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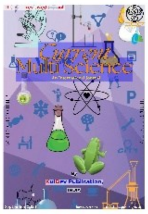

Research Article

# Impact of Storage Fungi on Biochemical Changes in some oil Seeds

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A B S T R A C T

India is one of the world's top producers of oilseeds and it plays a significant role in the Indian agricultural economy. Western vidarbha region in Maharashtra plays an important role in the production of oil seeds in India. Seed-borne fungus are a major problem during storage oil seeds,A variety of factors, including postharvest and storage disease pathogens, as well as unfavorable environmental circumstances have a serious effect on seeds. Survey and collection of stored oil seeds soybean, mustard, sesame, Niger and linseedscollected from several places in Maharashtra's western vidarbha region. The purpose of this study was to check at how oil seeds changed during storage.In this study 10 seed-borne fungus were isolated from abnormal oil seeds though different methods i.e.The Agar plate method PDA media, GNA was used to detect seed mycoflora in these samples as recommended by ISTA,.isolate fungi *Alternaria alternata, Alternaria dianthicola Aspergillus flavus, Aspergillus niger, Curvularia lunata, Cercospora sesani Fusarium oxysporum, Rhizopus nigricans Trichoderma viride and Penicillium spp* .Seed quality deteriorates under various storage conditions. In view of this, experiments were carried out to analyse biochemical changes in oilseeds, such as changes in decreasing sugar and crude fibre content, caused by an artificial infestation of storage fungi.


## 1. Introduction

In India is blessed with varied agro-ecological environments ideally suited for growing a variety of oilseeds which include nine main oilseed crops are grown seven of which are edible oils (soybean, groundnut, and rapeseed ,sunflower, sesame, niger, and mustard two are of non-edible oils (castor and linseed). In terms of acreage, production is the most important factor. Oilseeds are only second in terms of economic value. In recent years many developing countries including India, have attempted to improve seed output. Unfortunately a considerable portion of annual production is lost in storage due to a lack of efficient post-harvest preservation techniques, and these losses have been related in part to microbial action in storehouses.

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Fungi that develop on stored grains can affect germination rates and cause losses in carbohydrate, protein, and total oil content, as well as increase moisture content and free fatty acid content, among other biochemical changes (Kashinath Bhattacharya & Subrata Raha, 2002).Deterioration is defined as a catabolic process in oil seeds that includes cytological, physiological, biochemical, and morphological alterations Kapoor et al. (2010). Oilseeds are sensitive to fungal attack due to improper storage conditions. The fungi both qualitatively and quantitatively damage the grains. Changes in glucose, protein, and fat levels are caused by storage fungus.Seed is a living organism that is subjected to a variety of environmental challenges that have an impact on its quality. Seed viability and vigour are influenced by several physico-chemical parameters in storage, including moisture content, atmospheric relative humidity, temperature, initial seed quality, physical and chemical composition of seed, gaseous exchange, storage structure, packaging materials (Doijode, 1995).The viability of a seed has been correlated with changes in chemical constituents in the cell. Because fungus growing on stored seeds can decrease germination rates while also causing losses in protein, carbohydrate, and total oil content, as well as an increase in moisture content and free fatty acid content, as well as other biochemical changes during storage. The preservation of cereal grains, oilseeds, and other seeds is negatively affected by the tropical climate's high temperature and relative humidity, as well as improper storage conditions, resulting in a total loss of quality and quantity of seed production(AmeerJunaithal *et a1*., 2013).Numerous deteriorative bacteria, mainly fungus, have caused plenty of issues in manufacturing and storage. Many authors have recorded the presence of *A. flavus*, as well as other fungus, in sesame seeds ( Mbah, M. C. and C. O. Akueshi 2000).In the finger millet seeds, Aspergillus *flavus* and *Curwlaria lunata* decreased the carbohydrate, sugar, and protein levels (Prasad *et a1*., 1988).

Farmers in the western vidarbha region (Amravati division) are having major problems with oilseeds.Oilseeds seeds come into contact with a variety of microorganisms in the field and during storage. Oil-seeds are sensitive to fungus infectionmany seed-borne fungi were discovered during the storage period and they were responsible for physical and biochemical changes. Because of the issues, soybean, mustard, sesame, niger, and linseed stored oilseeds were selected for this study.

**Materials And Methods**

Collection of samples, detection and identification of seed mycoflora:Seed samples were collected from fields, storehouses, market places and seed companies and as per method described by Neergaard (1973). The seed mycoflora of oil seeds was isolated on Glucose nitrate agar (GNA) media as recommended by ISTA (1966), De Tempe (1970). Ten dominant fungi isolated from damaged oilseeds were applied to examine their impact on oilseed nutritional status. Healthy soybean, mustard, sesame, niger, and linseed seeds were surface sterilized with 0.1% mercuric chloride solution, then cleaned and immersed for four hours in sterile distilled water. The seeds were removed carefully of excess water. The seeds were divided into flasks (weighing l00g each) and treated separately with 10ml spore suspension of the test fungi.The flasks were incubated for 14 days at room temperature. Seeds were properly cleaned under running tap water after collecting to remove the entire mycelia mat from their surface. The seeds were then dried at 60°C for 48 hours before being crushed into fine powder to determine chemical changes in the seeds. Seeds inoculated with spore suspensions of fungi but not treated with spore suspensions of fungi served as the control ( Kakde and chavan 2011).

The sugar content in the material was estimated by the procedure recommended by Oser (1979). Crude fiber content was estimated by the method recommende by Sadashivam and Manickam (2008).

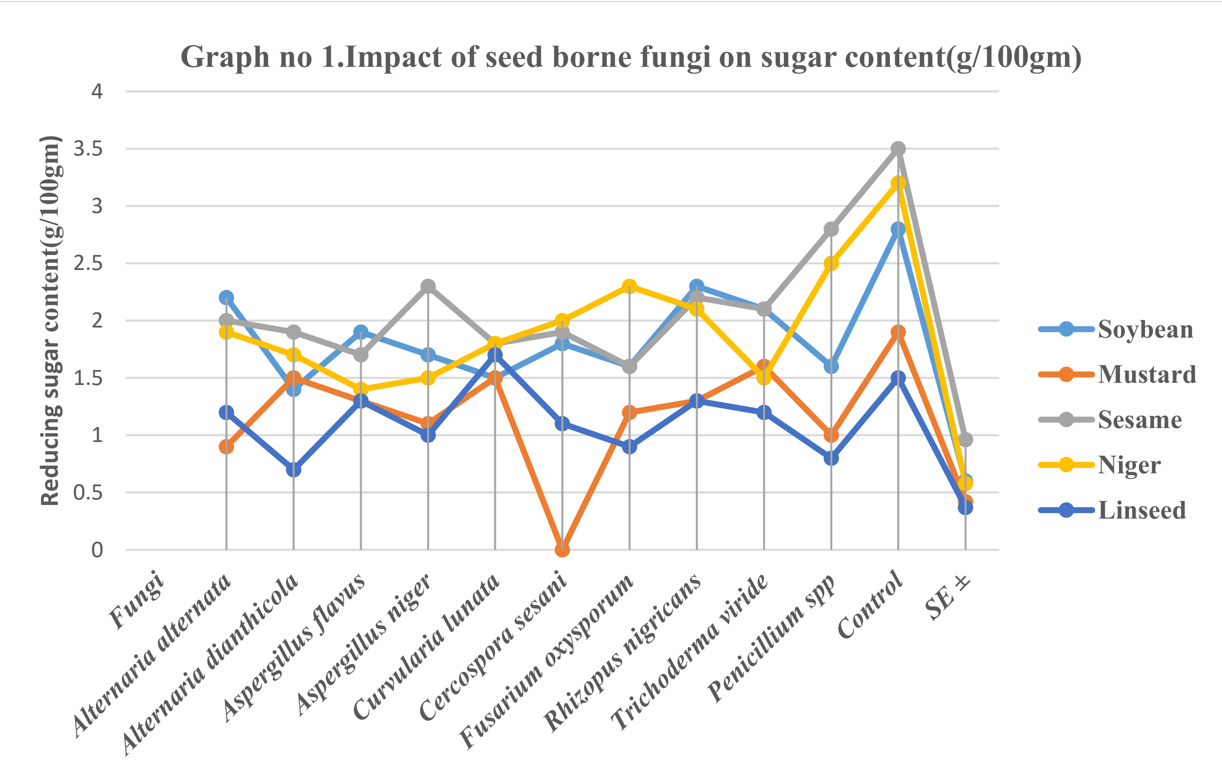
**Sugar Content**

**Table no 1.Impact of Seed-Borne Fungi on Sugar Content (g/100g).**

| Seeds / Fungi | Soybean | Mustard | Sesame | Niger | Linseed |
|---|---|---|---|---|---|
| ***Alternaria alternata*** | 2.2 | 0.9 | 2 | 1.9 | 1.2 |
| ***Alternaria*** | 1.4 | 1.5 | 1.9 | 1.7 | 0.7 |

| | | | | | |
|---|---|---|---|---|---|
| ***dianthicola*** | | | | | |
| ***Aspergillus flavus*** | 1.9 | 1.3 | 1.7 | 1.4 | 1.3 |
| ***Aspergillus niger*** | 1.7 | 1.1 | 2.3 | 1.5 | 1.0 |
| ***Curvularia lunata*** | 1.5 | 1.5 | 1.8 | 1.8 | 1.7 |
| ***Cercospora sesani*** | 1.8 | o.8 | 1.9 | 2 | 1.1 |
| ***Fusarium oxysporum*** | 1.6 | 1.2 | 1.6 | 2.3 | 0.9 |
| ***Rhizopus nigricans*** | 2.3 | 1.3 | 2.2 | 2.1 | 1.3 |
| ***Trichoderma viride*** | 2.1 | 1.6 | 2.1 | 1.5 | 1.2 |
| ***Penicillium spp*** | 1.6 | 1 | 2.8 | 2.5 | 0.8 |
| **Control** | 2.8 | 1.9 | 3.5 | 3.2 | 1.5 |
| **SE±** | 0.60 | 0.42 | 0.96 | 0.58 | 0.37 |

**SE± : Standard error**

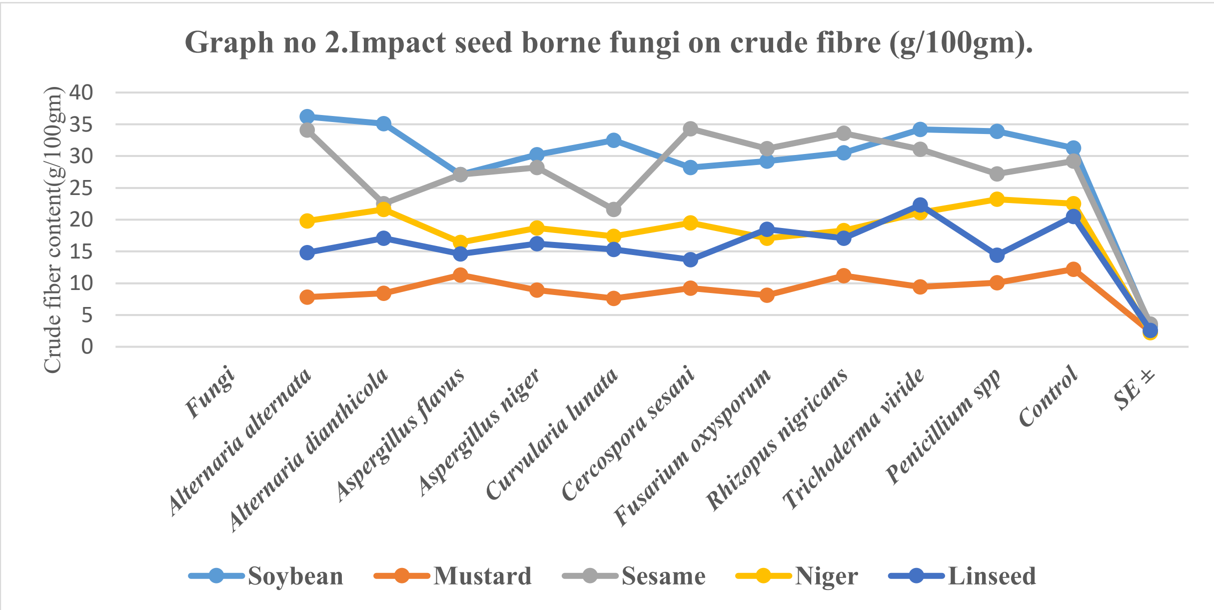



**Crude fiber**

**Table no 2.Impact of Seed-Borne Fungi on Crude Fibre Content (g/100g).**

| Seeds / Fungi | Soybean | Mustard | Sesame | Niger | Linseed |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| ***Alternaria alternata*** | 36.2 | 7.8 | 34.1 | 19.8 | 14.8 |
| ***Alternaria dianthicola*** | 35.1 | 8.4 | 22.5 | 21.6 | 17.1 |
| ***Aspergillus flavus*** | 27.1 | 11.3 | 27.1 | 16.4 | 14.6 |
| ***Aspergillus niger*** | 30.2 | 8.9 | 28.2 | 18.7 | 16.2 |
| ***Curvularia lunata*** | 32.5 | 7.6 | 21.6 | 17.4 | 15.3 |
| ***Cercospora sesani*** | 28.2 | 9.2 | 34.3 | 19.5 | 13.7 |
| ***Fusarium oxysporum*** | 29.2 | 8.1 | 31.2 | 17.1 | 18.5 |
| ***Rhizopus nigricans*** | 30.5 | 11.2 | 33.6 | 18.3 | 17.1 |
| ***Trichoderma viride*** | 34.2 | 9.4 | 31.1 | 21.1 | 22.3 |
| ***Penicillium spp*** | 33.9 | 10.1 | 27.2 | 23.2 | 14.4 |
| **Control** | 31.3 | 12.2 | 29.2 | 22.5 | 20.5 |
| **SE±** | 3.3 | 2.4 | 3.6 | 2.2 | 2.6 |




**Result And Discussion**

In table no.1 and graph 1 show that, *Alternaria dianthicola, Fusarium oxysporum* and *Penicillium spp*. caused a decrease in reducing sugar in soybean seeds. Also, *Alternaria dianthicola, Curvularia pellescens*, and *Fusarium equiseti* caused a reduction in reducing sugar in soybean seeds reported by kakde and chavan (2011).*Cercospora sesani, Alternaria alternata* and *Penicillium spp*cause a significant reduction in reducing sugar concentration in mustard. *Curvularia lunata, Fusarium oxysporum*, and *Aspergillus flavus* exhibited the maximum reduction reducing sugar in sesame seeds.Due to *Macrophominaphaseolina* and *Fusarium oxysporum* infestations, decreasing sugar in sesame is significantly reduced reported by kakde and chavan (2011).Whereas reducing sugar in Niger is significantly reduced due to *Trichoderma viride, Aspergillusflavus*, Penicillium *spp* and

*Alternaria dianthicola* cause a large loss of reducing sugar in linseed.Oil content decreased total sugar by 23.4 percent and decreasing sugars by 45.6 percent during storage reported by (Jaya singh *et al* 2018).

*Aspergillus niger, Cercospora sesani, Curvularia lunata, Trichoderma viride*, and *Penicillium spp* were reported to cause the highest rise in crude fibre content in soybean but *Aspergillus flavus,Alternaria alternata, Alternaria dianthicola*,*Fusarium oxysporum*and *Rhizopus nigricans* decrese crude fibre as compare to control. Rathod (2007) reported that *Alternaria* species significantly reduced crude fibrecontent.*Fusarium equiseti* and *Penicillium notatum* showed a decrease in crude fibre reported by kakde and chavan (2011),when compared to the control, all fungi reduce crude fibre in mustard.The most significant drop in crude fibre content in sesame was found to be caused by *Alternaria dianthicola, Aspergillus flavus, Aspergillus niger, Curvularia lunata*, and *Penicillium spp*. According to kakde and chavan (2011),*Penicillium chrysogenum* and *Curvularia lunata* were shown to be responsible for the highest reduction in sesame crude fibre content.The impact of all fungus has resulted in a significant loss in crude fibre content in niger and linseed. (Table 2 and graph 2).

**Conclusion**

Finally, the study found that fungus growth on stored oil seeds caused bio-deteriorative changes in seed contents such as reducing sugar and crude fiber.It appears that seeds are a dominant aspect of fungal transmission; therefore, post-harvest seeds should be properly maintained without damage and managed with appropriate eco-friendly management to prevent fungal infection.

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