Phytochemical study and evaluation of the antimicrobial activities of the leaves extracts of *Bersama engleriana* (Melianthaceae)

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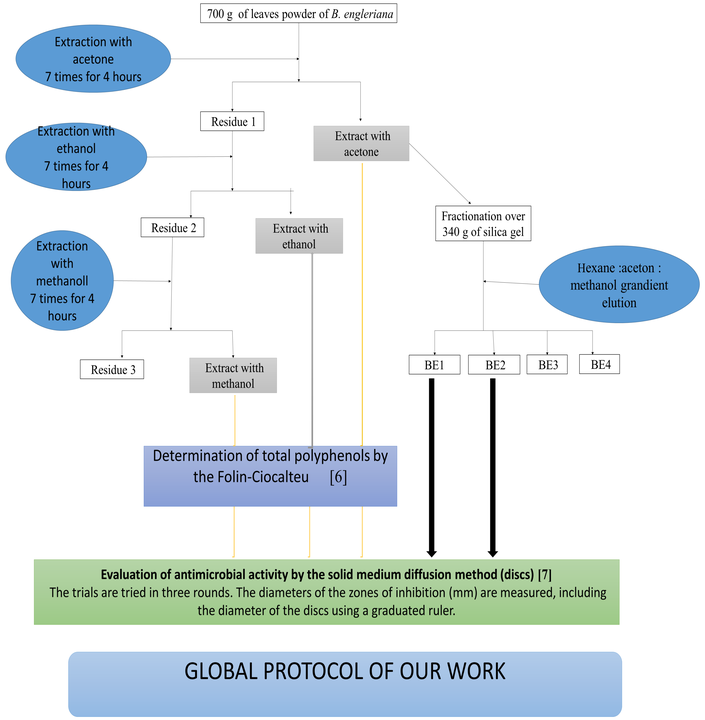
Introduction

The food that people consume, comes from the immediate environment, but also, more and more from imports from various countries. These foods from elsewhere are not always safe for humans. These foods can be contaminated during production, processing, transport or handling with substances that are potentially harmful to health [1]. The agents responsible for infections are fungi, bacteria and parasites. Nowadays, due to the constantly high cost of drugs and the emergence of multi-resistant microbes, there is a renewed interest in traditional pharmacopoeia [2]. One of the strategies of this research is to explore plants used in traditional medicine. *Bersama engleriana* is a medicinal plant used in traditional medicine for the treatment of several diseases such as gastric disorders, dysentery, diarrhoea, intestinal worms, etc.

The present study aimed to evaluate the antimicrobial activity and to isolate the chemical constituents of the extracts of *Bersama engleriana* leaves.

Materials and Methods



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Results and Discussion

Table 1: Results of extractions, screening of compound families and total polyphenol content in *B. engleriana leaf* extracts

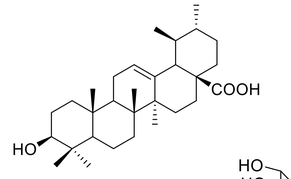
Extracts	Acetone	Ethanol	Methanol
Quantity g	40.52	15.9	15.4
Classses of coumponds			
Alkaloïds	+	-	-
Phenolic coumpounds	+	+	+
Flavonoïds	+	-	-
Saponins	_	+	+
Coumarins	+	+	+
Triterpens	+	+	+
Tanins	+	-	-
Total polyphenol content in mg EAG/g	1.41 ± 0.73	1.12 ± 0.59	1.26 ± 0.65

Table 2: Results of the antibacterial test on extracts and compounds isolated from the leaves of *B. engleriana*

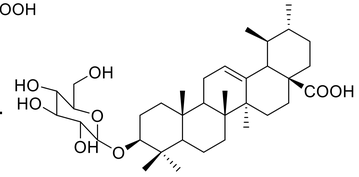
	Concentrations (mg/mL)	*Staphylococcus aureus*	*Escherichia coli*	*Clostridium perfringens*
Acetone extract	25	16.7 ± 0.6 $^{b, c, d}$	13. 5 ± 0.7 $^{d, e, f}$	17.5 ± 3.5 ^{c}
	50	18.7 ± 1.2 ^{c}	11.5 ± 0.7 $^{a, b, c, d}$	11.0 ± 1.0 $^{a, b}$
	100	25. 4 ± 0.6 ^{d}	15. 5 ± 2. 1 ^{f}	13.0 ± 0.0 $^{a, b}$
Ethanol extract	25	16.7 ± 1.2 $^{b, c, d}$	11.0 ± 1.4 $^{a, b, c}$	11.0 ± 2.8 $^{a, b}$
	50	17.4 ± 2.3 $^{b, c}$	10.5 ± 0.7 $^{a, b}$	10.5 ± 0.7 ^{a}
	100	23.4 ± 0.6 ^{d}	14.5 ± 0.7 $^{e, f}$	11.5 ± 0.7 $^{a, b}$
Methanol extract	25	14.4 ± 0.6 ^{a}	20.0 ± 0.0 ^{g}	14.0 ± 1.4 ^{b}
	50	15.7 ± 0.6 $^{a, b, c}$	12.0 ± 0.0 $^{b, c, d}$	10.5 ± 0.7 ^{a}
	100	17,4 ± 0,6 $^{b, c}$	13.0 ± 0.0 $^{c, d, e}$	13,0 ± 0.0 $^{a, b}$
BE1	1 mg/mL	16.0 ± 2.8 $^{a, b}$	11.5 ±0.7 $^{a, b, c, d}$	0.0 ± 0.0
BE2	1 mg/mL	15.0 ± 1.4 $^{a, b, c}$	9.5 ± 0.7 ^{a}	10.5 ± 0.7 ^{a}
Chloramphenicol	30 µg/disque	34.4 ± 1/7	23.7 ± 4.5	8.0 ± 0.5

Table 3: Chemical shifts of carbons and protons of compound BE2 with literature data

Position	Δh of BE2	δH of biblio-graphic data [8]	δC of BE2	δC of biblio-graphic data [9]	Mul-tiplicity
1	1.59	1.59	39.23	39.1	CH_2
2	1.86	1.86	27.23	28.1	CH_2
3	4.36	3.49	79.18	78.1	CH
4	-	-	39.31	39.5	C
5	1.02	0.90	55.91	55.8	CH
6a	1.60	1.60	18.86	18.8	CH_2
6b	1.35	1.39			
7a	1.59	1.59	33.63	33.6	CH_2
7b		1.39			
8	-	-	40.05	40.0	C
9	1.76	1.67	-	48.1	CH
10	-	-	37.40	37.3	C
11	1.91	1.97	23.79	23.6	CH_2
12	5.48	5.51	126.11	125.5	CH
13	-	-	138.80	139.3	C
14	-	-	42.62	42.5	C
15 a	1.56	1.49	28.42	28.7	CH_2
15 b	1.51	1.41			
16 a	2.17	2.15	24.74	24.9	CH_2
16 b	2.16	2.03			
17	-	-	-	48.1	C
18	2.45	2,67	53.48	53.6	CH
19	1.51	1,51	39.68	39.5	CH
20	1,18	1.02	39.54	39.4	CH
21	2,43	2.37	31.20	31.1	CH_2
22	2.15	2.00	37.47	37.5	CH_2
23	1.51	1.27	28.56	28.8	CH_3
24	1.20	1.05	16.02	16.5	CH_3
25	1.22	1.08	15.78	15.7	CH_3
26	1.11	0.92	17.37	17.5	CH_3
27	1.35	1.26	23.92	23.9	CH_3
28	-	-	181.18	179.8	C
29	1.19	1.03	17.32	17.5	CH_3
30	1.12	0.98	21.42	21.4	CH_3



3-β-hydroxylurs-12-en-28-oic acid (BE2)



3-β-glycoside ursolic acid (BE1)

Conclusion

The acetone extract has a higher total polyphenol content than the ethanol and methanol extracts with values of: 1.41 ± 0.73; 1.12 ± 0.59 and 1.26 ± 0.65 mg EAG/g EX respectively.

The acetone and ethanol extracts have better antibacterial activity on S. aureus with inhibition diameters of 25.4 and 23.4 mm respectively. The best antibacterial activity on *C. perfringens* and *E. coli* is obtained by the acetone (17.5 mm) and methanol (20.0 mm) extract.

Column chromatographic fractionation of the acetone extract allowed us to isolate several compounds. Only BE2 and BE1 were identified by spectroscopic methods as ursolic acid and its glycoside. The *S. aureus* and *E. coli* strains are highly sensitive to BE1 and BE2 while the *C. perfringens* strain is sensitive to BE2.

References

[1] **Panisset J., Dewaily E. and Doucet-Leduc H., 2003**. Éditions Technologie et documentation, 369 - 395.

[2] **Kabore Z.I. and Millogo K. H., 1997.** *Revue Pharmacopée et Médecine traditionnelles africaines*, IX, 17 - 23.

[3] **Momeni J., Tsopmejio J.P., Nkouam T.F. and Ngassoum M.B., 2016.** Chev. *Natural Science*, 8, 70 - 78.

[4] **Haddouchi F., Zerhouni K., Sidi-Yekhelef A. and Chaouche T. M., 2016.** *Rupestre. Bullletin de la société Royale des sciences de Liége*, 85, 152 - 159.

[5] **Dufour D., 2006.** Mémoire de la maîtrise en ressources renouvelables présenté à l'université de Chicoutimi, Quebec, 79 p.

[6] **Kriwacki R W. and Pitner T., P., 1989.** *Pharmaceutical Research,* 6 (7), 1 - 2

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