Reprint **ISSN 1991-3036 (Web Version)**

International Journal of Sustainable Crop Production (IJSCP)

(*Int. J. Sustain. Crop Prod.*)

Volume: 7 **Issue: 3** **November 2012**

Int. J. Sustain. Crop Prod. 7(3): 21-27 (November 2012)

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http://ggfagro.com/ejournals/current issues

IJSCP** issn 1991-3036, HQ:19-10 cantral place, saskatoon, saskatchewan, s7n 2s2, Canada

ISSN-1991-3036 (Online)
Int. J. Sustain. Crop Prod. 7(3): 21-27 (November 2012)

STUDY OF SEED BORNE FUNGI ASSOCIATED WITH SORGHUM SEEDS

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Accepted for publication on 10 October 2012

ABSTRACT

Karim MM, Fakir GA, Hossain MI, Akhter A, Rahman MZ (2012) Study of seed borne fungi associated with sorghum seeds. *Int. J. Sustain. Crop Prod.* 7(3), 21-27.

Fungi associated with the seeds of sorghum (*Sorghum vulgare*) collected from different locations of Bangladesh were recorded. Ten fungi encountered in sorghum seeds, in order of prevalence, were- *Curvularia lunata*, *Fusarium moniliforme*, *Alternaria tenuis*, *Colletotrichum graminicola*, *Bipolaris sorghicola*, *Botrytis cenerea*, *Aspergillus niger*, *Penicillium oxalicum*, *Phoma sorghina* and *Curvularia trifolii*. Prevalence of the total as well as the individual seed-borne fungal infections recorded in sorghum varied significantly with respect to sources of seed collection. Seed germination also varied significantly depending on the crop varieties or seed sources. No definite relationship between germination and seed-borne fungal infections was observed. *B. cinerea* and *C. trifolii* in seeds of sorghum appear to be new records of seed-borne fungi of the crop in the world. Out of ten, except *C. graminicola* in sorghum are being reported as new seed-borne fungi of the crop from Bangladesh.

Key words: *seed-borne fungi and sorghum seeds*

INTRODUCTION

Seed is the basic input for crop production. Pathogen free healthy seed is considered as the vital input for desired plant populations and good harvest. Many plant pathogens are seed-borne, which can cause enormous crop losses. In Bangladesh, out of 16% annual crop losses due to plant diseases, at least 10% loss is incurred due to seed-borne diseases (Fakir 1983). Coincidentally important or devastating crop diseases are seed-borne and caused by fungi.

Cereals make the largest contribution to human nutrition. In Bangladesh, the major cereals are rice, wheat and maize. The minor cereals include barley (jab), sorghum (jowar) and millets- bazra, cheena and kaon. Sorghum (*Sorghum vulgare*) is an important grain and fodder crop ranking fourth after paddy, wheat and maize in the world. It is grown in many parts of the world under tropical and sub-tropical climatic conditions. The crop is used for feeding poultry, swine, cattle and horses and as human food. In our country, 2,000 metric tons of sorghum grains are produced annually from about 4,000 acres of land and the average yield is 1.2 metric tons per hectare (BBS 2005).

Among Sorghum suffers from more than 30 fungal diseases (USDA 1960). Richardson (1990) listed 40 seed-borne fungal pathogens causing 32 different diseases in the crop. According to him, important seed-borne fungal diseases recorded on sorghum are stalk rot (*Aspergillus niger*), target spot (*Bipolaris sorghicola*), stalk rot/anthracnose/red leaf (*Colletotrichum graminicola*), seed rot/stalk rot (*Fusarium moniliforme*), seedling blight/charcoal rot (*Macrophomina phaseolina*) and covered smut/grain smut (*Sphacelotheca sorghi*). Although appreciable amount of works have been done on diseases, particularly on seed-borne fungal pathogens affecting the seed health of major cereal crops in Bangladesh, very little attention has been paid to diseases and seed health of minor cereals like sorghum. On the contrary, only 4 diseases are known to occur on sorghum, respectively in the country (Talukdar 1974). Fakir (1982) listed two seed-borne fungi- *Colletotrichum graminicola* and *Sphacelotheca sorghi* in sorghum.

From the above deliberations, it is evident that very limited work has been done on seed-borne diseases/seed-borne fungi of sorghum in Bangladesh. So, the present study has been undertaken to study the prevalence of fungi in seeds of sorghum grown in Bangladesh.

MATERIALS AND METHODS

The experiments were conducted at the Seed Pathology Centre (SPC), Department of Plant Pathology (DPP), Bangladesh Agricultural University (BAU), Mymensingh, using four local varieties viz. Dhaka Sorghum, Mymensingh Sorghum, Sherpur Sorghum and Pabna Sorghum were collected at farmers' level from Dhaka, Mymensingh, Sherpur and Pabna. From each location four samples were collected and thus, a total of 16 seed samples were collected from four locations. The sorghum seed samples of Dhaka, Mymensingh, Sherpur and Pabna were designated as Dha S_1, Dha S_2, Dha S_3, Dha S_4, Mym S_1, Mym S_2, Mym S_3, Mym S_4, Sher S_1, Sher S_2, Sher S_3, Sher S_4, Pab S_1, Pab S_2, Pab S_3 and Pab S_4. Each sample contained about 50g seeds. Seeds were collected during January to February, 2005.

After collection, seed samples were kept in paper bags and stored in the refrigerator of the Seed Pathology Centre at 5 ± 1^0C for study. Health of all the seed samples used were analyzed for detection of fungi by the Blotter Method following the International Rules for Seed Testing Association (ISTA 2001). The seed samples were analyzed for health by Blotter method. In this method, three pieces of filter paper (Whatman No.1) were soaked in sterilized water and placed at the bottom of 9 cm dia. glass petridish. Two hundred seeds from each

sample were taken randomly and then placed on the moist filter paper in 8 replicated petridishes at the rate of 25 seeds per plate. The petridishes with seeds were then incubated at 22 ± 2^0 C under 12/12 hours alternating cycles of NUV and darkness in the incubation room of the Seed Pathology Centre (SPC) for seven days. After incubation the seeds were examined under the stereo-microscope for recording the seed-borne fungal infections grown on the incubated seeds.

Seed-borne infections of fungi observed under the stereo-microscope were identified by observing their growth characters on the incubated sorghum seeds in the Blotter method. The fungi were identified to species level, wherever possible, following the keys of Malone and Musket (1964), Raper and Fennel (1965), RamNath *et al.* (1970), Booth (1971), Ellis (1971), Chidambaram *et al.* (1973), Mathur and Kongsdal (2003). Germination was determined with natural soil in plastic pot in the green house of the Seed Pathology Centre (SPC), BAU, Mymensingh. The soil was collected from the field laboratory of the department of Plant Pathology, BAU, Mymensingh. Two thousands seeds were used for germination test 10 replicate (200 seeds/tray). Data on germination were recorded after 4, 7 and 14 days after sowing. But germination recorded on the 14th day was taken into final account. Germination was expressed in percentage. The data were analyzed following the Completely Randomized Design (CRD). The mean differences for efficiency of the treatments were judged by Least Significant Difference (LSD) test.

RESULT AND DISCUSSION

A total of 1249 seed-borne fungal infections were recorded from 3200 seeds obtained from 16 different samples collected at four locations of Bangladesh. The total seed-borne fungal infections varied in prevalence considerably depending on the sample and location of seed collection. Out of the 1249 seed-borne fungal infections recorded from 16 different samples of sorghum seeds collected from four different locations- Dhaka, Mymensingh, Sherpur and Pabna; ten species of fungi representing nine genera were identified. The identified fungi were *Alternaria tenuis*, *Aspergillus niger*, *Bipolaris sorghicola*, *Botrytis cinerea*, *Colletotrichum graminicola*, *Curvularia lunata*, *Curvularia trifoli*, *Fusarium moniliforme*, *Penicillium oxalicum* and *Phoma sorghina*. Of all these fungi, the most predominant fungi were *C. lunata* (19.1%), followed by *F. moniliforme* and *A. tenuis* which constituted 16.2% and 15.1% of the total seed-borne fungal infections, respectively. Other predominant fungi were *A. niger*, *B. sorghicola*, *B. cinerea*, *C. graminicola* and *P. oxalicum*, constituting at least 5.0% of the total seed-borne infections. The *C. trifoli* had the lowest (1.5%) occurrence. Again, as regarded to percentage of seed yielding individual fungi, 7.5% of the seeds yielded *C. lunata*, followed by *F. moniliforme* (7.3%) and *A. tenuis* (5.9%). Of the 16 seed samples, all samples were infected by *A. tenuis* and *C. lunata*, followed by *F. moniliforme* (15), while the lowest number of samples (4) was infected by *C. trifoli*. On the other hand, 12 samples each were found to be infected by *A. niger*, *B. sorghicola* and *C. graminicola* (Table 1).

Table 1. Frequency of occurrence of fungi recorded on sorghum seeds collected from four locations

Fungi	No. of fungal infections	% of total infections [a]	% of total seeds yield infections [b]	No. of infected seed sample [c]
Alternaria tenuis [d]	188	15.1	5.9	16
Aspergillus niger [d]	101	8.1	3.2	12
Bipolaris sorghicola [d]	134	10.7	4.2	12
Botrytis cinerea [d]	117	9.4	3.7	6
Colletotrichum graminicola [d]	135	10.8	4.2	12
Curvularia lunata [d]	239	19.1	7.5	16
Curvularia trifoli	19	1.5	0.6	4
Fusarium moniliforme [d]	202	16.2	7.3	15
Penicillium oxalicum [d]	64	5.1	2.0	13
Phoma sorghina	50	4.0	1.6	6

[a] Percentage of total infections was calculated on the basis of 1249 fungal infections.
[b] Percentage of the seed yielding of different fungal pathogens was calculated on the basis of 3200 seeds.
[c] Total no. of seed samples were 16.
[d] Predominant fungus constituted at least 5.0% of the total seed-borne infections.

Of the ten fungi identified in the seeds collected from Dhaka. The most predominant fungi, in order to prevalence, were *B. cinerea* (18.0%), *F. moniliforme* (17.4%), *B. sorghicola* (14.2%), *C. lunata* (13.9%), *A. tenuis* (13.6%), *A. niger* (9.7%) and *C. graminicola* (8.5%). At least 7.6% of the seeds yielded *B. cinerea*, the most predominant fungus. All the four seed samples of this location were infected each by *A. tenuis*, *B. sorghicola*, *C. lunata* and *F. moniliforme*; while three samples each were infected by *A. niger*, *B. cinerea* and *P. oxalicum*. The fungus *C. graminicola* was found in two seed samples. On the other hand, one sample was found to be infected by *C. trifoli* and *P. sorghina*. The most predominant fungi encountered in the sorghum seeds of Mymensing location were *C. lunata* (33.9%), *F. moniliforme* (15.1%), *A. tenuis* (14.4%), *B. cinerea* (8.4%), *P. oxalicum* (7.7%), *C. graminicola* (6.0%) and *P. sorghina* (5.0%). At least 12.6% of the seeds yielded *C. lunata*, the most predominant fungus. In this location, no seed-borne infection of *C. trifoli* could be found. All the four seed samples of this location were infected each by *A. tenuis*, *C. lunata* and *P. oxalicum*. On the other hand,

three samples each were infected by *A. niger*, *C. graminicola* and *F. moniliforme*. The fungi *B. sorghicola* and *P. sorghina* were detected in two seed samples, while only a single sample was infected by *B. cinerea*. In the sorghum seeds collected from Sherpur location, the most predominant fungi in order to prevalence, were *F. moniliforme* (18.1%), *C. graminicola* (17.4%), *A. tenuis* (13.7%), *C. lunata* (12.8%), *A. niger* (12.1%), *B. sorghicola* (10.9%) and *P. oxalicum* (5.9%). At least 7.3% of the seeds yielded *F. moniliforme*, the most predominant fungus. Out of the four seed samples tested, all samples each were found to be infected by *A. tenuis*, *A. niger*, *C. lunata* and *F. moniliforme*; while three seed samples each were infected by *B. sorghicola*, *C. graminicola* and *P. oxalicum*. On the other hand, two samples each was infected by *C. trifoli*, whereas, only a single sample was infected by *B. cinerea* and *P. sorghina*. In Pabna, the predominant fungi that encountered the seeds; in order of prevalence were *A. tenuis* (18.9%), *C. lunata* (17.2%), *F. moniliforme* (13.7%), *B. sorghicola* (12.7%), *C. graminicola* (11.0%), *B. cinerea* (8.2%), *A. niger* (5.2%), *Phoma sorghina* (6.9%) and *P. oxalicum* (5.2%). At least 6.9% of the seeds yielded *A. tenuis*, the most predominant fungus. All the four samples of this location each were found to be infected by *A. tenuis*, *C. graminicola*, *C. lunata* and *F. moniliforme*. The fungi *B. sorghicola* and *P. oxalicum* were found in three seed samples, while *A. niger* and *P. sorghina* were detected in two seed samples. On the other hand, one sample was infected by *B. cinerea* and *C. trifoli* (Table 2).

Table 2. Frequency of seed borne fungi recorded on sorghum seeds collected from different locations of Bangladesh

Fungi	No. of fungal infections	% of total infections [a]	% of total seeds yield infections [b]	No. of infected seed sample [c]
Fungi recorded on sorghum seeds collected from Dhaka				
Alternaria tenuis [d]	46	13.6	5.8	4
Aspergillus niger [d]	33	9.7	4.1	3
Bipolaris sorghicola [d]	48	14.2	6.0	4
Botrytis cinerea [d]	61	18.0	7.6	3
Colletotrichum graminicola [d]	29	8.5	3.6	2
Curvularia lunata [d]	47	13.9	5.9	4
Curvularia trifoli	1	0.3	0.1	1
Fusarium moniliforme [d]	59	17.4	7.4	4
Penicillium oxalicum	7	2.1	0.9	3
Phoma sorghina	8	2.3	1.0	1
Fungi recorded on sorghum seeds collected from Mymensingh				
Alternaria tenuis [d]	43	14.4	5.4	4
Aspergillus niger	14	4.7	1.8	3
Bipolaris sorghicola	14	4.8	1.8	2
Botrytis cinerea [d]	25	8.4	3.1	1
Colletotrichum graminicola [d]	18	6.0	2.3	3
Curvularia lunata [d]	101	33.9	12.6	4
Curvularia trifoli	0	0.0	0.0	0
Fusarium moniliforme [d]	45	15.1	5.6	3
Penicillium oxalicum [d]	23	7.7	2.9	4
Phoma sorghina [d]	15	5.0	1.9	2
Fungi recorded on sorghum seeds collected from Sherpur				
Alternaria tenuis [d]	44	13.7	5.5	4
Aspergillus niger [d]	39	12.1	4.9	4
Bipolaris sorghicola [d]	35	10.9	4.4	3
Botrytis cinerea	7	2.2	0.9	1
Colletotrichum graminicola [d]	56	17.4	7.0	3
Curvularia lunata [d]	41	12.8	5.1	4
Curvularia trifoli	15	4.7	1.9	2
Fusarium moniliforme [d]	58	18.1	7.3	4
Penicillium oxalicum [d]	19	5.9	2.4	3
Phoma sorghina	7	2.2	0.9	1
Fungi recorded on sorghum seeds collected from Pabna				
Alternaria tenuis [d]	55	18.9	6.9	4
Aspergillus niger [d]	15	5.2	1.9	2
Bipolaris sorghicola [d]	37	12.7	4.6	3
Botrytis cinerea [d]	24	8.2	3.0	1
Colletotrichum graminicola [d]	32	11.0	4.0	4
Curvularia lunata [d]	50	17.2	6.3	4
Curvularia trifoli	3	1.0	0.4	1
Fusarium moniliforme [d]	40	13.7	5.0	4
Penicillium oxalicum [d]	15	5.2	1.9	3
Phoma sorghina [d]	20	6.9	2.5	2

[a] Percentage of total infections was calculated on the basis of 339 fungal infections.
[b] Percentage of the seed yielding of different fungal pathogens was calculated on the basis of 800 seeds.
[c] Total no. of seed samples were 4.
[d] Predominant fungus constituted at least 5.0% of the total seed-borne infections.

The prevalence of total and the predominant individual fungi detected in sorghum seeds of the 16 different samples obtained from four different locations of Bangladesh varied markedly depending on the location and seed sample. The highest occurrence of *A. tenuis* (4.3%) and *B. sorghicola* (7.0%) were recorded in sample Dha S_1. But, the lowest count of *A. tenuis* (1.3%) and *B. sorghicola* (0.8%) were observed in sample Dha S_2 and Dha S_4, respectively. The maximum prevalence of *A. niger* (5.8%), *C. graminicola* (5.5%) and *C. lunata* (4.8%) were recorded in sample Dha S_3. On the other hand, the highest percent of *B. cinerea* (7.8%) was recorded in sample Dha S_4, while the lowest (2.3%) in sample Dha S_1. The fungus coulded be recorded from the sample Dha S_3. The highest (7.3%) and lowest (1.3%) incidence of *F. moniliforme* was recorded in sample Dha S_2 and Dha S_3, respectively. No seed-borne infection of *C. graminicola* could be found from the seeds of sample Dha S_1 and Dha S_2. On the other hand, the fungus *A. niger* could not be recorded in sample Dha S_2.

The highest seed-borne infection of *A. tenuis* (4.3%) and *C. graminicola* (2.8%) were recorded in sample Mym S_3. But, the lowest count of *A. tenuis* (1.8%) and *C. graminicola* (0.5%) were observed in sample Mym S_1 and Mym S_2 respectively. The fungus *C. graminicola* could not be recorded in sample Mym S_4. On the other hand, the highest occurrence of *P. oxalicum* (3.3%) and *P. sorghina* (2.5%) were observed in sample Mym S_1. But, the fungus *B. cinerea* was found only in sample Mym S_1. The highest (10.8%) and lowest (3.8%) incidence of *C. lunata* was recorded in sample Mym S_2 and Mym S_4, respectively. The highest (4.8%) count of *F. moniliforme* was observed in sample Mym S_4. The fungus could not be recorded in sample Mym S_1. Seeds in sample Mym S_3 and Mym S_4 did not yield any *P. sorghina*.

The highest and lowest seed-borne infection of *A. tenuis* was recorded in sample Sher S_3 (5.3%) and Sher S_4 (1.0%), respectively. The maximum occurrence of *A. niger* (5.8%), *C. graminicola* (6.8%) and *C. lunata* (3.5%) were observed in sample Sher S_4. On the other hand, the maximum occurrence of *F. moniliforme* (8.3%) and *P. oxalicum* (2.8%) were observed in sample Sher S_1. The highest (4.8%) incidence of *B. sorghicola* and lowest incidence of *A. niger* (0.8%), *C. graminicola* (3.0%) and *P. oxalicum* (0.5%) were recorded in sample Sher S_2. The fungi *B. sorghicola*, *C. graminicola* and *P. oxalicum* could not be recorded from the samples Sher S_1, Sher S_3 and Sher S_4, respectively.

The highest seed-borne infection of *A. tenuis* (4.3%) and *C. lunata* (7.3%) were recorded in sample Pab S_3. The highest (3.3%) incidence of *A. niger* was recorded in sample Pab S_4. The fungus could not be recorded from the sample Pab S_1 and Pab S_3. On the other hand, the maximum occurrence of *B. sorghicola* (4.8%), *C. graminicola* (3.5%) and *P. oxalicum* (1.8%) were observed in sample Pab S_2. The fungus *B. cinerea* recorded only on the sample Pab S_1. The highest occurrence of *F. moniliforme* (3.3%) was observed in both the samples Pab S_2 and Pab S_3. Seeds in sample Pab S_4 did not yield any *B. sorghicola* and *P. oxalicum* (Table 3).

Table 3. Prevalence of seed-borne infections of individual fungi detected in seeds of sorghum collected from four different locations

Sample no.	% Seed-borne infection [a]									
	Alternaria tenuis [b]	*Aspergillus niger* [b]	*Bipolaris sorghicola*	*Botrytis cinerea* [b]	*Colletotrichum graminicola* [b]	*Curvularia lunata* [b]	*Curvularia trifolii*	*Fusarium moniliforme* [b]	*Penicillium oxalicum*	*Phoma sorghina*
Seeds collected from Dhaka										
Dha S_1	4.3 a	1.0 b	7.0 a	2.3 c	0.0 c	3.3 b	0.3 a	3.0 bc	0.5 b	0.0 b
Dha S_2	1.3 c	0.0 c	3.3 b	5.3 b	0.0 c	1.3 d	0.0 b	7.3 a	0.0 c	0.0 b
Dha S_3	3.8 a	5.8 a	1.0 c	0.0 d	5.5 a	4.8 a	0.0 b	1.3 c	0.8 a	0.0 b
Dha S_4	2.3 b	1.5 b	0.8 c	7.8 a	1.8 b	2.5 c	0.0 b	3.3 b	0.5 b	2.0 a
CV (%)	18.40	18.56	16.82	12.52	21.10	14.19	10.99	13.18	29.16	8.16
Seeds collected from Mymensingh										
Mym S_1	1.8 c	0.5 b	0.0 c	6.3 a	1.3 b	4.0 c	-	0.0 c	3.3 a	2.5 a
Mym S_2	3.3 b	0.0 c	2.3 a	0.0 b	0.5 c	10.8 a	-	4.5 a	0.8 b	1.3 b
Mym S_3	4.3 a	0.5 b	0.0 c	0.0 b	2.8 a	6.8 b	-	2.0 b	1.0 b	0.0 c
Mym S_4	3.5 ab	2.5 a	1.3 b	0.0 b	0.0 c	3.8 c	-	4.8 a	0.8 b	0.0 c
CV (%)	17.81	12.39	17.22	15.92	18.37	12.73	-	14.43	18.74	14.13
Seeds collected from Sherpur										
Sher S_1	2.3 b	2.3 b	0.0 d	0.0 b	4.3 b	1.5 c	0.0 c	8.3 a	2.8 a	0.0 b
Sher S_2	2.5 b	0.8 c	4.8 a	0.0 b	3.0 c	3.3 a	1.0 b	1.8 b	0.5 bc	1.8 a
Sher S_3	5.3 a	1.0 c	3.0 b	0.0 b	0.0 d	2.0 b	2.8 a	1.3 b	1.5 b	0.0 b
Sher S_4	1.0 c	5.8 a	1.0 c	1.8 a	6.8 a	3.5 a	0.0 c	3.3 b	0.0 c	0.0 b
CV (%)	9.68	14.20	13.77	17.58	13.41	11.32	14.03	16.22	19.08	19.47
Seeds collected from Pabna										
Pab S_1	3.0 b	0.0 c	3.3 b	6.0 a	1.3 b	1.0 d	0.0 b	2.0 b	1.3 b	0.0 b
Pab S_2	2.5 c	0.5 b	4.8 a	0.0 b	3.5 a	2.5 b	0.0 b	3.3 a	1.8 a	0.0 b
Pab S_3	4.3 a	0.0 c	1.3 c	0.0 b	1.5 b	7.3 a	0.0 b	3.3 a	0.8 c	2.3 a
Pab S_4	4.0 a	3.3 a	0.0 d	0.0 b	1.8 b	1.8 c	0.8 a	1.5 b	0.0 d	2.8 a
CV (%)	9.39	12.35	15.73	13.43	22.36	7.01	14.82	18.41	15.12	17.36

Means followed by the same letter (s) in a column did not differ significantly at 1% level by DMRT.
[a] Data based on 200 seeds.
[b] Predominant fungus constituted at least 5.0% of the total seed-borne infections.
CV means co-efficient of variation.

Germination of seeds of the 16 samples of sorghum collected from four different locations varied significantly from 63.8-88.8% depending on the seed source and seed sample. Highest germination was recorded in sample Pab S_1 (88.8%) at Pabna, while the lowest germination (63.8%) was observed in Dha S_1 at Dhaka. On the other hand, in Dhaka the highest germination (78.8%) was observed in sample Dha S_1 and in Pabna, the lowest germination (64.3%) was observed in sample Pab S_3. In Mymensingh, maximum germination (83.3%) was recorded in sample Mym S_3 and the minimum (68.0%) in Mym S_2. In Sherpur, the highest germination (79.5%) was recorded in sample Sher S_3, while the lowest germination (67.0%) was recorded in Sher S_2. No definite relationship between germination and seed-borne fungal infections was observed. Out of sixteen samples of sorghum, fourteen samples had higher percentage of germination failure than the total seed-borne fungal infections obtained. But, only two samples (Dha S_4 and Pab S_1) showed lower germination failure than total seed-borne fungal infections (Table 4).

Table 4. Germination percentages and total seed-borne fungal infections in sorghum seeds collected from different locations

Location	Sample no.	% seed germination	% germination failure	% of total seed-borne fungal infections
Dhaka	Dha S_1	63.8	36.2	21.7
	Dha S_2	70.1	29.5	18.5
	Dha S_3	73.5	26.5	23.0
	Dha S_4	78.8	21.2	22.5
Mymensingh	Mym S_1	71.8	28.2	19.7
	Mym S_2	68.0	32.0	23.5
	Mym S_3	83.3	16.7	15.4
	Mym S_4	77.8	22.2	16.7
Sherpur	Sher S_1	77.0	23.0	21.5
	Sher S_2	67.0	33.0	19.5
	Sher S_3	79.5	20.5	16.9
	Sher S_4	71.5	28.5	23.2
Pabna	Pab S_1	88.8	11.2	17.9
	Pab S_2	80.5	19.5	18.9
	Pab S_3	64.3	35.7	20.8
	Pab S_4	76.8	23.2	16.0

Nota bene: Analyzed 200 seeds per sample per location

In sorghum, ten species of fungi were detected in seeds of sixteen samples collected at four different locations. The fungi were- *A. tenuis*, *A. niger*, *Bipolaris sorghicola*, *Botrytis cinerea*, *Colletotrichum graminicola*, *C. lunata*, *C. trifoli*, *F. moniliforme*, *P. oxalicum* and *Phoma sorghina*. Very limited works on seed-borne fungi of sorghum seeds have been carried out in Bangladesh. But appreciable works have been done out side the country in different parts of the world. Of the ten fungi, recorded in sorghum seeds; six fungi, namely *A. tenuis*, *A. niger*, *B. sorghicola*, *C. lunata*, *F. moniliforme* and *P. sorghina* have been reported from the seeds of sorghum from Brazil, Denmark, Egypt, India and Mozambique (Mathur *et al.* 1975; Chavan and Raut, 1987; Trap *et al*. 1987; Osman *et al*. 1988; Safiullah and Ranganathaiah, 1989; Rastogi *et al*. 1990; Randhawa *et al*. 1998 and Pinto 2002). In Bangladesh, Talukdar (1974) and Fakir (1982) listed three and two seed-borne pathogens in sorghum, respectively. They both identified the fungi *C. graminicola* and *Sphacelotheca sorghi*, respectively, responsible for red leaf spot/stalk rot and grain smut of sorghum. Talukdar also identified *Phyllachora graminis*, which caused black spot/tar spot. Thus, based on critical analysis of the literature available on seed-borne fungal pathogens on sorghum occurring in Bangladesh, appears that, nine fungi out of ten (expect *C. graminicola*) are newly reported fungal pathogens in Bangladesh. These fungi were not reported in sorghum, earlier in Bangladesh as seed-borne fungi. From available world literature, it also appears that *C. trifoli* has not been demonstrated earlier as seed-borne pathogen of sorghum. The fungi- *A. niger*, *B. sorghicola*, *C. graminicola* and *F. moniliforme* are pathogenic in sorghum plant in the field causing stalk rot, target spot, red leaf and seed rot (Richardson 1990).

In the present study, the prevalence of total and individual fungal infections of sorghum varied depending on the varieties or sources of seed collection. Such variation in the occurrence of seed-borne fungi has been demonstrated in a number of crops viz. rice, kaon, mustard, black gram, wheat, jute and chilli by different research workers (Hossain *et al*. 1977; Barma and Fakir, 1981; Dey and Fakir, 1988; Kabir and Fakir, 1988; Rahman *et al*. 1988; Fakir and Islam, 1990; Basak *et al*. 1991 and Fakir and Halder, 1993).

CONCLUSION

In the present study, seed-borne infections and germination percentages were recorded from sorghum seeds collected from four different locations in Bangladesh. Seed-borne fungal infections detected, varied from 16.0-23.5% in sorghum. Similarly, Germination of seeds of sorghum varied significantly from 63.8-88.8%. The results show that, no definite relationship between germination and seed-borne fungal infections was observed. In this present study, pathogenicity of different species of fungi of sorghum has not been conducted. To demonstrate the role of these fungi associated with seeds of sorghum pathogenicity needs to be tested.

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