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EFFECT OF SEED DIFFUSATES ON FUNGAL POPULATION AND GERMINATION OF SUNFLOWER SEEDS

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SUMMARY

All four seed diffusates used for treatment of sunflower seeds, *Azadirachta indica*, *Capsicum annuum*, *Coriandrum sativum* and *Eugenia jambulana*, reduced the populations of seed-borne fungi: *Alternaria alternata*, *Drechslera tetramera*, *Emericellopsis terricola*, *Fusarium moniliforme*, *F.semitectum*, *Macrophomina phaseolina* and *Phoma oleracea*. Of four seed diffusates, those from *A.indica* and *C.sativum* controlled the fungal populations almost 100%. Seed germination was increased in seed samples of both sunflower cultivars under study, HO-1 and NK-212. The obtained results indicate that seed diffusates could substitute costly chemicals for safe control of seed-borne diseases, protecting at the same time the environment from chemical pollution.

Key words: seed diffusates, fungal population, seed germination, sunflower

INTRODUCTION

For a long time herbalists have been aware that some plants are harmful to human and animal health and that certain plants possess protective and curative effect against a variety of diseases. With sharpened awareness about environment pollution, many research workers have been attracted to find safe and cheap control of plant diseases using extract and decoctions from different plant parts (Garber and Houston, 1959; Kandasamy *et al.*, 1974; Hale and Mathur, 1977; Charya *et al.*, 1979; Kumar *et al.*, 1979; Misra and Dixit, 1979; Maidu and John, 1981; Dwivedi and Dubey, 1986; Rahber Bhatti, 1988).

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Nowadays, controlling diseases with chemicals of synthetic origin is being discouraged due to environmental hazards. Chemicals pollute the atmosphere and mishandling could cause health hazards to illiterate farmers, specially in developing countries (Rahber Bhatti, 1992). Bhutta (1998) studied the antifungal properties of thirty-two seed diffusates and found ten of them to be effective against major sunflower seed-borne fungi. Information on seed treatment with seed diffusates and their effect on fungal populations and germination of sunflower seed are scarce. In this study, four seed diffusates, namely *Azadirachta indica*, *Capsicum annuum*, *Coriandrum sativum* and *Eugenia jambulana*, were used to treat the two sunflower cultivars HO-1 and NK-212. The obtained results are presented in this paper.

MATERIALS AND METHODS

Seed treatment with seed diffusates

Two sunflower seed samples (cultivars HO-1 and NK-212), naturally infected with seed-borne fungi namely *Alternaria alternata*, *Drechslera tetramera*, *Emericellopsis terricola*, *Fusarium moniliforme*, *F.semitectum*, *Macrophomina phaseolina* and *Phoma oleracea* were used in this study. Four hundred seeds of each sample were soaked overnight in one per cent concentration of four seed diffusates namely *Azadirachta indica*, *Capsicum annuum*, *Coriandrum sativum* and *Eugenia jambulana*. Overnight soaked seeds were dried between sheets of filter paper for three hours at laboratory temperature. Four hundred seeds were placed at twenty seeds per Petri dish in three layers of moistened blotter paper. Seeds of the same samples were simply soaked in distilled water and used as control treatment. The seeds were incubated at 25°C±2 for seven days under alternating cycle of fluorescent tube light. After seven days, seeds were examined under stereoscopic microscope and fungal growth was identified based on habit characters. Results were recorded in percent infection of seeds.

Effect of seed diffusates on sunflower seed germination

Four hundred seeds of sunflower cultivars HO-1 and NK-212 were soaked overnight at laboratory temperature in 1% concentration of crude seed diffusates as mentioned above. Similarly, four hundred seeds of each cultivar were soaked overnight in distilled water for control treatment. Seeds were dried between sheets of filter paper for three hours at room temperature.

The seeds were placed separately on anchor brand paper, size 24x48 cm, in four replicates each. Paper with seeds was rolled, put in polythene bags and incubated at 20-25°C for eight days. Moisture was provided to keep the paper wet. One set of seeds was also laid down as control. After eight days, paper rolls were opened and seedlings were examined individually and calculated for germination percentage.

RESULTS AND DISCUSSION

All four seed diffusates used for treatment of sunflower seeds, *Azadirachta indica*, *Capsicum annuum*, *Coriandrum sativum* and *Eugenia jambulana*, reduced the population of seed-borne fungi *Alternaria alternata*, *Drechslera tetramera*, *Emericellopsis terricola*, *Fusarium moniliforme*, *F.semitectum*, *Macrophomina phaseolina* and *Phoma oleracea*. Rahber Bhatti (1992) observed inhibition of fungal growth by diffusates from bark and cork of 37 trees and shrubs including the four seed diffusates in the test. In the present study, the seed diffusates were used for treating sunflower seed.

Table 1: Effect of seed diffusates on fungal populations and germination (percentage) of sunflower seed

Sunflower cultivar	Germination and fungal percentage	Seed diffusate				Control
		Azadirachta indica	*Capsicum annuum*	*Coriandrum sativum*	*Eugenia jambulana*	
HO-1	Seed germination	80.0	76.0	80.0	74.0	70.0
	A.alternata	1.0	6.0	1.0	8.0	68.0
	E.terricola	0.0	1.0	0.0	1.0	2.0
	F.moniliforme	0.0	0.0	0.0	0.0	0.5
	F.semitectum	0.0	0.0	0.0	0.0	1.0
NK-212	Seed germination	85.0	80.0	85.0	75.0	72.0
	A.alternata	1.0	4.0	1.0	6.0	58.0
	D.tetramera	0.0	0.0	0.0	0.0	1.0
	M.phaseolina	0.5	1.5	0.5	2.0	5.0
	P.oleracea	0.0	0.5	0.5	1.0	2.0

The results revealed that out of the four seed diffusates *A.indica* and *C.sativum* controlled the fungal population almost 100%. Also, seed germination was increased in both cases (Table 1). Fungal population of *M.phaseolina* could only be reduced from 5% to 0.5, 1.5 and 2.0% by diffusates under test. Seed germination was increased from 72 to 75% and from 80 to 85%, respectively. Seed treatment with seed diffusates showed no difference in respect to sunflower cultivars HO-1 and NK-212. Results of the present study indicate that seed diffusates provide safe control of seed-borne fungi and that they could substitute costly chemicals and protect the environment from chemical pollution.

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EFECTO DE EXTRACTOS DE SEMILLAS SOBRE LA POBLACION DE HONGOS Y LA GERMINACION DE SEMILLAS DEL GIRASOL

RESUMEN

Todos los cuatro extractos de semillas utilizados, desde la especie *Azadirachta indica*, *Capsicum annuum*, *Coriandum sativum* y *Eugenia jambulana*, reducian las poblaciones de hongos que se trasladan por semillas, *Alternaria alternata*, *Drechslera tetramera*, *Emericellopsis terricola*, *Fusarium moniliforme*, *F.semitectum*, *Macrophomina phaseolina* y *Phoma oleracea*. Los extractos que devienen de *A.indica* y *C.sativum*, exterminaban las poblaciones de hongos casi 100%. La germinacion de semillas ha sido aumentada para ambos cultivars estudiados, HO-1 y NK-212. Los resultados obtenidos indican que los extractos de semillas pueden substituir los medios quimicos caros para el tratamiento de enfermedades trasladadas por semillas, protegiendo al mismo tiempo el medio humano contra la polucion quimica.

EFFET DES EXTRAITS DE SEMENCE SUR LA POPULATION DE CHAMPIGNONS ET SUR LA GERMINATION DES GRAINES DE TOURNESOL

RÉSUMÉ

Les quatre extraits de semence utilisés, *Azadirachta indica*, *Capsicum annuum*, *Coriandrum sativum* et *Eugenia jambulana*, ont réduit les populations des champignons *Alternaria alternata*, *Drechslera tetramera*, *Emericellopsis terricola*, *Fusarium moniliforme*, *F.semitectum*, *Macrophomina phaseolina* et *Phoma oleracea*, transmis par la semence. Les extraits de *A.indica* et *C.sativum* ont détruit les populations de champignons à presque 100%. La germination a été améliorée dans les échantillons de graines des deux cultivars de tournesol étudiés, HO-1 et NK-212. Les résultats obtenus indiquent que les extraits de semence pourraient être utilisés dans le traitement des maladies transmises par la semence et remplacer ainsi des produits chimiques onéreux tout en fournissant une protection contre la pollution chimique de l'environnement.