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SEED-BORNE MYCOFLORA OF VEGETABLE SEED LOTS IN NORTHERN AREAS OF PAKISTAN

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Seed-borne mycoflora of sixty six vegetable seed lots from Northern Areas of Pakistan were examined using the standard blotter technique. Thirteen genera and 21 species of fungi were obtained from contaminated seed lots. *Alternaria alternata* was found in 71.21% of the seed lots (range 0.5-89.5%), *Fusarium moniliforme* was recorded in 34.84% of the seed lots (range 0.5-57%) and *Penicilium* sp were observed in 28.78% of the lots (range 0.5-11.%). Besides these *Aspergillus flavus, Alternaria radicina, A tenuissima, Botrytis cinerea, Cephalosporium* sp, *Chaetomium* sp, *Cladosporium* sp, *Curvularia* sp, *Dichomera* sp, *Drechslera hawaiiensis, Fusarium culmorum, F equiseti, F nivale, F oxysporum, F. semitectum, F solani, Nigrospora* sp and *Verticillium* sp, were also encountered from the seed samples.

Key words: Mycoflora, Vegetable seeds, Blotter technique.

Introduction

Vegetables constitute an important source of vitamins, proteins and minerals in human diet. In Pakistan, vegetables are grown on an area of 215,000 hectares with an average yield of 13.37 tonnes per hectare (Anon 1992). Inspite of the fact that seed and soil-borne diseases take a heavy toll of vegetable production in Pakistan, no systematic survey has been conducted to determine the actual losses.

The importance of seed transmitted diseases in Pakistan was first recognized by Kausar (1955). Later, Khan *et al* (1990) isolated *Alternaria brassicicola, A raphani, Aspergillus flavus, Myrothecium verrucaria,* from seeds of different vegetable crops. Khanzada *et al* (1988), reported *Alternaria alternata, A tensuissima, Aspergillus niger, Curvularia clavata, C lunata, C robusta, Drechslera hawaiiensis, D spicifer, Epicocum purpurascens, Fusarium moniliforme, F oxysporum, Memnoniella echinata, Mucor* spp, *Myrothecium roridum, Penicillium* sp, *Phoma* spp, *and Stachybotrys atra.* Khan *et al* (1990) reported the incidence of seed-borne mycoflora on various vegetable crops and suggested detection techniques for them.

Seed-borne mycoflora plays an important role in the seed production system. Keeping in view the importance of seedling rot, seedling blight and wilt diseases, seed health testing of different vegetable crops were carried out for seed certification purposes.

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Materials and Methods

A total number of 66 seed lots collected from ten vegetable crops in the Northern Areas of Pakistan were studied for seed-borne mycoflora using the standard blotter test (Anon 1993) at The Central Seed Health Testing Laboratory of Federal Seed Certification Department, Islamabad. Four hundred seeds from each lot were tested @ 10 seeds per petri plate in case of large seeded crops and 25 seeds per plate for small seeded crops. The petri plates were incubated at 20° ± 2°C for 7 days under 12/12 h cycles of fluorescent light. The fungi growing on seeds were identified on the basis of habit characteristics under stereoscopic microscope (Ellis 1971; Nelson *et al* 1983; Barnett and Hunter 1987).

Results and Discussion

The results of the studies are summarized in Table 1. Out of sixty six vegetable seed lots tested, (71.21%) were found contaminated with *Alternaria alternata,* followed by *Fusarium moniliforme (34.84%), Penicillium* sp *(28.78%), Fusarium semitectum (16.66%), Cephalosporium* sp *(7.57%), Curvularia* sp *(7.57%), Chaetomium* sp *(6.06%), Fusarium oxysporum (4.54%), Alternaria tenuissima (3.03%),*

Table 1
Incidence of seed-borne fungi in vegetable crops in Northern Areas of Pakistan

Crops	Varieties	NST	NIS	Fungi	Infection%	Range
Cabbage	Brusnwick	4	3	*Alternaria alternata*	0.66	0.5-1.0
			1	*Aspergillus flavus*	0.50	0.50
			1	*Fusarium moniliforme*	0.50	0.50
			4	*Penicillium* sp	9.12	8.0-10.0
Cabbage	Holland	4	1	*Botrytis cinerea*	0.50	0.50
	Winter		4	*Penicillium* sp	3.12	0.5-7.0
Chinese	Chilas Green	4	2	*Alternaria alternata*	2.00	1.5-2.5
Cabbage			2	*Fusarium moniliforme*	1.00	0.5-1.5
Capsicum	California	10	10	*Alternaria alternata*	11.90	7.5-17.5
	Wonder		1	*Alternaria radicina*	0.50	0.5
			2	*Alternaria tenuissima*	2.00	1.0-3.0
			4	*Chaetomium* sp	0.50	0.5-1.0
			2	*Curvularia* sp	0.50	0.5
			3	*Drechslera hawaiiensis*	0.66	0.5-1.0
			2	*Fusarium culmorum*	0.75	0.5-1.0
			9	*Fusarium moniliforme*	2.88	0.5-10.5
			1	*Fusarium nivale*	0.50	0.5
			3	*Fusarium semitectum*	2.00	0.5-4.0
			1	*Nigrospora* sp	0.50	0.50
Capsicum	Yolo Wonder	10	10	*Alternaria alternata*	63.40	31.0-89.5
			1	*Dichomera* sp	0.50	0.50
			2	*Fusarium moniliforme*	0.50	0.50
			1	*Fusarium semitectum*	0.50	0.50
Carrot	Mantasforto	8	8	*Alternaria alternata*	3.43	0.5-4.5
			3	*Curvularia* sp	0.50	0.50
			5	*Fusarium moniliforme*	0.70	0.5-1.5
			1	*Fusarium semitectum*	0.50	0.50
			3	*Nigrospora* sp	0.66	0.5-1.0
Cauliflower	Snow Ball-16	4	3	*Alternaria alternata*	1.00	0.5-1.5
			4	*Penicillium* sp	7.75	3.5-10.0
Lettuce	Grand Rapid	8	4	*Alternaria alternata*	1.37	0.5-2.5
			3	*Penicillium* sp	0.50	0.50
Okra	Clemson	4	4	*Cephalosporium* sp	1.25	0.5-2.5
	Spineless		1	*Fusarium equiseti*	0.50	0.50
			4	*Fusarium moniliforme*	48.50	28.0-57.0
			2	*Fusarium oxysporum*	0.75	0.5-1.0
			3	*Fusarium semitectum*	1.00	1.00
			1	*Verticillium* sp	1.00	1.00
Peas	Arkel	2	2	*Alternaria alternata*	4.75	4.0-5.5
			1	*Cephalosporium* sp	1.00	1.00
			1	*Fusarium oxysporum*	1.00	1.00
			1	*Fusarium semitectum*	1.00	1.00
			1	*Fusarium solani*	2.50	2.20
Tomato	Roma	4	1	*Alternaria alternata*	0.62	0.62
Turnip	Pruple Top	4	4	*Alternaria alternata*	1.00	1.00
	White Globe		2	*Cladosporium* sp	0.50	0.50
			1	*Dichomera* sp	1.00	1.00
			2	*Fusarium semitectum*	0.75	0.5 - 1.0
			4	*Penicillium* sp	8.37	5.0-11.50

NST, Number of samples tested; NIS, Number of infected samples.

Cladosporium sp *(3.03), Dichomra* sp *(3.03%), Fusarium culorum (3.03%), Alternaria radicina (1.51%), Fusarium equiseti (1.51%), F nivale (1.51%), F solani (1.51%), Aspergillus flavus (1.51%), Botrytis cinerea (1.51%)* and *Verticillium* sp *(1.51)%* respectively.

Alternaria alternata was the most predominant species observed on most of the vegetable crops. Maximum infection of 89.5% was recorded on Capsicum variety Yolowonder, followed by California Wonder with 17.5% infection and Peas variety Arkel with 5.5% infection. *Fusarium moniliforme,* the casual agent of seedling rot was predominantly observed in the Okra variety Clemson spineless with 57.0% infection followed by Capsicum variety California wonder with 10.0% infection. *Penicillium* sp was predominantly recorded on Turnip variety Purple Top White Globe with 11.5 % infection followed by the Cauliflower variety Snow Ball-16 with 10.0% infection, Cabbage variety Brusnwick with 10.0% infection and Cabbage variety Holland Winter with 7.0% infection. Most of the fungi recorded are known to produce mycotoxins which are not only harmful for human health and poultry feed causing serious damage to the liver, kidney and nervous system (Anon 1989), but also enhance seed deterioration by decreasing viability of seed lots during storage (Christensen 1973). Keeping in view the importance of these fungi, there is a need for a quality seed production pogramme and to adopt proper storage procedures to minimize the damage done by these fungi.

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