

■ Market segment dynamics

In less than 50 years, owing to their innumerable mechanical qualities, biological inertia, low cost (1-2 euros/kg), consumer convenience, plastic materials have invaded our everyday life. In a world market estimated at 200 million tons/year (+5% average annual growth), Europe totals 40 million tons (20%) of which France accounts for 7 million tons. The only negative aspect is the obvious discrepancy between the lifetime of these products (200 years for plastic bags) and their useful life (a few days, or even a few hours). Overflowing dumps, polluted ground, air, sea and visual environment, contribution to the greenhouse effect, collection and recycling costs that are exploding, these issues are combining to form a level of social awareness that is constantly growing due to the emphasis of the debate on the depletion of petrol reserves and price increases.

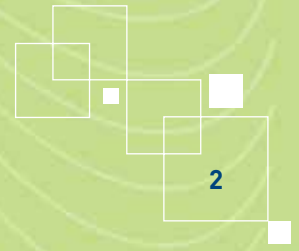
Biodegradable materials include polymers from the petrochemical industry (e.g.: polyethylene associated with a biodegradable polymer such as starch or cellulose), natural polymers or biopolymers synthesized by living organisms (plants, animals, micro-organisms), such as PLA (Poly Lactic Acid), PHB (Poly Hydroxy Butyrate) or PHBV (3 Poly Hydroxy Butyrate 3 Hydroxy Valerate) and finally, polymers obtained through conversion of all the top parts of plants, without separation or purification of their components.

The world production of biodegradable polymers has continued to grow over the past 15 years, without however exceeding 2% of the market either in Europe or in France. The current estimations show a world production of 1 million tons/year in 2010 and 5 million tons/year in 2020. The market is dominated by CARGILL (USA), NOVAMONT (Italy), TOYOTA (Jap), BASF and BIOTEC (Ger.), but new players include DUPONT and PROCTER & GAMBLE (USA), EASTMAN (NL) and UCB (UK). The most "mature" markets are in the USA, Japan and Europe. In spite of the limited size of this latter market, the industrial sector of bio plastics is already very structured.

■ France's attractiveness

Anchored in a European market of half a billion consumers (EU 27), where the progressive conversion to sustainable development is underway, France is a catalyst for initiatives with regard to agro-resources and biopolymers:

- A legislative and regulatory framework which offers more incentives:
- The creation of Eco-Emballages (1992) to organize and supervise the sorting of domestic packaging waste.
- Standards for biodegradability, ecotoxicity and phytotoxicity (NF U 52-001 standard of 20/01/04)
- Ban on bags at checkouts as from 1st January 2010 (Loi d'Orientation Agricole 2006)
- Local/regional initiatives for banning plastic bags (e.g.: Ile de Ré, Corse).
- Public and private R&D networks give rise to synergies between industrial players, laboratories, technical centers and agricultural manufacturers such as the international "Industries and agro resources" cluster in Champagne-Ardenne-Picardie, which due to its transborder programs is increasingly positioned as the major European cluster for plant optimization.



- Europe's leading "reserve" of agro resources: France is the leading agricultural country in Europe and has acknowledged expertise in production techniques which are capable of meeting industrial requirements. The organization of French agriculture activities with its specialized groups, its powerful and structured cooperatives, provides a much appreciated partner

for multinationals and foreign small and mid-sized companies, particularly in the bio-fuels sector (Cargill, Abengoa, Saria, Sudzucker, etc).

■ **International players in France**

- ULICE, a subsidiary of the French agricultural cooperative group LIMAGRAIN (1,043 million euro turnover, 6,000 employees in 35 countries) developed FIBERPLAST®, a polymer (polyolefin, PS, ABS, elastomer, etc.) charged with a plant material (cereal and plant fiber) for the plastics industries, in particular in the packaging, automobile and agro-food sectors.
- The French company SPHERE (300 million euro turnover; 1,300 employees, 14 production units in Europe, 5 of which are located in France), European leader in domestic packaging, established a JV with the English company Stanelco plc to take control of BIOTEC, the German leader in R&D and production of biodegradable materials (200 patents). At the start of 2007, SPHERE entered into a partnership with AdventAgri (group of potato manufacturers) to develop a R&D laboratory at Haussimont (Marne), which is part of the "Industries Agro resources" cluster, as well as a production unit for bioplastic granules.