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Short report

Antifungal activity of *Aloe vera* leaves

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Abstract

Aloe vera fresh leaves hydroalcoholic plant extract was tested against the mycelial growth of *Botrytis gladiolorum*, *Fusarium oxysporum* f.sp. *gladioli*, *Heterosporium pruneti* and *Penicillium gladioli* on Czapek-agar medium. The minimum fungicidal concentration (MFC) varied between 80 and 100 μl/ml, depending on the fungal species.

Keywords: *Aloe vera*; Antifungal activity; Phytopathogenic fungi

1. Plant

Aloe vera L. Burm.f. (Liliaceae) leaves were harvested from the greenhouses of "Alexandru Borza" Botanical Garden in Cluj-Napoca.

2. Uses in traditional medicine

Traditionally, *A. vera* has been used in ointments and creams to assist the healing of wounds, burns, eczema, and psoriasis [1].

Due to its content in anthraquinone glycosides, *A. vera* is externally used for cicatrisation and internally as laxative. *A. vera* hydroalcoholic plant extract is also part of some make-up products with cicatrisation effect, due to its mucilage content [2]. It has been also reported to have antifungal properties [3].

3. Previously isolated constituents

A. vera is reported to contain mono- and polysaccharides, tannins, sterols, organic acids, enzymes, saponins, vitamins and minerals [1].

The main active constituent of *A. vera* plant extract is aloine, an anthraquinone heteroside [4].

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4. Tested material

A. vera fresh leaves aq. ethanol extract.

5. Studied activity

Antifungal activity by agar-dilution method [5], the quantity of aloine by a high-performance liquid chromatography method coupled with mass spectrometry (LC/MS/MS) [6] and the MFC.

The percentage of mycelial growth inhibition (P) was calculated by the formula $P=(C-T)/C\times 100$, where C is the diameter of the control colony and T that of the treated ones [7].

6. Used microorganisms

The fungal species listed in Table 1, isolated from ornamental Iridaceae.

7. Results

The results are reported in Table 1. Sample chromatograms of aloine from *A. vera* plant extract are presented in Fig. 1a (the UV trace at 354 nm) and Fig. 1b (the MS signal). The retention time for aloine was 3.15 min. Due to

Table 1
Effect of *A. vera* hydroalcoholic extract against the mycelial growth of phytopathogenic fungi

Fungi	*Aloe vera* extract (μl/ml)	Colony[a] diameter (mm)	P[b] (%)	Standard error	Diflazon[c] (μl/ml)	Colony[d] diameter (mm)
B. gladiolorum	*C*[e]	65	–	–	*C*[e]	65
	40	21	67.69	±0.44	20	40
	60*	3	95.38	±0.36	60*	19
	80*	0	100	0	80*	4
					100*	0
F.oxysporum f.sp. *gladioli*	*C*	68	–	–	*C*	68
	20	63	7.35	0	20*	6
	40*	26	61.76	±0.21	60*	3
	80*	4	94.12	±0.33	80*	2
	100*	0	100	0	100*	0
H. pruneti	*C*	15	–	–	*C*	15
	40*	5	66.67	±0.22	20*	12
	80*	2	86.67	±0.22	60*	7
	100*	0	100	0	100*	6
					120*	5
					160*	3
					180*	0
P. gladioli	*C*	13	–	–	*C*	13
	20	10	23.08	±0.22	20	11
	40*	6	53.85	0	60	11
	80*	2	84.62	±0.21	100	11
	100*	0	100	0	120	11
					160	10
					200	10

*$P<0.001$.
– = Absent.
[a] Mycelial growth in presence of *A. vera* extract, 5 days after inoculation.
[b] Mycelial growth inhibition in presence of *A. vera* extract.
[c] Antimycotic drug.
[d] Mycelial growth in presence of Diflazon, 5 days after inoculation.
[e] *C* 70% aq.EtOH.

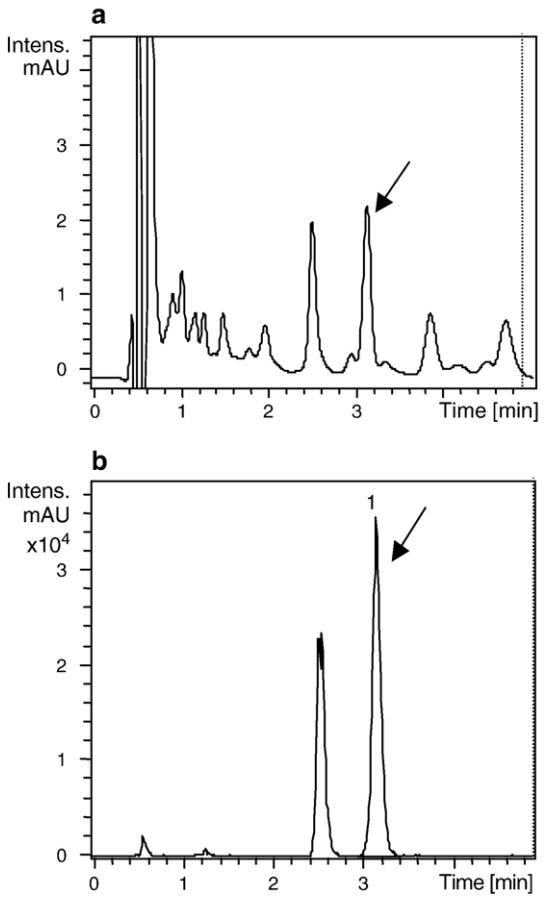

Fig. 1. Chromatograms of aloine from *A. vera* plant extract: a. UV signal at 354 nm; b. MS/MS signal. The retention time of aloine is 3.15 min (peak marked with an arrow).

enhanced sensitivity and selectivity of MS/MS over the UV detection, we have chosen to use it for quantification of aloine in *A. vera* plant extract.

A quantity of 0.017705 mg aloine/ml *A. vera* plant extract was determined by HPLC method.

8. Conclusions

The total hydroalcoholic plant extract obtained from *A. vera* fresh leaves had antifungal activity against the mycelial growth of *B. gladiolorum*, *F. oxysporum* f.sp. *gladioli*, *H. pruneti* and *P. gladioli*, compared to the control (70% aq.EtOH). The MFC of plant extract was 80 μl/ml in case of *B. gladiolorum* and 100 μl/ml in case of *F. oxysporum* f.sp. *gladioli*, *H. pruneti* and *P. gladioli*. The antifungal activity was compared to Diflazon (antimycotic drug).

Our results bring new information to the literature data about the antifungal activity of *A. vera* plant extract against the mycelial growth, on Czapek-agar medium, of phytopathogenic fungi isolated from ornamental plants.

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