



ANTIBACTERIAL STUDIES OF ESSENTIAL OIL OF *THYMUS SERPYLLUM* LINN

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ABSTRACT

The essential oil isolated from the seeds and leaves of the plant *Thymus serpyllum* Linn were found to be associated with encouraging powerful antibacterial activity and therefore may find use in future as good antibacterial agent.

Key words: Essential oil, *Thymus serpyllum* Linn, Seed and leaves, Powerful antibacterial agents.

INTRODUCTION

The antibacterial properties of the volatile constituents of plant have been well known¹. These have found use as preservatives, fungicides and germicides. Of course, because the volatile oil contain a good number of constituents, therefore it has not yet been generalized related to their bactericidal activity on any specific class of bacteria²⁻³.

In our country the indigenous system of medicine reports a large number of medicinal plants which have found use in the treatment of infectious diseases. The preparations made from these plants are applied locally to cure abscesses, sores, ulcers and are also administered orally for the treatment of various types of infections in the body. Scientists, in recent years have achieved success in isolating active antibacterial substances from plants which possess significant antibacterial properties⁴⁻⁵.

The bacterial⁶ growth inhibiting properties and other medicinal uses of volatile oils are suggestive of their possible use as antibacterial agents⁷ and therefore *thymus serpyllum* Linn, need more concentrated analysis.

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Thymus serpyllum Linn⁸ is commonly known as Banajwain and belongs to natural order Labiatae. It is a herb, which is given for curing weak vision and in complaints of stomach and liver disorders. It is also useful in diseases like suppression of urine and menstruation.

European people consider it as a tonic, antiseptic, carminative and use its infusion for treating skin diseases. Its seeds are reported to be used as vermifuge, while its oil is applied for treating toothache. It occurs widely from Kashmir to Kumaon.

In view of its important medicinal values, the essential oils isolated from its seeds and leaves were investigated for their antibacterial activity.

EXPERIMENTAL

Essential oil of seeds and leaves were isolated by steam distillation method separately and thereafter subjected to studies for their antibacterial activities.

The antibacterial activity was studied by paper disc diffusion plate method and nutrient agar 2.5% petri plates already seeded with test species. The "Oxide nutrient broth" was employed as inoculum for investigating antibacterial activity⁹⁻¹⁰.

The sterilized paper disc soaked in pure essential oil and the solution of its various dilution, were placed in the petri plate previously seeded with the suspension of the test species. The antibacterial activity has been expressed in terms of the diameter of the zone of inhibition, measured as an average of maximum dimension.

The sterilized agar media was brought to room temperature and 10 mL of this media was poured over to each sterilized petri-dish along with 5 mL of "oxide nutrient broth" culture of the organism which was added to each petri-dish. The broth culture were mixed thoroughly by rotatory motion of the plates and thereafter allowed to cool.

The various bacterial species were first incubated at 5°C for 2 hours. The zone of inhibition were recorded at 35°C after 40 hours.

The "oxide nutrient broth" was having the following composition and used for preparing the inoculum as tabulated in Table 1.

Table 1:

1	Peptone	5 g
2	Glucose	10 g
3	Beef extract	5 g
4	Distilled water	500 mL

The nutrient agar for the slants and media was prepared by adding 2.5% agar to the oxide nutrient broth. Thereafter amounts as above of the ingredients were dissolved in fresh hot distilled water and sterilized by autoclaving at 25 lb/sq. inch. for about 30 minutes in an autoclave.

The media and slant for preparing sub-cultures of organism was obtained by autoclaving at 20 lbs./sq inch. pressure for 25 minutes. The petri-dishes were sterilized by keeping overnight in electrically heated oven at 135°C.

5.0 mL of sterilized nutrient agar was poured in to the sterilized culture tube and allowed to cool. The tubes were incubated with the adding the bacteria and were then placed in the incubator for some time.

The various observation of essential oils of seeds and leaves of *thymus serpyllum* Linn are recorded in Table 2 and 3.

Table 2: Antibacterial activity of the essential oil from the seed of *Thymus Serpyllum* linn

S. No.	Bacteria	Diameters of zone of inhibition (mm)			Control Tetracycline
		Essential oil	Dilution		
			1 : 10	1 : 20	
1	<i>Bacillus subtilis</i>	5.0	1.4	0.5	9.8
2	<i>Bacillus pumili</i>	6.4	1.5	0.2	9.6
3	<i>Bacillus anthracis</i>	7.8	1.6	0.4	8.7
4	<i>Escherichia coli</i>	8.1	1.6	0.5	10.6
5	<i>Proteus vulgaris</i>	10.4	1.9	0.7	12.4

Cont...

S. No.	Bacteria	Diameters of zone of inhibition (mm)			Control Tetracycline
		Essential oil	Dilution		
			1 : 10	1 : 20	
6	<i>Pseudomonas aeruginosa</i>	7.8	1.5	0.3	11.6
7	<i>Klebsiella pneumoniae</i>	7.6	2.3	4.0	10.8
8	<i>Salmonella pullorum</i>	8.4	4.2	4.0	10.6
9	<i>Salmonella Newport</i>	8.6	3.6	2.7	10.2
10	<i>Salmonella stanely</i>	7.6	2.8	2.6	11.4
11	<i>Staphylococcus aureus</i>	10.0	2.4	1.5	11.8
12	<i>Staphylococcus albus</i>	10.2	4.2	3.2	13.4
13	<i>Streptococcus agalactiae</i>	9.8	2.0	1.0	12.8
14	<i>Vibrio cholerae</i>	7.4	1.8	0.8	10.6

Table 3: Antibacterial activity of the essential oil from the leave of *Thymus Serpyllum* linn

S. No.	Bacterial species	Diameters of zone of inhibition (mm)			Control Tetracycline
		Pure oil	Dilution		
			1 : 10	1 : 20	
1	<i>Bacillus anthracis</i>	6.4	2.0	0.8	7.4
2	<i>Salmonella pullorum</i>	6.5	1.9	0.6	8.9
3	<i>Salmonella Newport</i>	5.2	1.7	0.7	6.8
4	<i>Salmonella stanely</i>	5.1	1.6	0.6	7.4
5	<i>Escherichia coli</i>	5.2	1.8	0.8	7.2
6	<i>Salmonella Richmond</i>	4.8	3.0	0.6	8.3
7	<i>Pseudomonas aeruginosa</i>	4.7	2.7	1.1	7.9
8	<i>Klebsiella pneumoniae</i>	4.4	1.8	1.2	7.6
9	<i>Proteus vulgaris</i>	4.8	7.0	1.7	8.1
10	<i>Bacillus substilis</i>	6.9	-	1.6	8.4

Cont...

S. No.	Bacterial species	Diameters of zone of inhibition (mm)			Control Tetracycline
		Pure oil	Dilution		
			1 : 10	1 : 20	
11	<i>Staphylococcus aureus</i>	6.5	5.0	1.1	7.6
12	<i>Streptococcus agalactiae</i>	6.3	1.4	0.6	7.5
13	<i>Bacillus subtilis</i>	5.8	1.6	0.7	7.4
14	<i>Bacillus pumilis</i>	5.6	1.0	0.9	8.2

RESULTS AND DISCUSSION

The essential oil of seeds of *Thymus serpyllum* Linn was found to have maximum activity against *Proteus vulgaris*, *Staphylococcus aureus*, *Staphylococcus albus*, whereas low activity was noticed in case of *Bacillus subtilis* and *Bacillus pumilis*.

In other nine cases the essential oil was found to be moderately active in comparison to control-Tetracycline.

On the other hand in case of essential oil from leaves, the essential oil was found to be associated with maximum activity with *Bacillus anthracis* and *Salmonella pullorum* along with *Bacillus subtilis* and *Staphylococcus aureus*, whereas least activity was observed in case of *Klebsiella pneumoniae*, while the rest were having moderate activity.

As such the comparison with control tetracycline led to the conclusion that there exists enough scope to explore the possibility of the use of these two essential oils as powerful antibacterial agents in future.

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