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Antifungal Activity of *Zataria multiflora* against Some Plant Pathogenic Fungi

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The aim of this experiment was to evaluate the efficacy of leaves aqueous extract of *Zataria multiflora* against some important plant pathogenic fungi *viz.*, *Alternaria alternate*, *Penicillium expansum*, *P. javanicum* and *P. italicum* under laboratory conditions. The leaves aqueous extract revealed maximum antifungal activities at its 10 per cent concentration. The activity of extract was found increasing with increasing concentration and at highest (10 per cent) it was on par with lowest one.

Key words: Antifungal efficacy, Plant pathogenic fungi, Radial growth, *Zataria multiflora*.

In the modern agriculture, the appearance of antibiotic resistance fungi to antifungal agents has been an important issue for most of scientist's world wise. These resistances to antifungal increase the disease rate in communities (Cowan, 1999). The changing of antifungal agents with medicinal plants may stun the above mentioned resistant fungi. Out of the alternative methods, natural products especially medicinal plants such as, *Zataria multiflora* (Boiss.) is very famous Iranian folk medicine. This plant is a member of Laminaceae family that grows in most of the place of Iran (Ali *et al.*, 2000; Hossenizadeh *et al.*, 2000). This plant is extremely used as anesthetic, antiseptic, antispasmodic and flavor ingredient in a wide variety of food (Hossenizadeh *et al.*, 2000; Jafari *et al.*, 2011). In the present study crude aqueous extract of leave of *Zataria multiflora* was evaluated against some important fungi.

MATERIALS AND METHODS

Fresh leaves were collected and washed, cut into small pieces and boiled in sterilized distilled water for 20 min. in microwave oven, then ground in blender for 10 min. and filtered through cheese cloth followed by Whatman filter paper no. 1. The filtrate was centrifuged for 15 min. at 1000 rpm, filtered through Whatman filter paper no. 1 and stored as stock solution.

Extract was evaluated using food poisoned technique against plant pathogenic fungi at 10, 5 and 2.5 per cent in PDA medium while pouring into Petri plates. The medium were inoculated by the test pathogens using discs of 5 mm dia. cut from 10 days old growing cultures of the test fungi and incubated at 24 ± 2 °C in incubator. PDA medium without the test compound served as control. The radial growth of the mycelium was measured over a period of 5 days. The data were recorded and analyzed statically using One-way ANOVA followed by Duncan's Multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

On the basis of data presented in Table showed that antifungal activity of the leaves extract of *Zataria multiflora* was found significantly high at all concentrations used in this experiment. With increasing of extract concentration the effect was increased. However, the maximum effect was documented at 10 per cent concentration. Regarding to data recorded in this study the most susceptible pathogen was *P. expansum*, whereas, *A. alternate* was the most resistance one. In the

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Table 1. Antifungal activity of aqueous extract of *Zataria multiflora* on radial growth of various fungi

Treatment (Conc.)	*A. alternata*	*P. expansum*	*P. javanicum*	*P. italicum*
Control	78.10[a]	67.10[a]	70.50[a]	68.80[a]
10	20.30[d]	9.80[c]	15.80[d]	10.70[c]
5	28.10[c]	13.20[b]	20.40[c]	16.40[c]
2.5	34.20[b]	15.70[b]	29.30[b]	22.10[b]

Data presented as eight replicates, Column letter followed by different letters are significantly different at P= 0.05 level by DMRT.

other words, maximum radial growth of 34.20 and minimum of 9.80 mm was recorded.

Moderated pathogen responding to the extract of *Zataria multiflora* used in this investigation was *P. javanicum* and *P. italicum*. Exposing pathogens to 10 per cent aqueous leaves extract of tested plant resulted of 20.3, 15.80, 10.70 and 9.80 mm for *A. alternate*, *P. javanicum* and *P. italicum* and *P. expansum*, respectively, that were highly significant as compared to control of each pathogen. When *A. alternate* exposed to the aqueous extract of tested plant at different concentrations ranging from 34.20 to 20.30 mm recorded that statically was highly significant. In contrast, radial growth of *P. expansum* and *P. italicum* responding to different concentration of aqueous extract of *Zataria multiflora* were significant statically except at 5 – 2.5 and 5 – 10 per cent concentration, respectively. Ginger, garlic cloves and neem extracts significantly reduced the growth of rice blast pathogen under laboratory condition (Prasad *et al.*, 2002). Few plant extracts exhibited of *Rhizoctonia soani* growth under laboratory conditions (Tiwari *et al.*, 2007). In the other study, neem seed extract was used against *R. solani* and *Fusarium solani*, which considerably reduced the inoculum density of these two pathogens (Shanmugam, 2004). In the investigation made by (Ramezani, 2014) the effect of different leaves extracts of *Eucalyptus* spp. on causal organism of leaf blight of tomato (*A. solani*) was evaluated in the laboratory and field conditions. *Eucalyptus citriodora* was highly effective in inhibiting the growth of test pathogen, among the extracts tested. Ajoene, a compound extracted from *Allium sativus* effectively reduced the growth of *Phytophthora drechsleri* f.sp. *cajani* under controlled condition (Roy *et al.*, 1998). On the basis of present study it could be suggested the use of *Zataria multiflora* leaves extract for the management of plant pathogenic fungi where susceptible crop are to be grown. Furthermore, it should test these materials under field condition in order to effectiveness of plant and ultimately reducing diseases.

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