Tunisia

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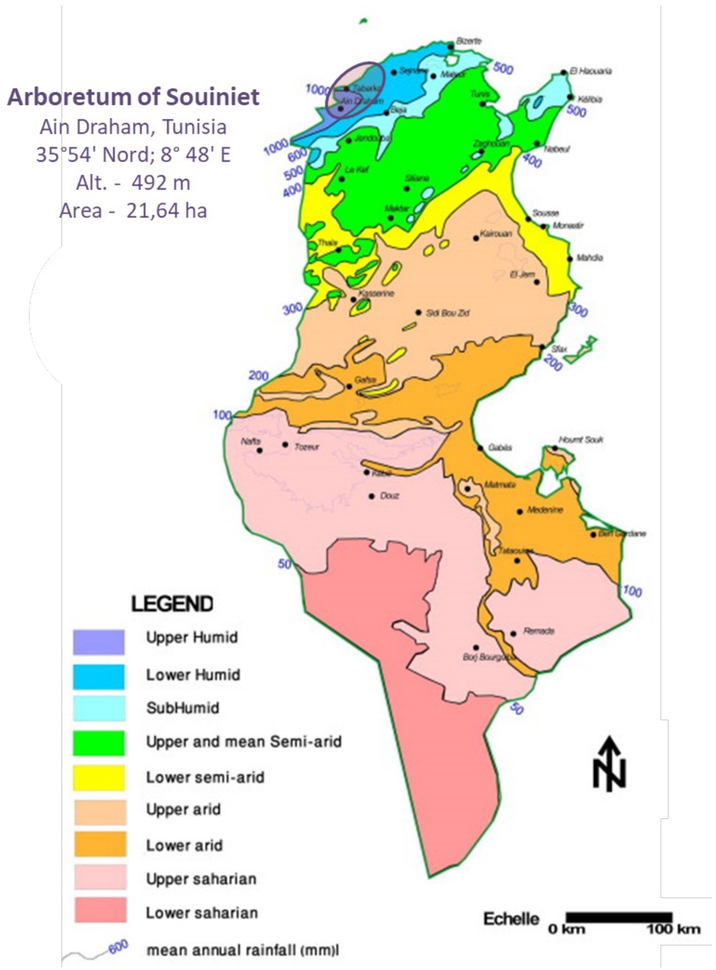
Context : Eucalyptus trees have been adapted to the Tunisian climate. Now, they need to be economically valued. Tunisian Eucalyptus have great technological properties allowing us to use them as wooden material. However, there is large variability in the natural durability between heartwood Eucalyptus spp. (Taylor et al. 2006). The wood sustainability assessment provides reliable parameters to predict the service life of wood-based products. This study aimed to evaluate the wood deterioration of four North Tunisian fast-growing Eucalyptus spp. exposed to basidiomycetes and termites. Then, these natural durability results were put in perspective with the extractive content and analysis.

Key words: Extractive's composition; GC-MS; Natural durability; Screening tests; Tunisian Eucalyptus.

Materials & Methods

LOCATION OF THE SOUINIET 'S ARBORETUM ON THE BIOCLIMATIC MAP OF TUNISIA



STUDIED *EUCALYPTUS* SPP.

Eucalyptus saligna

Eucalyptus maidenii

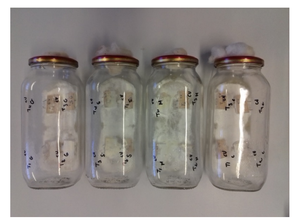
Eucalyptus camaldulensis

Eucalyptus gomphocephala

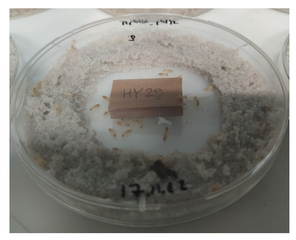
Years old: 55–60
Breast height diameters: 30 - 40 cm
Number: 5 trees per species

NATURAL DURABILITY

Fungal durability tests (according to XP CEN/TS 15083-1 (2006): *Trametes versicolor; Coniophora puteana*

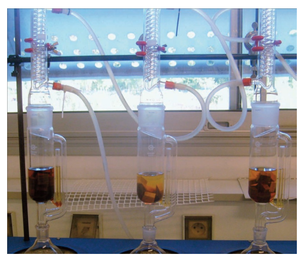


Termite resistance tests (according to EN 117 (2013): *Reticulitermes flavipes*

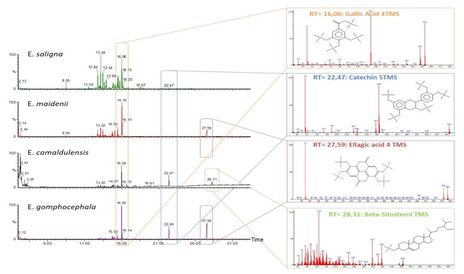


CHEMICAL COMPOSITION OF EXTRACTIVES FRACTIONS

Extraction processes
Dichloromethane & Acetone



GC-MS analyzes

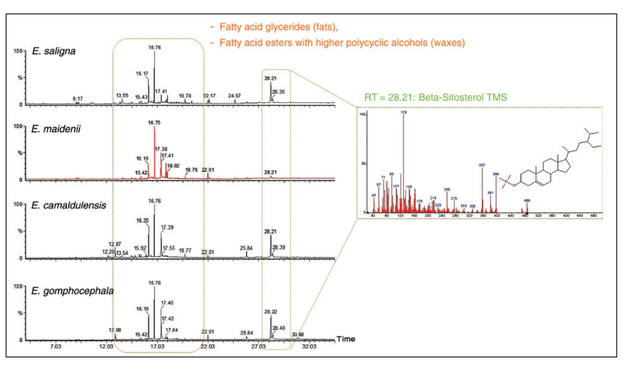


Results & Discussions

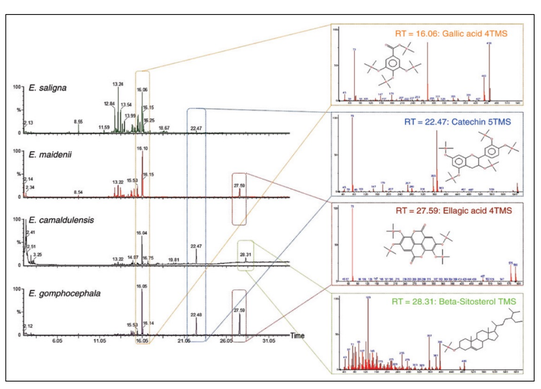
Durability classes of *E. saligna*, *E. maidenii*, *E. camaldulensis* and *E. gomphocephala* according to the XP CEN/TS 15083–1 (2006) and EN 117 (2013)

Species	Fungal resistance (according to the EN XP CEN/TS 15083-1)			Termite resistance (according to the EN 117)		
	Coniophora puteana (Brown rot)	Trametes versicolor (White rot)	Durability class	Reticulitermes flavipes (Eastern subterranean termites)		Durability class
	Average value of WL (%)	Average value of WL (%)		Survival rate (%)	Visual quotation	
E. saligna	0.65 ± 1.05	2.04 ± 2.60	1	34.7 ± 12.03	3	Sensible
E. maidenii	0.17 ± 0.15	0.45 ± 0.27	1	13.33 ± 7.02	1	Durable
E. camaldulensis	0.23 ± 0.63	0.28 ± 0.25	1	14.00 ± 6.93	1	Durable
E. gomphocephala	0.06 ± 0.06	0.27 ± 0.21	1	12.67 ± 5.03	1	Durable

Chemical composition of dichloromethane-extractives, identified by GC-MS.



Chemical composition of acetone-extractives, identified by GC-MS.



Qualitative evaluation of the presence of chemical compounds with antifungal activities in the *E. saligna, E. maidenii, E. camaldulensis* and *E. gomphocephala* extracts.).

✓GC-MS analyses highlighted that the high contents of gallic acid, fatty acid glycerides, fatty acid esters and phenolic compounds in the four Eucalyptus extractives provided to the wood a high level of decay resistance (Durability class 1).

✓Content variations in sitosterol, catechin and ellagic acid, which also have anti-termite activities, allowed to classify the natural durability of the four Eucalyptus spp. as following: *E. gomphocephala* > *E. camaldulensis* > *E. maidenii* > *E. saligna*

✓These decay and termite-resistant of Tunisian Eucalyptus wood could be extensively used in some industrial processes such as pulp, paper, chipboard, plywood manufacturing and also wooden material and building structure, improving the economy of the wood sector in Tunisia.

Species	Solvent used for extraction	Extractive contents (%)	Presence of chemical compounds with anti-fungal and anti-termite activities				
			Gallic acid	Fatty acid glycerides and fatty acid esters	Sitosterol	Catechin	Ellagic acid
E. saligna	DCM	1.20	0	+++	++	0	0
	Acetone	2.60	++	++	0	-	0
E. maidenii	DCM	0.80	0	++	-	0	0
	Acetone	8.50	+++	+	0	0	+
E. camaldulensis	DCM	0.30	0	+++	++	0	0
	Acetone	5.80	++	-	+	++	0
E. gomphocephala	DCM	1.10	0	+++	++	0	0
	Acetone	12.30	+++	-	0	++	++

Acknowledgements

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References

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