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Detection of Seedborne Fungi of Soybean (*Glycine max* (L.) Merril)

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Abstract

The representative soybean seed samples (cv. JS - 335) from major soybean growing 11 districts of Madhya Pradesh were collected during Rainy season. Out of six fungal species recorded, Aspergillus niger was found predominant in the samples analysed from 11 districts (1.0 to 17.0 %), while the occurrence of Colletotrichum dematium (1.0 to 9.0%) was least by blotter method and Aspergillus flavus was found predominant in the samples (1.0 to 14.0 %), while the occurrence of Macrophomina phaseolina (1.0 to 6.0%) was least by agar plate method. Out of two methods employed for detection of seed mycoflora, standard blotter method was found superior over agar plate method.

Keywords:- *Soybean, fungi, seed mycoflora and seed samples.*

Introduction

Low yield and productivity of soybean in India is mainly due to various diseases and pests occurring in the field and causing yield losses. One of the major constraints in the endeavour of increasing productivity of soybean is its susceptibility to a large number of diseases caused by fungi, bacteria, viruses and nematodes. In India, although 40 fungal pathogens have been identified in soybean crop, but only a few of them are economically important[2]. Seed health testing methods like blotter paper method and agar plate methods have been employed for detection of internal and external seed borne mycoflora of soybean. The frequency in occurrence of such potentially pathogenic fungi on soybean cultivars poses a potential threat in crop production programme. However, information on seedborne fungi associated with soybean seeds and its detection by different methods.

Materials and Methods

The soybean seed samples from 11 districts of Madhya Pradesh were obtained and analyzed for the assessment of seed mycoflora. The collected seed samples were shade dried and stored in paper bags at ambient storage temperatures of 28 ± 2 ºC for further studies.

Two different seed health testing methods viz., standard blotter method and agar plate method were applied for estimation of seed mycoflora. The total fungal colonies were calculated and per cent infection was assessed.

Results and Discussion

Standard blotter Method

In all, 6 pathogens were predominantly recorded on the seed samples from 11 districts. The association of *Colletotrichum dematium* was recorded in all the seed samples in the range of 1.0-9.0%. Maximum (9%) association was observed on 7th day in incubated seeds of Jabalpur and Hoshangabad. While the seeds from Seoni and Indore exhibited maximum association upto 6% (Table 1).

The seed samples obtained from Jabalpur and Seoni yielded maximum 10% association of *Macrophomina phaseolina*. The pathogen association was predominant upto 7% in seeds obtained from farmers of Chhindwara, Betul, Sehore, Indore, Ujjain, Sagar and Tikamgarh (Table 1).

Association of *Fusarium oxysporum* was noticed in the range of 2.0-15.0%, being maximum in seeds from Seoni. Association of *Aspergillus niger* and *Aspergillus flavus* was noticed in all the seed samples obtained from 11 districts. On incubated seeds the association of *A. niger* ranged from 1.0-17.0%, being maximum in seeds obtained from Sehore. The

seed samples obtained from Indore, Hoshangabad, Chhindwara, Seoni and Jabalpur exhibited association of *A. niger* in the range of 11.0-16.0%. Association of *A. flavus* upto 16% was observed in the seed from Jabalpur. Association of the fungus was in the range of 10.0-14.0% in the seeds from Sagar, Damoh, Indore, Chhindwara and Seoni. (Table 1).

Table 1 Association of mycoflora with farmers saved soybean seed as tested by Standard blotter method

Location	Per cent association of mycoflora						Per cent Germination
	Colletotrichum dematium	Macrophomina Phaseolina	Fusarium oxysporum	Aspergillus niger	Aspergillus flavus	Purple seed stain	
Jabalpur	3.0-9.0	4.0-10.0	7.0-10.0	5.0-12.0	4.0-16.0	5.0-12.0	76
Seoni	3.6-6.0	3.0-10.0	9.0-15.0	2.0-12.0	4.0-14.0	5.0-8.0	75
Chhindwara	3.0-5.0	2.0-7.0	4.0-9.0	2.0-16.0	4.0-13.0	5.0-16.0	79
Betul	2.0-5.0	2.0-7.0	4.0-11.0	2.0-5.0	4.0-6.0	5.0-14.0	80
Hoshangabad	1.0-9.0	2.0-3.0	4.-14.0	2.0-12.0	4.0-8.0	4.0-10.0	75
Sehore	1.0-9.0	2.0-7.0	4.0-11.0	2.0-17.	4.0-8.0	5.0-8.0	80
Indore	2.0-6.0	1.0-7.0	4.0-10.0	2.0-11.0	4.0-13.0	4.0-8.0	81
Ujjain	2.0-5.0	1.0-7.0	4.0-10.0	2.0-10.0	4.0-11.0	4.0-6.0	80
Damoh	2.0-4.0	2.0-4.0	4.0-8.0	2.0-8.0	3.0-10.0	5.0-6.0	85
Sagar	1.0-3.0	1.0-8.0	2.0-3.0	1.0-3.0	4.0-11.0	3.0-4.0	82
Tikamgargh	1.0-2.0	2.0-7.0	3.0-7.0	2.0-8.0	2.0-9.0	3.0-6.0	80

Dry examination of seed samples with nacked eye, revealed the presence of purple seed stain disease in the range of 3.0-16.0%. The disease was present in all the seed samples obtained from 11 district of Madhya Pradesh. Maximum association (16%) was observed in the seeds from Chhindwara while the maximum incidence ranged from 6.0-14.0% in the seeds from Jabalpur, Seoni, Betul, Hoshangabad, Sehore, Ujjain, Damoh and Tikamgarh (Table 1).

Similar set of seed samples, obtained from 11 districts, were analyzed for the associated mycoflora by standard agar plated method.

Association of *Colletotrichum dematium* ranged from 1.0-7.0%, being maximum in the seeds obtained from farmers of Hoshangabad. The pathogen found associated in all the seed samples. The pathogen was also dominant in the seed samples from Sehore and Indore (5.0-6.0%) (Table 2).

Standard agar plate method

Table 2 Association of mycoflora with farmers saved soybean seed as tested by agar plate method

Location	Per cent association of mycoflora					Per Cent Germination
	Colletotrichum Dematium	Macrophomina phaseolina	Fusarium oxysporum	Aspergillus niger	Aspergillus flavus	
Jabalpur	2.0-4.0	3.0-5.0	3.0-5.0	3.0-5.0	3.0-14.0	62
Seoni	1.0-2.0	1.0-3.0	4.0-7.0	1.0-6.0	2.0-10.0	61
Chhindwara	1.0-3.0	2.0-6.0	2.0-5.0	2.0-6.0	2.0-10.0	60
Betul	2.0-4.0	2.0-5.0	2.0-7.0	1.0-4.0	2.0-3.0	63
Hoshangabad	1.0-7.0	2.0-3.0	3.0-6.0	2.0-2.0	2.0-6.0	60
Sehore	1.0-5.0	2.0-4.0	3.0-5.0	2.0-9.0	3.0-3.0	61
Indore	2.0-6.0	1.0-3.0	2.0-3.0	2.0-8.0	2.0-10.0	60
Ujjain	2.0-4.0	1.0-4.0	3.0-5.0	2.0-8.0	3.0-8.0	60
Damoh	2.0-3.0	1.0-2.0	4.0-6.0	1.0-6.0	3.0-6.0	60
Sagar	1.0-2.0	1.0-6.0	1.0-3.0	1.0-2.0	2.0-9.0	55
Tikamgargh	1.0-1.0	2.0-5.0	2.0-5.0	2.0-10.0	2.0-8.0	58

The seed samples from Chhindwara and Sagar exhibited maximum association (6%) of *Macrophomina phaseolina.* The association of *Fusarium oxysporum* ranged from 1.0-7.0%, being maximum from the seeds obtained from Betul and Seoni. The association of *Fusarium oxysporum* was predominant in the seed samples from Jabalpur, Chhindwara, Hoshangabad, Sehore, Ujjain and Damoh (5.0-6.0%).Association of *Aspergillus niger* and *A. flavus* was recorded in all the samples. Maximum association (10%) was recorded in the seed samples from Tikamgarh while 14% seeds from Jabalpur had association of *A. flavus* (Table 2).

Major mycoflora associated with seeds were *C. dematium, M. phaseolina, F. oxysporum, A. flavus, A. niger* and purple seed stain. Blotter method was reported to be superior over agar plate method for detection of associated mycoflora[1,3,4].

Conclusion

The present investigation indicated that there was variation in mycoflora from one locality to another. Mycoflora of seed varied from place to place due to change in conditions prevailing during seed development, harvesting and storage. Out of two methods adopted for detection of seed mycoflora, standard blotter method was proved to be superior over agar plate method as the total fungal colonies was more in Standard blotter method. Out of six fungal species recorded, *Aspergillus niger* and *Aspergillus flavus* was found predominant in the samples analysed from 11 districts.

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