FREQUENCY OF FUNGAL MYCOFLORA ON RICE

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INTRODUCTION

Rice (Oryza sativa L.) is the second best essential cereal crop of the world [1]. It is staple food for more than half of the world’s population. About 90% of global rice production is contributed by Asia continent alone. Rice is also essential staple food and cash crop of Pakistan [2]. Rice crop is exposed to attack of 50 diseases that including 6 bacterial, 21 fungal, 4 nematodes, 12 viral, and 7 miscellaneous diseases and disorders. Rice (O. sativa L.) is the most extensively grown cereal crop cultivated in more than 147 million hectares, worldwide [3]. Rice seed is known to be colonized by several genera of fungi, among which many are identified as plant pathogens. The infected seed not only affects the quality of the grain but also spreads the seed-borne pathogens to different regions. Rice is known to be attacked by 56 fungal pathogens [4] out of which 41 are reported as seed borne. It is described a number of fungal species on rice accountable for grain staining. In the Philippines, 70 fungi as seed-borne fungi have been reported on rice. A broad list of fungi correlated with rice seed is given in Table 1. There are various seed-borne pathogens in agriculture [5]. The seed-borne fungi have been grouped into diverse classifications by many workers as field and storage fungi [6] obligate parasites, facultative saprophytes, and facultative parasitism or saprophytes and parasitism. In this research article, various fungal pathogens attacking on rice have been given. Most fungi identified on rice are either:

I. Pathogenic fungi (causing characteristic disease symptoms)

II. Deleterious fungi (normally do not cause any disease but affect rice quality in storage, seed germination, and cause seed rot).

The best haulers of several pathogens are seeds which are responsible for maximum plant diseases prominent to huge loss of crop yield [7].

Table 1: Colonization % = Number of seeds/pieces colonized by a fungus x 100

| S. No. | Plant part | Number of sample | Number of fungi isolated |
|--------|------------|------------------|-------------------------|
| 1.     | Panicles   | 5                | 10                      |
| 2.     | Stem       | 9                | 13                      |
| 3.     | Leaf       | 17               | 14                      |

Table 2: No. of Counts of Mycoflora on Rice

| S. No. | Fungal spp.   | Count |
|--------|---------------|-------|
| 1      | Aspergillus niger | 3     |
| 2      | Fusarium      | 6     |
| 3      | Aspergillus flavus | 1     |
| 4      | Cercospora    | 2     |
| 5      | Hemicola      | 2     |
| 6      | Nigrospora    | 4     |
| 7      | Bipolaris     | 2     |
| 8      | Rhizoctonia   | 1     |
| 9      | Curvularia    | 4     |
| 10     | Chlamydosporium | 1    |
| 11     | Alternaria    | 2     |
| 12     | Alteraria alternata | 1   |
| 13     | Fusarium graminearum | 1 |
| 14     | Phoma         | 1     |
| 15     | Arthrobotrys  | 1     |
| 16     | Pyricularia   | 1     |

Conclusion: In our research, the frequency of fungal mycoflora on rice has been calculated and the maximum isolates of Fusarium spp. have been found.
Table 3: Percentage of mycoflora on different parts of rice plant

| S. No. | Sample code | Name of fung(sp.)  | Leaf  | Stem  | Panicles |
|--------|-------------|---------------------|-------|-------|----------|
| 1.     | 435         | *Aspergillus niger* | 5.5%  | 5.5%  |          |
|        |             | *Fusarium*          | 5.5%  | 5.5%  |          |
|        |             | *Aspergillus flavus*| 5.5%  | 11.1% |          |
|        |             | *Cercospora*        | 27.8% | 44.44%|          |
| 2      | 434         | Anonymous           | 16.67%| 8.3%  |          |
|        |             | *Bipolaris*         | 8.3%  | 2.5%  |          |
|        |             | *Nigrospora*        | 8.3%  | 2.5%  |          |
|        |             | *Curvularia*        | 16.67%|       |          |
| 3      | 395 PR      | Anonymous           | 17%   | 31.03%|          |
|        |             | *Nigrospora*        | 24.13%| 6.89% |          |
|        |             | *Fusarium*          | 6.89% | 6.89% |          |
|        |             | *Curvularia*        | 6.89% |       |          |
|        |             | *Hemila*            | 6.89% |       |          |
|        |             | *Chlamydosporium*   | 6.89% |       |          |
| 4      | 395 PR      | *Fusarium*          | 42.30%| 30.70%|          |
|        |             | *Hemila*            | 30.70%| 27%   |          |
|        |             | *Nigrospora*        | 60%   |       |          |
| 5      | 431 PR      | *Nigrospora*        | 40%   |       |          |
|        |             | *Cercospora*        | 60%   |       |          |
| 6      | 422         | *Nigrospora*        | 64.70%| 64.70%|          |
|        |             | *Aspergillus niger* | 35.25%| 35.25%|          |
| 7      | 433         | *Aspergillus niger* | 18.51%| 18.51%|          |
|        |             | *Nigrospora*        | 18.51%| 18.51%|          |
|        |             | *Fusarium*          | 25.92%| 25.92%|          |
|        |             | *Chlamydosporium*   | 18.51%| 18.51%|          |
|        |             | *Alternaria alternata* | 18.51%| 18.51%|          |
| 8.     | 404-PR      | *Aspergillus*       | 3.4%  | 44.82%|          |
|        |             | *Nigrospora*        | 44.82%| 17.24%|          |
|        |             | *Bipolaris*         | 17.24%| 17.24%|          |
|        |             | *Cercospora*        | 17.24%|       |          |
|        |             | *Fusarium*          | 25%   |       |          |
| 9.     | 1-SD-R      | *Aspergillus*       | 37.5% | 37.5% |          |
|        |             | *Nigrospora*        | 37.5% |       |          |
| 10     | 438         | *Fusarium*          | 54.16%| 54.16%|          |
|        |             | *Aspergillus*       | 4.16% | 4.16% |          |
|        |             | *Alternaria*        | 4.16% | 4.16% |          |
|        |             | *Nigrospora*        | 20.83%| 20.83%|          |
|        |             | *Fusarium*          | 20.83%| 20.83%|          |
| 11.    | 437         | *Nigrospora*        | 35.71%| 35.71%|          |
|        |             | *Aspergillus*       | 32.14%| 32.14%|          |
|        |             | *Alternaria*        | 32.14%| 32.14%|          |
|        |             | *Rhizoctonia*       | 32.14%| 32.14%|          |
| 12.    | 412         | *Fusarium*          | 26.53%| 26.53%|          |
|        |             | *Nigrospora*        | 16.33%| 16.33%|          |
|        |             | *Aspergillus*       | 25.53%| 25.53%|          |
|        |             | *Arthrobotrys*      | 16.33%| 16.33%|          |
|        |             | *Cercospora*        | 4.08% | 4.08% |          |
|        |             | *Rhizoctonia*       | 4.08% | 4.08% |          |
|        |             | *Curvularia*        | 6.12% | 6.12% |          |
| 13.    | 411         | *Aspergillus*       | 10.25%| 10.25%|          |
|        |             | *Rhizoctonia*       | 10.25%| 10.25%|          |
|        |             | *Bipolaris*         | 10.25%| 10.25%|          |
|        |             | *Alternaria*        | 15.38%| 15.38%|          |
|        |             | *Chlamydosporium*   | 15.38%| 15.38%|          |
|        |             | *Nigrospora*        | 23.07%| 23.07%|          |
|        |             | *Curvularia*        | 15.38%| 15.38%|          |
| 14.    | 411=Sindh   | *Nigrospora*        | 35.48%| 35.48%|          |
|        |             | *Fusarium*          | 29.03%| 29.03%|          |
|        |             | *Curvularia*        | 19.35%| 19.35%|          |
|        |             | *Bipolaris*         | 16.12%| 16.12%|          |
| 15     | 420         | *Fusarium*          | 20%   |       |          |
|        |             | *Pyricularia*       | 20%   |       |          |
|        |             | *Fusarium*          | 20%   |       |          |
|        |             | *graminearum*       |       |       |          |
|        |             | *Aspergillus niger* | 4%    |       |          |

(Contd...)
of climatic conditions from temperate to tropics [10] and by wind the pathogen is spread and by infected plant debris or seeds left in the fields the pathogen dispersed. At any stage of growth, rice blast can be seen and produce various symptoms [11]. In different parts of the world, numerous rice blast epidemics have occurred, resulting in yield losses in these areas ranging from 50% to 90% of the expected crop. Yield losses due to blast prolonged from 1 to 50% in diverse rice growing regions of the world dependent on the type of cultivar grown and ecological conditions flourished under normal situations. However, heavy losses are caused by the various diseases under favorable ecological conditions and production may reach up to 90%.

In this research work, mycoflora of various fungal pathogens attacking on rice has been studied.

### METHODS

#### Surveillance and sampling

Diseased samples containing of seeds, stems, and leaves of various rice varieties were collected from different locations including district Narowal-Muridike Rd, Sialkot, Punjab, Pakistan (32°04’06.7”E, 74°33’48.4”E), Nankana Sahib, Punjab, Pakistan (31°21’06.8”N, 73°45’52.6”E), and Bhai Pheru-Mur Khunda Rd, Nankana Sahib, Punjab, Pakistan (31°15’49.9”N, 73°50’10.5”E). These samples were placed into paper bags and were properly labeled and taken back into the laboratory for isolation of different disease causing fungi.

#### Surface sterilization

The affected seeds, stems, and leaves were disinfected with 5% commercial bleach (sodium hypochlorite) for 1–1.5 min and then put into decontaminated Petri dishes comprising freshly prepared potato dextrose agar (PDA) medium. Then, the rice samples were furthermore cut into minor portions such as leaf samples were cut into 0.5 cm² pieces, whereas, stems and panicles samples were cut into 0.5–1.0 cm² pieces.

#### Inoculation

Five seeds/pieces of diseased plant parts were placed in each Petri dish. These Petri dishes were incubated at 25°C for 5 days to induce sporulation of the fungi. Different fungal colonies were appeared, which were purified and multiplied on PDA. The isolated fungal species were identified on the basis of their morphological characteristics through microscopy. The data on frequency of isolated fungi from seeds, stems, and leaves of different rice various varieties were recorded.

### RESULTS AND DISCUSSION

#### Identification and classification

Usually, fungal documentation is done on the basis of morphological features of the collection, conidia, and conidigenous cells. Here, in this research, the fungi were categorized by the progress of spores.
which result in the collection characteristics seen in the laboratory. Fungi were frequently distinguished on the basis of conidiogenesis and other structures, that is, conidiophores and conidiogenous cells were also taken in account. Some fungi produce sporangia (sac-like cells), the whole protoplasm of which became slashed into spores called sporangiospores. On special hyphae called sporangiophores, sporangia were also observed.

Here are the following tables including Tables 1-3 in which the mycoflora of rice has been explored. The results has also been demonstrated in Graphs 1-3.

CONCLUSION

In most modern classifications, fungi are ranked, like plants and animals, as a separate kingdom. A bunch of related species is grouped in a genus, of related genera in families, of families in orders, orders in classes, and classes in subkingdoms. Zygomycotina, Ascomycotina, and Deuteromycotina are the three subkingdoms of the kingdom fungi that include the most significant genera in food spoilage. Fungi from each of these subkingdoms have fairly separate properties, shared with other genera and species from the same subkingdom.

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