

## FUNGI ON STORED CEREALS

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The presence of fungi on stored grains of *Oryza sativa* (Ponni and ASD-18), *Triticum vulgare*, *Eleusine corocana* and *Pennisetum typhoides* was tested by plating the grains on Czepek-Dox-agar medium. The fungi developed in the stored grains included, *Aspergillus*, *Mucor*, *Rhizopus*, *Trichoderma*. Among them, *A. niger* and *A. flavus* were universally present in all the stored grains.

**Keywords :** Stored grains; Storage fungi.

Cereal grains are the major sources of food and raw materials for many industrial processes<sup>1</sup>. The loss of grains during storage is roughly placed at 5% in the world and 30% in India. Cereals are infested with large number of microorganisms<sup>2,3</sup>. The principal causes for the loss in quantity and quality of stored grains are chiefly, rodents, insects, mites and fungi<sup>4-6</sup>. Fungi growing on the stored grains are responsible for the loss of germination, discolouration, heating and mustiness, biochemical changes, production of toxins and loss in weight<sup>7-8</sup>. The extent of damage in grain depends on the level of infestation by fungi. Among the major factors that influence development of fungi on stored grains, high relative humidity (70-90%), low temperature, longer time of storage and the presence of inoculum at the place of storage<sup>9,10</sup> are important. In the study, fungi present in grains of *Oryza sativa*, *Triticum vulgare*, *Eleusine corocana* and *Pennisetum typhoides* at major storage places of Tiruchirapalli and Dharmapuri Districts were isolated and reported. The cereals, Ponni and ADS-18, *Triticum vulgare*, *Eleusine corocana* and *Pennisetum typhoides* stored in gunny bags for 4-11 months at the place of storage, were washed, sterilized in 0.1% HgCl<sub>2</sub> for 60 sec and further cleaned with 7.5% NaCl to see fungi present inside the grains. The grains were spread on a filter - paper-linked - petri dishes to absorb excess moisture. The grains were then plated onto the Czepek-Dox Agar medium<sup>1</sup>. Bacterial growth was prevented by the addition of streptopenicillin to the

medium (25 units. ml<sup>-1</sup>). The plates were incubated at 30°C in the culture room and the fungal colonies developed were subcultured and identified<sup>11,12</sup>.

The presence of different fungal species in grains are indicated in Table-1. The total number of fungal colonies was highest in stored grains of *Triticum vulgare*, when compared to other grains. In all the stored grains, *A. niger* was the more predominant form. Occurrence of *A. nidulans*, *T. viridae*, *Rhizopus*, *A. flavus* was at par in stored grains of *O. sativa* (Ponni). The occurrence of *A. niger* was higher than the other fungi in the grains of *O. sativa* (ASD-18), *E. corocana*, *T. vulgare* and *P. typhoides*.

The present study shows that all the stored food grains harboured fungi due to congenial environment prevailing in the storage places. The presence of *Aspergillus* spp. in the stored grains of Tiruchirapalli and Dharmapuri districts can be of great concern and proper conditions of storage would be necessary to eliminate and development of fungi on stored grains.

In summary, the grains of *Oryza sativa*, *Triticum vulgare*, *Eleusine corocana* and *Pennisetum typhoides* stored in different godowns for varied periods at Tirichirapalli and Dharmapuri districts indicated the presence of *Aspergillus* spp., *Mucor*, *Rhizopus* and *Trichoderma*. Of these, storage fungi, *A. niger* and *A. flavus* were seen to develop in all the grains encouraged by the prevailing conditions at the place of

**Table 1.** Occurrence of various fungi on stored cereals.

Cereals	Fungi present	Percentage of occurrence
<i>Oryza sativa</i> (Ponni)	<i>Aspergillus nidulans</i>	21.4
	<i>Trichoderma viridae</i>	21.4
	<i>Rhizopus sp.</i>	28.8
	<i>Aspergillus flavus</i>	28.6
<i>Oryza sativa</i> (ASD-18)	<i>Aspergillus niger</i>	47.0
	<i>Aspergillus flavus</i>	16.0
	<i>Trichoderma viridae</i>	16.0
	<i>Mucor sp.</i>	21.0
<i>Triticum vulgare</i>	<i>Aspergillus niger</i>	63.0
	<i>Aspergillus flavus</i>	9.0
	<i>Trichoderma viridae</i>	9.0
	<i>Mucor sp.</i>	18.0
<i>Eleusine corocana</i>	<i>Aspergillus niger</i>	54.0
	<i>Aspergillus fumigatus</i>	23.0
	<i>Aspergillus terreus</i>	22.0

storage.

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#### References

- Godfrey T and West S 1996, *Industrial Enzymology*, Macmillan press, U.K.
- WSDA 1967, *Agricultural Statistics*, WS Government printing office, Washington DC 20402.
- Christensen CM and Kaufmann HH 1969, *Grain Storage. The role of fungi on quality loss*, University of Minnesota Press, Minneapolis.
- Amos A J, 1948, *Analyst*, 73 678
- Griffiths DA, Hodson AC and Christensen CM 1959, *J Econ. Entomol.* 52 514
- Cotton R T 1950, *Insect pests of stored products*, Burgess Publishing Co. Minneapolis.
- Christensen C and Drescher R F 1954, *Cereal Chem.* 31 206
- Moss MO 1979, *Moulds, Toxins and Food*, John Wiley & Sons. Chichester.
- Lutey R W and Christensen CM 1963, *Phytopathol.* 53 713
- Christensen CM 1959, *Bot. Rev.* 23 108
- Ellis MB and Ellis J B 1988, *Microfungi on Miscellaneous Substrates-An Identification Handbook*, Croom Helm, London.
- Singh K, Frisrad JC, Thrane U and Mathus J B 1991, *An illustrated manual on Identification of Some Seed-borne Aspergillus, Fusaria, Penicillia and their Mycotoxins*. The Technological University of Denmark.