JOURNAL OF PURE AND APPLIED MICROBIOLOGY, August 2014. Vol. **8**(4), p. 3363-3366

Detection of Fungal Pathogens on Groundnut Seeds in Different Tribal Localities of Dangs District under South Gujarat

Kotgire Ganesh and B.P. Mehta

Department of Plant Pathology, N. M. College Agriculture, NAU, Navsari, India.

(Received: 17 January 2014; accepted: 19 April 2014)

Fungal detection on seeds from different locations on different varieties was carried out by standard blotter method. Frequency of *A. flavus* at Waghai, Bhenskatri, Kudkas and Gaurya was observed maximum except Pimpri *i.e.* 40.00, 50.00, 53.00 and 48.00 per cent respectively. Assessment of fungi on moldy and healthy seeds showed total five fungal species were associated with surface sterilized healthy seeds and six fungal species were associated with surface sterilized moldy seeds of Local, GG-2, Junagadh-11 and TAG-37 varieties. Frequency of *A. flavus* and *A. niger* were maximum in healthy and moldy seeds of all groundnut varieties.

Key words: Frequency, Moldy seeds, varieties, etc.

In Gujarat, groundnut is an important crop and its cultivation increased in tribal area due to increase in biodiversity, the total area under cultivation of groundnut is about 17,954 hectares with the production of 24,560 million tonnes of seeds with average productivity of 1368 kg ha^{-1}. In Dangs, groundnut occupies about 46 ha area with a total production of 6300 million tones with average productivity of 1369 kg ha^{-1} (Anon., 2012). Groundnut seed is infected with large number of field and storage fungi which are responsible for seed rot, seedling blight, stem rot and foliar infection as result subsequently hampered seed health. Deterioration of groundnut seeds due to fungal activity is normally associated with the production of off-colours and flavours, rancidity, discolouration effects on yield and quality of oil, loss of seed viability and formation of mycotoxins (Twiddy, 1994). Agroclimatic conditions play an important role in infecting the seeds by the fungi at the time of crop maturity as well as during threshing and further processing of the produce. An attempt was made to find out effect of locality, in which crop was grown in the association of important fungal pathogens on seeds of groundnut.

* To whom all correspondence should be addressed.

MATERIALS AND METHODS

Collection of seed samples

The peoples in tribal area in Dangs districts of south Gujarat cultivated and stored the groundnut seed in Bean for further use such infected and healthy seed samples of widely cultivated groundnut varieties like Local, GG-2, Junagarh-11 and Tag-37 were collected in brown paper bags from farmer's fields of Waghai, Bheskatri, Kudkas, Gaurya and Pimpri villages of Dangs district.

Detection and isolation of seed borne fungi

Assessment of fungi associated with groundnut seeds of different locations and moldy and healthy seeds was carried out from randomly taken 100 seeds of groundnut from each location (Table 1) with three repetitions by standard blotter method (Bhale *et al.*, 2001). Ten seeds after surface

sterilization by 1per cent sodium hypochlorite solution for one minute, were placed at equi distance on three layers of properly moistened sterilized blotters, and Petri plates were incubated under 12/12 hr alternating light and dark period at 25 ± 2º C. Developing fungal growth on each of the piece of seeds of groundnut after seven days was observed under stereoscopic binocular microscope and results were recorded accordingly.

Identification and Purification

Various seed-infecting fungi, developed on groundnut seeds, were cultured separately on PDA Petri plates. Each fungal growth was critically observed under microscope for cultural and morphological characters. Finally, fungal characteristics observed were compared with the characteristics described in earlier literature. The same pure cultures grown in slants were sent to Indian Type Culture Collection (I. T. C. C.), Division of Mycology and Plant Pathology, Indian Agricultural Research Institute (I. A. R. I.), New Delhi for identification and confirmation of isolated fungus. Cultures were maintained on PDA slants for purification by sub culturing and stored at 5º C for further study. Observations on the fungal flora, associated with the seeds, were recorded after 7 days and per cent frequency of each fungus was calculated. Mean frequency percentage of important fungi were compared and presented in Table- 2 and 3 and depicted in Fig. 1 and 2.

RESULT AND DISCUSSIONS

Identification of pathogens

The different cultures obtained from groundnut seeds were purified by single spore and hyphal tip isolation technique. The identification of the isolated fungus was done by studying the cultural, morphological characters and by microscopic examination of each of isolate and the fungi identified as *Sclerotium rolfsii*, *Helminthosporium* sp., *Fusarium equiseti*, *Fusarium moiliforme*, *Aspergillus niger* and *Aspergillus flavus*.

Assessment of fungi on farmers stored seeds of groundnut

The data pertaining to the frequency of fungi on farmers saved seeds of groundnut in their own places were presented in Table 2 and depicted in Fig. 1 revealed that the frequency of fungi varied in all the locations which was in the range of 12.00-40.00, 10.00-50.00, 9.00-53.00, 6.00-48.00 and 6.00-43.00 per cent at Waghai, Bhenskatri, Kudkas, Gaurya and Pimpri villages of Dangs districts respectively.

Frequency of *A. flavus* was observed maximum at all the locations except Pimpri *i.e.* 40.00, 50.00, 53.00 and 48.00 per cent respectively, whereas, seed samples of Pimpri recorded highest frequency of *A. niger i.e.* 46.00 per cent. At Waghai, frequency of *A. niger* (28.00%) was next followed by *F. moniliforme* (22.00%), *Helminthosporium* sp. (16.00%) and *S. rolfsii* (12.00%). Seed samples of

Table 1. Collection of seed samples from farmers' fields of Dangs districts

Village	Variety
Kudkas	Local, GG-2, GJ-11
Bhenskatri	Local, TAG-37
Waghai	Local, GJ-11, GG-2, TAG-37
Gaurya	Local, GG-2
Pimpri	Local, TAG-37

Table 2. Frequency of fungi in per cent on Healthy and Moldy seeds of different groundnut varieties

Fungi	Local*		GG 2*		Junagadh 11*		TAG 37*	
	H	M	H	M	H	M	H	M
Sclerotium rolfsii	2.00	8.00	4.00	11.00	3.00	6.00	3.00	9.00
Helminthosporium sp.	0.00	7.00	7.00	15.00	5.00	13.00	4.00	12.00
Fusarium equiseti	7.00	15.00	0.00	5.00	6.00	11.00	7.00	11.00
Fusarium moiliforme	10.00	17.00	10.00	16.00	5.00	15.00	8.00	14.00
Aspergillus niger	13.00	20.00	14.00	18.00	8.00	16.00	11.00	16.00
Aspergillus flavus	15.00	23.00	17.00	24.00	14.00	26.00	14.00	18.00

*Average of three repetitions H- Healthy, M- Moldy

Table 3. Frequency of fungi in per cent on farmers stored seeds of groundnut in Dangs

S. No.	Fungi	Locations*				
		Waghai	Bhenskatri	Kudkas	Gaurya	Pimpri
1	*Sclerotium rolfsii*	12.00	14.00	10.00	6.00	17.00
2	*Helminthosporium sp.*	16.00	10.00	19.00	10.00	22.00
3	*Fusarium equiseti*	19.00	16.00	9.00	15.00	6.00
4	*Fusarium moiliforme*	22.00	29.00	32.00	24.00	18.00
5	*Aspergillus niger*	28.00	38.00	37.00	32.00	46.00
6	*Aspergillus flavus*	40.00	50.00	53.00	48.00	43.00

*Average of three repetitions

Bhenskatri recorded minimum frequency of *Helminthosporium* sp. (10.00%) followed by *S. rolfsii* (14.00%) and *F. equiseti* (16.00%). At Kudkas, frequency of *F. equiseti* was observed lowest *i.e.* only 9.00 per cent followed by *S. rolfsii* (10.00%) and *Helminthosporium* sp. (19.00%), while, *A. niger* was second highest fungus which recorded 37.00 per cent frequency on seeds. The frequency of *S. rolfsii* at Gaurya and Pimpri was 6.00 and 17.00 per cent respectively and *F. moniliforme* 24.00 and 18.00 per cent respectively. The seed samples of Pimpri recorded minimum frequency of *F. equiseti* (16.00%) and highest frequency of *A. niger* (46.00%). This difference may be attributed to the effect of different environmental conditions occurring in different locations which influenced specific fungal infection.

This result tallies with results obtained by Agarwal and Gupta (1989). They reported

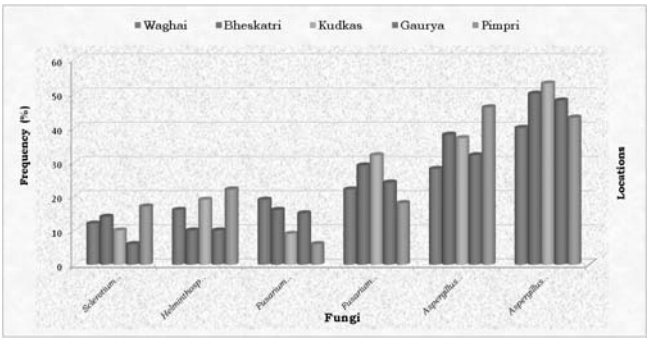

Fig. 1. Frequency of fungi on groundnut seed samples of different location in Dangs district

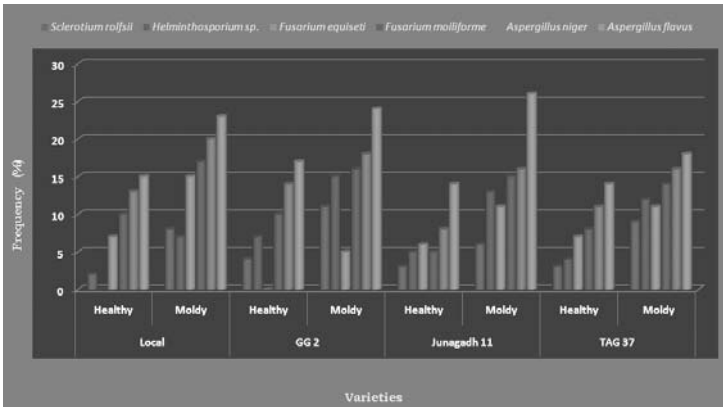

Fig. 2. Frequency of fungi on different varieties of moldy and healthy seeds of groundnut varieties

variation of fungal load observed in location to location. The minimum fungal load was detected on seeds of soybean from Junagadh (3.3%) followed by Akola (5.1%) while it was maximum on seeds from Parbhani (9.4%) which was closely followed by Navsari (8.4%).

Assessment of fungi on moldy and Healthy seeds of different groundnut varieties

Results on assessment of fungi associated with different varieties of moldy and healthy seeds of groundnut, carried out by blotter methods, are presented in (Table 3. and Fig. 2). Overall, five fungal species were associated with surface sterilized healthy seeds of all four varieties and six fungal species were associated with surface sterilized moldy seeds of all varieties.

Frequency of fungi on local variety of healthy seeds recorded *S. rolfsii* (2.00%), *F. equiseti* (7.00%), *F. moniliforme* (10.00%), *A. niger* (13.00%) and *A. flavus* (15.00%), while, on moldy seeds, *S. rolfsii* (8.00%), *Helminthosporium* sp. (7.00%), *F. equiseti* (15.00%), *F. moniliforme* (17.00%), *A. niger* (20.00%) and *A. flavus* (23.00%) were found on seeds.

Similarly, fungal frequency on healthy seeds of GG 2 variety was *S. rolfsii* (4.00%), *Helminthosporium* sp. (7.00%), *F. moniliforme* (10.00%), *A. niger* (14.00%) and *A. flavus* (17.00%) and on moldy seeds of GG-2, the frequency was *S. rolfsii* (11.00%), *Helminthosporium* sp. (15.00%), *F. equiseti* (5.00%), *F. moniliforme* (16.00%), *A. niger* (18.00%) and *A. flavus* (24.00%).

Frequency per cent of fungi associated with healthy seeds on variety of Junagadh-11 and TAG-37 were *S. rolfsii*, *Helminthosporium* sp., *F. equiseti*, *F. moniliforme*, *A. niger* and *A. flavus i.e.* 3.00 and 3.00, 5.00 and 4.00, 6.00 and 7.00, 5.00 and 8.00, 8.00 and 11.00 and 14.00 and 14.00 per cent respectively, and frequency on moldy seeds were 6.00 and 9.00, 13.00 and 12.00, 11.00 and 11.00, 15.00 and 14.00, 16.00 and 16.00 and 26.00 and 18 per cent respectively.

This results tallies with the result obtained by Kushi and Khare (1979). They observed that lesser number of fungi were associated with apparently healthy seeds whereas, moldy seeds recorded more no. of fungi in sesamum. Thus by and large, healthy and moldy seeds revealed preferential trend of fungal association. Thus it can be found that various fungi induced specific grain abnormality and hampered seed health.

Conclusion

Frequency of fungi on farmers stored seeds of groundnut varied in all the locations which was in the range of 12.00-40.00, 10.00-50.00, 9.00-53.00, 6.00-48.00 and 6.00-43.00 per cent at Waghai, Bhenskatri, Kudkas, Gaurya and Pimpri villages of Dangs districts respectively. Frequency of *A. flavus* was observed maximum at all the locations except Pimpri *i.e.* 40.00, 50.00, 53.00 and 48.00 per cent respectively. Five fungal species were associated with surface sterilized healthy seeds and six fungal species were associated with surface sterilized moldy seeds of Local, GG-2, Junagadh 11 and TAG 37 varieties. Frequency of *A. flavus* and *A. niger* was maximum in healthy and moldy seeds of all groundnut varieties. Frequency of *A. flavus* was recorded in the range of 14.00 to 17.00 per cent on healthy and 18.00 to 26.00 per cent on moldy seeds of groundnut varieties. So seed health testing in groundnut is required to reduce the seed borne fungal pathogens.

ACKNOWLEDGEMENTS

The authors are thankful to Dr. A. N. Sabalpara, Directorate of Research and Dean P.G. Studies, NAU, Navsari for constant encouragement in presenting the information.

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