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Effect of vegetable oil seed treatment on seed mycoflora of pea, *Pisum sativum* L

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ABSTRACT

Effect of seed treatment with six vegetable oils viz mustard, Neem, Karanj, cedar, apricot and olive was studied on the incidence of seed mycoflora of pea during the process of germination. Almost all the vegetable oils treatments resulted in significant reduction in the incidence of various fungi. The seeds treated with Neem oil had minimum incidence of *Aspergillus* sp (10.67%) followed by mustard (13.33%) irrespective of concentrations. Similar trend was observed in case of *Alternaria* sp where 2.67 per cent incidence was recorded on seeds treated with Neem oil though all the treatments were equally effective. Seeds treated with apricot oil had highest incidence of *Alternaria* sp (5.00%). No incidence of *Mucor* sp was observed in Neem and mustard treated seeds whereas 0.67, 1.00, 1.11 per cent incidence was recorded on seeds treated with Karanj, cedar and olive oils respectively. Apricot oil treatment proved least effective against *Mucor* sp. Mustard, Neem and Karanj provided almost complete protection against *Fusarium* sp whereas olive (0.22%), cedar (0.33%) and apricot (0.89%) were comparatively less effective. Hence pea seeds treated with Neem or Karanj oils provided maximum protection against fungal pathogens.

Keywords: Pea; *Pisum sativum*; vegetable oils; seed mycoflora

INTRODUCTION

Chemicals used in the control of diseases pollute the atmosphere besides affecting the crops. To avoid the hazardous effects of chemicals natural products of some plants and their products have been used to control plant diseases (Rahber-Bhatti 1986, Bowers and Locke 2000, Momin and Nair 2001). Plant extracts may therefore be an alternative to currently used fungicides for controlling pathogenic fungi as they constitute a rich source of bioactive chemicals (Wink 1993). Unlike insecticides the plant products viz castor oil, Neem oil, sweet flag powder, Karanja oil etc are known to control storage infestation effectively for a longer periods without impairing germination and vigour besides being cost effective, environmentally less toxic and eco-friendly (Pandey et al 1976 and Babu et al 1989). *Aspergillus* and

Fusarium species produce mycotoxins in food besides causing seedling blight, seed rot, kernel rot, stalk rot, wilt and stunt (Blat 1969, Thiel et al 1991, Fandohan et al 2003). Several reports have been made on the fungicidal properties of Neem oil (Singh et al 1980, Kazmi et al 1995). Locke (1995) reported that in field *Alternaria alternata, Aspergillus niger* and *Fusarium oxysporum* were completely controlled by using 2-10 per cent Neem oil. The present investigations were undertaken to find out effectiveness of seed treatment of peas with vegetable oils against *Aspergillus* sp*, Fusarium* sp*, Alternaria* sp and *Mucor* sp.

MATERIAL AND METHODS

The present studies on the effect of different vegetable oils against pulse beetle (*Callosobruchus chinensis*) were conducted in the Department of Environmental Science, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan. Pea seeds cv Arkel were heat sterilized at 55^{0}C for 4 h and 100 g sterilized seeds were put in different plastic container (250 cc). The contents of each container were thoroughly mixed and coated with selected doses (5%, 3% and 1%) of six different vegetable oils viz Mustard (*Brassica juncea* (L) Cezern & Coss), Neem (*Azadirachta indica* A Juss), Karanj (*Pongamia glabra* (L) Pierre), cedar wood oil (*Cedrus deodara* Roxb ex Rottl & Willd), apricot (*Prunus armeniaca* L) and olive (*Olea cuspidata* (L) Wall ex G Don) and control (distilled water). There were seven treatments including control and each treatment was replicated thrice. Laboratory reared insects were released in each jar as per the designed experiment. The seeds damaged by insects were further grown to study per cent germination by using paper towel method as proposed by Sen and Ghosh (1999) and kept in germination chamber at 25±1^{0}C for germination. While conducting the experiment four fungal species were found associated with the germinated seeds in different treatments. The fungal species growing on the germinated seeds were isolated and identified. Fungal structures from pea seeds were put on slide sterilized with cotton rinsed with alcohol (70%) and placed on slide containing one or two drops of lacto phenol/ cotton blue. The fungal structures were observed under the microscope and identified on the basis of mycelium, spore etc (Barnett and Hunter 1972).

RESULTS AND DISCUSSION

Minimum incidence of *Aspergillus* sp (Table 1) was observed in seeds treated with Neem oil (10.67%) which was significantly less than rest of the treatments. Karanj (15.33%), cedar (16.33%), mustard (15.33%), olive (16.22%) and apricot (18.56%) were at par with each other and also resulted in significantly lower disease incidence than control (25.00%).

Table 1. Incidence of *Aspergillus* sp on pea seeds treated with vegetable oils at different concentrations

Treatment	*Mean incidence (%) of *Aspergillus* sp at indicated concentrations (%)			
	5	3	1	Mean
Mustard	13.67(3.64)	15.67(3.95)	16.67(4.03)	15.33(3.87)
Neem	8.33(2.88)	10.67(3.21)	13.00(3.59)	10.67(3.23)
Karanj	10.67(3.25)	16.67(4.31)	18.67(4.03)	15.33(3.87)
Cedar	15.00(3.99)	16.00(4.21)	18.00(3.86)	16.33(4.02)
Apricot	13.67(3.69)	20.33(4.58)	21.33(4.56)	18.56(4.28)
Olive	12.67(3.49)	14.33(3.78)	21.67(4.64)	16.22(3.97)
Control	28.67(5.35)	21.67(4.62)	24.67(4.95)	25.00(4.97)
Mean	14.62 (3.76)	16.48 (4.09)	19.53(4.24)	16.76(4.03)

*Mean of three replications

Figures in parentheses are square root transformed values

$CD_{0.05}$

Treatment: (0.47)

Concentration: (0.31)

Treatment x concentration: (0.82)

Minimum incidence of *Alternaria* sp was observed (Table 2) on seeds coated with Neem oil (2.67%) which was statistically at par with Karanj (3.78%), cedar and mustard (4.67% each) and olive (4.11%).

There was no incidence of *Mucor* sp on seeds coated with Neem and mustard oil. These treatments were at par with Karanj (0.67%) and cedar (1.00%) and superior over rest of the treatments. Neem and mustard oils provided complete protection of seeds from *Mucor* sp even at lower concentrations of 1 and 3 per cent each (Table 3).

The incidence of *Fusarium* sp was nil in all tested concentrations of 5, 3 and 1 per cent each of Neem, Karanj and mustard, cedar and olive at 5 and 3 per cent each and apricot at 5 per cent. All the tested vegetable oils showed superiority over control (Table 4).

The results of present investigations corroborate the report of Vir and Sharma (1985) who reported that Neem oil at 10 per cent concentration gave 100 per cent growth inhibition of fungi viz *Fusarium moniliforme*, *Aspergillus niger, Drechslera rostrata* and *Macrophomina phaseolina.* Locke (1995) reported that

Table 2. Incidence of *Alternaria* sp on pea seeds treated with vegetable oils at different concentrations

Treatment	*Mean incidence (%) of *Alternaria* sp at indicated concentrations (%)			
	5	3	1	Mean
Mustard	1.33(1.27)	4.00(2.03)	8.67(3.03)	4.67(2.11)
Neem	0.33(0.88)	3.00(1.86)	4.67(2.21)	2.67(1.65)
Karanj	0.33(0.88)	4.00(1.93)	7.00(2.73)	3.78(1.85)
Cedar	0.33(0.88)	6.33(2.51)	7.33(2.80)	4.67(2.06)
Apricot	4.33(2.18)	4.67(2.06)	6.00(2.53)	5.00(2.26)
Olive	2.33(1.64)	4.67(2.24)	5.33(2.40)	4.11(2.09)
Control	4.67(1.64)	6.67(2.66)	7.00(2.72)	6.11(2.55)
Mean	1.95 (2.26)	4.76(2.17)	6.57(2.63)	4.43(2.08)

*Mean of three replications
Figures in parentheses are $\sqrt{x + 0.5}$ transformed values
$CD_{0.05}$
Treatment: (0.51)
Concentration: (0.33)
Treatment x concentration: (0.88)

Table 3. Incidence of *Mucor* sp on pea seeds treated with vegetable oils at different concentrations

Treatment	*Mean incidence (%) of *Mucor* sp at indicated concentrations (%)			
	5	3	1	Mean
Mustard	0.00(0.71)	0.00(0.71)	0.00 (0.71)	0.00(0.71)
Neem	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
Karanj	0.00(0.71)	0.67(1.00)	1.33(1.29)	0.67(1.00)
Cedar	0.00(0.71)	1.00(1.17)	2.00(1.56)	1.00(1.15)
Apricot	0.67(1.00)	1.67(1.39)	2.67(1.76)	1.67(1.38)
Olive	0.33(0.88)	1.67(1.46)	1.33(1.34)	1.11(1.23)
Control	0.33(0.88)	2.00(1.47)	3.67(2.02)	2.00(1.46)
Mean	0.19(0.80)	1.00(1.13)	1.57(1.34)	0.92(1.09)

*Mean of three replications
Figures in parentheses are transformed values
$CD_{0.05}$
Treatment: (0.31)
Concentration: (0.21)
Treatment x concentration: (0.55)

Table 4. Incidence of *Fusarium* sp on pea seeds treated with vegetable oils at different concentrations

Treatment	*Mean incidence (%) of *Fusarium* sp at indicated concentrations (%)			
	5	3	1	Mean
Mustard	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
Neem	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
Karanj	0.00(0.71)	0.00(0.71)	0.00(0.71)	0.00(0.71)
Cedar	0.00(0.71)	0.00(0.71)	1.00(1.09)	0.33(0.84)
Apricot	0.00(0.71)	0.67(0.76)	2.00(1.48)	0.89(0.99)
Olive	0.00(0.71)	0.00(0.71)	0.67(0.96)	0.22(0.79)
Control	3.00 (1.84)	2.67(1.72)	3.00(1.86)	2.89(1.80)
Mean	0.43(0.87)	0.48(0.86)	0.95(1.08)	0.62(0.94)

*Mean of three replications
Figures in parentheses are transformed values
$CD_{0.05}$
Treatment: (0.31)
Concentration: (0.20)
Treatment x concentration: (0.53)

Alternaria alternata, Aspergillus niger and *F oxysporum* were completely controlled by 2-10 per cent Neem oil. Niaz and Kazmi (2005) found Neem oil quite effective against *Aspergillus* species. Sitara et al (2008) have reported antifungal activity of Neem (*Azadirachta indica*) and mustard (*Brassica campestris*) oils against eight fungi viz *Aspergillus niger, A flavus, Fusarium moniliforme, F oxysporum, F nivale, F semitectum, Alternaria alternate* and *Drechslera hawiensis.*

Hence it can be concluded from the present study that treatment of pea seeds with Neem and Karanj oils provided good protection against fungal pathogens and contaminants.

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