

SEED MYCOFLORA OF VEGETABLES AND ITS CONTROL

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Twenty-eight fungal species were isolated from vegetable seeds by standard blotter method. *Rhizopus nigricans*, *Aspergillus niger*, *Alternaria alternata*, *Fusarium oxysporum*, *Drechslera spicifera*, *Chaetomium globosum*, *Curvularia lunata*, *Fusarium moniliforme* and *Alternaria tenuissima*, were most common. Of these, five fungal species were found pathogenic under normal conditions causing rots of seed, root and stem. Among fungicides Ridomil was the most effective for the control of seedborne mycoflora.

Key words: Vegetables, Seed mycoflora, Incubation, Fungicides, Pakistan.

INTRODUCTION

In Pakistan, the vegetables are grown under wide range of atmospheric conditions. The most widely cultivated vegetables are potato, tomato, cucurbits, cauliflower, turnip, chillies, and pea. Field survey conducted during the year 1986-87 showed that 5-10% loss in yield generally incur under normal condition due to seedling wilt/blight and seed rot caused by *Fusarium oxysporum*, *F. moniliforme*, *Alternaria alternata*, *A. tenuissima* and *Colletotrichum capsici*. These are the common seedborne diseases of various vegetable crops [2]. The present study was undertaken to find the mycoflora associated with vegetable seeds, their importance and control.

MATERIALS AND METHODS

Seventy seed samples of chillies, turnip, pea, spinach, tomato, okra, onion and guar were collected from fields, Government vegetable research stations and markets in Sind and Punjab. All the samples were tested for the associated fungi during 1987. Standard blotter method was followed [3].

The pathogenicity tests of *Alternaria alternata*, *Aspergillus niger*, *Curvularia lunata*, *Drechslera spicifera*, and *Fusarium oxysporum* on seed and seedling were conducted by the method of Srivastava and Saksena [7]. Pathogenicity of the fungi was further confirmed in sterile soil and surface sterilized seed, coated with test fungi. Suitable controls were maintained.

Five fungicides namely Benlate, Bayton, Captan, Ridomil and Vitavax 0.2% were evaluated for their efficacy in reducing the seed mycoflora of the vegetable seeds. The fungicides were thoroughly applied on seed in a conical flask. The treated seeds were plated at the rate of 25

seeds per plate on moist blotter and on pots containing sterilized soil. Untreated seed served as control. One hundred seeds of each vegetable were used in each treatment.

RESULTS AND DISCUSSION

In the present study twenty-eight fungal species were isolated from vegetable (Table 1). The most predominant fungi detected, in order of prevalence, were *Aspergillus niger*, *Alternaria alternata*, *Chaetomium globosum*, *Rhizopus nigricans*, *Drechslera spicifera*, *Fusarium moniliforme*, *F. oxysporum*, *Curvularia lunata* and *Alternaria tenuissima*. Maximum fungi were in chillies, followed by tomato, okra, pea, turnip, onion, vetchfied (guar) and spinach.

Five fungal species *Alternaria alternata*, *Aspergillus niger*, *Curvularia lunata*, *Drechslera spicifera* and *Fusarium oxysporum* reduced the germination percentage by causing seed rot (Table 2). Kumar *et al.* [6] also reported that *A. alternata* and *A. niger* reduced seed germination by causing seed rot in pea. *Fusarium oxysporum* reduced the germination from 19.54 percent over the control, followed by *Drechslera spicifera*, *Curvularia lunata*, *Alternaria alternata* and *Aspergillus niger*. The maximum effect of fungi on reduction of seed germination and seedling blight was recorded in okra and pea.

Seed treatment with Bayton, Benlate, Captan, Ridomil and Vitavax eliminated seedborne fungi and improved germination 70-99 percent as compared to 59-74 percent in control (Table 3). The effectiveness of systemic fungicides against seedborne fungi of pea and other vegetables has been reported by Grewal *et al.* [4], Kumar *et al.* [6] and Kalra and Sohi [5]. Ridomil not only checked the growth of fungi but also resulted in significantly higher seed

Table 1. Percent incidence of seedborne fungi associated with seeds of eight vegetable crops.

Fungi	Chillies	Okra	Onion	Pea	Spinach	Turnip	Tomato	Vetchfied (guar)
<i>Alternaria alternata</i>	7.0	—	1.5	2.0	—	5.0	10.0	4.5
<i>A. longipes</i>	—	—	0.5	—	—	1.0	—	—
<i>A. tenuissima</i>	4.5	—	—	—	0.5	0.5	0.5	2.5
<i>Aspergillus flavus</i>	—	—	2.0	2.0	—	—	—	1.5
<i>A. niger</i>	4.5	5.0	8.5	12.0	—	—	0.5	—
<i>A. terreus</i>	2.0	—	—	—	0.5	3.0	—	—
<i>Chaetomium globosum</i>	—	4.0	—	—	2.0	10.0	0.5	—
<i>C. tortile</i>	—	—	—	—	—	1.0	—	—
<i>Cladosporium cladosporioides</i>	—	—	—	—	0.5	—	1.0	—
<i>C. sphaerospermum</i>	—	—	—	2.5	—	—	—	2.5
<i>Curvularia clavata</i>	1.5	—	—	—	—	0.5	—	—
<i>C. lunata</i>	4.5	—	0.5	0.5	2.5	—	1.5	5.5
<i>C. pallescens</i>	—	—	—	1.5	—	1.0	—	—
<i>C. robusta</i>	0.1	0.5	—	0.5	—	—	—	—
<i>C. vericulosa</i>	—	—	—	—	0.6	—	—	—
<i>Drechslera spicifera</i>	1.5	7.5	—	2.0	6.0	3.0	3.5	2.5
<i>D. hawaiiensis</i>	2.5	—	1.0	—	—	2.0	—	—
<i>D. rostrata</i>	—	0.5	—	—	0.5	—	1.5	2.5
<i>Epicoccum purpuraseus</i>	0.5	—	—	—	—	0.5	—	—
<i>Fusarium moniliforme</i>	6.5	0.5	—	—	—	—	2.5	—
<i>F. oxysporum</i>	3.5	5.5	—	6.5	—	—	4.5	3.0
<i>F. semitectum</i>	—	—	3.0	0.5	—	—	—	—
<i>Memnoniella echinata</i>	0.5	—	0.5	0.2	2.0	—	0.5	0.5
<i>Myrothecium roridum</i>	1.5	—	—	—	—	0.1	—	—
<i>Penicillium purpurogenum</i>	0.5	—	0.5	1.0	0.5	0.2	—	0.5
<i>Phoma</i> sp.	1.0	—	—	0.5	—	—	—	—
<i>Rhizopus nigricans</i>	—	4.0	10.5	5.0	5.0	—	10.0	—
<i>Stachybotrys atra</i>	0.5	2.5	—	—	1.5	2.0	—	—
Total fungi (%)	43.1	35.0	28.5	30.8	24.6	29.8	36.5	25.5

— Not present

Table 2. Effect of fungi on germination of vegetable seeds.

Vegetables	<i>Alternaria alternata</i>	<i>Aspergillus niger</i>	<i>Curvularia lunata</i>	<i>Drechslera spicifera</i>	<i>Fusarium oxysporum</i>	Control
Chillies	87.50	90.00	81.00	77.50	72.00	97.00
Lady's finger	89.00	90.50	82.50	76.00	44.50	98.50
Onion	80.50	85.00	—	74.00	73.50	92.00
Pea	84.50	88.50	86.50	78.00	52.00	99.00
Spinach	68.50	—	61.00	57.50	—	84.00
Turnip	64.00	71.00	58.00	52.50	51.50	80.00
Tomato	66.50	80.50	53.50	50.00	49.00	90.00
Vetchfied (guar)	88.50	92.50	87.50	81.50	46.50	98.00

— Not included

Table 3. Effect of fungicides on germination percentage of eight vegetable seeds.

Vegetables	Bayton	Benlate	Captan	Ridomil	Vitavax	Control
Chillies	90.50	88.00	87.00	98.50	84.50	74.00
Lady's finger	88.50	86.00	83.00	96.00	78.50	68.50
Onion	86.50	82.50	78.50	94.50	74.50	65.00
Pea	74.00	72.50	70.50	84.00	68.00	61.00
Spinach	78.00	75.00	69.50	87.00	67.50	58.50
Turnip	80.00	78.00	75.50	91.50	72.00	72.00
Tomato	85.50	81.00	76.00	94.00	73.00	64.50
Vetchfied (guar)	80.50	77.50	71.50	90.50	69.00	69.00

germination of vegetable crops. Therefore, the losses caused by above seedborne diseases can be minimized by the application of these chemicals.

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