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Biological Activity of Essential Oil of *Eucalyptus Camendulensis* on Some Fungi and Bacteria

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ABSTRACT
Eucalyptus camaldulensis is a tree of the genus Eucalyptus widely distributed in Algeria and in the world. The value of its aromatic secondary metabolites offers new perspectives in the pharmaceutical industry. This strategy can contribute to the sustainable development of our country. *These Eucalyptus camendulensis*: has been selected for screening antibacterial. Preliminary tests performed on the essential oil of *Eucalyptus camendulensis* showed that this oil has antibacterial activity vis-à-vis the bacterial strains (*Enterococcus feacalis, Enterobacter cloaceai, Proteus microsilis, Escherichia coli, Klebsiella pneumoniae and Pseudomonas aeruginosa*) and antifungic (*Fusarium sporotrichioide and Fusarium graminearum).* The culture medium used was nutrient broth Muller Hinton. The interaction between the bacteria and the essential oil is expressed by a zone of inhibition with diameters of MIC indirectly expression of. And we used the PDA medium to determin the fungic activity. The extraction of the aromatic fraction (essentially oil- hydrolat) of the fresh aerian part of the *Eucalyptus camendulensis* was performed by hydrodistillation. The average essential oil yield is 0.99%. The antimicrobial and fungal study of the essential oil and hydrosol showed a high inhibitory effect on the growth of pathogens.
Keywords - Essential oil, *Eucalyptus camendulensis*, bacteria and Fungi.

I. INTRODUCTION

The MAP are plants that have grown or have picks in his natural environment for its medicinal and had an infinite variety of jobs, to report the therapeutic area, food, cosmetics, industrial, etc.. Herbs can play an important role in conserving biodiversity. These plants are actually very familiar to rural people who are very sensitive to their scarcity and their disappearance.Indeed, medicinal plants play an important role of health care population and represent a significant source of income for many families in the countryside and cities [2]. Humans use plants for thousands of years to treat various ailments, in many developing countries; much of the population relies on traditional doctors and their collections of medicinal plants to cure them [1]. Essential oils have many therapeutic properties. In herbal medicine, they are used for their antiseptic properties against infectious diseases of fungal origin, against dermatophytes [4], those of bacterial origin.

II. WORK METHODOLOGY

1. Extraction of essential oils by hydrodistillation

The hydrodistillation of *Eucalyptus camendulensis* (leaves dry) is performed using a Clevenger-type device (1928) (Clevenger, 1928). The setup used is shown in Figure 1.

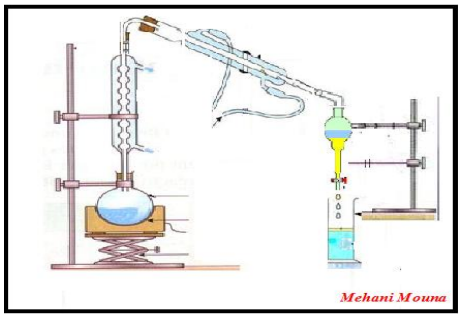

Figure 1: Mounting a hydrodistillateur

2. Study of the biological activity of essential oil

Five bacteria (*Enterococcus feacalis, Escherichia coli, Enterobacter cloaceai, Klebsiella pneumoniae*, *Proteus microsilis* and *Pseudomonas aeruginosa*) and two yeast (*Fusarium sporotrichioides* and *Fusarium* graminearum) were chosen for their high frequency in human infections.

3. Method of aromatogramme

The aromatogram is based on a technique used in medical bacteriology, called antibiogram (Benjilali B and al, 1986), (B Satrani and al, 2007). It has the advantage of being very flexible in the choice of products to test and apply to many bacterial species. (Billerbeck and al, 2002), Pibiri, 2005).

In this method, we use filter paper discs of 6 mm in diameter, impregnated in different concentrations of essential oil diluted in DMSO at 25%, 50% and

75%. These discs we deposit on the surface of an agar medium inoculated with the surface of a bacterial suspension. The incubation was carried out in an oven at 35 ° C for 24 h for bacteria and at 25 ° C for 5 days for yeasts.

4. 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.

III. RESULTS

1. Antimicrobienne Activity

The study of antibacterial extracts of Eucalyptus camadulensis by the agar diffusion method or the method of absorbing disc. The diameter measurement of the inhibition zones including the disk (6 mm) to determine the antimicrobial activity of this plant in vitro.

The following figure 2 shows the results of the antimicrobial activity of the HE (classical diffusion method) of the Eucalyptus plant on bacterial strains *microsilis Proteus*, *Enterococcus feacalis, cloaceai Enterobacter, Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Escherichia coli* .

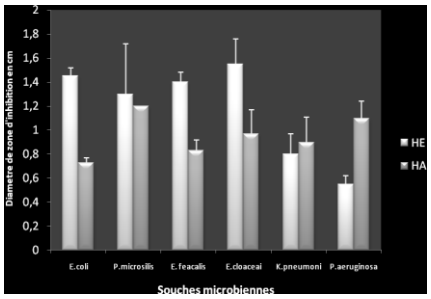

Fig. 2: Antimicrobial activity of HE *Eucalyptus camendulensis*

The HE has in vitro inhibitory activity against the bacteria tested. By taking into consideration the inhibition diameters, HE is active on *E.coli*, *P.microsilis*, *E.cloaceai* and *E. feacalis* respectively with a muting area 1.45, 1.3, 1.4 and 1.55 cm. On the contrary, it is less active vis-à-vis P.aeruginosa and K.pneumoni (0.55 and 0.8 cm). In contrast to *P. aeruginosa* and *P.microsilis* do not indicate great inhibitory action (insensitive) on essential oil of Eucalyptus.

Similar results were reported by ALITONOU *et al in* 2004. They show that the essential oil of *Eucalyptus tereticornis Sm.a*, a broad inhibitor against microorganisms studied power; SOHOUNHLOUE *et al* also showed that the essential oils of *Clausena anisata*, *Eucalyptus camadulensis* and *Ocimum basilicum* have biological activity on microorganisms. Our results are consistent with those reported by KESBI *et al* in 2011, which showed that Eucalyptus is endowed with an efficient biological activity of microorganisms.

B. Antifungal Activity

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 graph 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.

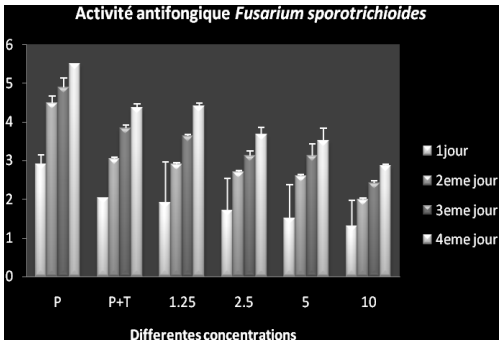

Fig. 3: Antifungal Activity of *Fusarium sporotrichioides*.

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.

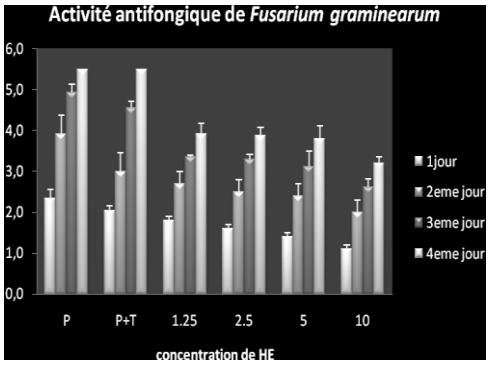

Fig. 4: Antifungal Activity of *Fusarium graminearum*

According the graph 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.

IV. CONCLUSION

The use of volatile formulations based on medicinal and aromatic plants may have many advantages over existing products syntheses. Many herbs contain chemical compounds having antimicrobial properties. Several research studies have been focused on the essential oils of these herbs. The search for new therapeutic herbs character used mainly to show the validity of their use by traditional practitioners. It also showed that our country has to offer a rich and varied plant biomass. This is an immeasurable source for the development and the development of new active molecules for therapeutic purpose. Better understanding of our study was to Eucalyptus camendulensis by studying of its aromatic fraction (HE-HA). We were able to evaluate and verify some of its biological properties and highlight its pharmacological potential. In addition to its potential antimicrobial and antifungal verified on standardized gelose medium germs and vapor phase, the aromatic fraction has an undeniable antiinflammatory action. Therefore, it may be proposedeventually as an asset of choice in the local treatment of inflammation.

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