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**Research area: Product aims**

Raw materials // Chemical additives

**Key words:**

Bio, green, paper, packaging, recycling, sustainability

**TITLE:****Completely bio-based paper products - wrong track or new opportunity?****Background/Problem area**

Bio-based products consist of renewable raw materials as well as inorganic fillers and petrochemically based materials. Today, products based on regenerative raw materials are regarded as being indispensable for a resource-conserving and environmentally compatible recycling management. The demand for bio-based paper products is rising continuously due to the growing demands placed on the environmental acceptability of products and a constant increase in the price of resources. Such products today influence the competitive edge of companies and determine to an ever greater extent purchasing behaviour together with price and quality.

Cellulosic fibrous raw materials and starch for papermaking meet the requirement of being bio-based. This, however, is not the case for a variety of additives and aggregates that are currently being used in the processes of papermaking and converting, e.g. retention agents, defoamers or wet strength agents. It is therefore essential to examine and compare the ecological and monetary opportunities and risk of completely bio-based paper and converting products in order to increase further their acceptance among papermakers and converters.

**Objectives/Research results**

The objective is to demonstrate which opportunities and risks exist from today's point of view in respect of bio-based paper and packaging products. Obstacles are to be identified and evaluated. This is to also occur with a comparison to the level of development of bio-based products in the plastics sector. Economical and ecological consequences are to be evaluated and recommendations given for action to be taken.

Starting from a literature research on cellulosic fibrous raw materials (recovered paper, mechanical pulp, chemical pulp), man-made fibres, chemical raw materials (fillers, additives, aggregates, etc.) and paper-based products (paper, board, etc.), an analysis and evaluation of the actual situation of bio-based products in the paper industry were conducted. These served as the basis for ascertaining the respective magnitude of bio-based percentage. The result was a percentage of approx. 74% for the use of regenerative raw materials in the paper industry and a substitution potential of approx. 26% for overall papermaking and converting. The non-regenerative raw materials are in particular the additives, coating pigments, fillers that are used and the recovered paper in the inorganic percentage. The percentage of non-regenerative raw materials to be substituted in wood-containing magazine paper, for example, exceeded 30%, whereas corrugated base paper showed a value of approx. 18%. In addition, data were gathered on the costs of the respective feedstocks.

The actual situation of bio-based products in the plastics industry was evaluated in a subsequent step. High growth rates in bioplastics of as much as 20% annually were found as well as a high demand by virtue of a growing trend toward environmentally friendly products. Poor transparency for the consumer as the result of a policy of insufficient information was found to be a problem. In addition, at present there is still no regulated disposal for bioplastics. The currently low production volumes also give rise to comparatively high material costs.

Ultimately, the feasibility of the use of regenerative raw materials as an alternative for chemical additives (internal sizing and coating) was investigated. It was found that the substitution of coating colour additives, sizing agents, wet and dry strength agents as well as retention and draining aids is feasible in principle. As things stand at the moment, soy protein and casein, for instance, are suitable as a replacement for coating colour additives, starch and sizes based on natural oils for conventional sizing agents, chitosan, starch and galactomannan for wet and dry strength agents as well as chitosan and xylan for retention and draining aids. On this basis, an overall substitution potential of more than 300kt resulted for conventional chemical additives. It was also found, however, that to date no true alternatives exist for some additives, e.g. fixatives, cleansers, optical brighteners and biocides.

Future studies are aimed at creating an evaluation matrix containing a comparison and evaluation of regenerative feedstocks (polymer binders, coating colour additives, etc.) and selected parameters (barrier properties, processability, etc.). Finally, we will derive recommendations for action to be taken.

**Application/Economic benefits**

The results of the project are of major importance for the entire paper industry. There is a high degree of usability both for graphic, packaging, hygienic and specialty paper. The use and the availability of bio-based products are indispensable for a further strengthening of paper in its competitive battle with other materials. They also constitute an important basis for the vision of a sustainable bio-based economy by the year 2030.

**Period of time:** 01.01.2013 bis 31.12.2013

**Remarks**

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