ANTIMICROBIAL ACTIVITY OF SOME ENDEMIC PLANTS (*SALVIA CRYPTANTHA, ORIGANUM ACUTIDENS, THYMUS SIPYLEUS* SSP. *SIPYLEUS*)*

BAZI ENDEMİK BİTKİLERİN (*SALVIA CRYPTANTHA*, *ORIGANUM ACUTIDENS, THYMUS SIPYLEUS* SSP. *SIPYLEUS*) ANTİMKROBİYAL ETKİLERİ

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ABSTRACT

In this study, *Salvia cryptantha* Montbret & Aucher Ex Bentham, *Origanum acutidens* (Handz.-Mazz.) Ietswaart, *Thymus sipyleus* Boiss. subsp. *sipyleus*, which were collected from Erzincan have been investigated in respect of their antimicrobial activities against these bacteria and yeast: *Pseudomonas aeruginosa*, *Escherichia coli*, *Enterobacter aerogenes*, *Staphylococcus aureus* and *Candida albicans*. For this purpose, the ethanol extracts of plants were prepared and tested by "Disc Diffusion Method". As a result of this study it was found that the extracts of plants generally revealed antimicrobial activity against gram positive bacteria but had no antimicrobial activity against gram negative bacteria and yeast *Candida albicans*.

Key-Words: Antimicrobial activity, *Salvia cryptantha*, *Origanum acutidens*, *Thymus sipyleus* subsp. *sipyleus*

ÖZET

Bu çalışmada, Erzincan bölgesinden toplanan *Salvia cryptantha* Montbret & Aucher Ex Bentham, *Origanum acutidens* (Handz.-Mazz.) Ietswaart, *Thymus sipyleus* Boiss. subsp. *sipyleus*, endemik bitkilerinin *Pseudomonas aeruginosa*, *Escherichia coli*, *Enterobacter aerogenes*, *Staphylococcus aureus* bakterilerine ve *Candida albicans* mayasına karşı olan antimikrobiyal aktiviteleri incelenmiştir. Bu amaçla bitkilerin etanol ekstraktları çıkarılıp disk diffüzyon yöntemiyle test edilmiştir. Çalışmanın sonucunda, bitki ekstraktlarının gram pozitif bakterilere karşı antimikrobiyal etkileri saptanırken, gram negatif bakterilere ve *Candida albicans* mayasına karşı aynı etkisi saptanamamıştır.

Anahtar Sözcükler: Antimikrobiyal aktivite, *Salvia cryptantha*, *Origanum acutidens*, *Thymus sipyleus* subsp. *sipyleus*

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1. INTRODUCTION

Although molds, actinomycetes and bacteria are the chief sources of antibiotics, antibacterial agents are also present in higher plants. Such antibacterial agents include almost all classes of secondary metabolites (Macfoy and Cline, 1990).

Some species of *Salvia, Origanum* and *Thymus* have been widely investigated for novel antimicrobial agents and a lot of these agents have been isolated and identifed (Cruz et al., 1989; Zafra-polo et al., 1989; Dığrak et al., 1999).

This paper reports the demonstration of *in vitro* activity by several endemic plant extracts against pathogenic bacteria and one yeast. The ethanol leaf extracts were tested for their uninduced inhibitory activity against four species of bacteria (*Pseudomonas aeruginosa, Escherichia coli, Enterobacter aerogenes, Staphylococcus aureus*) and one yeast (*Candida albicans*) which were pathogens of man. Resistance to antibiotics and antifungals by these pathogenes is increasing thus there is a growing need for effective new drugs.

2. MATERIAL AND METHODS

2.1 Plant Materials

Arial parts of the plants were collected from different regions of Erzincan in 2001 during flowering period. The material was dried at room temperature (28 $\pm 2^{o}$C), powdered and stored in air-tight containers to protect against light and humudity. Its identification was confirmed by the Department of Science Education of Faculty of Erzincan Education. A voucher specimen is deposited in the Herbarium of that Faculty.

The ethanol extracts (Caceres et al., 1990) of these plants were successively fractionated according to the procedures of Aslan et al (1989), which were refrigerated at 4^{o}C until subsequently assayed in vitro (Moran et al.,1992).

2.2 Antimicrobial Activity

The study was carried out against the following reference strains [*Pseudomanas aeroginosa* (ATCC 27853), *Escherichia coli* (ATCC 25922), *Candida albicans* (ATCC 60193), *Staphylococcus aureus* (ATCC 25923)] and clinic isolates [*Pseudomanas aeroginosa* (n:30), *Escherichia coli* (n:30), *Candida albicans* (n:30),

Staphylococcus aureus (n:30) and *Enterobacter aerogenes* (n:30)], all of which were obtained from the Department of Microbiology, Faculty of Medicine, University of Ataturk.

The antimicrobial activity was determined by the disc diffusion method (Farag et al., 1989). A suspension of the tested microorganism was spread on the Brain-Heart infusion agar. Filter paper discs of 6mm diameter which contained 10µl of plant extracts were placed on the inoculated plates. The petri dishes were subsequently incubated at 37^{o}C for 24 hour in the case of bacteria, while the fungi were cultured at 30^{o}C at 24 and 48h. After incubation the growth inhibition rings were quantified by measuring the diameter of the zone of inhibition in mm (including the diameter of the disc) from the lower surface of the petri dishes (Lopez- Garcia et al., 1992). And the control is consisted of paper disc soaked with appropriate solvent and evaporated to dryness. All the assays were carried out in triplicate.

3. RESULTS AND DISCUSSION

In vitro, preliminary screening of the antimicrobial activity of the plant extracts from *Salvia cryptantha*, *Origanum acutidens*, *Thymus sipyleus* subsp. *sipyleus*, was studied against some bacteria and one yeast using the filter paper disc agar diffusion technique. The antimicrobial effects of plant extracts against the different strains are illustrated in Table 1 and Figure 1.

Table 1. Antimicrobial Activities of Some Plant Extracts.

Microorganism	Means of İnhibition Zone (mm)			
	Plant Species			
	Origanum	*Salvia*	*Thymus*	Control
Enterobacter aerogenes *(n: 30)*	-	-	-	-*
Escherichia coli (n:30)	-	-	-	-
Pseudomanas aeroginasa (n:30)	-	-	-	-
Staphylococcus aureus (n:30)	15	15	15	-
Candida albicans (n:30)	-	-	7	-

* No effect : İnhibition zone of $\leq$ 5mm

Within the 3 plant extracts examined, 100% presented inhibitory effects at least one microorganism. The data for the inhibition zones (mm) of various microorganisms indicate that plant extracts had no effect against the

gram-negative bacteria and the extract of *Thymus* had very little effect on *Candida albicans*. The gram-positive bacteria (*Staphylococcus aureus*) were more sensitive towards all the extracts . And all the extracts showed the same inhibition zones of > 15mm for *Staphylococcus aureus*. Also we saw the same effect for reference strains. The data show that gram-negative bacteria were more resistant to various extracts than gram-positives. Similar findings have been reported by others (Zafra et al. 1989; Dıgrak et al., 1999).

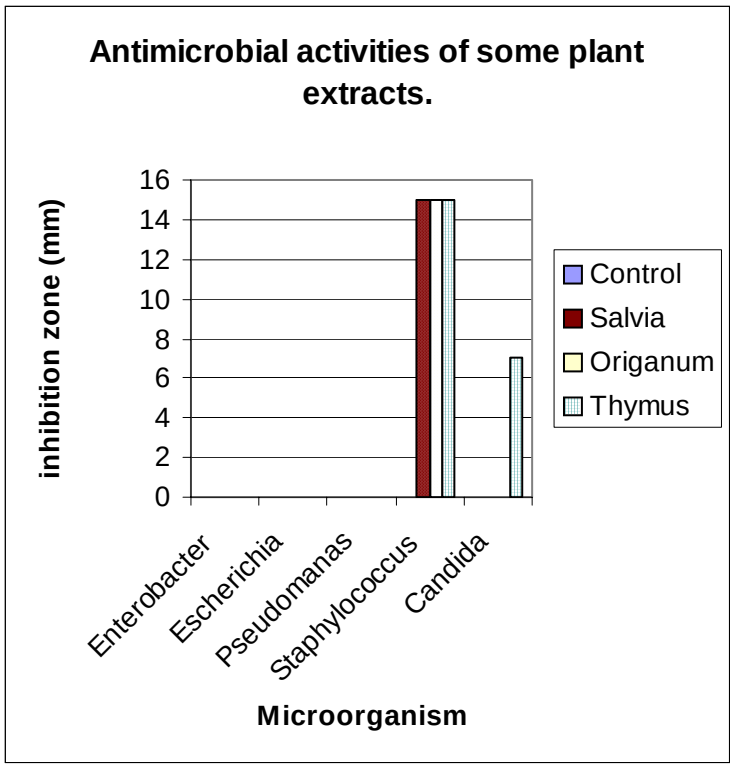

Figure. Antimicrobial Activities of Some Plant Extracts.

In conclusion ıt may be said that whole extracts can be used for protection against Gram-positive bacteria. Meanwhile, for the evalution of these plants which were naturally grown in Turkey and are endemic plants for Erzincan region, studies will be very beneficial for medicine and botanic.

4. REFERENCES

Aslan A., Güllüce M. And Öğütçü H. (1999). An Investigation on The Antimicrobial Activity of Some Lichens. Biyoteknoloji Dergisi. Cilt 22, Sayı 2, 19-26.

Caceres A., Cano O., Samayoa B. And Aguılar L. (1990). Plants Used in Guatemala For The Treatment of Gastrointestial Disorders. J. Of Ethanopharmacology Volume: 30, 55-73.

Cruz T., Cabo M. P., Cabo M.M., Jiminez J., Cabo J. and Ruiz C. (1989). In Vıtro Antibacterial Effect of The Essential Oil of *Thymus longiflorus*. Microbios, Volume: 60 (242), 59-61.

Dığrak M., İlçim A., Alma M. H. And Şen S. (1999).Antimicrobial Activities of The Extracts of Various Plants. Tr. J. of Biology, Volume : 23, 241-248.

Farag R.S., Daw Z. Y., Hevedi F.M. and El-baroty G.S.A.(1989). Antimicrobial Activity of Some Egyptan Specie Essential Oils. J. of Food Protection, Volume : 52 (9), 665-667.

Lopez-Garcia R. E., Hernandez- Perez M., Rabanal R.M., Darias V., Arias A. And Sanz J. (1992). Essential Oils And Antimicrobial Activity of Two Varieties of *Cedronella canariensis*. J. of Ethnopharmacology, Volume : 36, 207-211.

Macfoy C. A. And Cline E. J. (1990). In Vıtro Antibacterial Activities of Three Plants Used in Traditional Medicine in Sierra Leone. J. of Ethnopharmacology Volume: 28, 323-327.

Moran A., Montero M. J., Matin M.L. and Roman L.S. (1992). Pharmacological Screening And Antimicrobial Activity of The Essential Oil of *Artemisia caerulescens* subsp. g*allica*. J. of Ethnopharmacology, Volume : 26, 197-203.

Zafra-polo M. C., Blazquez M.A. and Vıllar A. (1989). Spasmolytic And Antimicrobial Activity of The Essential Oils From *Thymus leptophyllus* and *T. webbianus*. Fitoterapia. Volume : 5, 469-473.