

- 1) The positive list system for all biomass-based plastics and their compounds, film etc.
- 2) Biomass-based plastic ratio requirement: minimum 25% of the products measured by C<sup>14</sup> measurement (ASTM D6866-05)
- 3) No components having any non-usable material as decided by JBPA

At present more than 60 products are already registered in this system.

### Biomass-based plastics products in the Japanese market

The first product registered according to the BiomassPla Certification system is the membership card of the main sales chain of automobile related products (Fig. 3). This also shows the high level of concern regarding the 'Carbon Neutral Concept' in the Japanese automobile industry.

The kids' shoes shown in (Fig. 4) are made from a mixed PLA/PET fabric in the upper part. The sole is made of a soft PLA compound with good elastic properties.

A full body shrink-sleeve for beverage bottles was launched on the market in spring 2008. It is now one of the



Fig 6: Textile applications



Fig 8: Mobile phone housing



Fig 9: Note book PC housing

most popular products made of biomass-based plastics which can be found in most convenience stores in Japan.

Fig. 5 shows a wrapping film cutter that was originally made of steel. It was then produced from PLA because of its excellent cutting performance together with its safety, and the advantage of having no metal parts to dispose of.

In the field of textile applications many high grade products have been launched on the market as shown in Fig. 6.

At the G-8 world summit meeting and the related conference in Hokkaido, Japan, a needle carpet made of PLA caught the attention of the top politicians worldwide (Fig. 7).

#### Applications in durable products

A most impressive area of application in Japan is in the field of durable products.

Japanese companies have been making significant efforts to utilise biomass-based plastics for durable products such as consumer electronics and automobile products on the basis of the latest material chemistry and processing technology improvements.

The housing for the NTT DOCOMO mobile phone (Fig. 8) is made of a kenaf-fibre-reinforced PLA composite developed by Yujitika. Fujitsu presented a notebook PC with a housing made of a PLA/PC nano-blend developed by Toray (Fig. 9)

Fuji-Xerox launched a copying machine for which PLA blend materials were used in the movable parts.

One of the first automobile related products was a PLA-based floor mat presented by Toyota in 2003.

And many Japanese car manufactures are continuously developing and launching various products (as can be seen in this and previous 'automotive' issues of bioplastics MAGAZINE).

 [www.jbpaweb.net](http://www.jbpaweb.net)

Fig 7: Needle carpet made of PLA  
(at G8 World Summit Meeting Hokkaido 2008)

