

Agricultural Sidestream as a Biomaterial Commodity: Opportunities and Challenges

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Abstract

Biocomposite packaging materials are attractive as they can be made up of biodegradable polymers and agricultural residues. The Agricultural sidestream is usually considered as waste, not traded as a commodity, having no economic value. Biocomposite packaging materials use has been motivated by stringent regulations. In many African countries, fossil-based and nondegradable plastic bags and packaging are banned to relieve the plastic pollution issue. For alternatives, the development of packaging materials that offer sufficient properties to store goods and increase the shelf life of the products without being environmentally harmful is needed. Renewable-based polymers and harvest crop sidestreams can be used to create fully soil and marine-degradable biocomposite packaging materials. Material is processable with the same machinery as conventional plastics and without complex chemical treatments to be implemented in African countries such as Kenya, South Africa, Uganda, and Ethiopia. This creates a low-investment requirement possibility for existing plastic processors.

Increased usage of local raw material reduce need of import. Most of the locally available sidestreams (e.g. cowpea, finger millet, sorghum, faba bean) can be used to produce biocomposite films for flexible packaging and injection mould specimens for rigid packaging.

In the project InnoFoodAfrica, biocomposite materials made from a biopolymer blend reinforced with up to 30 % agricultural sidestream were compounded by extrusion, followed by injection moulding and film extrusion for the development of rigid and flexible packaging, respectively. The sidestream may require additional pretreatment to improve dispersion into matrix and eliminate possible microbiological contamination. One of the intermediate products, pellets, can also be exported globally.

The prices of these polymers are now unfortunately higher than the prices of conventional polymers, however, in the future, it can be assumed that the production of biobased and biodegradable polymers will increase with increasing demand for more sustainable materials, which will decrease the prices. In addition, mixing with sidestream material, the production costs will decrease, to a level to be competitive against existing products in the market. This creates value for sidestreams. Thus, the use of sidestreams in biocomposite materials enable the development of new value chains and add new income source for local farmers.

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Senior Scientist Janne Keränen from VTT Technical Research Centre of Finland Ltd has PhD from Physics and he has almost 25 years of experience in R&D mostly in the area of papermaking technologies, techno-economic feasibility studies of new production lines and sustainable use of biomass resources. Altogether he has about 50 publications. He is currently WP leader in InnoFoodAfrica, from which this reaserch is about. He enjoys in 'digging deep' to the origins of the data.