CHEMICAL AND ANATOMICAL STUDY OF *Gleditsia triacanthos* TO IDENTIFY OPPORTUNITIES FOR WOOD AND NON-WOOD USES

Ibáñez M.1, Romero M.1, Camargo A.2

1-Instituto Superior de Estudios Forestales, Sede Tacuarembó, Universidad de la República, Uruguay.
marcela.ibanez@cut.edu.uy/michael.romero@cut.edu.uy
2-Procesos Industriales de la Madera, Sede Tacuarembó, Universidad de la República, Uruguay.

INTRODUCTION

Known as honey-locust, Gleditsia triacanthos is a woody species of the Fabaceae family, native to North America. It can be considered an aggressive colonizer: a root sucker, its abundant seed production and high germination capacity allows it to rapidly form dense, impenetrable stands. Today it is categorized as invasive in Oceania, Europe and many South American countries, such as Uruguay and Argentina.

Given its wide distribution, it is extremely difficult to control. Chemical methods, namely drilling the trunk and applying herbicides, are commonly used; such control methods reduce its effects on the environment, visual impact and operation costs and time.
One way to mitigate its negative impact is to identify opportunities to use G. triacanthos after cutting down the bushes by reevaluating its biological products.Using its wood or non wood byproducts and residues as raw material for new biochemical products, biomaterials and biocombustibles creates added value and reduces waste.

This work aims to study the applicability y valorización of this species as a source of both combustible and non-wood products, transforming it from a problem to a resource. In order to achieve this, the heat capacity, chemical composition and anatomical description of its wood was determined.

MATERIALS AND METHODS

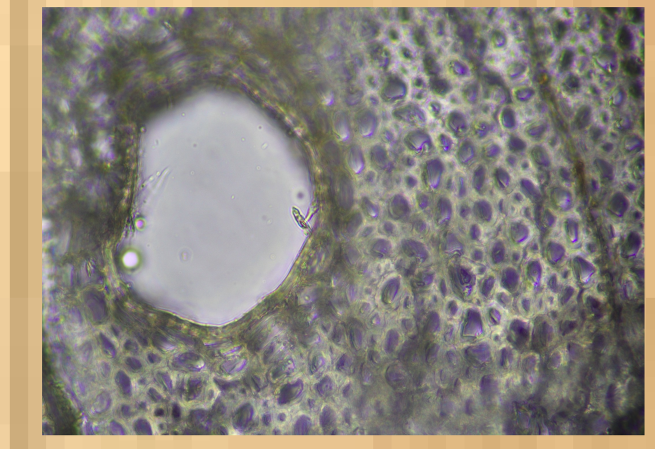
27-year-old Gleditsia triacanthos trees from the Bernardo Rosengurtt Experimental Station Facultad de Agronomía, Udelar (32° 20'16.22 "S, 54° 26' 58.00"W) were used in the study. Sapwood and heartwood were air dried for four weeks to a stable moisture content of 12%. Heartwood and sapwood were then cut into (3,0 x 3,0 x 3,0) cm cubes.

<u>Wood characterization</u>

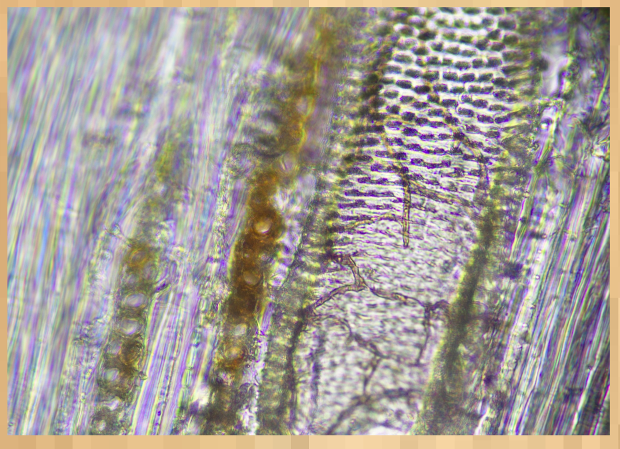
***Microscopy**

Wood samples were softened in water and glycerin (4: 1) for 24 h. They were then sectioned with a sliding microtome Reichert-Jung xylotome (Vienna, Germany) into 10-20 mm thick slides; transverse, tangential y radial section planes. The slides were then observed with fluoresce microscope, Nikon Eclipse 50i.

→Transverse



→ Tangential



→ Radial

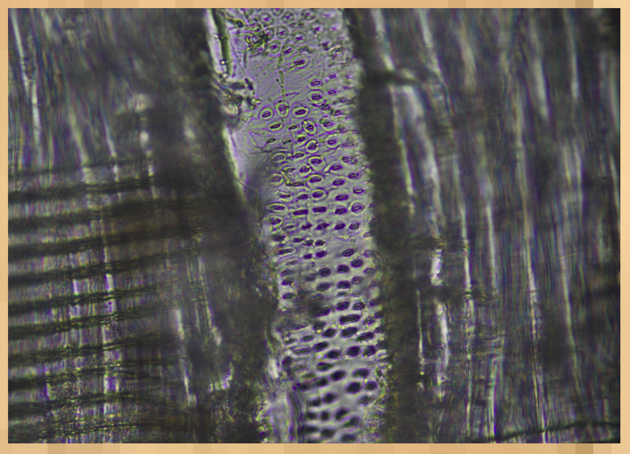


Table 1. Composición quimica de la albura y el duramen de *G. triacanthos*

Title 1	Albura	Duramen
Ethanol extractives (%)	4.29 ± 0.02	8.60 ± 0.02
Acido insoluble lignin (%)	13.30 ± 2.07	9.65 ± 0.58
Acido soluble lignin (%)	0.54 ± 0.02	0.88 ± 0.03
Holocellulose (%)	79.9 ± 0.97	82.88 ± 1.68
Cellulosa (%)	45.19 ± 1.42	43.41 ± 1.06

Table 2. Análisis próximo y poder calorífico de *G. triacanthos*

Title 1	Albura	Duramen
Ash (%)	0.72 ± 0.04	0.80 ± 0.03
Volatile (%)	83.04 ± 0.62	83.18 ± 0.56
Heat capacity (KJ/KG)	18239	18608

***Chemical analysis**

→Wood, hollocelulose, celulose & lignin

Heartwood and sapwood were finely milled in a rotary mill (Marconi Ltd, Piracicaba, Brasil). A sample was taken in order to determine humidity content by weight difference before and after drying in a stove at 103 ± 2°C until constant weight. Milled samples were extracted with ethanol for 24 h in a Soxhlet apparatus. Lignin content was determined as the sum of acid-insoluble lignin (or Klason lignin) and acid-soluble lignin according to Sluiter et al. Holocellulose was determined according to Abreu et al. Cellulose content was determined by reaction with nitric acid. Ash determination was performed according to ASTM D1102 standard. Volatile determination was performed according to ASTM E872-82 standard. Calorific value was determined according to ASTM D2015-89(00) standard using a calorimetric oxygen pump (XRY-1A +, China). The Stiasny number was determined.

RESULTS

The extract could be used for adhesive formulations since the results showed a Stiasny number higher than 65 and an acceptable extraction yield value.

UNIVERSIDAD DE LA REPÚBLICA URUGUAY

SEDE TACUAREMBÓ