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Short Communication

QUARANTINE PROCESSING OF EXOTIC SORGHUM GERMPLASM DURING 1976-1998

USHA DEV, P.C. AGARWAL, INDRA RANI AND RAM NATH, National Bureau of Plant Genetic Resources, Pusa Campus, New Delhi 110 012

Out of 4261 seed samples of Sorghum imported from 17 different countries during 1976-1998 (14% of total sorghum germplasm imported), five hundred eighty eight samples of *Sorghum* spp were found infested with 57 different species of fungi This communication reports potential pathogenic fungi of considerable importance intercepted during course of quarantine investigations.

Key words : Sorghum, germplasm, pathogenic fungi, quarantine

Sorghum is a major staple food in the semi-arid and tropical regions. There are 44 fungal pathogens reported to be associated with seeds of *Sorghum* spp, (Richardson, 1990). Though exchange of plant genetic resources (PGR) is a key factor in crop improvement programme, there is always an associated risk of inadvertent spread of pests and pathogens into new areas.

During last 23 years (1976-1998), four thousand two hundred and sixty one (4261) seed samples of sorghum germplasm were received from 17 countries (Table 1). All the seed samples were first subjected to dry seed examination under the stereo-binocular microscope for the presence of discoloured or deformed seeds, mycelial growth or fungal fructifications. The seeds were then subjected to blotter test and incubated for seven days at 20°C ± 1 under alternating cycles of 12 hr. light and darkness.

During the examination, 588 samples were found infected with 57 different species of fungi (Table 2). Some of the potential pathogenic fungi of considerable economic significance intercepted were *Botrytis cinerea* (grey mould fungus); *Curvularia lunata, Fusarium moniliforme, Phoma sorghina* (grain mould fungi), *Colletotrichum graminicola* and *Colletotrichum gloesporioides* (stalk rot, red leaf, anthrocnose), *Gloeocercospora sorghi* (zonate leaf spot); *Drechslera maydis* (target spot), *Drechslera sorokiniana* (seedling blight), *Macrophomina phaseolina* (charcoal rot, seedling blight) and *Periconia circinata* (milo disease, crown rot root rot) (Khetarpal and Ram Nath, 1982; Ram Nath *et al.*, 1986). Most of the fungi recorded were important from quarantine point of view as they are reported to be seed-borne and seed-transmitted on sorghum or other crops (Richardson, 1979 and 1990).

D. *sorokiniana, D. turcica, F. moniliforme, F. solani* and *G. sorghi* etc. are reported to have a wide host range including cereals, millets and vegetable crops. Interception of race "T" of *Drechslera maydis* on sorghum seeds from USA (Ram Nath *et al.*, 1973) was very significant as in 1979 this race attacked cytoplasmic male sterile lines of maize in USA, reaching to an epiphytic proportion and the losses were estimated to be one billion US dollars in that year (Tatum, 1971).

Table 1. Sorghum germplasm processed during 1976-1998

Source/Country	No. of samples processed	No. of samples infected
Argentina	4	1
Australia	10	2
Egypt	291	0
Hungary	49	0
Japan	18	0
Kenya	139	3
Nigeria	502	74
Philippines	76	76
S. Korea	3	2
Senegal	5	0
Sri Lanka	2	0
Sudan	106	3
Tanzania	1	0
Turkey	13	0
USA	2825	425
USSR	174	1
Zimbabwe	44	1
Total	4261	588

Botrytis cinerea, Brachyspora spp., *Cercospora* sp., *Curvularia andropogonis C. Crepinii, C. deightoni, C. oryzae, Drechslera papendorfii Phaeotrichoconis crotolariae., Phomopsis* sp., *Pithomyces* sp. *Pyrenochaeta* sp. and *Ulocladium* sp. have not been reported to be seed-borne in sorghum, however these are known to be potential pathogens in other crops (Richardson, 1990). In India, *Drechslera turcica, Colletotrichum graminicola* and the grain mould fungi like *Phoma* spp., *C. lunata* and *F. moniliforme* are considered as pathogens of major economic significance (Ravindranath 1978). *C. lunata, F. moniliforme* and *Phoma sorghina* causal organisms of seed mould are reported to be the major factor in the deterioration of the seed quality, loss in viability and germination (Singh *et al.*, 1989).). The presence of physiologic races in some other pathogens like *D. sorokiniana* (Robles. 1949) and *D. turcica* (Lefebvre, 1945) have implications of international spread. It is evident that the highest number of seed samples i.e. 2825 were imported from USA, however the highest number of samples i.e. 425 infected with 33 different fungal species were also from USA. Hence it could be inferred that larger the seed import larger is the risk associated with. Introduction of pathogenic races or pathotypes to regions where local cultivars are resistant to endemic races of the same species may have serious consequences (Neergaard, 1977), therefore, significance of these interceptions increases manifold.

Table 2. Pathogenic fungi intercepted in imported sorghum germplasm

Fungi Intercepted	Source/Country
Alternaria longissima Deighton & McGarvie	Nigeria, USA
Arthobotrys sp.	USA
Botrytis cinera Pers. Ex. Pers.	USA
Brachyspora dingliyae Hughes	Nigeria
Brachyspora sp.	Nigeria, USA
Cercospora sp.	Nigeria
Chaetomium sp.	Nigeria, USA
Choenophora spp.	Philippines
Colletotrichum gloeosporioides (Penz.) Sacc	Nigeria, USA
Colletotrichum graminicola (Ces.) Wils	Nigeria, S. Korea, USA
Curvularia andropogonis (Zimm.) Boedijn	Nigeria
Curvularia clavata Jain	Nigeria
Curvularia crepinii (Westend) Boedijn	Nigeria
Curvularia cymbopogonis (Dodge) Groves &	Nigeria
Curvularia lunata (Wakker) Boedijn	Nigeria, USA
Curvularia oryzae Bugnicourt	Nigeria, USA
Curvularia penniseti (Mitra) Boed.	Nigeria, USA
Drechslera biseptata (Sacc. & Roum.) Richardson	Nigeria, USA

Drechslera hawaiiensis (Bugnicourt) Subram. &	Nigeria
Drechslera maydis (Nisik) Subram. & Sherwin)	Philippines, Sudan, USA
Drechslera rostrata (Drechsler) Richardson	Nigeria, USA
Drechslera sorghicola (Lefebvre & Shrewin)	Kenya, Nigeria, USA, Zimbabwe
Drechslera *sorokiniana* (Sacc.) Subram. & Jain	Kenya, USA
Drechslera turcia (Pass) Subram. & Jain	Nigera, USA
Fusarium equiseti (Corda) Sacc.	Nigeria, USA
Fusarium fusarioides Wr. & Rg.	Nigeria, Korea, USA
Fusarium semitectum Berk. and Rav.	Nigeria, USA
Fusarium solani (Mart.) App. & Wr.	Argentina, Nigeria, USA
Gonatobotrys sp.	USA
Gloeocercospora sorghi Bain & Edgerton ex Deighton	Kenya, Nigeria, USA
Macrophomina phaseolina (Tassi.) Goid	Kenya, Nigeria, USA
Phaeotrichoconis crotolariae (Salam & Rao)	Nigeria
Phoma sorghina (Sacc.) Boerema,Dorenbosch & Van Kest	Australia, Nigeria, S. Korea, Sudan, USA, Zimbabwe
Phomopsis sp.	USA
Pithomyces sp.	Nigeria
Pyrenochaeta sp.	Nigeria
Ulocladium spp.	Nigeria

The introduction of germplasm harboruring pathogens of economic significance can pose a threat to the sorghum improvement programme of the country. Detection of 588 infected samples contributing to about 14 per cent of the total importance of sorghum germplasm emphasises the need of plant quarantine.

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