

Área: ORG

Physicochemical and Antimicrobial Properties of Four Stingless Bee Propolis

Jaqueline P. P. Martins (PG),¹ Maiara G. Luz (IC),² Cleverson Busso (PG),² Renato Eising (PQ)².

Jaqueline.martins7@unioeste.br

¹UNIOESTE Universidade Estadual do Oeste do Paraná; ²UTFPR Universidade Tecnológica do Paraná;

Keywords: Phenolics, Flavonoids, Antioxidant and Antimicrobial

Highlights

Stingless bee propolis exhibits high levels of phenolic compounds and flavonoids, with remarkable antioxidant and antimicrobial activity, highlighting its natural potential.

Resumo/Abstract

Stingless bees occur throughout tropical and subtropical regions, and Brazil hosts about 43% of the described species, including *Tetragona clavipes*, *Scaptotrigona polysticta*, *Scaptotrigona bipunctata*, and *Tetragonisca angustula*. The propolis produced by these bees is rich in phenolic compounds and flavonoids, showing notable antioxidant and antimicrobial activities. Its chemical composition varies according to the bee species, local flora, and collection period (Devequi-Nunes *et al.*, 2018). The study evaluated the physicochemical properties and antibacterial activity of stingless bee propolis extracts. The methodology followed the flowchart in figure 1.

assays, only the alcoholic extracts inhibited *Staphylococcus aureus*, with no effect against *Escherichia coli*. These results indicate that the antimicrobial activity depends on both the bee species and the solvent used.

Bee Species	Extract	Wax Content (%)	Phenolic Content (mgGAE/mLPE)	Flavonoid Content (mgQE/mLPE)	Antioxidant Activity (µMTE/mLPE)
<i>T. Clavipes</i> (Bora)	Milli-Q water	--	0,7717	0,0945	1442
	Ethanol 80 %	0,8	2,2912	0,0897	1477
<i>S. Polysticta</i> (Berjot)	Milli-Q water	0,35	0,0834	0,0346	459
	Ethanol 80 %	0,3	0,0917	0,0076	512
<i>S. Bipunctata</i> (Tubuna)	Milli-Q water	0,24	0,0691	0,0205	700
	Ethanol 80 %	0,17	0,192	0,0453	1203
<i>T. Angustula</i> (Jataí)	Milli-Q water	0,27	0,0399	0,0369	552
	Ethanol 80 %	0,28	0,1207	0,0207	830

Chart 1. Wax content, phenolic compounds, flavonoids, and antioxidant activity of propolis extracts from different stingless bee species (*T. clavipes*, *S. polysticta*, *S. bipunctata*, and *T. angustula*), obtained by purification in water or extraction with 80% ethanol.

The hydroalcoholic extract of *T. clavipes* showed higher phenolic content, strong antioxidant activity, and effectiveness against *S. aureus*, indicating potential as a natural preservative, although further studies are required.

References

DEVEQUI-NUNES, D. *et al.* 2018. PLoS ONE, 2018 v. 13, n. 12, e0207676. <https://doi.org/10.1371/journal.pone.0207676>

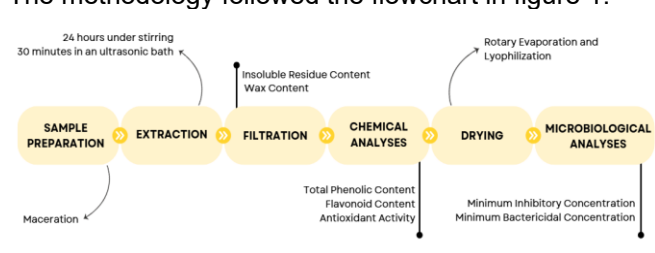


Figure 1. Flowchart of methodology employed in this work.

According to chart 1, the high levels of insoluble residue indicated the presence of non-solubilized compounds, varying according to the bee species and the botanical origin. All samples showed low wax content. The alcoholic extracts exhibited higher phenolic content and stronger antioxidant activity, demonstrating the efficiency of ethanol in extracting bioactive molecules. Some aqueous extracts presented higher flavonoid levels, possibly glycosylated. In the antibacterial

Agradecimentos/Acknowledgments

The authors acknowledge CAPES and CNPq for financial support, as well as UNIOESTE, UTFPR and Biopark Educação.