4 ...to manufacture everyday products

100% biodegradable and made from renewable resources, bioplastics have become part of our everyday life

1 potato : 10 bioplastic sacks

Strong and efficient, bioplastics have many applications:

Packaging

- Bags: carrier bags, shopping bags, refuse bags, fruit and vegetable bags
- Food: bottles, jars, catering trays, yoghurt jars…

Fast Food Industry

- Disposable crockery and cutlery
- Trays
- Boxes

Pharmaceuticals and Cosmetics

- Capsules
- Jars
- Boxes

More information: www.biotec-distribution.eu

5 Finally BIOPLAST® products are:

- 100% biodegradable
- Compostable
- Recyclable
- Reusable

After being used, bioplastics decompose under the influence of microorganisms present in the soil, and are naturally eliminated, without human intervention

Example: a BIOPLAST® bag disappears in less than 180 days

Depending on its thickness, it degrades totally into water, carbon gas and biomass according to International Standard EN 13432.

Bioplastics are easily compostable

Collected with green refuse, bioplastics products become compost, to be used as fertilizers, in particular for organic agriculture. This compost can be produced either at home or in a composting plant.

Reduction of greenhouse gas emissions

Using renewable biomass leads to a reduction in greenhouse gas emissions. In the case of bioplastics, this reduction reaches 50%.

Guaranteeing the product is biodegradable and compostable

In order to develop bioplastics, it is essential that consumers be guaranteed their biodegradability and compostability.

Standard EN13432 centres on 4 main points :

- Checking the component, to insure that they do not contain heavy metals
- Biodegradation: the 90% biodegradability threshold must be reached in a maximum of 6 months
- Disintegration: no subsisting material fragment over 2mm x 2mm after 12 weeks
- Humus ecotoxicity

To guarantee compliance with the Standard, certification organisms have created labels

- Belgian organism Vinçotte created OK Compost, a label in compliance with EN13432
- German organism Din Certco created Compostable, a label in compliance with EN13432

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Exploring the world of bioplastics in 5 steps






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1 Potato is the starting point

Bioplastics are plastics manufactured from renewable vegetable resources.

Among all vegetables, potato starch has several advantages for the production of bioplastics:

- its starch yield per acre
- its neutral olfactory properties
- a new generation of bioplastics without plasticizers

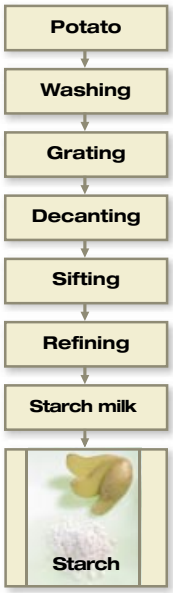
More than 20 varieties at the Starch Industry's disposal

- Grown in Eastern and Northern France.
- Rich in starch (between 17% and 21%).
- Natural irrigation.
- Kaptah Vandel, Amyla, Epona more that 20 varieties exclusively grown for the Starch Industry
- 1.2 million tonnes of starch potato produced in France in 2006

Bioplastics, promising markets for sustainable agriculture

Presently, the main commercial outlets for French potato starch are paper and food industries. Other markets are growing strongly, such as refuse bags, agricultural films or "GEL FEU". Other applications are under consideration in plastics, textile and adhesives industries.

2 Then starch is extracted



Starch contains amylose, the basic sugar of the vegetable world

Amylose is present in more than 50 plants including potatoes, corn, wheat, rice and manioc. It is used in many industries:

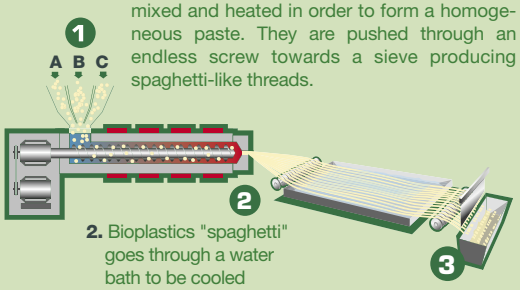
- Food industry: sugar, cakes, sauces, soups, desserts
- Paper industry, to improve paper/cardboard properties
- Pharmaceutical industry, to bind tablet components
- Chemical industry, to replace oil, especially for plastics

Starch and vegetable chemistry

Almost all oil-based products can be manufactured from renewable vegetable resources because they share a common basis: carbon. But vegetables hold a major asset: they are renewable and greenhouse effect neutral. Moreover, organic products are neither toxic nor polluting.

3 Bioplastics are produced from starch...

BIOPLAST® *is made from potato starch, sugar and/or copolyester. They take the shape of granules.*



1. Starch (**A**), sugar (**B**) and/or copolyester (**C**) are mixed and heated in order to form a homogeneous paste. They are pushed through an endless screw towards a sieve producing spaghetti-like threads.

2. Bioplastics "spaghetti" goes through a water bath to be cooled

3. The threads are finally cut into granules

BIOPLAST® bioplastic granules are the primary raw material converted by plastic manufacturers to make a large range of everyday products.

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