Mycofloral Diversity and Contamination Assessment of Tur (Cajanus cajan) and Fennel (Foeniculum vulgare) Seeds

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***Abstract*—The present study investigating the occurrence, diversity, and distribution of fungal species (mycoflora) associated with tur and fennel seeds collected from different markets from Aurangabad, Maharashtra, India. A total of 120 seed samples were analyzed using standard mycological methods, focusing on both field fungi and storage fungi. Identification was performed through morphological and microscopic characteristics. Aspergillus spp., Penicillium spp., Fusarium spp., Rhizopus spp., and Alternaria spp. were the dominant genera detected, with Aspergillus flavus and Penicillium citrinum showing the highest incidence. The fungal load varied significantly between tur and fennel seeds, revealing high contamination in poorly stored samples. The findings highlight the need for improved post-harvest handling and storage to reduce mycotoxin risks and seed quality deterioration.**

***Index Terms*—Mycoflora; Tur seeds; Fennel seeds; Fungal contamination; Aspergillus; Penicillium spp.**

I. INTRODUCTION

Seeds are very important agricultural commodities, and their quality directly impacts crop productivity and food safety. Tur (Cajanus cajan) is an essential legume in semi-arid regions, while fennel (Foeniculum vulgare) seeds are widely used as spices and medicinal herbs. Both are susceptible to fungal infection during pre- and post-harvest stages. Several researchers have reported fungal contamination in seeds .Sikora & Munkvold (2004) documented that storage fungi such as Aspergillus and Penicillium species are prevalent in damp and warm environments. Pitt & Hocking (2009) analyzed seed mycoflora and emphasized Aspergillus contamination as a global concern due to aflatoxin production. Kumar et al. (2017) studied fungal diversity in legume seeds and reported Fusarium and Alternaria as frequent contaminants with potential plant pathogen roles. Fungi not only reduce germination and nutritive value but may also produce harmful mycotoxins, which makes unfit for consumption. Analysing the mycoflora helps develop strategies to mitigate seed spoilage and ensure safety. However, comparative studies on tur and fennel seed mycoflora under Indian climatic conditions remain limited, warranting detailed investigation.

II. MATERIALS AND METHODS

Sample Collection

A total of 120 seed samples (60 tur and 60 fennel) were collected randomly from local markets and farms across Aurangabad, Maharashtra during the post-harvest season (November–December 2025). Samples were stored in sterile containers and transported to the laboratory.

Isolation of Fungi

The Agar Agar method was used:

1. Seeds were surface sterilized with 1% sodium hypochlorite for 2 minutes and rinsed with sterile distilled water.
2. Five seeds from each sample were placed on Potato Dextrose Agar (PDA) plates in triplicate.
3. Plates were incubated at 28±2°C for 5–7 days.
4. Fungal colonies were recorded and sub-cultured for identification.

Identification of Fungal Isolates

Identification was based on:

I. i.Macroscopic colony features (color, texture)
II. ii.Microscopic characteristics using lactophenol cotton blue stain
III. iii.Standard keys by Barnett & Hunter (1998) and Domsch et al. (1980).

Data Analysis
Fungal incidence percentage
Incidence (%) = (Total seeds plated) ×100
Number of seeds infected

III. OBSERVATION

Frequency of Fungal Genera
Fungal Incidence on Tur seeds:

Fungal Incidence on Tur seeds		Fungal Incidence on Fennel seeds	
Fungi Associated	Percentage %	Fungi Associated	Percentage %
Aspergillus flavus	39 %	Aspergillus niger	32%
Penicillium citrinum	29 %	Aspergillus flavus	26%
Fusarium oxysporum	15 %	Penicillium chrysogenum	22%
Alternaria alternata	11 %	Fusarium equiseti	10%
Rhizopus stolonifer	6 %	Alternaria spp.	10%

Comparison Between Seed Types

I. i.Total fungal contamination was higher in tur seeds (60%) than fennel seeds (52%).
II. ii.Aspergillus species dominated both seeds but varied in species composition.
III. iii.Storage fungi were more frequent than field fungi.

IV. RESULT

Aspergillus flavus showed the highest incidence (38%) followed by Penicillium citrinum (28%), indicating dominance of storage fungi in tur seeds. Fennel seeds were predominantly contaminated by Aspergillus niger (32%) and A. flavus (26%), while field fungi occurred at comparatively lower frequencies. Tur seeds showed higher overall fungal incidence compared to fennel seeds. Storage fungi (Aspergillus and Penicillium) dominated both seed types.Aromatic nature of fennel seeds may contribute to reduced fungal diversity. Presence of toxigenic fungi (A. flavus) suggests potential mycotoxin risk.

V. DISCUSSION

The predominance of Aspergillus and Penicillium species aligns with typical mycofloral profiles of stored seeds. Their high incidence is associated with warm and humid conditions common in post-harvest environments. Aspergillus flavus is particularly concerning due to its ability to produce aflatoxins, posing health risks to consumers and livestock.

The differences in fungal profiles between tur and fennel seeds may reflect variances in seed surface properties, moisture content, and storage conditions. Fennel seeds' aromatic compounds might exhibit antifungal effects, which could explain slightly lower fungal prevalence.

VI. CONCLUSION

The study highlights significant fungal contamination in both tur and fennel seeds, emphasizing the need for:

I. Effective drying practices
II. Improved storage conditions (low humidity & temperature)
III. Regular quality monitoring

Future research should assess mycotoxin levels to quantify health risks and explore biological control measures to protect seed quality.

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