



**From plant to agromaterial: Innovative axes to a better design
of biobased fibers used in thermoplastic composites**

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Abstract:

Fibres Recherche Développement (FRD®) is a research and innovation company dedicated to the promotion of biobased fibers for applications in materials (insulation, concrete, composites, etc.).

Indeed, FRD is an engineering platform for projects promoting the design and development of innovative materials thanks to their multi-scale expertise in agro-material, from field to final product, through three main axes: Custom-tailored studies (Market, source, supply studies, technical monitoring studies...), research contracts (materials innovation, assistance with design and processing, design of fractionated and functionalized fibers / aggregates / reinforcements...) and projects management and engineering.

In order to satisfy the increasing demand for new eco-designed products with higher performances, the use of biobased fibers is considered with great interest. Extracted from stems, hemp and flax fibers have promising properties interesting textile, non-woven and composites industries. But, the access to these major markets implies to reach precise specifications and to certify high levels of quality. Indeed, due to some persistent technological barriers, many markets remain hardly accessible to biobased fibers.

Several R&D projects pointed out the effects of each successive stage involved in stem formation, straw treatment and in fibers process. Innovative axes to a better design of hemp fiber used in thermoplastic composites are described above:

- Genetic and Agronomy: Botanical origin, genetic and pedoclimatic conditions can affect fibers quality at molecular / chemical and morphological levels.
- Retting: Different levels of retting can impact the performance of fibers and thermoplastic composites.
- Fractionation: Industrial process used to extract and transform fibers can alter several morphological, mechanical and chemical intrinsic parameters of fiber bundles.
- Functionalization: Fiber treatments can modify fiber - matrix interaction and improve composite performances
- Processing of the final product: Processing conditions (profile screw, mechanical energy, cumulative strain...) can impact the morphology of fibers in the materials, and thus the final properties.

Through innovation programs*, we are strongly working on understanding the keys properties of fibers and the correlations between their quality and the microstructure and properties of biocomposites.

*<http://www.f-r-d.eu/projects/>