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Antimicrobial Effect of Essential Oil of Plant *Schinus molle* on Some Bacteria Pathogens

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***Abstract*—**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.

Essential oils have many therapeutic properties. In herbal medicine, they are used for their antiseptic properties against infectious diseases of fungal origin, against dermatophytes, those of bacterial origin.

The aim of our study is to determine the antimicrobial effect of essential oils of the plant *Schinus molle* on some pathogenic bacteria. It is a medicinal plant used in traditional therapy. Essential oils have many therapeutic properties. In herbal medicine, they are used for their antiseptic properties against infectious diseases of fungal origin, against dermatophytes, those of bacterial origin.

The test adopted, is based on the diffusion method on solid medium (Antibiogram), this method allows to determine the susceptibility or resistance of an organism according to the sample studied.

Our study reveals that the essential oil of the plant *Schinus molle* has a different effect on the resistance of germs: for *Pseudomonas aeruginosa* strain is a moderately sensitive with an inhibition zone of 10mm, further Enterobacter, *Escherichia coli* and *Proteus* are strains that represent a high sensitivity, a zone of inhibition equal to 14.66 mm.

***Keywords*—**Essential oil, microorganism, antibiogram, *Shinus molle*.

I. Introduction

IN recent years, several reasons led to the restoration of the use of medicinal plants, they are first of a lower cost than synthetic drugs, and then they come at a time when the public is disillusioned to modern medicine [1].

It is also recognized in the scientific world that the products of natural origin are an important source of therapeutic agents for microbial diseases that are a large number of victims in terms of morbidity as mortality [2], such as antimicrobial compounds from plants may inhibit bacterial growth by different mechanisms. The human uses of 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 treat them.

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The MAP are plants that have grown or have picks in its natural environment for its medicinal properties and have an infinite variety of jobs, to report the therapeutic field, food, cosmetic, industrial, etc.. Herbal remedies can play an important role in biodiversity conservation. These plants are indeed well known that rural populations are very sensitive to their scarcity and their disappearance. In effect, medicinal plants are important for health care populations and represent a significant source of income for many families in the countryside and in cities.

In this context, the use of traditional medicine is widespread in Algeria. Accessibility, availability and popularity are not the shadow of a doubt, since almost all of the rural population of Algeria doesn't remedies for their health need.

From time immemorial, the plant kingdom has provided humans with essential resources to its feeding, hygiene and health. Since the earliest times, perfumes of these plants are associated with mystic rites, artistic and aesthetic.

It is known that some plants emit odors to attract insects or to defend themselves. These odors are small glands located on the surface of leaves, stems or flowers that contain the essential oil. The essential oil is a volatile aromatic substance extracted from the plant. Little or no greasy, it's called oil because it does not mix with water.

Such as gasoline, it ignites. Once extracted from plants, essential oils are used in perfumery, cosmetics, in food and other industries.

Essential oils have many therapeutic properties. In herbal medicine, they are used for their antiseptic properties against infectious diseases of fungal origin, against dermatophytes, those of bacterial origin.

The present study focuses on the extraction of crude leaf extracts, essential oils, and a contribution to the identification of their biological activity on the plant: *Schinus molle.*

II. Work Methodology

A. Plant Material

The aromatic plant harvested in the month of May 2010 is among the most abundant species in the northwest region of Algeria. This is *Schinus molle*: These have been selected for screening antibacterial.

Peruvian Pepper (*Schinus molle*, also known as American pepper, Peruvian peppertree, escobilla, false pepper, molle del Peru, pepper tree, peppercorn tree, Californian pepper tree, pirul and Peruvian mastic. is an evergreen tree that grows to 15 meters (50 feet). It is native to the Peruvian Andes. The bright pink fruits of *Schinus molle* are often sold as "pink

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peppercorns" although *S. molle* is unrelated to true pepper (*Piper nigrum*).

In traditional medicine, *S. molle* was used in treating a variety of wounds and infections due to its antibacterial and antiseptic properties. It has also been used as an antidepressant and diuretic, and for toothache, rheumatism and menstrual disorders, with recent studies in mice providing possible support for its antidepressant effects. It has also been speculated that *S. molle*'s insecticidal properties make it a good candidate for use as an alternative to synthetic chemicals in pest control.

B. Classification

Kingdom: Plantae
Sub kingdom: Tracheobionta
Class: Magnoliopsida
Order: Sapindales
Family: Anacardiaceae
Genus: *Shinus*
Species: *Shinus molle*

C. Biological Materials

1. Extraction of Essential Oils by Hydrodistillation

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

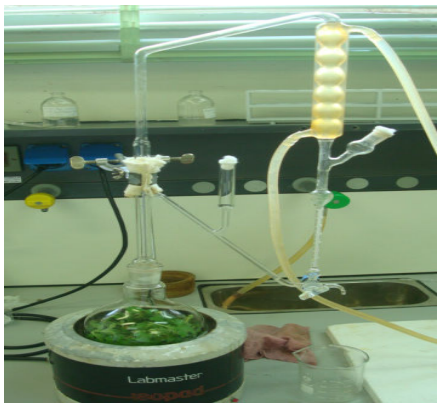


Fig. 1 Hydrodistillation of *Shinus molle*: Installation of hydrodistillation (Clevenger apparatus) [3]

The extraction procedure comes down to boil a quantity of 200g of seed dry for 2h with 1000ml of water in a 1 liter flask (Fig. 1). The distillation was carried out with a recycling cohobage commonly known as described in the Ph.Eur [4].

The essential oil yield was determined from fresh plant material [5], are defined as follows:

$$\text{RHE a} = \frac{\text{HE mass}}{\text{Mass dry plant material}}$$

D.Study of the Antimicrobial Activity of Essential Oil Microbial Strains Studied

Five bacteria (Proteus, *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa,* and *Klebsiella pneumoniae*) and one yeast (*Candida albicans*) were chosen for their high frequency in human infections.

Bacterial strains are lots of ATCC (American Type Culture Collection). They are identified and confirmed in the laboratory of the hospital Bodiaf Ouargla Mohamed (Algeria).

E. Culture Medium and Products Active

We used the Muller Hinton agar. In our tests, we tested both the antimicrobial activity of oiled essetielle of *Trigonella focnum greacum*.

F. Study Protocols

1. Technique in Solid Medium: Method of Aromatogrammes

The aromatogram is based on a technique used in medical bacteriology, called antibiogram [6], [7]. It has the advantage of being very flexible in the choice of products to test and apply to many bacterial species [8], [9].

In this method, we use filter paper discs of 6mm 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 24h for bacteria and at 25°C for 5 days for yeasts.

The absence of microbial growth resulting in a translucent halo around the disc whose diameter is measured and expressed in millimeters.

III. Results

The antimicrobial activities of all the plant extracts against the five bacteria strains and one fungic strain examined were assessed by the presence or absence of inhibition zones and MBC values. The MBC values and the inhibition zones of the plant extracts tested for antibacterial activity are given in Fig. 2.

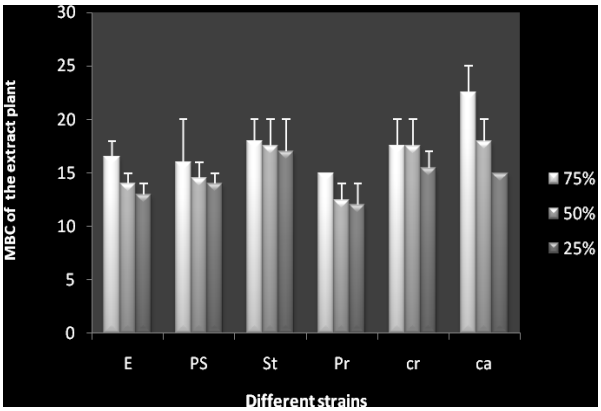


Fig. 2 Microbial activity of essential oil of the plant *Shinus molle*

The analysis has yielded by hydrodistillation of plant samples, an essential oil of pale yellow with a yield of 0.50%.

The results of tests conducted on the antibacterial activity of essential oils on different bacterial strains indicated in the table above, show that the antimicrobial effect of *Trigonella*

focnum greacum on different bacterial strains has a bactericidal effect.

At 75% dilution, *E. coli*, *Pseudomonas aeroginosa*, *Staphylococcus* strains and cribsila are moderately sensitive to essential oils tested with a zone of inhibition equal respectively 13, 12.33, 11.67 and 10.5mm. In addition, *Candida albicans* is the most sensitive strain with an inhibition zone of 18.33mm. By cons, *Proteus* strain is weakly sensitive to the essential oil tested with an inhibition zone of 9.3mm.

At 50% of dilution, the most sensitive strains are *E. coli* and *Candida albicans* with the same zone of inhibition of 17.5 mm. *Klebsiella pneumoniae* and *Pseudomonas aeroginosa* strains are moderately sensitive to the essential oil, record the same value that is equal to 15mm. By cons, *Proteus* and *Staphylococcus* strains are weakly sensitive.

At 25% of dilution, the strain *Proteus* is weakly sensitive to the essential oil with an inhibition zone of 11mm, for against, *Candida albicans*, *Staphylococcus,* and *Klebsiella pneumoniae* reported strong sensitivity to the essential oil with the same zone of inhibition 17mm. In addition, *E. coli* and *Pseudomonas aeroginosa* strains are moderately sensitive.

IV. Conclusion

Following this study, to verify experimentally the validity of the traditional use of medicinal plants in the treatment of microbial diseases caused by Five bacteria (*Proteus, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae*) and one yeast (*Candida albicans*) we conclude that:

Studies have complied with the antimicrobial effectiveness of essential oils against the microorganisms studied.

Regarding the sensitivity of microbial species against the essential oils, we found that species sensitivity to the essential oil of the plant *Schinus molle* be different depending on the concentration of this oil.

All of these results are only a first step in the search of substance biologically active natural source. Additional tests are required and must be able to confirm the performance highlighted, for it would be interesting also to further phytochemical and biological investigations on these plants including the purification of the extracts obtained in order to isolate the molecules responsible for the antimicrobial activities, which will expand the therapeutic arsenal of herbal plants.

Finally, we are recommending people to a reasonable use of medicinal plants, because improper use of these plants will probably lead to harmful side effects to human health.

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