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Survey of Seed-Borne Fungi Associated with Rice Seeds in Tamil Nadu, India

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Abstract: A total of 287 rice seed samples consisting of 20 cultivars were obtained from different locations of Tamil Nadu state, India were used for testing their health status. Totally 8 genera of fungi *viz*., *Alternaria, Aspergillus, Bipolaris, Chaetomium, Curvularia, Fusarium, Sarocladium* and *Trichoderma* comprising twelve species were found to be associated with the seed samples. Among them, the most predominant one was *Bipolaris oryzae* which was associated with 58.89 per cent seed samples, followed by *Alternaria padwickii* (52.96%).

Key words: Missing

INTRODUCTION

Rice (*Oryza sativa* L.) seeds are known to harbour a wide range of both fungi and bacteria (1). A total of more than 100 fungi were detected on rice seeds. However, the detection frequency varied considerably. About 20 species of fungal pathogens were detected from rice seed at any one time (2). The crop is affected by as many as 36 seed-borne diseases of which 31 were caused by fungi (3). In the present study, a survey was taken up to assess the prevalence and extent of different seed-borne fungi in ruling varieties and hybrids of Tamil Nadu.

MATERIALS AND METHODS

- Collection of rice seed samples for determining the seed-borne microflora. The rice seed samples (287) employed in the present investigation were collected from different locations of Tamil Nadu. Each seed sample of 200 grams was collected and used for the studies. The details of the seed samples collected are furnished in (Table 1 and 2).
- Detection and enumeration of seed-borne microflora of rice seed samples. The detection of seed-borne microflora of rice seeds was made as described by ISTA, 1993 (4) using standard blotter method as follows.

The seeds were incubated in plastic Petridishes containing three layers of whatman No.1 filter paper moistened with sterile water. Four hundred seeds in each sample were incubated at 20±2°C under alternate cycles of 12 hour NUV light and 12 hour darkness for 7 days. Then the seeds were examined on eighth day under stereo binocular microscope (Wild MPS 45) and the fungi were identified (5). The fungi associated with rice seed samples were recorded and expressed in percentage individually. One hundred seeds formed one replication and four replications were maintained.

Table 1: Survey for the occurrence of *S.oryzae* in rice seed samples different parts of Tamil Nadu

Sl. No.	Place of collection	Source	No. of Samples
1	Aduthurai	Tamil Nadu Rice Research Institute	21
2	Ambasamudram	Rice Research Station	18
3	Bhavanisagar	Agrl. Research Station	24
4	Chidambaram	Farmer's holding	16
4	Coimbatore	Paddy Breeding Station and wet land	33
		Seed Testing Laboratory	45
5	Dharmapuri	Seed Testing Laboratory	20
6	Gobichettipalayam	Farmer's holding	16
7	Madurai	Seed Testing Laboratory	14
8	Modakkuruchi	Farmer's holding	14
9	Paiyur	Regional Research Station	7
10	Paramakudi	Farmer's holding	10
11	Pattukkottai	Farmer's holding	15
12	Pudukkottai	Farmer's holding	27
13	Sathyamangalam	Farmer's holding	4
14	Thalavadi	Farmer's holding	3
Total			287

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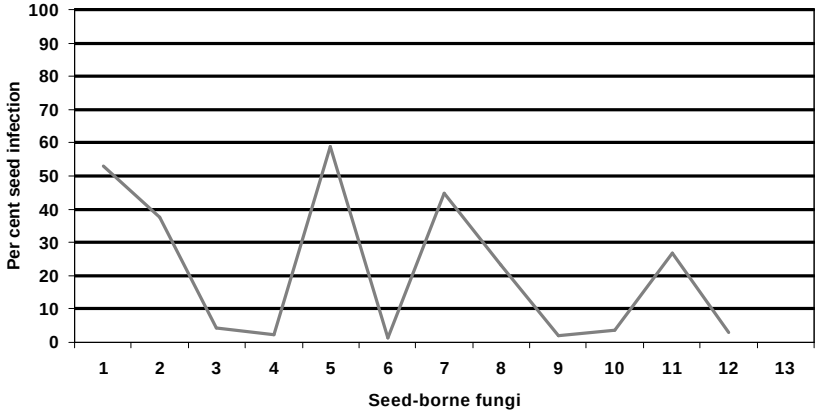
Table 2: Rice seed samples of ruling varieties and hybrids collected from different parts of Tamil Nadu

Sl.No.	Variety	No. of Samples
1	ADT 36	31
2	ADT 38	12
3	ADT 39	27
4	ADT 43	18
5	ADT 45	15
6	ADTRH 1	11
7	ASD 16	3
8	ASD18	19
9	ASD19	23
10	Bhavani	8
11	Co 43	28
12	CORH 2	17
13	CR1009	5
14	Improved white ponni	19
15	IR 20	19
16	IR 50	10
17	MDU 1	4
18	MDU 2	2
19	TKM 6	9
20	TKM 9	7
Total		287

RESULTS AND DISCUSSION

A total of 287 seed samples consisting of 20 cultivars were obtained from different parts of Tamil Nadu and were used for testing their health status and the results are furnished in (Table 3).

Totally 8 genera of fungi *viz*., *Alternaria, Aspergillus, Bipolaris, Chaetomium, Curvularia, Fusarium, Sarocladium* and *Trichoderma* comprising twelve species were found to be associated with the seed samples. Among them, the most predominant one was *Bipolaris oryzae* which was associated with 58.89 per cent seed samples, followed by *Alternaria padwickii* (52.96%), *Curvularia* (44.60%), *Alternaria tenuis* (37.63 %) and *Sarocladium oryzae* (26.83 %). The following fungi *viz*., *Fusarium moniliform,e Aspergillus flavus, Fusarium solani, Trichoderma* spp., *Aspergillus niger* and *Chaetomium globosum* were observed to an extent of 23.00, 4.53, 3.48, 2.44, 2.01 and 1.39 per cent in the seed samples respectively.



1.*Alternaria padwickii*, 2. *Alternaria tenuis*, 3. *Aspergillus flavus*, 4. *Aspergillus niger*, 5. *Bipolaris oryzae*, 6. *Chaetomium globosum*, 7. *Curvularia* spp, 8. *Fusarium moniliforme*, 9. *Fusarium semitectum*, 10. *Fusarium solani*, 11. *Sarocladium oryzae*, 12. *Trichoderma* spp.

Fig. 1: Occurence of seed-borne fungi in rice seed samples collected from different locations of Tamil Nadu, India

Table 3: Occurrence of seed-borne fungi in rice seed samples (287) obtained from different locations of Tamil Nadu

			Range of infection percentage in infected seed samples									
Sl. No.	Fungus detected	Seed lot Infected (%)	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
1	*Alternaria padwickii*	52.96	96	33	7	2	4	10	-	-	-	-
2	*Alternaria tenuis*	37.63	84	9	4	5	6	-	-	-	-	-
3	*Aspergillus flavus*	4.53	10	3	-	-	-	-	-	-	-	-
4	*Aspergillus niger*	2.01	6	-	-	-	-	-	-	-	-	-
5	*Bipolaris oryzae*	58.89	117	22	11	8	5	6	-	-	-	-
6	*Chaetomium globosum*	1.39	4	-	-	-	-	-	-	-	-	-
7	*Curvularia* spp	44.60	124	4	-	-	-	-	-	-	-	-
8	*Fusarium moniliforme*	23.00	49	17	-	-	-	-	-	-	-	-
9	*Fusarium semitectum*	2.09	6	-	-	-	-	-	-	-	-	-
10	*Fusarium solani*	3.48	8	1	1	-	-	-	-	-	-	-
11	*Sarocladium oryzae*	26.83	32	22	11	7	3	2	-	-	-	-
12	*Trichoderma* spp.	2.44	7	-	-	-	-	-	-	-	-	-

Rice seeds were reported to have been associated with 32 genera and 48 species (6) of fungi. Twenty different fungi were identified on the rice seeds (7) which include 10 genera and 20 species (Figure 1).

In the present investigation, 8 genera and 10 species were identified from 287 rice seed samples comprising 20 varieties collected from various places of Tamil Nadu. The fungi identified were *Alternaria padwickii* (Kuhn.), *Alternaria tenuis* Neep., *Aspergillusflavus* Link., *Aspergillus niger* Van Tieghem, *Bipolaris oryzae* Shoem, *Chaetomium globosum* (Kunze.), *Curvularia* spp., *Fusarium moniliforme* Sheld., *Fusarium semitectum* Berk. & Rav., *Fusarium solani* Sheld., *S. oryzae and Trichoderma* spp.(Figure 1).

In this concern totally 18 fungal species belonging to twelve genera were found to be associated with the rice seed samples in Tamil Nadu (8, 9). The frequency of *S. oryzae* was 36.72 per cent.

Out of 287 seed samples tested, 77 samples carried *S. oryzae.* Among the 77 seed samples, 32 carried 1-10 per cent, 22 carried 11-20, 11 carried 21-30 per cent and 7 carried 31-40 per cent, 3 carried 41-50 per cent and 2 samples carried 51-60 per cent seed infection. The present study reveals the presence of diverse mycoflora both pathogenic and non pathogenic in rice seeds in ruling varieties and hybrids in Tamil Nadu. The plants developed from discoloured seeds might serve as a source of inoculum for many serious problems of the crop (9, 10). Since rice is a staple food, better seed health management is a prerequisite for successful rice cultivation.

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