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In vitro Nematicidal and fungicidal effects on oil of Origanum syriacum from Palestine against root-knot nematode and Fusarium Solani plant pathogens

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Abstract:

Plant material of Origanum syriacum from Palestine extracted in methanol was fractionated in ethyl acetate n-hexane. n-hexane was oily fraction was tested for in vitro fungicidal and Nematicidal activity n-hexane soluble oily fraction of Origanum syriacum. n-hexane fraction of Origanum syriacum showed anti fungal activity opposed to extremely damaging two plant pathogens Fusarium Solani and Fusarium Oxysporum and formed a zone of inhibition 22mm and 10mm correspondingly. n-hexane fraction also showed Nematicidal activity not in favor of the plant parasitic Nematode, Meloidogyne Javanica and showed 83% mortality at 1mg/ml.

Key words: *essential oil, Origanum syriacum, Nematicidal activity and fungicidal activity*.

Introduction:

Origanum syriacum belongs to the family Lamiaceae is an aromatic branched perennial herd. It is cultivated in many

places of the world. Growing wild in the Sinai Desert of Egypt (1). Constituents of essential oil of many species have been studied (2-7). In folk medicine it is used as a powerful disinfectant, flavoring, perfumery and scenting soaps (8-10).

The oil of the leaves of O. syriacum reportedly possess ovicidal (11), bioherbicidal (12), insecticides (13-14) and anti mycotic activities (15). It was reported that carvacrol and thymol represent the major constituents of the essential oil of Origanum specie (16).

Material and Method:

Plant parasitic nematodes and root infecting fungi are emerging and posing a serious threat to modern agriculture. They attack root of plants, limit nutrient uptake of plants and destroy the root system of the victim which often result in loss of plant. The Genus Fusarium contains a lot of species that have been renowned for ages as being imperative plant pathogens. The association of Fusarium Oxysporum and Meloidogyne is known to increase disease severity in cotton and in tomatoes.

In Vitro Juvenile Mortality Test:

The Nematicidal action of bacterial fractions was examined by a customized procedure of Myer et al (1982)(11). The 1mg/ml concentration of n-hexane fraction arranged in particular solvent. In a glass dish, 1ml of each concentration was kept for 24 hours. The aqueous suspension of nematode was added after the evaporation of solvent. The respective solvent in the watch glass served as control. After 48 hours, 10 hands picker 2nd stage Juvenile of Meloidogyne Javanica were added with 5ml of distilled water to the watch glass, each concentration have 3 replicated.

In vitro test against root-knot infecting Fungi:

The fungicidal activity of bacterial fractions was verified by a modified technique of Ara et al (1998, 12). 10 µl of n-hexane fraction was applied directly on uncontaminated filter paper discs and desiccated. On one side of the Petri dished, the loaded discs were placed containing Czepak's Dox agar (pH 7.2). A 5mm disc of vigorously breeding culture of plant pathogens like Fusarium Solani, Fusarium Oxysporum, Rhizoctonia Solani and Macrophomina phasolina were vaccinated at another side of the dish. Respective solvents impregnated on the Discs treated as a control. Every treatment was repeated three times and the plates were incubated at 28°C for five days.

Results and Discussion:

In the present investigation the anti fungal and Nematicidal activity on the extracted n-hexane fraction has been carried out. The n-hexane oily fractions have been screened. The geographical location of the plant affects the chemical composition to some extent. The essential oil Origanum syriacum originated from Southern Palestine near Al-Khalil city has been screened for activity. Oily fractions of n-hexane examined in vitro against four species of Phyto pathogenic fungi Fusarium Solani, Fusarium Oxysporum, Rhizoctonia Solani and Macrophomina phasolina tested using the agar disc diffusion method, showed anti fungal activity against two species. The largest activity was observed for Fusarium Solani and moderate observed for Fusarium Oxysporum. However, the oil was found to be infective against two fungi i.e. Rhizoctonia Solani and Macrophomina phasolina (Table 1).

N-hexane fraction was also evaluated against one specie of root-knot nematode. Showed 28% mortality against M.

Javanica after 24 hours of incubation. However, the mortality significantly increased 83% after 48 hours of exposure (Table 2).

Conclusion:

The oily fractions of n-hexane extracted of O. syriacum collected from Palestine showed anti fungal and Nematicidal activity. Origanum syriacum showed anti fungal activity against the extremely damaging two plant pathogens Fusarium Solani, Fusarium Oxysporum and produced a zone of inhibition 22mm and 10mm (10 µl/disc) respectively. Fraction also showed Nematicidal activity against the plant parasitic nematode Meloidogyne Javanica and showed 83% mortality.

Table 1: Fungicidal activity of the extracted oil of O. syriacum
Zone of Inhibition (mm) (10 µl/disc)

TREATMENT	**FS**	**FO**	**MP**	**RS**
CONTROL	0	0	0	0
OILY FRACTION	20	10	0	0

FS FUSARIUM SOLANI
FO FUSARIUM OXYSPORUM
MP MACROPHOMINA PHASEOLINE
RS RHIZOCTONIA SOLANI

Table 2: Nematicidal Activity of the extracted Oil of O. syriacum
Mortality of Meloidogyne Javanica

Time	**24 h**	**48 h**
Control	0	0
Oil Fraction	28%	83%

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