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Short communications

ANTIFUNGAL EFFECTS OF *MICROMERIA MYRTIFOLIA* BOISS. & HOHEN. IN BOISS. AND *PRANGOS UECHTRITZII* BOISS. HAWSSKN DECOCTIONS

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Antifungal effect of *Micromeria myrtifolia* Boiss. & Hohen. in Boiss. and *Prangos uechtritzii* Boiss. Hawsskn decoctions was tested against *Alternaria alternata, Aspergillus niger, Aspergillus parasiticus, Botrytis cinerea, Fusarium oxysporum* f.sp. melonis and *Penicillium digitatum.* Of the 2 substances tested *Pr. uechtritzii*, being present at 75 to 80% concentration in potato dextrose agar, partly inhibited growth of *A. alternata, B. cinerea* and *P. digitatum. Pr. uechtritzii* had higher antifungal effect than *M. myrtifolia* on mycelial growth during incubation. *M. myrtifolia* partly affected mycelial growth of *A. alternata* and *A. niger* at the beginning of incubation. But the mycelial growth of *F. oxysporum* was not inhibited by *M. myrtifolia* concentrations during incubation. Also, *Pr. uechtritzii* did not have any affect on mycelial growth of *A. niger* during incubation *P. digitatum*, the most sensitive microorganism to both decoctions. Higher decoction concentrations of plants used in study will be probably inhibit mycelial growth of microorganisms.

Keywords: antifungal effect, decoction, inhibition, moulds

Micromeria myrtifolia Boiss. & Hohen. in Boiss. and *Pr. uechtritzii* Boiss. Hawsskn grow as wild, and are known as taş çayı and çaşır in Turkey, respectively. *M. myrtifolia* is drunk as tea. But *Pr. uechtritzii* is used as vegetable and pickling product. Although spices are used primarily for their desirable flavour and odour, they may play other important roles in food systems. They are highly valued for their use as antimicrobial agents. Antimicrobial properties of spices and of their essential oils have been documented. The preservative action of herbs and spices has only recently received attention in the literature where studies have been reported that mycotoxin-producing moulds may be inhibited by some herbs and spices. Past investigations have indicated that the antimicrobial factor of spices resides in the essential oil/or oleoresin fraction. Aromatic plants/spices, herbs and derivatives widely used in foods were used

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as antimicrobial agents against several microorganisms under in vitro conditions. While antimicrobial activities of several spices in culture media have been reported over the years, few tests have been conducted in food systems (BEUCHAT, 1976; SHELEF et al., 1980, HITOKOTO et al., 1980; AZZOUZ & BULLERMAN, 1982; ZAIKA et al., 1983; FARAG et al., 1989; BENJILALI et al., 1984; GRAHAM & GRAHAM, 1987; BOYRAZ & ÖZCAN, 1997).

There are several chemicals that can be used as antimicrobial agents. For instance, acetic acid and sulfur dioxide are widely used as food preservatives. However, these chemicals require caution in handling since they are corrosive and their vapours can irritate the eyes and respiratory tract. On the contrary, herbs and their derivatives possessing antimicrobial activity, might have beneficial effect, but cause no health problems to the handler and consumer. In this respect, various essential oils of spices were tested for their inhibitory activity towards the growth of some microorganisms.

The objective of this work was to evaluate the inhibitory potency of *M. myrtifolia* and *P. uechtritzii* decoctions on *A. alternata*, *A. niger*, *A. parasiticus*, *B. cinerea*, *F. oxysporum* and *P. digitatum* in vitro.

1. Materials and methods

1.1. Materials

Micromeria myrtifolia Boiss. & Hohen. in Boiss. (*Labiatae*) and *Prangos uechtritzii* Boiss. Hawsskn (*Apiaceae*) used in the experiments were collected from Mersin (Gülnar) and Kayseri, respectively, in 1997. Plants were identified at the Department of Biology, Faculty of Science and Education, Selçuk University.

1.2. Organisms

Moulds used in this study were: *A. parasiticus* NRRL 2999, obtained from USDA, Agricultural Res. Service, National Center for Agricultural Utilization Res. Service, Illinous, USA; *A. alternata*, *A. niger*, *B. cinerea*, *F. oxysporum* and *P. digitatum* obtained from Department of Food Engineering, Faculty of Agriculture, Selçuk University.

1.3. Medium

Potato dextrose agar (E. Merck, Darmstadt) was used as main medium in the experiment. Plants used in this study were boiled in water (1:2, w/v) for one hour. After the decoctions were filtered, they were cooled and stored in refrigerator until use. Decoctions to be used in the experiment were prepared as 50, 66, 75 and 80% concentrations. Then, each medium of about 120 ml quantity, prepared from different concentrations, separately was put into 250 ml Erlenmeyer flasks and sterilized by autoclaving at 121 °C for 15 min.

1.4. Analysis

The effect of decoctions at different concentrations (50, 66, 75 and 80%) was determined against *A. niger*, *A. parasiticus*, *A. alternata*, *B. cinerea*, *F. oxysporum* and *P. digitatum* grown on Czapek Dox agar. Potato dextrose medium containing the decoctions in different concentrations was dispensed into petri dishes (20 ml/dish). Five mm discs of the test fungi, cut from periphery of 7 day old cultures, were inoculated upside down separately to each assay plate and incubated at 28 °C. The colony diameter was measured and percent mycelial inhibition was calculated (DEANS & SVOBODA, 1990). Four replicates of each treatment were similarly maintained and averages calculated. Control sets were simultaneously run without using decoctions of plants.

$$I = [(C–T)/C] \times 100$$

I: Inhibition (%)
C: Colony diameter of mycelium from control petri plate (mm)
T: Colony diameter of mycelium from test petri plate (mm)

2. Results and discussion

The inhibitory effects of different concentrations of plant decoctions were tested. The results are shown in Tables 1 and 2.

While decoctions of *Pr. uechtritzii* were effective against *A. alternata*, *A. parasiticus*, *B. cinerea* and *P. digitatum* during incubation, *M. myrtifolia* was effective also against *P. digitatum* and *B. cinerea*. The decoction at concentration of 80% of *P. uechtritzii* had the largest effect on mycelial growth of *A. alternata*, *A. parasiticus* and *P. digitatum*. However, none of the concentrations of *Pr. uechtritzii* showed inhibitory effect against *A. niger*. Also, *F. oxysporum* showed resistance against all concentrations after five days. High concentrations usually showed high inhibitory effect.

Table 1

Inhibitory effect of M. myrtifolia *decoction at different concentrations (% inhibition)*

Incubation days	Concentrations %	*A. alternata*	*A. niger*	*A. parasiticus*	*B. cinerea*	*F. oxysporum*	*P. digitatum*
3	50	2	–[a]	–	4	–	43
	66	3	29	–	5	–	48
	75	13	29	–	6	–	57
	80	13	33	–	28	–	65
4	50	5	–	–	5	–	66
	66	11	31	–	7	–	70
	75	20	31	–	8	–	71
	80	29	37	–	25	–	72
5	50	–	–	–	6	–	54
	66	11	43	–	24	–	68
	75	19	49	–	24	–	68
	80	30	51	–	27	–	69
6	50	–	–	30	10	–	41
	66	13	–	33	24	–	58
	75	21	–	35	37	–	60
	80	36	–	54	38	–	61
7	50	–	–	32	32	–	37
	66	18	–	35	35	–	47
	75	28	–	38	42	–	49
	80	44	–	53	51	–	50
8	50	–	–	19	36	–	32
	66	–	–	24	36	–	41
	75	–	–	31	47	–	44
	80	–	–	47	52	–	48
9	50	–	–	9	42	–	31
	66	–	–	14	42	–	37
	75	–	–	22	50	–	41
	80	–	–	41	52	–	43
10	50	–	–	–	42	–	30
	66	–	–	–	44	–	33
	75	–	–	–	49	–	37
	80	–	–	–	52	–	39

[a] No inhibition

None of the concentrations of *M. myrtifolia* showed inhibitory effect against *F. oxysporum* through incubation. Also, not all concentrations showed inhibitory effect against *A. parasiticus*, *A. niger* and *A. alternaria* during incubation. The most sensitive mould tested against all concentrations of *M. myrtifolia* were *P. digitatum* and partly *B. cinerea*. However, the concentration of 80% in accordance with other concentrations of *M. myrtifolia* showed higher inhibitory effect against some mould used in the experiment. *Pr. uechtritzii* did not affect the mycelial growth of *A. niger* during incubation at all.

Consequently, these two decoctions had partly inhibited the growth of some microorganisms used in the experiment. Inhibitory effect of both decoctions was lower than that of the spices themselves and derivatives such as essential oils or oleoresin (AZZOUZ & BULLERMAN, 1982; SHELEF, 1983; ÖZCAN, 1998). This decrease can be probably due to the evaporation of their essential oils during boiling, because their components have got antimicrobial effect (BEUCHAT, 1976, SHELEF et al., 1980).

Table 2

Inhibitory effect of Pr. uechritzii *decoction at different concentrations (% inhibition)*

Incubation days	Concentrations (%)	*A. alternata*	*A. niger*	*A. parasiticus*	*B. cinerea*	*F. oxysporum*	*P. digitatum*
3	50	36	–[a]	4	4	32	24
	66	45	–	8	6	39	47
	75	48	–	10	15	55	49
	80	48	–	12	19	59	57
4	50	38	–	6	5	17	50
	66	47	–	8	7	34	64
	75	49	–	11	13	41	71
	80	51	–	14	27	54	71
5	50	37	–	10	7	15	52
	66	44	–	10	12	27	57
	75	46	–	18	28	36	69
	80	57	–	29	29	50	71
6	50	31	–	23	10	–	54
	66	34	–	32	23	–	59
	75	44	–	39	28	–	68
	80	57	–	61	39	–	79
7	50	29	–	18	26	–	53
	66	34	–	32	54	–	54
	75	41	–	40	57	–	70
	80	59	–	59	60	–	77
8	50	31	–	12	31	–	52
	66	39	–	18	58	–	56
	75	44	–	29	60	–	65
	80	57	–	48	62	–	75
9	50	36	–	11	32	–	50
	66	42	–	14	59	–	51
	75	45	–	25	60	–	58
	80	47	–	39	61	–	62
10	50	24	–	4	39	–	49
	66	32	–	8	63	–	50
	75	39	–	12	63	–	61
	80	43	–	14	67	–	69

[a] No inhibition

As a result, the effect of decoctions was not 100% on mycelial growth, *Pr. uechtritzii* showed the highest inhibitory effect against all the moulds tested. While all the concentrations of *Pr. uechtritzii* showed inhibitory effect against *A. alternata*, *A. parasiticus*, *B. cinerea* and *P. digitatum* during incubation, *M. myrtifolia* showed inhibitory effect against only *P. digitatum* and *B. cinerea*. The most sensitive microorganism to both water decoctions was *P. digitatum*. So, the higher decoction concentrations of both plants will probably inhibit the mycelial growth of *A. alternaria*, *B. cinerea* and *P. digitatum*.

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