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Taraxacum officinale as an bioactives source with antimicrobial properties useful for urinary track infections.

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BACKGROUND

Currently, the most effective treatment for recurrent urinary tract infections in women is the use of antibiotics. However, limitation for this treatment is the duration and dosage of antibiotics and bacteria[1]. Therefore, alternatives approaches need to be consider. The most common is the use traditional botanical remedies, in which dandelion (*Taraxacum* sp.) has several references in treating bacterial infections.

These properties have been attributed to the large number of bioactive compounds in their tissues, particularly triterpenes such as amyrin and lupeol[2]. The objective of this work was to determine the presence of bioactives compounds, specifically amyrin and lupeol from i*n vitro* tissue and from wild leafs of *T. officinale,* for the evaluation of its *n*-hexane extracts against several strains that cause urinary tract infections.

MATERIALS AND METHODS

***In vitro* plant culture:** *T. officinale c*allus culture were obtained from hypocotyls explants sown in sucrose 2.3%, 0.1 mg·L^{-1} 1-naphthaleneacetic acid and 1.0 benzylaminopurine mg·L^{-1} for a total period of 12 weeks, transferring the callus every 2 weeks to fresh medium. Calli were harvested, and β- amyrin and lupeol content was quantified by HPLC-UV. To corroborate the presence of this compounds in fully developed tissues for further antimicrobial assays, *n*-hexane leafs extracts were analyzed by GC-MS and NMR.

Extract preparation. The fresh leaves were collected in the city of Temuco (Chile) and reduced to powder, which was macerated in *n*-hexane for 48 h. The liquid extract obtained was concentrated *in vacuum* and was subjected to phytochemical screening. Secondary metabolites were identified for GC-MS and NMR.

Antimicrobial Test: Antibacterial activities (minimum inhibitory concentrations; MIC) were evaluated on the uropathogenic bacteria *Escherichia coli, Klebsiella pneumoniae* and *Proteus mirabilis* using the serial microdilution method [3].

RESULTS

➢**Lupeol and amyrin content**

Highest amount of lupeol was obtained in the 10th week of growth, with an average value of 0.29 ug/g (dry weight) and amyrin at the 12th week with an average value of 0.05 ug/g (dry weight), indicating that it is possible to produce this compounds in undifferentiated plant cell cultures (Fig. 1 A, Fig.1 B and Fig E). Moreover, chemical analysis of n-hexane extract leaves (Fig. 1 C and Fig. 1D) by GC-MS and NMR indicated β-amyrin acetate and lupeol as the main components in were also identified in *T. officinale* leaf extracts(Fig. 1 F and Fig. 1G).

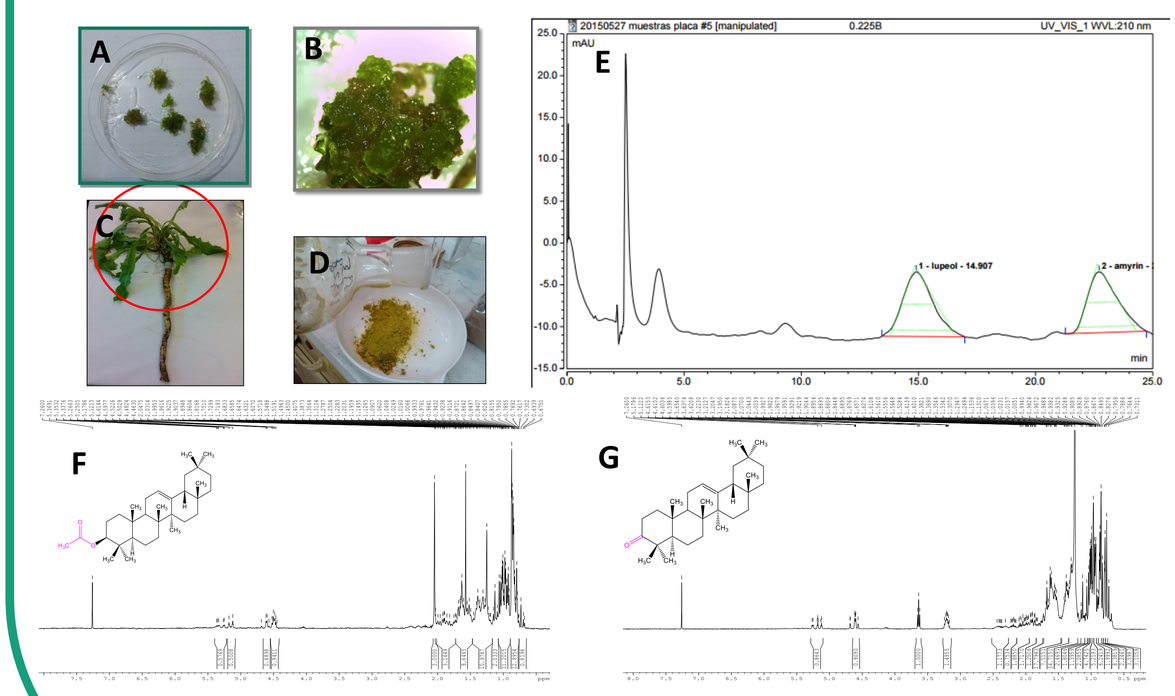

Figure 1: (A, B) callus culture of *T. officinale;* (C) *T. officinale* wild plants; (D) powder extracts of *T. officinale;* (E) HPLC chromatogram of callus samples; RMN spectrum of (F) β-amyrin acetate (G) and Lupeol.

➢ **Animicrobial activity**

T. officinale extract was active against *E. coli*, *K. pneumoniae* y *P. mirabilis*, showing 100% of inhibition at 400 mg/L for *E. coli* and 1600 mg/L for the other strains (Table 1). The extracts exhibited varying degrees of atimicrobial effects (Table 2).

Table 1: MIC value of the *n*-hexane extract against *Escherichia coli*, *Klebsiella pneumoniae and Proteus mirabilis*.

	MIC (µg/mL)		
	Escherichia coli	***Klebsiella pneumoniae***	***Proteus mirabilis***
n-hexane leaf extract	≥ 400	1600	1600

Table 2: Antibacterial Inhibition Percentage of the *n*-hexane extract against *Escherichia coli, Klebsiella pneumoniae* and *Proteus mirabilis*.

	Antibacterial Inhibition Percentage (%)		
µg/mL	***Escherichia coli***	***Klebsiella pneumoniae***	***Proteus mirabilis***
1600	100	100	100
800	100	93	70
400	100	80	54
200	72	57	39
100	43	67	31
50	25	49	28
25	37	61	36
10	32	53	0

CONCLUSION

In our experience, the apolar *n*-hexane extract from *T. officinale* leafs inhibited antibacterial proliferation, probably due to its composition of triterpenoids as β-amyrin and lupeol, which were also identified in *in vitro* callus culture of this plant. These results will propel to work on a improved formula containing an extract rich in this compounds to control uropathogenic bacteria.

REFERENCES

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