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Antimicrobial Effect of Essential oil of Plant *Trigonella focnum greacum* on some Bacteria Pathogens

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***Abstract*—**The plant world is the source of many medicines. Recently, researchers have estimated that there are approximately 400,000 plant species worldwide, of which about a quarter or a third have been used by societies for medicinal purposes. The human uses of plants for thousands of years to treat various ailments, in many developing countries, much of the population trust in traditional doctors and their collections of medicinal plants to treat 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 Trigonella focnum greacum on some pathogenic bacteria, it is a medicinal plant used in traditional therapy. The test adopted is based on the diffusion method on solid medium (Antibiogram), this method determines the sensitivity or resistance of a microorganism vis-à-vis the extract studied. Our study reveals that the essential oil of the plant Trigonella focnum greacum has a different effect on the resistance of germs. For staphiloccocus Pseudomonnas aeroginosa and Krebsilla, are moderately sensitive strains, also Escherichia coli and Candida albicans represents a high sensitivity. By against Proteus is a strain that represents a weak sensitivity.

***Keywords*—**essential oil, microorganisme, antibiogram

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I. Introduction

THERE's about 500,000 plants on earth 10 000 of them, approximately, have properties that are biologically interesting application in several areas including in the medical field. In fact, despite the progress standards by modern medicine, herbal medicine offers many advantages that make the use of medicinal plants useful and justifiable on several plants [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.

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.

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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: *Trigonella focnum greacum.*

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 *Trigonella focnum greacum*: These have been selected for screening antibacterial. Fenugreek (Sénégrain) is a herbaceous plant from 30 to 40 cm high, the seeds have a therapeutic value, due to their high concentration of mucilage, protein and fat, Fenugreek seeds are known for their general tonic activity, making profit, as a tonic, against asthenia, malnutrition, underweight. This plant, however, many other activities, non-traditional but experimentally demonstrated: hypoglycaemic activity (trigonelline), hypocholesterolemic activity.

B. Classification

Riegne: Plantae
Sous règne: Tracheobionta
Classe: Magnoliopsida
Ordre: Fabales
Famille: fabaceae
Genre: *Trigonella*
Espèce: *Trigonella focnum graecum*

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C. Biological Materials

1. Extraction of essential oils by hydrodistillation

The extraction of essential oils of the plant was performed by hydrodistillation in a Clevenger type apparatus of 200 g of dry seed immersed in a flask of 1000 ml of water for 2 hours. Essential oils recovered in small opaque bottles. The extraction yield of essential oil is calculated by the weight of the dried plant material before extraction. The hydrodistillation of *Trigonella focnum greacum* (dry seed) is performed using a Clevenger-type device (1928) [3]. The setup used is shown in Figure 2.1.

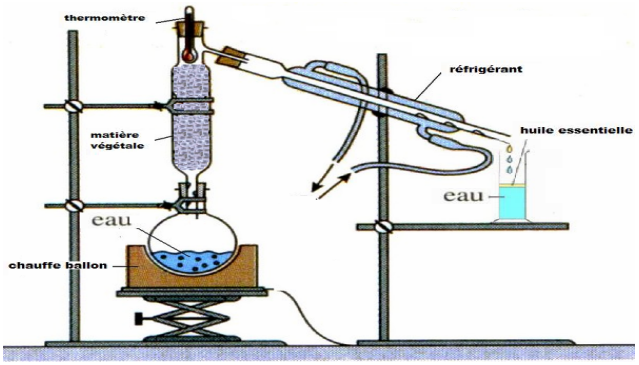


Fig. 1 Hydrodistillation of *Trigonella focnum greacum*:- Installation of hydrodistillation (Clevenger apparatus) - (Original, 2009)

The extraction procedure comes down to boil a quantity of 200 g of seed dry for 2 h with 1000 ml of water in a 1 liter flask (Figure1). 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

1. 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

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 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. 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 figure 2.

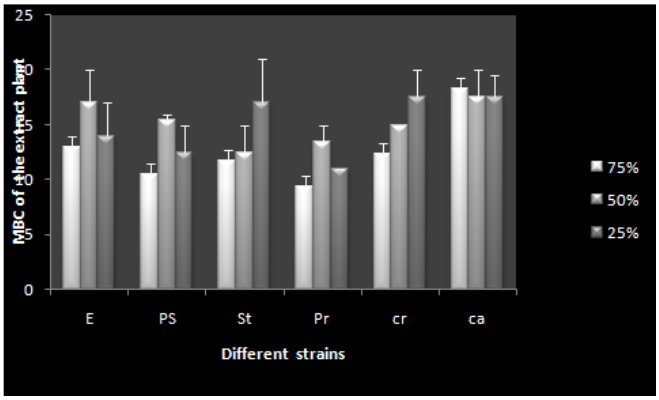


Fig. 2 Microbial acvtivity of essential oil of the plant *Trigonella focnum greacum*

The analysis has yielded by hydrodistillation of plant samples, an essential oil of pale yellow with a yield of 0.59%.

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*, and *Staphylococcus* strains *Klebsiella pneumoniae* are moderately sensitive to essential oils tested with a zone of inhibition equal respectively 13, 12.33, 11.67 and 10.5 mm. In addition, *Candida albicans* is the most sensitive strain with an inhibition zone of 18.33 mm.

By cons, *Proteus* strain is weakly sensitive to the essential oil tested with an inhibition zone of 9.3. 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 15 mm. By cons, *Proteus* and *Staphylococcus* strains are weakly sensitive.

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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:

All samples from essential oils of the plant Trigonella focnum greacum have shown interesting biological activity of the five bacterial strains and one fungal strain.

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 Trigonella focnum greacum be different depending on the concentration of this oil.

All of these results is 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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