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# Isolation and Identification of Thermophillic Fungi from Storage Rice Products

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**Abstract:** ***In present study isolation of fungi were done and chiwada from storage rice product such as poha murah. These organisms usually grow during storage of rice products and produces mycotoxins that are carcinogenic or mutagenic for human beings. Isolation of thermophillic fungi were done at 45°C from different sample of rice storage products in different media by Warcut (1950) method. Morphological studies were done and stained by lactophenaol cotton blue. Identification were done with the help of various Literatures related with fungal identification. Result were shown that during storage of various rice products poha, murrah and chiwada different thermophillic fungal diversity were obtained. More number of thermophillic fungi were found in poha (4) and murrah (3) as compare to chiwada (2). A. fumigatus and Rhizopus sp. shown dormancy on storage rice products whereas A. flavus in murrah and Mucor sp. and Rhizomucor sp. found in poha. Effect of various temperature (25-45°C) and media (YPSS, Malt agar, and Potato Dextrose Agar) on thermophilic fungi result were shown that 45°C temperature and YPSS media highly supported growth of fungi. By these investigation easily understand the rice-grain fungal species and raised awareness about the control of fungi contaminated food and feed. This studies, we can find out effective and safe method for controlling grain fungi during storage may be the microbe-mediated (biological) control measure to overcome the economic losses.***

**Keywords:** Rice products, Mycotoxins, Thermophillic fungi, *A. fumigatus, A. flavus, Mucor* sp., *Rhizopus*

## 1. Introduction

The diet of many people is supplemented with food items preserved by special methods and available in a variety of conditions and stages of preparation. The unrestricted growth and multiplication of these microorganisms in food may render it unfit for consumption and can result in spoilage or deterioration. Cereals and cereal products contain microorganisms from insects, soil and other sources. Mostly bacteria such as species and some molds like *Aspergiltus*, *Penicilltum* were also present over their [1].

Among the eukaryotic organisms, only a few species of fungi have the ability to thrive at temperatures between 45°C and 55°C. Such fungi comprise thermophilic and thermotolerant forms, which are arbitrarily distinguished on the basis of their minimum and maximum temperature of growth [2] the ability of some 30 species, out of approximately 50,000 recorded fungal species, to breach the upper temperature limit of eukaryotes is a phenomenon that deserves elucidation. Moreover, this group of fungi provides scientists with valuable experimental material for investigations of the mechanisms which, although allowing their growth at moderately high temperatures, limit it beyond 60 to 62°C [3]. The first of the known thermophilic fungi, *Mucor pusillus*, was isolated from bread and described over a century ago by [4]. Some reports shown that thermotolerant fungi associated with bio deterioration of stored and other agricultural products [5].

Wheat and other grain samples were separately analysed to identify the presence of fungi and their mycotoxins. The mycological profile of the retail in different markets at Riyadh (Kingdom of Saudi Arabia) was studied. Sixteen samples were collected from storage shops importer from Saudi Arabia. The most common genera were *Alternaria* (isolated from 68.96% of the tested samples), *Aspergillus* (24.14%) and in a lesser extent *Fusarium* (6.9%) [6]. *Aspergillus flavus* is one of the major producers of aflatoxin and can contaminate wide range of agricultural commodities either in field or in storage. 15 presumptive *Aspergillus flavus* has been isolated from 30 feed and grain samples. This study alarms us about the potential risks of *Aspergillus flavus* to public health if contaminate agricultural commodities such as grains or raw materials such as poultry feed [7]-[8]. The organisms usually grow during storage of rice products and produces mycotoxins that are mutagenic and carcinogenic for human beigns. Therefore, occurrence of mycotoxins and aflatoxin should be further investigated to assess health risks linked with the consumption of this commodity. Proper harvest and storage management is required to reduce the risk of aflatoxin in feed and grains. In this studies isolation and identification of thermophillic fungi from rice product such as poha, murah and chiwada were done.

## 2. Materials and Methods

In this studies isolation and identification of thermophillic fungi from rice product such as poha, murah and chiwada were done. Samples of rice products such as poha, murah and chiwada were collected from the storages of villagers and town merchants. Isolation of thermophillic fungi were done by 2 methods. In first method 5gof each sample were incubated at 45Cfor 24 hrs, after that small amount of heat treated powder inoculated on Emerson's EYPSs media [9]. In second method powder samples of each were amended with 10% glucose and cellulose and the incubated at 45C temperature for 48hrs. Then samples were plated on EYPSs media by [9]. Morphology studies and staining (lacto phenol cotton blue) were done of isolated thermophilic fungi. Fungi were identified with the help of literatures and guidance.

Effect of various temperature (25-45°C) and media (YPSS, Malt agar, and Potato Dextrose Agar) on thermophilic fungi were studied.

## 3. Results and Discussion

Isolation and identification of thermophillic fungi from rice product such as poha, murah and chiwada result were shown that during storage of various rice products poha, murrah and chiwada five different thermophillic fungal diversity *Aspergillus fumigatus* were obtained. More number of thermophillic fungi were found in poha (4) and murrah (3) as compare to chiwada (2). *A. fumigatus* and *Rhizopus* sp. shown dormancy product whereas *A. flavus* in murrah and *Mucor* sp. and *Rhizomucor* sp. found in poha (Table: 1) (Fig.: 1).

**Table1:** List of Thermophilic Fungi of storage rice products

| *Thermophilic Fungus* | *Poha* | *Chiwada* | *Murrah* |
|---|---|---|---|
| *Aspergillus fumigatus* | + | + | + |
| *Aspergillus flavus* | - | - | + |
| *Mucor* sp. | + | - | - |
| *Rhizopus* sp. | + | + | + |
| *Rhizomucor* | + | - | - |
| Total | 4 | 2 | 3 |

### 3.1 Effect of various temperature and media on thermophilic fungi isolated from storage rice products

Effect of various temperature (25°C- 45°C) and media (YPSS, Malts agar, and Potato Dextrose Agar) on thermophilic fungi isolated from storage rice products. Thermophilic fungi were shown high growth at 45°C as compare to 35°C and 25°C. At 45°C temperature highest radial growth of *A. fumigatus* shown 4.2 cm whereas *Rhizopus* sp. 2.6cm *A. flavus* and *Mucor* sp. 1.7cm (Table: 2). Different thermophilic fungi shown different rates of growth in different media. YPSS media highly supported growth of thermophilic fungi *A. fumigatus* shown 4.1 cm whereas *Rhizopus* sp. 2.8cm *A. flavus* and *Mucor* sp. 1.7cm (Table: 3)

**Table 2:** Effect of Various Temperature (25-45°C) on Thermophilic Fungi of stored rice products

| *Thermophilic Fungus* | *Radial growth of Fungi (in cm)* | | |
|---|---|---|---|
| | *25°C* | *35°C* | *45°C* |
| *Aspergillus fumigatus* | 2.9 | 3.2 | 4.2 |
| *Rhizopus* sp. | 2.1 | 2.5 | 2.8 |
| *Mucor* sp. | 0.9 | 1.1 | 1.7 |
| *Aspergillus flavus* | 0.9 | 1.1 | 1.7 |

**Table 3:** Effect of Different Media (YPSS, Malts agar, and Potato Dextrose Agar) on Thermophilic Fungi of stored rice products

| *Thermophilic Fungus* | *Radial growth of Fungi (in cm)* | | |
|---|---|---|---|
| | *Potato Dextrose Agar Media* | *Malt Agar Media* | *YPSS Media* |
| *Aspergillus fumigatus* | 3.5 | 2.1 | 4.1 |
| *Rhizopus* sp. | 2.3 | 1.9 | 2.8 |
| *Mucor* sp. | 1.2 | 0.7 | 1.7 |
| *Aspergillus flavus* | 1.4 | 0.9 | 1.7 |

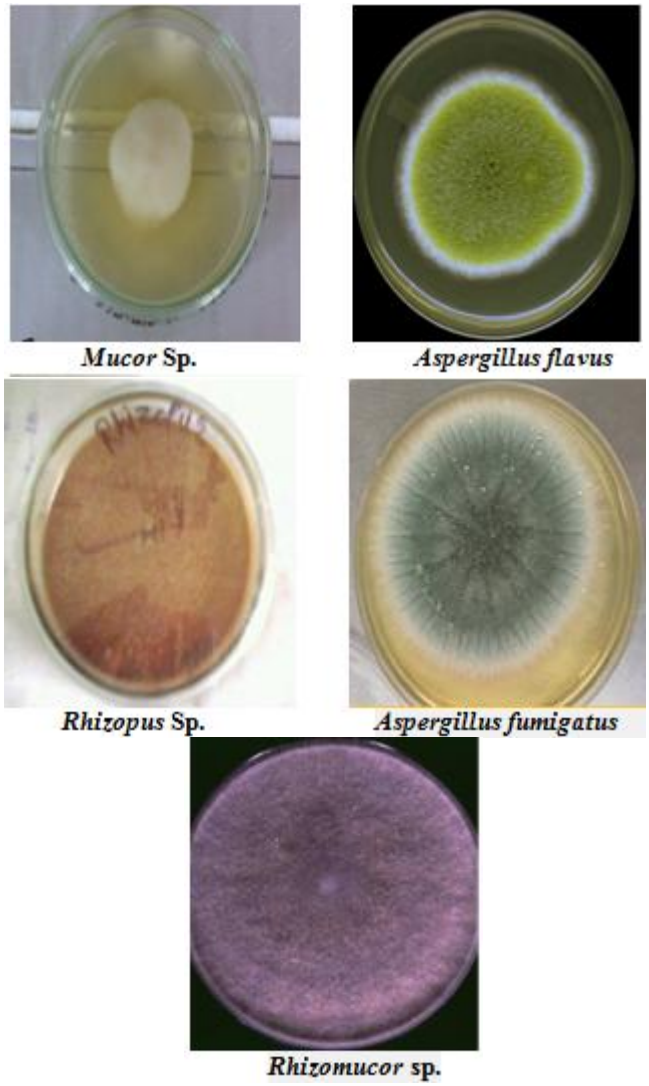


**Figure 1:** Thermophilic Fungi of storage rice products

Previous studies shown that during storage of grains some thermophilic fungi were grown such as *Mucor* sp. [4], *Aspergillus* sp. [6]-[7], released mycotoxins and aflatoxin and destroyed stored food grains. In present study also found that *A. Fumigatus* and *Rhizopus* sp. grown highly in all rice storage products whereas *A. flavus, Mucor* sp. were also found in some rice storage products. 45°C temperature and YPSS media supported growth of fungi because they were thermophile and required starch materials for their healthy growth. These investigation help us to understanding of the impact of rice-grain fungal species on human and animal health, whether in the form of disease-causing spores or dangerous mycotoxins (*e.g.,* aflatoxins), has raised awareness about the control of fungi contaminated food and feed.

## 4. Conclusion

In this studies isolation and identification of thermophillic fungi from rice product such as poha, murah and chiwada were done. This studies, we can find out thermophillic fungi *A. Fumigatus*, *Rhizopus* sp., *A. flavus, Mucor* sp. and *Rhizomucor* sp. during storage rice products and also find that 45°C temperature and YPSS media supported growth of all fungi. These studies help us to kwon about damage causing fungi and their nature. With the help of this

investigation we will also find out novel active agents for antifungal compounds or detoxification enzymes and biosynthesis inhibitors of mycotoxins in future. It is essential because it can provide safe and effective method for aflatoxin detoxification, and overcome the economic losses which causes by fungi due to poor storage condition.

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