Short report

Antifungal activity of *Aloe vera* leaves

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Received 14 July 2006; accepted 23 November 2006
Available online 6 February 2007

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.

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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>
<thead>
<tr>
<th>Fungi</th>
<th><em>Aloe vera</em> extract (µl/ml)</th>
<th>Colony (^a) diameter (mm)</th>
<th>( P ) (^b) (%)</th>
<th>Standard error</th>
<th>Diflazon (^c) (µl/ml)</th>
<th>Colony (^d) diameter (mm)</th>
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</thead>
<tbody>
<tr>
<td><em>B. gladiolorum</em></td>
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<tr>
<td>65</td>
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<td>–</td>
<td>C(^e) 65</td>
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<tr>
<td>40</td>
<td>21</td>
<td>67.69 ±0.44</td>
<td>20</td>
<td>40</td>
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<tr>
<td>60*</td>
<td>3</td>
<td>95.38 ±0.36</td>
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<td>19</td>
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<td>80*</td>
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<td>4</td>
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<td><em>F. oxysporum f.sp. gladioli</em></td>
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<td>68</td>
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<td>C(^e) 68</td>
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<td>20</td>
<td>63</td>
<td>7.35 ±0.1</td>
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<td>40*</td>
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<td>61.76 ±0.26</td>
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<td>80*</td>
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<td><em>H. pruneti</em></td>
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<td>15</td>
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<td>C(^e) 15</td>
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<tr>
<td>40*</td>
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<td><em>P. gladioli</em></td>
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<td>13</td>
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<td>C(^e) 13</td>
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<td>84.62 ±0.21</td>
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<tr>
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<td>100</td>
<td>120</td>
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</table>

\( \text{a Mycelial growth in presence of } A. vera \text{ extract, 5 days after inoculation.} \)

\( \text{b Mycelial growth inhibition in presence of } A. vera \text{ extract.} \)

\( \text{c Antimycotic drug.} \)

\( \text{d Mycelial growth in presence of Diflazon, 5 days after inoculation.} \)

\( \text{e } C \text{ 70% aq. EtOH.} \)

\(^*P<0.001.

\( \text{–= Absent.} \)

\(^a\) 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.
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 Czapec-agar medium, of phytopathogenic fungi isolated from ornamental plants.

Acknowledgements

This study was financially supported by the Romanian Ministry of Education and Research from the CNCSIS 10/81/2005 project.
References