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Screening of Some Fungi Isolation of Rice Cultivars in Different Site of Allahabad, Varanasi, Mirzapur, Jaunpur and Chandauli District in Uttar Pradesh.

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Abstract: *Rice (Oryza sativa L.) one of the staple food crops of 60% of world's population, suffers from different kinds of diseases caused by fungi. In the present study, five paddy samples were collected from different places of Allahabad, Varanasi, Mirzapur, Jaunpur and Chaundali District of Uttar Pradesh, in India and screened for fungal pathogens using Potato Dextrose Agar plate method. Results showed varied Disease Incidence in collected samples ranging from 56.66% to 83.33%. The variety "BPT-5204" collected from Allahabad showed a minimum DI of 56.66% whereas "Basmati-370" collected from Jaunpur showed 83.33% of maximum of total DI, followed by "Narendra-59" from Mirzapur 80%, "Sonam" from Chandauli which showed 73.33% DI and "Rupali" collected from Varanasi which showed 63.33% DI. Highest fungus frequency was recorded in rice variety Basmati-370 and lowest fungus frequency was found in BPT-5204. Seven fungal species namely Penicillium, Helminthosporium sp, Fusarium sp., Aspergillus niger; Aspergillus ochraceus, Altrnaria sp., and Aspergillus clavatus in all the five samples have been recorded.*

Key word: *Isolation, seed born fungi, rice varieties.*

I. Introduction

Rice is one of the most important food crops of Asia, including India and is feeding more than 3 billion people. The cultivated rice, *Oryza sativa* originated in South East Asia in humid tropical climate and under influence of local environment. Rice provides 23% of global human per capita energy and 16% per capita protein. Rice protein ranks high in nutritional quality among cereals, though protein content is modest.

Rice is grown in all the 72 districts of Uttar Pradesh with low to high acreage. It is part of the nearly every meal and it is grown on a majority of the rural farms. Uttar Pradesh is the leading producer of rice and rank 3rd in the country. Annual rice production is around 12 metric ton in state. Rice is cultivated mainly in Kharif season (wet season) in around 5.90 million hectare followed by zaid (summer season) 35000-40000 hectare only. As regards the boro rice, it is grown in only deeply flooded areas around 3000 ha or so mainly in the eastern districts of the Uttar Pradesh. The average productivity of the state is around 2 t/ha.

Many fungi, ranging from major pathogen to non pathogens of rice, have been recorded as seed born on rice. For example, (Zainum et al 1977) in Malaysia recorded 33 fungal isolates on 23 cultivars of rice obtained from 11 location, of which Trichoccnis (Alternaria) padwickii was most common. In India, Majumdar et al reported rice seed infected with *Helminthosporium oryzae, Curvularia lunta, Cochlobolus lunatus*, *Alternaria tenusi* and *Epicoccum sp., H. oryzae*, a seed born fungus, is amajor pathogen of cultivated rice, causing brown leaf spot (Aluko. M. O. 1969, Awoderu, V. A. 1974, Khatua et al 1978) and sometimes seed infection (Bedi e tal 1971,Reddi et al 1972). Infection of rice sedd by *H. oryzae* has also been considered a major cause of poor seed emergence (Misra et al: 1969, Rath et al:1974), and *Carvularia lunata* isolated from rice has also been reported to reduce seed germination and infect rice seedling.

Rice disease such as blast, brown leaf spot, seedling blight dwarf disease have, from time to caused heavy damages to rice in India. The disastrous epiphytotics of rice blast caused losses upto 2/3 of rice yield in India (Kulkarni, 1959). Most of the diseases of rice causing heavey and serious losses are seed-born; brown spot caused by *Helminthosporium oryzae* and blast by *Pyricularia oryzae* are the two most important ones. Stack burn and seedling blight caused by *Trichoconis padwickii* is also a seed-born disease but, is a week pathogen. This disease, however, can cause heavy losses under favourable condition (Singh and Khare 1983).

II. Material and Methods

This research study was carried out between 15 Jun to 20 October 2013 in the Bhargva Agricultural Botany laboratories of the Department of Botany, University of Allahabad, Allahabad, Uttar Pradesh, India.

Collection of seed samples

Paddy samples were collected from Allahabad, Varanasi, Mirzapur, Jaunpur, and Chandauli District of Uttar Pradesh from local traders as collected seed samples were packed in polyethylene covers.

Preparation of media:

Potato skin was peeled and cut into small pieces. Two hundred gm of potato pieces was weighed and boiled with known volume of distilled water. The boiled potato was filtrated and the collected filtrate was brought up to 1000 ml with distilled water. Twenty gm of Dextrose and 15 gm of Agar were added to the above extract, and then sterilized at 121UC for 15 min.15 ml of media was poured to sterilize Petri plates, and allowed to cool. Petri plates containing solidified media were used for planting the seeds.

Fungi isolation:

150 seeds from each variety were taken randomly from each region and 30 seeds were laid on each (90 mm) sterilized disposable Petri dish for surface-contaminated seed fungi used blotter test while agar test used for inner fungi infesting seeds , in the second method (agar test) the seeds were sterilized by sodium hypochlorite (1% solution for 5 mins.) All the cultured petridishes were incubated at 25 ± 2º C for 7 days (Michael 2000, Maudi 2000 and Agarwal 1987).

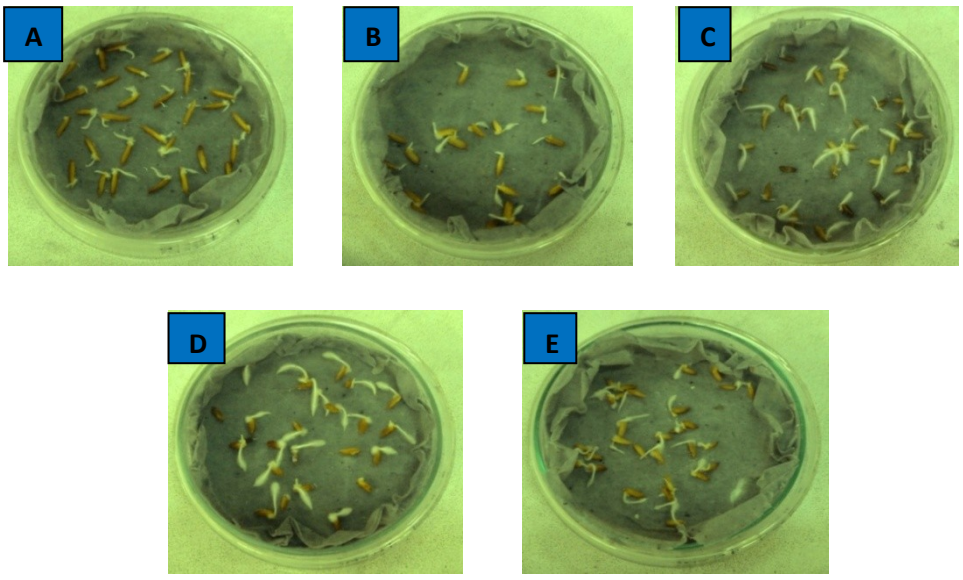
The fungal morphology was recorded at the end of 7 days incubation period, conidia and hyphae of fungi growing on the seeds were picked off each infected seed with fine forceps, mounted on a slide, and examined with a compound microscope. Preparing slides and each fungus was identified of its conidia and hyphae details of characters were carefully recorded. The fungi isolated and purified were identified with the help of standard manuals (Lislie, J.E. & Summerel, B.A. 2006, Mathur, S.B. & Kondgsdal, O. 2003, Singh, N. S. and Khare, M. N. 1983). The percentage of disease incidence, percentage of frequency were calculated with following formulae.

$$\text{Disease Incidence (DI)} = \frac{\text{Total No. of diseased seeds}}{\text{Total No. of seeds plated}} \times 100$$

$$\text{Frequency of occurrence (\%)} = \frac{\text{No. of seeds on which a fungal species occurs}}{\text{Total No. Of seed}} \times 100$$

Identification of Seed-born Fungi:

Fungal morphology were studied macroscopically by observing colony features (Texture and Color) and microscopically by staining with Lacto phenol cotton blue and observed under compound microscope for conidiophores, conidia and arrangement of spores (Aneja, 2001). The fungi were identified with the help of literature (Nagamani *et al*., 2006).



Rice Varieties [A]: Basmati 370, [B]: Narendra 59, [C]: Sonam, [D]: Rupali, [E]: BPT 5204.

III. Results

The paddy samples collected from different places of Allahabad, Varanasi, Mirzapur, Jaunpur, Chandauli District of Uttar Pradesh have been screened for fungal pathogens using Agar plate method. The present result showed varied Disease Incidence in collected samples ranging from 56.66% to 83.33%. The variety BPT-5204 collected from Allahabad showed a minimum DI of 56.66% whereas Basmati-370 collected from Jaunpur showed the highest DI of 83.33%. Narendra-59 has 80% of DI, Sonam which has showed about 73.33% DI and Rupali has 63.33% DI. Highest fungus frequency was recorded in rice variety Basmati-370 and lowest fungus frequency was found in BPT-5204.

Table 1: Disease Incidence of Different Rice Varieties.

Rice Varities	Disease Incidence (%)
Basmati 370	83.33%
Narendra 59	80%
Sonam	73.33%
Rupali	63.33%
BPT 5204	56.66%

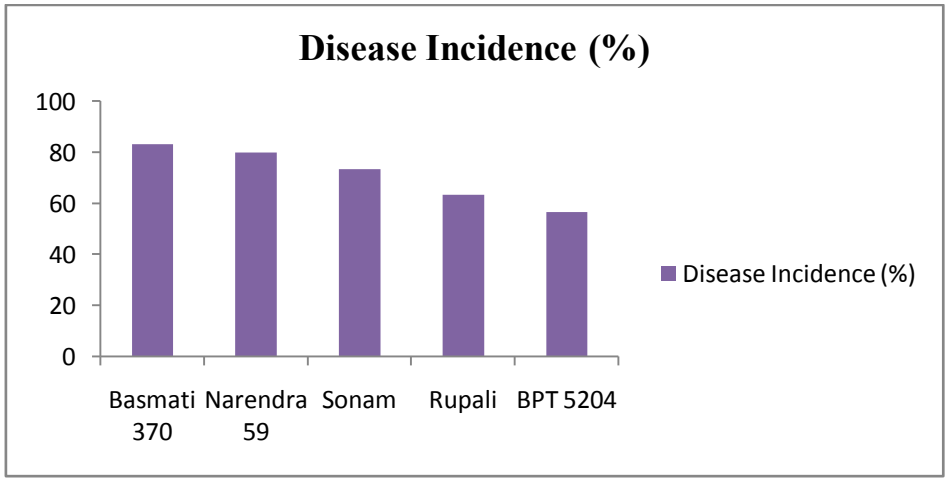


Fig 1: Disease incidence % of different varieties of Rice

Table 2: Fungus Frequency of Different Varieties of Rice.

Rice Varities	Fungus Frequency (%)						
	Fusarium sp.	***Alternaria sp.***	***Aspergillus niger***	***Penicillium sp.***	***Aspergillus clavatus***	***Aspergillus ochraceus***	***Helminthos porium sp.***
Basmati 370	26.66	23.33	.....	16.66	.....	10	6.66
Narendra 59	23.33	20	16.66	10	6.66	.....	3.33
Sonam	20	16.66	13.33	10	3.33	10	.....
Rupali	16.66	13.33	10	6.66	10	.....	6.66
BPT 5204	13.33	10	.....	10	13.33	10	.....

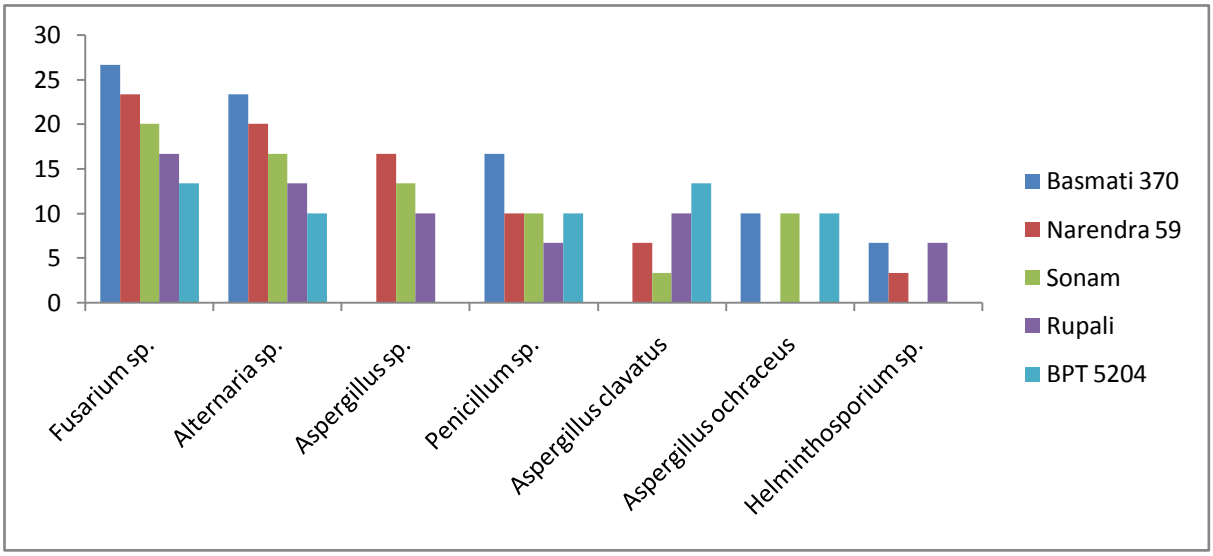


Fig. 2: Fungus Frequency of Different Varieties of Rice Plants.

IV. Discussion

Paddy is one of the important food crops for world's population and widely grown all over the world. The crop is known to infect by many pathogens including fungi. Fungal disease is considered as the major disease of paddy because of its destructiveness under favourable conditions. Hence disease management strategies include use of resistant hybrids/cultivars, chemical control and cultural practices are regularly employed. But, now a day's biological control strategies are gaining more insight for managing of pathogens and disease control. Highest percentage of DI (83.33%) was found associated with seeds of Basmati-370 that was significantly higher than Disease Incidence associated with all other rice varieties. There was 56.66%, 63.33%, 73.33% and 80% DI found associated with the rice seeds of BPT-5204, Rupali, Sonam, Narendra-59 respectively (Fig. 1). Seven fungal species namely *Penicillum*, *Helminthosporium sp., Fusarium sp., Aspergillus niger, Aspergillus ochraceus*, *Alternaria sp.*, and *Aspergillus clavatus* were found associated with the seeds of different varieties of rice. There was a variation in percentage frequency of occurrence of different fungal species in seeds of different varieties of rice (Fig. 2). Earlier workers have reported *Pyricularia oryzae, Alternaria alternata, A. padwickii, A. longissima, Curvularia oryzae, C. lunata*, *Drchslera oryzae, Aspergillus niger, Fusarium miniliforme, F. semitectum, F. oxysporum, F. soalni,* and species of *Phoma, Cercospora, Chaetomium, Sclerotium, Pecicillium, Myrothecium* and *Colletotrichum* from seeds of different varieties of rice (Wahid *et al.,* 2001; Khan, 2000; Javaid et al., 2002; Nguefack *et al*., 2007). Highest percentage of *Fusrium sp.* (26.66%) was recorded in seeds of Basmati 370 that was significantly higher than its occurrence in seeds of all other varieties. There was 23.33%, 20%, 16.66% and 13.33% occurrence of this fungal species in seeds of Narendra 59, Sonam, Rupali and BPT 5204 respectively. Highest percentage of *Alternaria sp*. was also found in seeds of Basmati 370 (23.33) followed by Narendra 59 (20%), Sonam (16.66%), Rupali (13.33%) and BPT 5204 (10%). Highest percentage of *Aspergillus niger* was recorded Narendra 59 (16.66%), Sonam (13.33%), Rupali (10%) and Basmati 370, BPT 5204 *Aspergillus niger* was not found. Highest percentage of *Penicillium sp.* (16.66%) was recorded in seed Basmati 370, (10%) in seed Narendra 59, Sonam, BPT 5204 and (6.66%) in seed Rupali. Highest percentage of *Aspergillus clavatus* was recorded (13.33%), Rupali (10%), Narendra 59 (6.66%), Sonam (3.33%), *Aspergillus clavatus* was not found in seed Basmati 370. The same percentage of *Aspergillus ochraceus* was recorded (10%). Narendra 59, Rupali *Aspergillus ochraceus* was not found. Likewise same percentage of *Helminthosporium sp.* was also recorded (6.66%), Narendra 59 (3.33%) and Sonam, BPT 5204 *Helminthosporium sp.* was not found.

V. Conclusion

In the present study different rice varieties viz Basmati 370, Narendra 59, Sonam, Rupali and BPT 5204 were studied for screening of fungi isolation of rice varieties. The result identified different fungal species like *Fusarium sp., Alternaria sp., Aspergillus niger, Penicillum sp., Aspergillus clavatus, Aspergillus ochraceus and Helminthosporium sp*. isolate to above rice varieties. The highest percentage of disease incidence was found (83.33%) in seed Basmati 370 and minimum disease incidence percentage was recorded in seed BPT 5204 (56.66%). Highest fungus frequency was recorded in rice variety Basmati-370 and lowest fungus frequency was found in BPT-5204.

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