Study of the mechanical properties of adhesive formulations for the wood industry based on *Pinus elliottii* tannins.

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Summary

The aim of this work was to test adhesive formulations based on pine bark (*Pinus elliottii*) tannic extract and with total formaldehyde substitution, evaluated by ABES (Automatic Bonding Evaluation System) to study the mechanical properties by varying the strength of adhesion, recorded in function of time and temperature. This study, by providing an insight on the behavior of resins, will have future applicability on the production of particleboards. Four pH (4, 6, 8 and 10) and two hardeners (Glyoxal and Hexamine) were tested, with different pressing times (sec), evaluating the adhesion strength (MPa). These essays were compared with another species of pine (*Pinus radiata*) as reference.

Materials and method

Tannic extract of P. radiata

Tannic extract of P. elliottii

Hardeners and pH

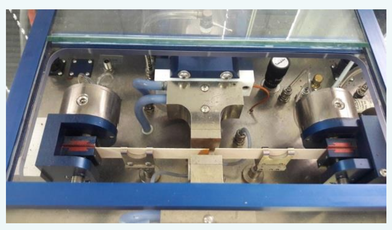
Hardener Hexamine (7%) (pH 8 and 10)

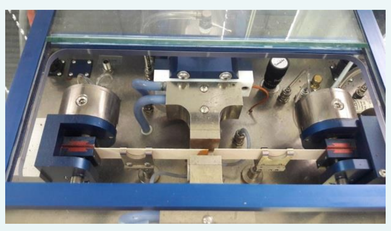
Hardener Glyoxal (12%) (pH 4 and 6)

Hardener Hexamine (7%) (pH 8 and 10)

Hardener Glyoxal (12%) (pH 4 and 6)

Calorimetric study of mechanical curing (ABES)



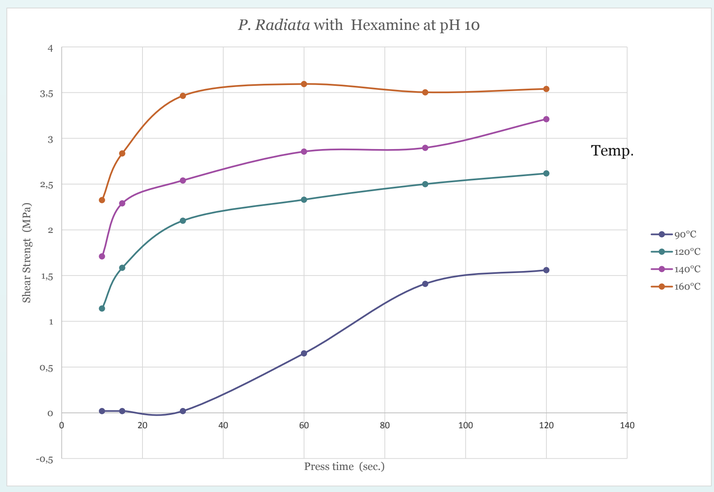


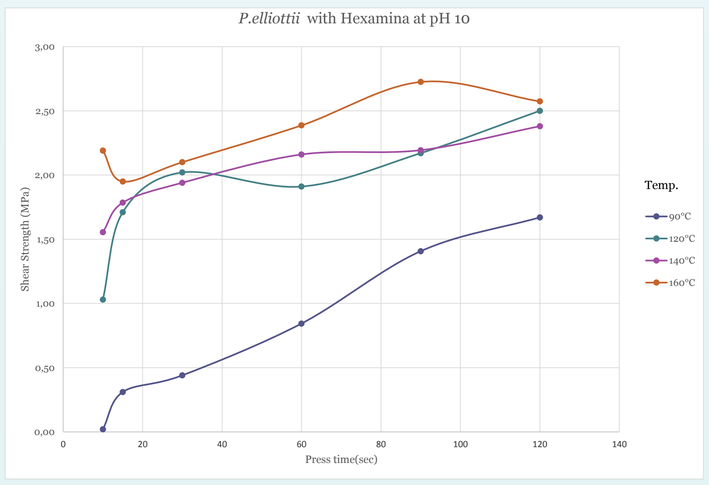
Test conditions

Strenght test
Strength: 4 Mpa
Press Time (sec):
10, 15, 30, 60, 90 and 120
Temperature (Cº):
90, 120, 140 and 160

Results

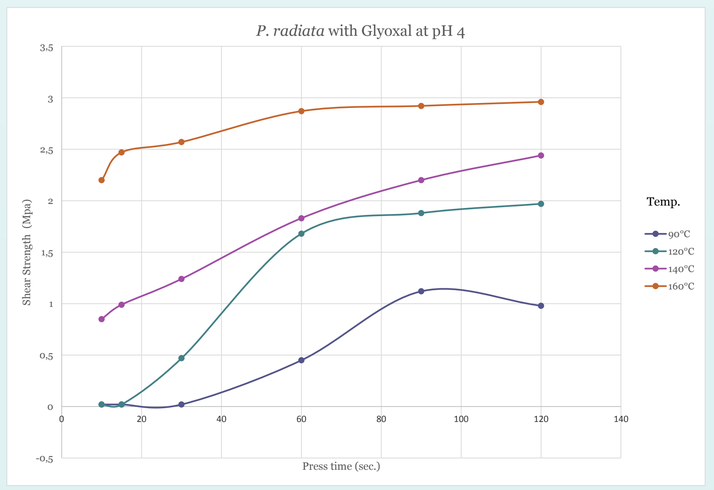
The best results were obtained with the addition of Hexamine as a hardener at pH 10 for both P. radiata and P. elliottii. In the case of Glyoxal, the best results were obtained at pH 4, its best performance being with P. radiata.

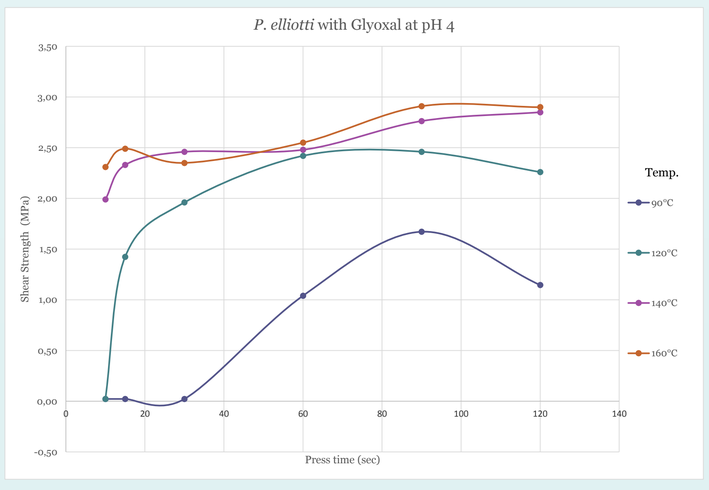




Discussion

Other proportions of P.elliottii extract with different concentrations of hardeners should be tested to study their potential as an adhesive for the wood industry. rheological studies and chemical curing by (DSC) will be carried out to complement these tests.





Conclusion

There is potential use of P. elliottii tannic extract as a substitute for formaldehyde in adhesives, using Hexamine as a hardener. The results of using of Glyoxal as hardener are not as good results, at least under the tested concentrations.

Bibliographic reference

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Acknowledgments