

ANTIFUNGAL PROPERTIES OF MEDICINAL PLANTS AGAINST *COLLETOTRICHUM LINDEMUTHIANUM*

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INTRODUCTION

Anthraxnose disease of common bean (*Phaseolus vulgaris* L.), caused by *Colletotrichum lindemuthianum* (Sacc. & Magn.) Scribner, is responsible for extensive yield losses worldwide. Control strategies mainly include, genetic resistance. However, the major limitation for the development of durable resistance in common bean cultivars is the high variability in *C. lindemuthianum* (Silva et al., 2007). Despite that, this disease is currently managed with synthetic fungicides. Nevertheless, there is a growing global concern over the continuous use of synthetic chemicals about food crops because of their potential effects on human health and the environment (Talamini & Stadinik, 2004). In attempt to modify this condition, some alternative methods of control have been adopted. Within this context is the utilization of plants, which are natural sources of antimicrobial substances and whose fungitoxic potential has been referred to in several studies. The goal of this study was to assay medicinal plants from the Alto Rio Grande region, in Minas Gerais State, Brazil, with ability to produce active products in the control of *C. lindemuthianum*.

MATERIALS AND METHODS

Leaves extracts of *Malva silvestris* L., *Ocimum gratissimum* L., *Origamum vulgare* L. and *Tetradenia riparia* (Hochst) NE. Br were prepared as described (Magallanes et al., 2003). In order to assay the extracts fungitoxicity, mycelia growth and percentage of conidia germination were evaluated. Both experiments were performed in a completely randomized statistical design, with four repetitions, in a factorial 4 x 6 design. Four strains of *C. lindemuthianum* were used, two from the 65 race and two from 81 race; four leaves extracts plus two controls, one of Tween 80 at 1% (g/mL) and the other of the fungicide Cercobin 700 WP (IHARABRAS S.A. INDÚSTRIA QUÍMICAS). Briefly, for evaluation of the leaf extracts effect on mycelia growth, 500 µl of plant extracts dissolved in Tween 80 at 1% at the 7.0 g/L concentration were placed on Petri dishes (90 x 15 mm) containing 8 mL culture medium M₃. The plates were inoculated with 9 mm diameter plugs with *C. lindemuthianum* mycelium and incubated at 22°C under 12 h photoperiod for 20 days. Growth inhibition of each fungal strain was measured by colony mycelia diameter after that period (Paulert, 2005). To measure extracts effect on percentage conidia germination, 500 µl plant extracts dissolved in Tween 80 at 1% at the concentration of 6.5 g/L were placed in Petri dishes (60 x 15 mm) with 4.5 mL culture medium agar-water. Afterwards, the plates were inoculated with 200 µl of a 1.2 × 10⁶ spores per milliliter suspension with the four fungal strains and incubated at 22°C under 12h photoperiod for 24 hours. Percentage conidia germination was determined by evaluation of 50 conidia per each plate in light microscope (Pereira, 2006). The statistical significance of differences between mean values was assessed using an ANOVA and Scott Knott range test.

RESULTS AND DISCUSSION

In the ANOVA, for mycelia growth, all sources of variation were significant (P<0.01). Although the interaction effect of extracts x strains was significant there was no difference in the classification of extracts for different strains. Then, the means values were analyzed independently of strain. The best extract for inhibition of mycelia growth was *O. vulgare*, which decreased the mycelia growth in 31%

relatively to the control Tween 80 at 1% (Table 1). Castro et al. (2006) reported that *Ricinus communis* L. extracts showed reduction of 36% in the mycelia growth with the same pathogen. However, in this case, the measurements were made daily. In the variance analysis for conidia germination, only the strains x extracts interaction effect was not significant. The best result was observed with the extract of *O. gratissimum*, which showed inhibition of 77% when compared to the control Tween 80 at 1% (Table 1). This number is close to the results reported by Abreu (2005) with aquatic plants extracts, presenting inhibition of 70% of *C. lindemuthianum* conidia germination relatively to the control. The conidia were more sensitive to the plant extracts than the mycelium fungal (Table 1). The causal agent of anthracnose has direct penetration in epidermal cells (Jerba et al, 2005). Then, with the results obtained in the *in vitro* tests, we imply that the best extract in this disease control is *O. gratissimum*. Finally, the results showed that the plant extracts are able to decrease mycelia growth and conidia germination of *C. lindemuthianum*, indicating their potential as an alternative control of that pathogen. However, more studies are necessary, for example, to evaluate the extracts in field conditions.

Table 1. Effect of plant extracts in the mycelia growth (MGR) in centimeters (cm) and percentage of conidia germination (PCG).

Treatment	MGR(cm)	PCG (%)
Cercobin 700	3.2 A	3.6 A
<i>Origamum vulgare</i>	5.8 B	25.8 D
<i>Ocimum gratissimum</i>	6.3 C	19.2 B
<i>Tetradenia riparia</i>	6.4 C	21.6 C
<i>Malva silvestris</i>	6.6 D	23.6 C
Tween 80	8.4 E	81.8 E

Means followed by the same letters are not significantly different by the Scott-Knott test at 5% probability.

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