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## **Valorisation of plant coproducts: characterisation and implementation of a prioritisation methodology using multi-criteria analysis**

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Plant co-products have a great potential for recovery as secondary materials. Despite their enormous potential, only a small percentage of these co-products are recovered, which has negative social, economic and environmental impacts. However, the viability of recovery alternatives depends on a number of criteria. It is therefore necessary to be able to list all the criteria to be taken into account and the possible ways of application.

A methodology has been established to develop a multi-criteria analysis. This analysis uses the AHP (Analytic Hierarchy Process) method and the fuzzy TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method to weight the criteria and rank the recovery routes studied. Banana co-products and their recovery routes were taken as a case study. These co-products were analysed on the basis of 4 criteria, 23 sub-criteria and 136 recovery alternatives. The analysis was applied to 2 matrices: one general (by co-product) and the other more specific (by application pathway).

The combination of the bibliographic characterisation of the co-products and their matrix analysis made it possible to demonstrate their richness in nutrients and bioactive components, associated with interesting uses in nutrition and health. The method made it possible to evaluate engineering, product quality, economic and environmental criteria, of which the sub-criteria of legislative feasibility and toxicity had the greatest impact in the classification of co-products.

The most interesting recovery routes are obtaining fatty acids by fermentation and extracting bioactive components. This multi-criteria approach can be used to manage co-product recovery options.