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Short Communication

ANTIFUNGAL ACTIVITY OF CHLOROFORM AND ACETONE EXTRACTS OF *SOLANUM DOLICHOSEPALUM* AGAINST *FUSARIUM OXYSPORUM*

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ABSTRACT

Objective: Evaluate the effectiveness of acetone (A) and chloroform (C) extracts of the plant *Solanum dolichosepalum* to control two isolated strains (S1 and S2), each from different specimen passiflora of the fungus *Fusarium oxysporum*.

Methods: The extracts of *S. dolichosepalum* were obtained by Soxhlet-solid-liquid extraction and their antifungal activity and minimum inhibitory concentrations against *F. oxysporum* determined by the diffusion method in potato-dextrose agar using fluconazole (60 µg/ml) as a positive control.

Results: Both acetone and chloroform extracts of *S. dolichosepalum* presented antifungal effect on the two evaluated strains of *F. oxysporum*, exhibiting percentages of inhibition ranging between 33% and 95%, depending on extract concentration. It was found that extract C was more effective against S1 with a minimum inhibitory concentration (MIC) equal to 0.1558 g/ml, while extract A showed a greater inhibitory effect on S2 with a MIC = 0.1939 g/ml.

Conclusion: Extracts in chloroform and acetone of the plant *S. dolichosepalum* were shown to be effective media to control strains of the fungus *F. oxysporum*. The effectiveness of these extracts to control fungi is comparable to the antifungal activity measured in the extracts of other related species.

Keywords: *Solanum dolichosepalum*, Antifungal activity, *Fusarium oxysporum*

Plants of the genus *Solanum* are considered promising species in the biotechnology field due to their abundance and the broad range of biological activity arising from the diversity of their secondary metabolite content [1-7]. Among the potential biological applications that are currently being exploited for these plants, their use as a natural source of anti-fungal agents has recently excelled. [2-7] For instance, the application of extracts and compounds isolated from various species of the genus *Solanum* has been employed as an effective strategy to combat fungi of the genus *Cladosporium* [2], *Fusarium* [2-6], *Candida* [2, 7-9], *Penicillium* [3-5, 8], and *Aspergillus* [4, 5, 7].

In particular, the species *Solanum dolichosepalum* is a plant belonging to the *Solanaceae* family widely distributed in the Colombian Andean region, where it is known as "Frutillo" and is used by locals in the traditional way (infusions of its leaves and fruits) as an external antibacterial or anti-louse agent, as well as for the treatment of kidney diseases, [1] though its antifungal action was unknown. In order to evaluate such biological activity, polar and nonpolar extracts obtained from the leaves of *Solanum dolichosepalum* against *Candida albicans* and *Trichophyton rubrum* strains were evaluated by us recently. The results of this work showed an intermediate level of antifungal activity against both types of fungus strain.

As a continuation of the antifungal evaluation of the species *S. dolichosepalum*, in this paper, we evaluated the corresponding response of chloroform and acetone extracts obtained from its leaves against *Fusarium oxysporium*. The particular interest in this fungus is due to the negative appearance that it gives several food crops, such as lulo fruit, tomato, and green beans [10]. The plant material of *S. dolichosepalum* (sheet only) was collected near the town of Tinjacá (Boyacá, Colombia), a region located at an altitude of 2175 m and with an average temperature of 17 °C. The material was allowed to dry at room temperature for 3 w and then subjected to solid-liquid extraction using Soxhlet equipment and chloroform (Merck, 99.8%) or acetone (Panreac, 99.8%) as solvents. The total extraction time was 6 h with each solvent. The resulting extracts were concentrated to dryness in a rotary evaporator IKA brand model RV 10 at a temperature of 38±2 °C and then stored at-18±2 °C until use.

The antifungal activity of the extracts was evaluated using the agar diffusion method [4], for which was selected potato dextrose agar (Difco). Fluconazole (60 mg/ml: Genfar) and the extraction solvent were used as positive and negative controls, respectively. Petri dishes were incubated for 3 d at 26±2 °C and the inhibition halos measured. The lowest concentration of extract that inhibited the antifungal effect was taken as the MIC of each extract.

Table 1: Inhibition halos (in mm) in S1 and S2 as a function of the concentration of extracts of *S. dolichocepalum* in chloroform (C) and acetone (A) * Inhibition percentages are presented in parenthesis

[C] (g/ml)	*S1*	*S2*	[A] (g/ml)	*S1*	*S2*
0.6232	8±2 (38±9)	18±1 (94±6)	0.7758	20±2 (95±9)	12±2 (67±11)
0.3116	6±1 (29±5)	10±1 (56±6)	0.3879	14±2 (67±9)	10±1 (56±6)
0.1558	0±0	6±1 (33±6)	0.1939	8±1 (38±5)	0±0
0.0779	0±0	0±0	0.0969	0±0	0±0
0.0389	0±0	0±0	0.0485	0±0	0±0

* Data are presented as mean±SD (n = 3). Inhibition halos caused by fluconazole were 21±2 and 19±2 mm for S1 and S2, respectively. S1 = strain 1, S2 = strain 2.

Table 1 shows the inhibition halos and percentages of each of the two strains of *F. oxysporum* using five different concentrations of C and A extracts of *S. dolichosepalum*. Both extracts showed an inhibitory antifungal effect against the two strains tested, which can be explained by an inhibition of spore generation [3]. However, strain 1 (S1) exhibited a major sensitivity to the components of the A extract (MIC of 0.1939 g/ml), in contrast to strain 2 (S2), which showed a major sensitivity to the components of the C extract (MIC value of 0.1558 g/ml). These differing sensitivities between S1 and S2 to *F. oxysporum* can be attributed to differences in adaptation of the organisms in the environments of origin [10], and thus to the components of each extract. Although both extracts of *S. dolichosepalum* presented antifungal activity against the two strains of *F. oxysporum*, with an MIC range between 0.1558 and 0.3879 g/ml (fig. 1), this was found to be lower than the inhibitory effect of the positive control.

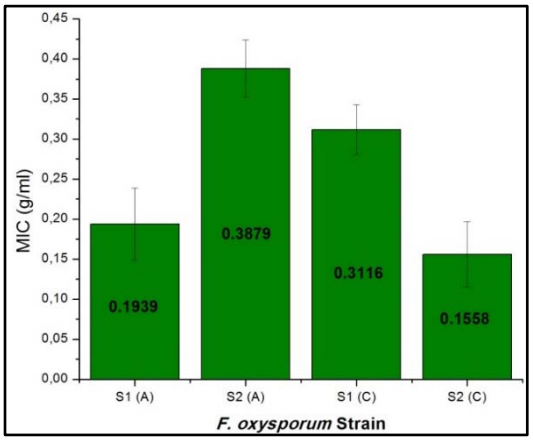

Fig. 1: MIC values in S1 and S2 for extracts of *S. dolichosepalum* in chloroform (C) and acetone (A) extracts. Data are presented as mean±SD (n=3)

The inhibition percentages of extracts C and A against S1 of *F. oxysporium* were 29% [0.3116 g/ml] and 38% [0.1939 g/ml], respectively and 33% [0.1558 g/ml] and 56% [0.3879 g/ml], respectively in the case of S2 (see table 1). The 38% inhibition of S1 by the A extract of *S. dolichosepalum* at the MIC was equal to the percentage reported by Aliero and Afolayan [5] for acetone extracts of *S. tumentosum* against the same fungus; while the 56% inhibition of S2 observed for our A extract was greater than the highest inhibition percentage against *F. oxysporium* using methanol extracts (50.56%) reported by these authors. Regarding our C extract, its inhibition percentages of 29% and 33% against S1 and S2 were lower than the minor inhibition value of 36.56% observed by Aliero and Afolayan [5] for aqueous extracts of *S. tumentosum* to control strains of *F. oxysporium*.

It was found that C and A *S. dolichosepalum* extracts have antifungal activity against *F. oxysporum*. Moreover, the MIC values suggest that the S2 was more sensitive to C extract, as the value was lower than found with An extract. Furthermore, S1 was more sensitive to the A extract. The effectiveness of these extracts to control fungi is comparable to the antifungal activity measured in the extracts of other related species.

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CONFLICT OF INTERESTS

Declared none

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