



Seed-borne inoculum of *Drechslera* spp. in barley (*Hordium vulgare*) and its control

Rekha Yadav

Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj-Faizabad, (U.P.) 224 229

e-mail: govind0139@gmail.com

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Abstract: Twelve fungal spp. belonging to nine genera namely *Alternaria alternata*, *Alternaria triticina*, *Aspergillus flavus*, *Aspergillus niger*, *Bipolaris sorokiniana*, *Curvularia lunata*, *Drechslera graminea*, *Drechslera spicifera*, *Fusarium moniliforme*, *Mucor* sp., *Penicilliumnotatum* and *Rhizopus nigricans* were isolated from barley seeds by blotter and agar plate methods. Among the isolates *Drechslera spicifera* and *Drechslera graminea* were found pathogenic. Experiment was conducted to test the effectiveness of different seed dressers (Fungicides, Botanicals and Bio-agents) against seeds inoculated with *Drechslera* spp. on germination and vigour index. Among fungicides vitavax was best followed by Bavistin and thiram (each @ 2g/kg seed). *Trichoderma harzianum* @ (4g/kg seed) and neem oil (1:10 dilution) were better amongst bioagents and plant products, respectively in respect of germination and vigour index against both *Drechslera* spp.

Key words: Barley, seed-born mycoflora, *Drechslera* spp., pre and post-emergence mortality, fungicides.

Introduction

Improvement and propagation of agriculture crops is highly dependent on healthy seeds. Infected seeds reduced germination, vigour and yield. Seed borne mycoflora may release the mycotoxins, which have harmful effect on humans and livestock (Chiarrapa and Gombogi, 1986). Barley (*Hordium vulgare* L. emend. Lam.) is an important central cereal crop for food, livestock feed and in industries specially in breweries. Poor seed health is a limiting factor in barley production. In barley, *Drechslera* spp. are responsible for ear blight leaf strip and net blotch disease occurring from seedling to maturity stages (Richardson, 1979). However no comprehensive studies have been made on seed mycoflora of barley. Hence, an attempt was made to identify different seed mycoflora associated with barley. The pathogenicity of *Drechslera* spp. and their effect on seed germination on vigour were investigated. An attempt was also made to manage the pathogenic *Drechslera* spp. using different seed dressers viz. (fungicide, botanicals and bio-agents).

Material & Methods

Barley seed samples (400 seeds in each sample) of ten genotypes namely RD2503, RD2508, RD2552, NDB-1, NDB-2, NDB-3, NDB-4, NDB1173, Lakhan and Azad were taken and evaluated for seed-mycoflora using different detection method i.e visual inspection, washing test, moist blotter method and agar plate method as per recommendation of ISTA (International Seed Health Testing Association, 1985). The isolated species of *Drechslera* spp. were grown individually on Potato Dextrose Agar (PDA) to inoculate seeds of RD2503 (higher number of fungi associated with this genotype) for pathogenicity and management of experiments.

Pathogenicity of both *Drechslera* spp. were proved by using different inoculation method (Seed, soil and leaves). Apparently

healthy seeds of barley were surface sterilized and artificially inoculated with 10 days old culture of each *Drechslera* spp. Inoculated seeds were treated separately with fungicides (Bavistin, Thiram, Topsin M, Vitavax @ 2.0g/kg seed and Captan, Indofil M-45 @ 2g/kg seed) botanical (neem oil, neem leaf extract, neem seed and neem bark extract) and bio-agents (*Trichoderma harzianum* and *Trichoderma viridae*). Treated seeds were placed on moist blotter paper. The trial was conducted at pathological laboratory of Narendra Deva University of Agriculture and Technology, Kumarganj-Faizabad in completely Randomized Design with Ten treatments and replication thrice. Three replications were maintained for each treatments and untreated serves as control. Observations were recorded after 10 days for germination, pre and post mortality and vigour index.

Table-1: Mycoflora on barley seeds

Mycoflora	Incidence (mean %-400 samples)			
	Moist blotter method		Agar plate method	
	Range	Mean	Range	Mean
<i>Alternaria alternata</i>	3-22	12.5	3-20	11.5
<i>Alternaria triticina</i>	3-10	6.5	4-9	6.5
<i>Aspergillus flavus</i>	2-14	8.0	3-12	7.5
<i>Aspergillus niger</i>	2-11	6.5	1-8	4.5
<i>Bipolaris sorokiniana</i>	2-0	5.0	2-8	5.0
<i>Curvularia lunata</i>	1-5	3.0	2-6	4.0
<i>Drechslera graminea</i>	1-8	4.5	2-9	5.5
<i>Drechslera spicifera</i>	1-7	4.0	1-7	4.0
<i>Fusarium moniliforme</i>	2-13	7.5	1-9	5.0
<i>Mucor</i> spp.	2-5	3.0	1-4	2.5
<i>Penicilliumnotatum</i>	1-2	1.5	2-3	2.5
<i>Rhizopus nigricans</i>	1-6	3.5	2-5	3.5

Table-2: Pathogenicity test for *Drechslera* spp. Seed Inoculation (no. of seed inoculated: 20) in pots

Fungal species	No. of Seeds germinated	No. of seed not germinated	No. of Diseased seedling	Symptoms
<i>D. graminea</i>	18	2	2	Seed rot seedling blight
<i>D. specifera</i>	18	2	2	Seed rot seedling blight
Control	20	0	0	None
In test tubes				
<i>D. graminea</i>	5	5	5	Seed rot seedling blight
<i>D. specifera</i>	5	5	4	Seed rot seedling blight
Control	10	0	0	None

Table-3: Effect of seed dressers against barley seeds inoculated with *Bipolasis sorokiniana* on germination and vigour index.

Treatments	Germination (%)	Seedling mortality (%)	Root and shoot Length		Vigour index
			Pre-emergence	Post-emergence	
Bavistin (2.0g/Kg seed)	91.6	5.0	3.3	29.1	2665.5
Captan (2.5g/Kg seed)	80.0	13.3	6.6	25.4	2032.0
Indofil M-45 (2.5g/Kg seed)	78.3	15.0	6.6	16.1	1260.6
Thiram (2.0g/Kg seed)	88.3	8.3	3.3	26.7	2357.6
Topsin M (2.0g/Kg seed)	80.0	11.6	8.3	20.9	1672.0
Vitavax (2.0g/Kg seed)	93.3	5.0	1.6	31.0	2892.3
Neem oil (1:10dilution)	78.3	16.6	5.0	16.2	1268.4
Neem leaf extract (1:10 dilution)	73.3	15.0	11.6	12.7	930.9
Neem bark, extract (1:10 dilution)	75.0	16.6	8.3	13.0	975.0
Neem seed, extract (1:10 dilution)	76.6	16.0	6.6	15.3	1171.9
<i>Trichoderma harzianum</i> 4.0g/Kg seed	75.0	18.3	6.6	12.9	967.5
<i>T. viride</i> (4.0 Kg seed)	70.0	20.0	10.0	11.1	777.0
Untreated check	66.6	23.3	10.0	11.4	759.2
C.D (P=0.05)	10.5	1.5	0.7	1.8	141.9

Vigour index was calculated as per cent germination multiplied by root and shoot length (Abdul-Baki and Anderson, 1973).

Results and Discussion

Twelve fungal species belonging to nine genera were detected and isolated from seeds of 10 barley genotypes through moist blotter paper and agar plates methods (Table-1). The per cent incidence of *Drechslera* spp. and other fungi was higher in moist blotter method as compare to agar plate method. Probably the weak and slow growing fungi could not grow on agar due to surface sterilization of seeds in agar plate method (Jain, 1990). Seed, soil and leaf inoculations were used to prove the pathogenicity of both *Drechslera graminea* and *Drechslera specifera* isolated from barley seeds (Table-2). Both *Drechslera* spp. were found pathogenic that caused pre and post emergence seedling mortality and symptoms of seed rot, seedling blight and leaf spot on the emerged seedling on inoculation of seeds, soil and leaves.

Seed treatments with different fungicides significantly increased the germination and vigour index and also reduced pre and post emergence seedling mortality and number of seedlings showing symptoms (Table-3). Amongst seed dressing fungicides,

Vitavax was most efficacious against both *Drechslera spicifera* than *Drechslera graminea*. The highest germination per cent and minimum pre and post emergence seedling mortality with less number of seedling showing symptoms. Vitavax has also been reported as the best seed dressers against seed born *Drechslera* spp. of barley (Patil *et al.* 1986). Among bio-agents *Tricoderma harzianum* was best followed by *Tricoderma viridae* and neem oil among plant products were found more efficacious.

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