**Background**

Food & Biobased Research has over 20 years of experience in developing products based on biodegradable and/or biobased polymers. Initially, the main interest was in products that could offer alternative end-of-life options like biodegradability in soil or in industrial composting installations. Nowadays, the focus is much more on biobased polymers with an improved carbon footprint and less dependency on crude oil. The difference between biobased and biodegradable is explained in the figure below.

**Product development**

Product development at Food & Biobased Research is performed in close collaboration with industrial partners. Usually 5 project phases can be distinguished:

- **Phase 1. Idea**
- **Phase 2. Screening**
- **Phase 3. Feasibility**
- **Phase 4. Development**
- **Phase 5. Scale-up**

After phase 1, where initial ideas are formulated, a screening phase is performed where different materials that might be suitable for the application are identified. In a feasibility study the technological feasibility is evaluated, focusing on product demands and processing techniques. The development phase will lead to a prototype, requirements for scaling-up and a cost price evaluation. In phase 5, the process is scaled-up and subsequently products can be commercialised.

**Product examples**

Together with industry Food & Biobased Research has developed several products or has had an important role in the product development. A selection of products is shown below.

**Conclusions**

Food & Biobased Research is an excellent partner for product development based on novel bioplastics. Our knowledge includes:

- Development of biobased polymers and monomers
- Properties & analyses of biobased polymers and products
- Biodegradable polymers and biodegradability testing
- Processing of biobased polymers
- Additives and fillers for biopolymers

Food & Biobased Research has a wide variety of processing equipment suitable for product development including compounding, injection moulding and film blowing (1-5 layers). For product analyses we have an extensive laboratory for mechanical, chemical, optical, thermal and degradability testing. An increasing number of products developed at our institute can be found on the market today.

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**Biobased plastics**

Biobased plastics are plastics based on renewable raw materials like starch, cellulose or plant oils. Two main groups of biobased plastics can be distinguished:

- Drop-in bioplastics like bio-PE and bio-PET that are (chemically) identical to traditional plastics
- Novel plastics like PLA, PHA’s and PEF.

Novel bioplastics have properties that differ from traditional plastics. In product development it is a challenge to match properties and product demands. Making use of specific benefits of novel bioplastics increases the chances of success of a new product. These advantages can be:

- High gloss and transparency of PLA
- Anti-static behaviour of TPS
- Excellent barrier properties of PEF
- Biodegradability of PHA.

**Biodegradable plastics**

When recycling is difficult, impossible or expensive, biodegradable plastics can offer a solution. Examples are biodegradable bin liners, geo-textiles, and several agricultural products like mulch films. Apart from the polymer selection, for biodegradable products there are specific requirements for additives, glues and inks.