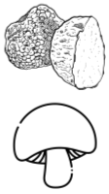
FOREST4EU

ITHub 4 – Non-Wood Forest Products



FOREST4EU partner: Cesefor

OG: ACREMA

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Type of Innovation: Technological Innovation

# Analytical techniques based on NIR technology for the characterisation of resins and their derivatives.

## Introduction

The quality of the resin is a key factor in the competitiveness and viability of the resin sector, about which there is insufficient knowledge to date. Starting from the distillation of the resin by hydrodistillation or steam distillation to obtain its main components (rosin and turpentine), and through laboratory analytical techniques, we can determine important parameters that will vary depending on the resination method, the species or the climate, among others, and which will be decisive when classifying the resin according to its quality and, therefore, its final destination. A study has been carried out on the analysis of resins and rosins using NIRs technology (Near Infrared Spectroscopy), a non-destructive, simple and fast technique that would allow an initial classification of the resins based on their quality parameters, such as rosin and turpentine content, for example. This would allow a more detailed knowledge of the product for sale to the first transformation industry, directing the resin production to different sectors, depending on the needs demanded by the companies.

## Approach and main results

The quality of the resin is a key factor in the competitiveness and viability of the resin sector, about which there is insufficient knowledge to date. Starting from the distillation of the resin by hydrodistillation or steam distillation to obtain its main components (rosin and turpentine), and through laboratory analytical techniques, we can determine important parameters that will vary depending on the resination method, the species or the climate, among others, and which will be decisive when classifying the resin according to its quality and, therefore, its final destination. A study has been carried out on the analysis of resins and rosins using NIRs technology (Near Infrared Spectroscopy), a non-destructive, simple and fast technique that would allow an initial classification of the resins based on their quality parameters, such as rosin and turpentine content, for example. This would allow a more detailed knowledge of the product for sale to the first transformation industry, directing the resin production to different sectors, depending on the needs demanded by the companies. The NIRs analysis has focused on the development of models to determine the % turpentine and % rosin of the starting resins and the acidity index of the rosins obtained. The first step of the working system in the development of a NIR prediction tool is calibration, which involves the analysis by classical (or laboratory)

technologies of a set of samples that are representative of the parameter of interest (called the calibration population). At the same time, these samples will be analysed by NIR, optimising the process so that quality spectra are obtained. The spectra will be confronted with data obtained by classical methodologies, constituting the working databases with which, using multivariate analysis software, prediction models will be developed. The second step is validation, the application of these models on samples not included in the calibration population, also analysed by classical methods, thus knowing the reference value of the parameter to be determined (known as the validation population). The statistical study of these results will determine the framework of application of the prediction models, restricting it to a classification system by categories, or it can be applied in quantitative analysis. Model development was studied considering a global data set, and also classifying the calibration population by method, species and both factors simultaneously. As expected, correlation values improve when variability is restricted. As an overall result it can be concluded that, although correlation coefficients of 0.8 have been obtained for some models, it is necessary to extend the calibration populations to be able to continue working and developing robust models that allow, if not quantification, a quick and easy classification of the resin. All this, together with the great versatility of commercial accessories for NIR equipment (portable and non-portable) would provide companies with a tool that not only allows product control, but also its commercialisation with a guarantee of traceability and quality.

## Lessons learned

NIRs technology is a promising technique in the resin industry as a simple and fast way to classify resin. The models developed for the prediction of rosin % show better statistics than those developed for the prediction of turpentine content. This may be due to the method used to obtain principal components. It is necessary to extend the calibration populations in order to be able to continue working and developing robust models that allow, at least, a quick and simple classification of the resin.

The information presented in this factsheet was developed by the FOREST4EU partner, drawing on the innovations and knowledge generated by the indicated operational group with their explicit authorization.

## Further information

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