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Fungi Associated with Sunflower Seeds in Egypt with Reference to Chemical Control Measures

Wafaa T. Shahda, A.M. Tarabeih, S.H. Michail and **Amal A.H. Hemeda**
Plant Pathology Department, Faculty of Agriculture,
Alexandria University, Alexandria, Egypt

Abstract. Seed health testing of 16 samples of sunflower yielded *A. alternata, C. lunata, D. halodes, D. specifera, F. proliferatum, F. semitectum, F. semitectum* var *majus, M. phaseolina, M. verrucaria, Nigrospora* sp. and *R. solani. S. rolfsii* was isolated from plant debris mixed with sunflower seeds.

R. solani and *S. rolfsii* were the most destructive during the premergence phase.

Vitavax 300 and Vitavax 200 at the rate of 2.25 g.a.i./kg seeds was in general the most effective in controlling damping-off of sunflower.

Introduction

Many investigators isolated certain fungi from sunflower seeds. *Alternaria alternata* (Fr.) keissler was reported on sunflower seeds [1-6]. *Curvularia lunata* (Waker) Boedijn was recorded on sunflower seeds in India. Fakir *et al.* [3] detected *Drechslera halodes* (Drechs.) Subran. & Jain, *Fusarium moniliform* (Sheldon), *F. semitectum* Berk. & Rav., *F. solani* (Mart.) App. & Wr. and *Macrophomina phaseolina* Tassi (Goil) in sunflower seed samples. *M. phaseolina* was isolated from sunflower seeds in Egypt [7,8].

Several investigators studied the pathogenic capabilities of sunflower seed borne fungi on attacking the seedlings and plants. *Sclerotium rolfsii* Sacc. was reported to cause root rot and wilt in sunflower plants [9-11]. *M. phaseolina* was recorded to cause stem rot of sunflower plants [12].

In chemical control studies, Vitavax was reported to be effective against all isolates of *A. alternata* obtained from nine vegetables in Romania [13]. Benlate T was recorded to be effective against *M. phaseolina* isolated from sunflower [14].

The objective of this study were to:

1 Identify fungi associated with sunflower seed lots from different locations in Egypt.
2 Test their pathogenicity to sunflower seedlings.
3 Conduct prilaminary experiments on their cheimcal control.

Materials and Methods

Sixteen seed samples of sunflower from Experimental stations of Alexandria University, Nobaria, and Menia university (13 samples of cv. Giza and 3 of cv. Miak) were used for health testing using the blotter and the agar plate methods [15]. In the blotter method, seeds were plated on three moistened blotters placed in plastic culture dishes (9cm.) at the rate of 10 seeds/dish. In the agar plate method, seeds were soaked for 5 min in 1% sodium hypochlorite solution then transferred to potato dextrose agar (PDA) plates (10 seeds/plate). Plates were incubated at 20°C under alternating cycles of 12 hr of near ultra vilote (NUV) irradiation and 12 hr darkness for 7 days.

Isolation were carried out from sunflower seed samples and plant debris mixed with the seed. One hundred small pieces of the plant debris were surface sterilized for 3 min in 1% sodium hypochlorite, plated on PDA at the rate of five pieces/plate and incubated under the conditions indicated earlier.

Pathogenicity tests of some of the isolated fungi were carried out in the greenhouse using plastic bags (10 cm diam.). Bags were filled with autoclaved aerated clay soil (1 kg soil each) mixed with two table spoon full (about 50g) of fungal inocula (autoclaved barley grains mixed with fungal growth). Four replicates were used./treatment. Data were recorded up to 30 days.

The effect of seven commercial fungicides (Benlate, Captan 50, Captan 75, Diathane M-45, TBZ, Vitavax 200, and Vitavax 300) on sunflower pathogenic fungi was studied in vitro and in vivo as seed treatment. In vitro method, different concentration of each fungicide were used. The minimal inhibitory concentration of each compound for each fungus was determined after the fungal growth has nearly filled the check treatment. In seed dressing method, Benlate, Captan 75, TBZ, Vitavax 200 and Vitavax 300 were used. Two rates, 2.25 and 3.75 g.a.i./kg seed were used for each fungicide. Seeds were mixed with the tested fungicides before sowing. Data were recorded weekly for one month after sowing.

Results and Discussion

Seed health testing of sunflower reveald the presence of *Alternaria alternata, Curvularia lunata, Drechslera halodes, Fusarium proliferatum, F. semitectum, Macrophomina phaseolina, Myrothecium verrucaria, R. solani* kuhn and *Stemphylium*

botryosum. Isolations from plant debris mixed with sunflower seeds yielded a number of the forementioned sunflower seed borne fungi beside *Sclerotium rolfsii*. These fungi were isolated by the blotter and agar plate methods. *A. alternata, F. proliferatum* and *M. phaseolina* were the most prevalent fungi. In pathogenicity tests, R. *Solani* and *S. rolfsii* were the most destructive damping-off pathogens during May, June, and July 1984 sowings (Table 1). *M. phaseolina* caused moderated pre-emergence losses which ranged from 22.5-35.0%, and more post-emergence losses during June 1984 (Table 1). The latter results agree with many investigators [16-18].

Table 1. Pre-and post-emergence damping-off and survivors of sunflower seedlings raised in soil artificially inoculated with certain seed-borne fungi.

Fungus	Sowing date	% of infection		
		pre-emergence	post-emergence	survivors
F. proliferatum	May	20	10	70
M. phaseolina	1984	35	7.5	57.5
R. solani	(av. 22°C)	92.5	0.0	7.5
*S. rolfsii***		97.5	0.0	2.5
Check		20	0.0	80
F. proliferatum	June	10	17.5	72.5
M. phaseolina	1984	22.5	30.0	47.5
R. solani	(23.5°C)	55	10	35
*S. rolfsii***		77.5	5	17.5
Check		20	0.0	80
F. proliferatum	July	17.5	2.5	80
M. phaseolina	1984	32.5	7.5	60
R. solani	(av.25°C)	80.0	2.5	17.5
*S. rolfsii***		90	0.0	10
Check		20	0.0	80

% Calculated from mean of 10 seeds/pot, and four replicates/treatment.
** Isolated from plant debris mixed with sunflower seed.
Check : not infected soil.

Infection of sunflower seedlings with these fungi may affect the yield of the crop growing under Egyptian conditions where sowing date in Egypt is May, June, and July.

The in vitro effect of certain fungicides viz. Benlate, Captan 75, thiabendazole, Vitavax 200 and Vitavax 300 on the mycelial growth of the seedborne fungi of sunflower was studied. Vitavax 200 was the most effective as the lowest inhibitory concentration was 0.05 mg a.i./ml medium for *M. phaseolina, R. solani* and *S. rolfsii*. While Benlate was the most effective one for *F. proliferatum* (0.06 mg a.i./ml medium).

Table 2. Effect of seed dressing with certain fungicides on the incidence of damping-off of sunflower seedlings.

	Check	Benlate 50		Captan 75		TBZ		Vitavax 200		Vitavax 300		Mean
		C_1	C_2	C_1	C_2	C_1	C_2	C_1	C_2	C_1	C_2	
F. proliferatum	43.2	85.6	85.0	54	88.1	72.4	80.9	79.1	82.6	78.9	95.7	76.9^{ab}
M. phaseolina	60.3	81.2	90.6	59.6	98.3	65.7	99.2	63.6	97.3	100	99.9	83.2^{a}
R. solani	3.5	75.6	38.6	50	28	81.7	69.5	81.0	15.1	72.8	59.6	52.3^{a}
S. rolfsii	21.8	50	25.3	62.9	83.4	65.8	53.4	99.2	81.0	92.0	85.8	65.5^{bc}
Mean of concentrations	32.2^{d}	73.1^{ab}	59.9^{c}	56.6^{c}	74.5^{ab}	71.4^{abc}	75.8^{ab}	80.7^{ab}	69.0^{bc}	85.9^{a}	85.3^{ab}	
Mean of fungicides	32.2^{c}	66.5^{b}		65.6^{b}		73.6^{ab}		74.9^{ab}		85.6^{a}		

C_1 = 2.25 g.a.i./kg seeds, C_2 = 3.75 g.a.i./kg seeds.
each number is the mean of 4 replicates (treatments), each replicate (pot) contains 10 seeds.

Dry seed treatment of sunflower showed that in general both vitavax 300 and vitavax 200 were superior in controlling damping-off of seed borne pathogens, 2.25 g.a.i./kg rate was better for both fungicides (Table 2). The effectivness of both fungicides is due to their effect on *M. phaseolina, S. rolfsii,* and *R. solani.* Such results substantiate the findings of sharmugan and Gavindaswamy [19] who found that vitavax was efficient against *M. phaseolina* and the finding of kanyeas and Davatzi [20] and sharma and Sohi [21] who found that vitavax was effective against *R. solani* when used as a seed dressing.

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الفطريات المصاحبة لبذور عباد الشمس ومقاومتها كيميائيًا في مصر

وفاء طاهر شهده، عبدالحميد طرابيه، سمير ميخائيل و أمال حميدة
قسم أمراض النبات، كلية الزراعة، جامعة الإسكندرية، جمهورية مصر العربية

ملخص البحث. أجري اختبار سلامة ست عشرة عينة من بذور عباد الشمس بزراعتها على ورق الترشيح والأجار لمدة ٧ أيام، ودلت النتائج على وجود الفطريات: الترناريا الترناتا *Alternaria alternata* وكيرفيولاريا ليوناتا *Curvularia lunata* ودرشلرا هالودس *Drechslera halodes* ودرشلرا سبسيفرا *D. specifera* وفيوزاريوم بروليفراتم *Fusarium proliferatum* وفيوزاريزم سميتكتم *F. semitictum* وفيوزاريوم سميتكتم ماجز *F. semitic-tum var majus* وماكروفومينا فاسيولينا *Macrophomina phaseolina* وميروثيسيوم فيروكاريا *Myrothecium ver-rucaria* ونيجروسبورا *Nigrospora sp.* ورايزوكتونيا سولاني *Rhizoctonia solani* وسكلوروشيم رولفزياي *Sclerotium rolfsii* وقد عزل الفطران الأخيران من بقايا النباتات المختلفة بالبذور. وأوضحت تجارب العدوى على أن الفطرين *R. solani* و *S. rolfsii* كانا أكثر الفطريات إصابة للبادرات في مرحلة ما قبل الظهور. وفي تجارب المقاومة كان المبيدان فيتافاكس ٣٠٠ وفيتافاكس ٢٠٠ أكثر المبيدات فاعلية في مقاومة مرض الذبول الطري لبادرات عباد الشمس بالمعدل ٢,٢٥ جرام مادة فعالة لكل كجم بذرة.