

## EuropaBio Background Briefing

### Genetically Modified Starch Potato (Amflora - EH92-527-1)

4 December 2006

#### **A unique industrial starch**

Amflora is a brainchild of experts in the potato starch industry and has been developed by researchers from BASF Plant Science. It is a European product designed to strengthen the competitiveness of the potato starch industry (which is mainly based in Europe) versus competition from other starch sources.

Europe is already a significant producer of potato starch, providing raw materials for industries such as papermaking, textiles, packaging and adhesives manufacturing. Normal potato starch is valued for its high molecular weight (giving excellent thickening properties) and low levels of fat and protein compared to wheat and corn starch.

Nearly all starches have two components:

- A high molecular weight, highly branched molecule with excellent thickening properties, called **amylopectin**
- A smaller, linear molecule which gels, called **amylose**

The 20% amylose in normal potato starch limits its usefulness for many industrial applications. Separation of the two components is not economic, so most industrial starch is first chemically modified to reduce the gelling tendency. This treatment also uses both energy and water, so increasing the cost of the starch and the environmental footprint of the process.

A new, nearly 100% amylopectin starch has been developed by BASF Plant Science – a EuropaBio member company - and is now close to the market. The development of this innovative product, to be called Amflora has only been possible by the use of genetic modification.

#### **How has this been achieved?**

Changing the nature of the starch was done by tweaking the pathway by which it is made in the plant cells. Both amylopectin and amylose are built from the same simple sugar – dextrose – and the different physical properties come about because of the way the monomers are joined.

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The linear chains of amylose are constructed using a single enzyme called GBSS (Granule Bound Starch Synthase). Scientists have used biotechnology to make a back-to-front copy of the gene (called an “anti-sense” gene) and then inserted this into the DNA of a conventional potato using a bacterium (*Agrobacterium tumefaciens*). The anti-sense gene interferes with the operation of the normal gene, and no GBSS is produced. In the absence of this enzyme, the polymerisation of dextrose all goes in one direction, to produce amylopectin.

### **Nearing approval**

This innovative potato is nearing the end of its approval procedure. The application, filed under the conditions of Directive 2001/18 (for deliberate release of GMOs) via the Swedish Competent Authority, is to be recommended for approval by the Commission early in December. The body considering this recommendation will be the Standing Committee on GMOs. If they fail to give the necessary qualified majority (two-thirds), the application then passes to the Environment Council. The Environment ministers’ vote also has to result in a qualified majority for a decision to be made, and this has not happened for any recent application. Assuming the vote is not decisive, it then falls to the Commission to decide and they will approve the application since this was their original recommendation.

Approval would mean the potato could be grown commercially and used for industrial processing, which is its intended use. However, there is also a parallel application for approval under the Food and Feed Regulation. This would allow for the potato pulp that remains in the production process also to be used as animal feed.

### **Uses and benefits**

Amflora starch will have a wide number of applications, including:

- Paper coating
- Additive for sprayable concrete
- Use in oil drilling mud
- Textiles
- Adhesives
- Packaging

Its key benefits are:

- Higher yield of amylopectin
- Reduced processing costs
- No need for chemical modification
- Improved performance

### **Identity Preservation**

Potatoes are a perfect crop when it comes to keeping varieties separate. Already, large quantities of starch potatoes are grown in Europe without any intermingling between them and the food crop. Since they are propagated via tubers (“seed” potatoes) cross-pollination is not an issue. There are also no native European species with which they are compatible.

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Amflora will be grown under contract and enter supply chains dedicated only to industrial processing. It will be subject to a rigorous Identity Preservation regime to guarantee its purity and enable the full value to be captured. This will also ensure it does not mix with lower quality, non-GM starch streams.

### **Safety assessment**

Each individual genetically modified crop has to undergo a rigorous scientific evaluation before it is planted outdoors. GM crops have now been grown commercially for over ten years, with some 90 million hectares being planted globally in 2005 (equivalent to about 70% of the total agricultural land in the EU15). No adverse health effects have been found for either people or animals in that time, and there can now be no doubt that approved GM crops are equally as safe as their conventional counterparts.

### **Prior approvals:**

The European Food Safety Authority (EFSA) concluded in Feb 2006 that Amflora “does not pose more risks to humans, animals and the environment than conventional potatoes”.

EFSA opinion: [http://www.efsa.europa.eu/en/science/gmo/gmo\\_opinions/1372.html](http://www.efsa.europa.eu/en/science/gmo/gmo_opinions/1372.html)

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