

Seed-borne Fungi of Some Vegetable Seeds In Gazan Province And Their Chemical Control

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Abstract. Seeds of five locally cultivated tomato, egg plant, Okra, Radish and Jew's mallow were obtained from farmers at various parts of Jazan province. Both moist blotter and agar plate methods were used to detect the maximum number of seed-borne fungi. A total of 30 fungal species belonging to 19 genera were identified. Okra seeds yielded the highest number of fungal species while egg plant seeds showed the least number of the organism. The most commonly isolated genera were *Alternaria*, *Fusarium* and *Aspergillus*. Three fungicides viz., Benomyl, Cozib and Mancozeb were used for seed treatment before incubation. Most of the fungi isolated were considerably decreased by fungicides. However Benomyl was the most effective one. All tested fungicides appeared to have poor effect on *Alternaria alternata*.

Key Words: Seed-borne Fungi, Vegetable, Gazan Province, Chemical control.

Introduction

Tomato (*Lycopersicum esculentum* Mill), Egg plant (*Solanum melogena* L.), Okra (*Hibiscus esculentus* L.). Radish (*Raphanus sativus* L.) and Jew's Mallow (*Corchorus olitorius* L.) are some of the important vegetables grown in Gazan province (South East of Saudi Arabia). Seeds play a vital role in the production of healthy crops. They are carriers of some important seed-borne diseases caused by microorganisms which results in considerable losses in yields. Many workers have reported isolation of various fungi from vegetable seeds (Esuruoso *et al.* 1975, Karwasra and Singh 1982, AlKassim 1996).

Some of the seed-borne fungi were found to be very destructive, caused seed rot, and decreased seeds germination. Also, cause pre and post germination death (Ellis *et al.* 1975, Bolkan *et al.* 1976, Elarosi 1993).

Seed-borne fungi are, however, easily controlled compared to air-borne or soil-borne fungi (Suryanarayana 1978). Many workers have used various fungicides for controlling seed-borne fungi by treating seeds of vegetables or other crops directly with the fungicides (Narain and Panigraha 1971; Agrawal and Singh, 1974; Ellis and Paschal 1979; Karwasra and Singh, 1982; Abou-Heilah, 1984; Kassim 1985, 1987,

Table 1. Percentage incidence (%) of seed-borne fungi based on the number of fungal colonies arising out of the vegetable seeds by PDA medium.

Fungi	Tomato	Egg plant	Okra	Radish	Jew's mallow
<i>Alternaria alternata</i> (Fr.:Fr.) Keissler	25	0	20	0	0
<i>A. brassicicola</i> (Schw.)	0	0	0	15	0
<i>Aspergillus holophilicus</i> Biochwitz	0	0	0	5	0
<i>A. niger</i> Van Tieghem	0	0	20	0	0
<i>A. restrictus</i> G. Smith	0	5	0	0	0
<i>Botrytis cinerea</i> Pers. :Fr.,	10	0	0	0	0
<i>Cladosporium herbarum</i> (Pers.:Fr.) Link	15	0	0	0	0
<i>Drechslera</i> sp	20	0	0	0	0
<i>Epicoccum nigrum</i> Link.	0	0	0	0	0
<i>Fusarium moniliforme</i> Sheldon.	0	0	5	0	0
<i>F. oxysporum</i> Schlecht.	20	0	0	0	0
<i>F. sp.</i>	0	0	0	0	15
<i>Macrophomina phaseoli</i> (Maubl.) Ashby	0	0	5	0	0
<i>Penicillium digitatum</i> Sacc.	0	0	10	0	10
<i>Phoma lingorum</i> (Tode:Fr.) Desm.,	0	0	0	5	0
<i>P. sp</i>	0	10	0	0	0
<i>Phomopsis</i> sp	0	0	0	0	5
<i>Pythium aphanidermatum</i> (Edson) Fitzp	15	0	0	0	0
<i>Rhizoctonia solani</i> Kuehn,	15	0	0	0	0
<i>R. sp</i>	0	0	10	0	0
<i>Septoria apiicola</i> Speg.	0	0	0	5	0
<i>Stemphylium botryosum</i> Wallr.,	0	0	5	0	0
<i>Verticillium albo-atrum</i> Reinke Berthold	15	0	0	0	0

1989, Valkonen and Koponen 1990 and Al Kassim 1996).

The present investigation was undertaken to find out the mycoflora associated with the seeds of some important vegetable crops cultivated in Gazan province. Some fungicides were used in an effort, to protect the seeds from fungal infection and to minimize the chances of losses after they are grown.

Materials and Methods

Seeds of five local varieties of tomato, egg plant, Okra, Radish and Jew's mallow were obtained from farmers in different parts of the province in February 1996. To test the seeds for mycofloral contamination, the methods suggested by ISTA for the

isolation of seed-borne fungi were adopted (Anonymous 1973). The agar plate method and standard blotter technique (Muskett and Malone 1941 de Tempe 1953) as modified by Kassim 1985, Al Kassim 1996) were used. After one week of incubation period, seed were examined under stereoscopic binocular for the presence of associated fungi. The isolated fungi were identified with the help of the keys, monograph and literature provided by Raper and Fennell (1965), Booth (1971), Ellis (1971), Barnett and Hunter (1972). In another experiment, seeds of the tested vegetables were separately treated by dipping them into 0.2% suspension of either Benomyl, or cozib or Mancozeb for 10 minutes at room temperature. A total of 100 gm of each

Table 2. Percentage incidence (%) of seed-borne fungi based on the number of fungal colonies arising out of the vegetable seeds by blotter technique.

Fungi	Tomato	Egg plant	Okra	Radish	Jew's mallow
<i>Alternaria alternata</i> (Fr.:Fr.) Keissler	25	0	20	0	20
<i>A. raphani</i> Groves & Skolko	0	0	0	10	0
<i>Aspergillus flavus</i> Link	0	25	0	0	20
<i>A. niger</i> Van Tieghem	0	0	25	0	15
<i>Botrytis cinerea</i> Pers.:Fr.,	15	0	0	0	0
<i>Cladosporium herbarum</i> Pers.:Fr.) Link	10	0	0	0	0
<i>Curvularia lunata</i> (Wakker) Boedijn.	0	0	10	0	0
<i>Drechslera</i> sp	20	0	0	0	0
<i>Fusarium oxysporum</i> Schlecht	20	0	10	0	0
<i>F. solani</i> (Mart.) Sacc.	0	0	15	0	0
<i>Humicola grisea</i> Traaen	0	0	5	0	0
<i>Penicillium</i> sp	0	0	20	0	10
<i>Pythium aphanidermatum</i> (Edson) Fitzp	10	0	5	0	0
<i>Rhizoctonia solani</i> Kuehn.	15	0	0	0	0
<i>Septoria apiicola</i> Speg.	0	0	0	5	0
<i>Trichoderma</i> sp	10	10	0	0	5

vegetable seeds were used in each treatment. Untreated seeds were used as controls. All experiments were carried out on agar plates.

Results and Discussion

Thirty fungal isolates were found to be associated with seeds of five different vegetable crops when plated on moist blotter and agar plate. The isolates belong to following nineteen genera; *Alternaria*, *Aspergillus*, *Botrytis*, *Cladosporium*, *Curvularia*, *Drechslera*, *Epicoccum*, *Fusarium*, *Humicola*, *Macrophomina*, *Penicillium*, *Phoma*, *Phomopsis*, *Pythium*, *Rhizoctonia*, *Septoria*, *Stemphylium*, *Trichoderma* and *Verticillium*. However, the number and the percentage of the fungi isolated by the method of agar plate were higher than those isolated blotter method (Table 1, 2). Similar results have been reported by other workers (Noble and Richardson, 1968, Esuruoso *et al.* 1975, Neergaard 1977, Abou-Heilah, 1984,

Al Kassim 1996). These results show that, potentially, all seeds of the tested vegetables were liable to attacks by the seed-borne fungi. Many of the isolated fungi were reported to be pathogenic to the seeds of different crops causing diseases such as seed rot, damping off, Root rot, fruit rot, wilt and foliar diseases, (Rajendra *et al.* 1970; Gupta and Chohan 1970; Scheinder *et al.* 1971; Singh *et al.* 1973; Siddiqui *et al.* 1974; Mathur 1983, Elarosi 1993).

It was found that Okra seeds yielded the highest number of fungal species followed by tomato, Jew's mallow, while egg plant seeds showed the least number of fungal species. Tomato seeds gave larger number of fungal colonies, followed by Okra, Jew's mallow; while radish seeds gave the smallest number of fungal colonies. The most common genera were *Alternaria*, *Fusarium* and *Aspergillus*.

The number of isolated fungi was considerably decreased when seeds were

Table 3. Effect of some fungicides on the seed-borne fungi of the vegetable seed.

Plant	Treatment	Tomato				Egg plant				Okra				Radish				Jew's Mallow			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Fungi		+	-	+	+	+	+	+	+	+	+	+	-	+	+	-	+	+	-	+	+
<i>Alternaria alternata</i>																					
<i>A. brassicicola</i>		-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>A. raphani</i>		+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>Aspergillus flavus</i>		+	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	-	+	-
<i>A. halophilicus</i>		-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>A. niger</i>		+	-	-	-	+	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-
<i>A. restrictus</i>		-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<i>Botrytis cinerea</i>		-	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
<i>Cladosporium herbarum</i>		+	-	-	+	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-
<i>Curvularia lunata</i>		+	-	+	+	-	-	+	+	-	-	-	+	-	-	+	-	-	-	-	-
<i>Drechslera sp.</i>		+	-	-	+	-	-	+	-	-	-	-	-	+	+	-	+	+	-	-	-
<i>Epicoccum nigrum</i>		+	-	-	+	+	-	+	-	-	-	-	-	+	-	-	+	-	-	-	-
<i>Fusarium moniliforme</i>		+	-	-	+	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-
<i>F. oxysporum</i>		+	-	-	-	+	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-
<i>F. solani</i>		+	-	-	+	+	-	-	-	-	-	-	+	-	-	+	+	-	+	-	-
<i>Humicola grisea</i>		+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Macrophomina phaseoli</i>		-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
<i>Penicillium digitatum</i>		+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
<i>P. sp.</i>		+	-	-	+	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
<i>Phoma lingorum</i>		-	-	-	-	+	-	-	-	-	-	-	-	+	-	-	+	-	-	+	-
<i>P. sp.</i>		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Phomopsis sp.</i>		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pythium aphanidermatum</i>		-	-	-	-	+	-	-	+	-	-	-	-	+	-	-	-	-	-	-	-
<i>Rhizoctonia solani</i>		-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>R. sp.</i>		+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Septoria apiticola</i>		-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Stemphylium botryosum</i>		+	-	+	-	-	-	+	-	-	+	+	-	-	+	-	-	-	-	-	-
<i>Trichoderma sp.</i>		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Verticillium albo-atrum</i>		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1 = Untreated seeds
2 = Seeds treated with Benomyl.
3 = Seed treated with Cozib.
4 = Seed treated with Mancozeb.

treated with 0.2% fungicides before placing them on the agar plates. The behaviour of the fungicides tested varied with the different fungal species or with the same species of fungus isolated from different plant seeds.

All tested fungicides appeared to have little effect on *Alternaria alternata*. These results are in agreement with the findings of other workers (Sharma and Basuchaudhry 1975 and Nene and Agarwal 1978). Ellis and Paschal (1979), Al-Kassim, 1996, have reported that Benomyl gave poor control of *Alternaria tenuissima*. On the other hand *Trichoderma* sp., *Drechslera* sp and *Fusarium solani* had less response to the test fungicide. Mancozeb had less effect on the fungi present in tomato and Jew's mallow seeds.

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الفطريات المحمولة على بذور بعض أنواع الخضار في منطقة جازان ومقاومتها الكيميائية

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**مشروع تطوير التنمية الزراعية بوادي جيزان - جازان
المملكة العربية السعودية

جمعت بذور خمسة أنواع من الخضار وهي الطماطم - البانجان - الباميه الفجل والملوخية وذلك من مزارعين من مختلف أجزاء منطقة جازان وقد استعملت طريقتي ورق الترشيح المبلل وأطباق الأجار لتحديد العدد الأقصى من الفطريات المنقولة بالبذور وقد تم التعرف على ٣٠ نوعاً فطرياً تتبع لتسعة عشر جنساً. أكثر الفطريات المعزولة كانت من بذور البامية وأقل تلك الفطريات المعزولة كانت من بذور البانجان. أما أكثر الأجناس المعزولة فكات الالترناريا- الفيوزاريم. والاسبرجلس. ومن ناحية أخرى اختبر فعالية ثلاثة أنواع من المبيدات وهي البنليت. الكوزيب والمانكوزيب واتضح أن هذه المبيدات اختزلت نمو معظم الفطريات المعزولة وكان أكثرها فعالية مبيد البنليت كما اتضح أيضاً أن تأثير المبيدات المستخدمة على فطرة الالترناريا كان ضعيفاً.