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RESEARCH ARTICLE

ANTIFUNGAL EFFECT OF ESSENTIAL OIL OF EUCALYPTUS CAMALDULENSIS PLANT ON *FUSARIUM GRAMINEARUM* AND *FUSARIUM SPOROTRICHIOIDE*

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ABSTRACT

Essential oils have many therapeutic properties. In herbal medicine, they are used for their antiseptic properties against infectious fungal diseases, dermatophytes, those of bacterial origin. The aim of our study was to determine the effect of antifungal essential oil of *Eucalyptus camaldulensis* plant. Eucalyptus is an herb used in traditional therapy. The test adopted is based on the diffusion method in solid medium (sensitivity). This method determines the sensitivity or resistance of the organism vis-à-vis the study sample. The analysis obtained by hydrodistillation of plant samples of an essential oil in a clear yellow color with a return of 0, 99%. Our study reveals that essential oil of *Eucalyptus camaldulensis* extracted have significant antifungal activity and can successfully replace antibiotic that show their inefficiencies against resistant microorganisms.

INTRODUCTION

Many plants (aromatic, medicinal plants, spices and others) have very interesting biological properties that have applications various domains, namely medicine, pharmacy, cosmetics and agriculture (Teixixeira, 2004). A medicinal plant is a plant that is grown or is picked in its natural environment for its medicinal properties (Benayad., 2008). Since antiquity humans use plants as a primary food source, subsequently developed for use as drugs and medicines to treat the end of various diseases. Whenever, after a crushed petal flower, a leaf, a twig, or any part of a plant, a fragrant, this means that an essential oil is released (Bekhechi *et al*., 2010). Essential oils are mixtures of aromatic substances produced by many plants and present as minute droplets. They are highly volatile and odorous (Padrint *et al*., 1996). Since their discovery essential oils have many biological activities. They can be used in pharmaceutical preparations (Ghedabnia *et al*., 2008). Our study aims is to determine the biological effects of essential oils of the plant.

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For this purpose the return to nature has become indispensable and must follow certain conditions for its use in the wide world of anti-infectives, which expands from one day to the next with more toxic substances most powerful, and more expensive. The main requirement for this revival, is a rigorous and rational scientific study of the antifungal activity of various natural extracts.

MATERIALS AND METHODS

For this study, it is used as plant material Eucalyptus camendulensis harvested at ITAS Ouargla Algeria in 2011 DATE. The samples are dried away from light and humidity at ambient temperature.

The extraction of essential oil of eucalyptus leaves was done by a hydrodistillateur type Clevenger (1928). It consists of a heating mantle, a 2L capacity flask where the plant material and water are placed, a column of vapor condensation (refrigerant) that comes from the heating of a ball receiving funnel extracts distillation and a thermometer to control the temperature and prevent overheating (Figure 1).

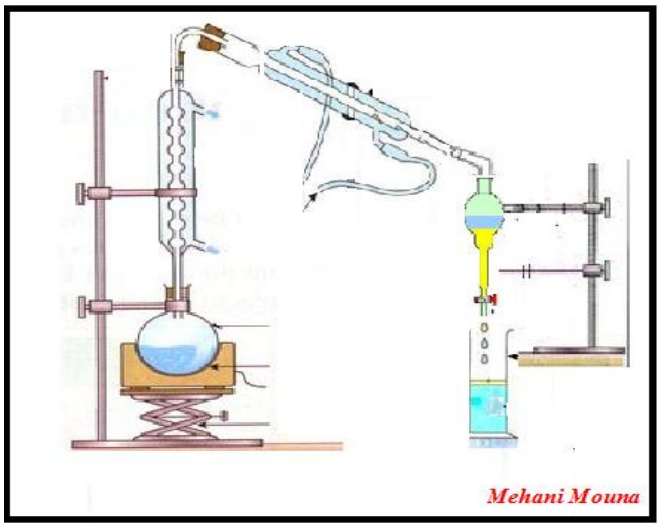

Figure 1. Installation of a hydrodistillateur

Study of the antifungal activity of the essential oil

Fungal strains studied

The strains used in this study were selected for their high contamination in wheat frequencies, and from the microbiology laboratory of the research center of Italy. In our study we used the following species: *Fusarium graminearum* and *Fusarium sporotrichioide*.

Antifungal Activity

For the realization of the antifungal activity was adopted method of direct contact. To prepare the different concentrations were taken different concentrations of essential oil of Eucalyptus namely (50, 10, 5, 2.5, 1.25, mu.l) and adjust to 20 ml PDA then stirred for 5 minutes to homogenize the medium PDA with essential oil. 5 ml mixture (PDA + HE + Tween 0.5%) was poured into Petri dishes, after cooling and solidification of this mixture on the bench of mycelial discs diameter of 5mm diameter end of the margin an elderly *Fusarium sporotrichioides* and *Fusarium graminearum* culture were taken with a cookie cutter and inoculated in the center of each box (1disque / box) (Photo 02). Each concentration was repeated three times. The dishes were incubated in the dark at 20 ± 2 ° C; Controls (PDA + PDA + Fusarium and Tween 0.5% + Fusarium) are made under the same conditions without essential oil and measurements are taken after 72 h of incubation.

Photo N° 01. Inoculum mycelial discs

Evaluation of mycelial growth

Mycelial growth was evaluated every 24 hours by measuring the mean of three perpendicular diameters passing through the center of the washer. This reading is always done in comparison with the control cultures they are started on the same day and under the same conditions. Any slight fungal grows even be considered negative action that is as essential oil subject is not inhibitory vis-à-vis the fungal growth.

Determination of antifungal index

After incubation in the light of the growth control, the antifungal index is calculated which is determined by the following formula (Chang *et al.*, 1999)

IA = (1-Da/Db) ×100

RESULTS AND DISCUSSION

Evaluation of mycelial growth

The antifungal activity is revealed by the absence or the presence of mycelial growth. The results of the diameter of antifungal activity of essential oil of *Eucalyptus camendulensis* are presented in the photo n°3. They vary between 13 and 55 mm (diameter including the disc) in the *Fusarium sporotrichioides* and *Fusarium graminearum*, the mycelial growth is varied between 11 and 55 mm.

Photo N°2. Antifungal Activity of *Fusarium sporotrichioides*

With different concentrations of essential oil extracted from Eucalyptus, it is observed that mycelial growth is remarkable after 72 h for the control and different concentrations of essential oil of Eucalyptus namely 1.25, 2.5, 5 and 10 µl, by against at 25 µl no mycelial growth of *Fusarium sporotrichioides* is observed. According the photo N° 4, which represents the activity antifonguique of *Fusarium graminearum* depending on the incubation time and the concentration of essential oil of *Eucalyptus camendulensis* we note that there is an increase in mycelial growth over time with the exception of the incubation 50µl concentration / 20ml of

PDA that shows no mycelial growth. In addition, a decrease in the growth of *Fusarium graminearum* mycélenne with increasing the concentration of essential oil of eucalyptus.

Photo N° 03. Antifungal Activity of *Fusarium graminearum*

Antifungal index (AI)

The antifungal index is the concentration which inhibits 50% of the mycelial growth graph No. 5 following this fungal index depending on the concentration of essential oil of eucalyptus. According to the graph No. 5, it is noted that all concentrations of essential oil of Eucalyptus camendulensis applied partially inhibited the growth of fungal strains tested.

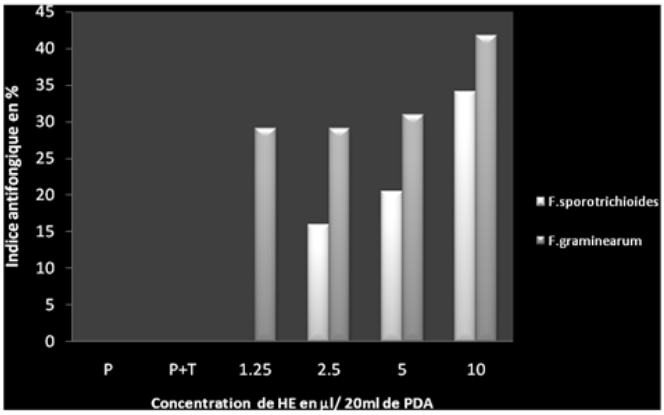

Figure 2. Index of mycelial growth

The antifungal index is increased with increasing the concentration of essential oil of Eucalyptus, and varied between 0% and 34.09 in *Fusarium sporotrichioides* between 29.09% and 41.81% in *Fusarium graminearum* he was observed by applying a concentration of essential oil of 10 .mu.l / ml of PDA 20.

Conclusion

In this study, we performed the extraction of essential oil of *Eucalyptus camendulensis* plant and we studied the antifungal activity on *Fusarium graminearum* and *Fusarium sporotrichioides.* We found that all the essential oils of *Eucalyptus camendulensis* plant showed an interesting biological activity on *Fusarium graminearum* and *Fusarium sporotrichioides*. Antifungal studies conformed the effectiveness of essential oils against microorganisms studied. In addition to its potential antifungal verified germs standardized agar, the aromatic fraction has an undeniable anti-inflammatory action. Therefore, it can be proposed, possibly as an asset of choice in the local treatment of inflammation. It would also be advantageous to further the phytochemical and biological investigations on these plants including purification of the extracts obtained to isolate the molecules responsible for the activities.

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