Jungbunzlauer

*From nature to ingredients®*

# Into the future with biopolymers

## Shaping polymer properties with bio-based additives

Biopolymers are used across a broad spectrum of applications due to their renewable nature and their biodegradibility. However, the neat polymers are often difficult to process and suffer from their brittle character. Jungbunzlauer can help you tackle these challenges with our range of bio-based CITROFOL® plasticisers. Our CITROFOL® citrate esters provide the ideal bio-based alternative to conventional plasticisers in biopolymers.

### Polylactic Acid (PLA) with CITROFOL®

PLA is a popular material as it is economically produced from renewable resources by polymerisation of fermentation-based lactic acid. However, its widespread application is hindered by numerous physical and processing limitations, like its brittleness or low elasticity.

- Easier processing due to reduced viscosity, motor load and melting temperatures
- Improved mechanical properties like elongation at break
- Increased processability for cast foils due to enhanced softness and lower brittleness

### Polyhydroxyalkanoate (PHA) with CITROFOL®

Poly (3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) belongs to the group of PHAs. It is a thermoplastic, biodegradable, non-toxic biopolymer that is produced naturally by bacteria. Its brittleness, low elongation at break and low impact resistance can pose issues in its commercial application.

- Improvement of the processing window and minimisation of thermal degradation due to reduced glass transition and melting temperature
- Easier processability due to reduced viscosity and motor load
- Increased flexibility for cast foils

## Cellulose Acetate (CA) with CITROFOL®

CA is a thermoplastic biopolymer made from wood pulp. Due to its biodegradability potential, its use has become even more widespread in recent years. Pure CA is a brittle material that requires the addition of a plasticiser – to ensure proper processing and optimised end properties.

- Excellent processability with CITROFOL® AI and AII
- Broader processing window due to reduced glass transition temperature
- Improvement of mechanical properties, e.g. impact strength
- Low migration potential

## Biodegradable mulch film

Mulch films are predominantly based on polyethylene (PE), a non-degradable polymer, which makes it necessary to collect the film before harvest. Through the adhering soil, the PE film cannot be reused nor recycled.
Biodegradable polymers like PLA or PHAs are growing in popularity for mulch films, which allow ploughing the film into the soil without harming effects, e.g. microplastic accumulation.

- Improve processability with CITROFOL® BII in PHBV/PLA blends
- Broad compatibility with different biopolymer matrices (PLA, PHB, PHBV)
- Increased mulch film stretchability
- Improved film disintegration behaviour

## Accelerated disintegration

Despite biodegradability, degradation can take a long time, in particular in normal environment when sharp conditions like in industrial composting cannot be reached. Therefore, an accelerated decomposition is preferred for specific product categories.

- In-house test setup for investigation of compostability of plasticised biopolymers
- Improved disintegration of biopolymers

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