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## STUDIES ON CHEMICAL CONSTITUENTS OF INFECTED GROUNDNUT KERNELS BY FUNGAL PATHOGENS, EAST KHANDESH, MAHARASHTRA, INDIA

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### ABSTRACT

In 2020, groundnut production for Maharashtra was 0.32 million tonnes. Groundnut production of Maharashtra fell gradually from 0.42 million tonnes in 2017 to 0.32 million tonnes in 2020. Ground nut production and utilization has increased since last decades due to high nutritive value and its uses. Seed borne fungi of groundnut (*Arachis hypogaea* L.) are responsible to deteriorate and degrade kernels quality and quantity of potential nutrients causing losses to the farmers in East Khandesh region during storage practices. The prevalent symptoms on seeds were decay, rots, pod rots, spots etc. In these studies, an attempt was made to note the dominant fungal organisms like *Aspergillus flavus*, *Rhizoctonia bataticola*, *Penicillium* sps., *Fusarium* sps. and so on, affecting the primary contents in the seeds such as carbohydrates, fats and proteins. The best storage practices are needed to check the damages. Present paper highlights % Changes in primary metabolites contents of groundnut kernels infected with different fungal species

**Keywords:** Groundnut seeds, fungal primary contents, East Khandesh.

### Introduction

India is the largest producer of groundnut (*Arachis hypogaea* L.) in the world. In East Khandesh region of Maharashtra groundnut is grown in kharip and rabi. Where irrigation facilities are available. The pods are sold fresh or dried and stored. Micro fungi from the soil cause disease to groundnut pods/kernels before and after harvest in the fields during the handling transport and storage also. They affect quality and quantity of pods and seeds resulting economic losses to farmers. Fungi like *Absidia corymbifera*, *Aspergillus aculeatus*, *A. flavus*, *A. niger*, *A. terreus*, *A. ustus*, *Curvularia lunata*, *Fusarium oxysperum*, *Humicola* sp., *Penicillium funiculosum*, *P. varians*, *Phytophthora undulate* and *Rhizoctonia bataticola* discover and damage. The kernels (Joffe and Borut, 1966; Gupta and Chohan, 1970). In these studies, an attempt was made to note the dominant fungal species affecting primary contents of groundnut kernels.

### Materials and Method

Groundnut pod samples were collected from fields throughout East Khandesh region of Maharashtra from 2006-2008. The mycoflora from suspected concealed pod/kernels was isolated and screened by soil dilution plate techniques (Montegut, 1960). Some pods and kernels were also directly plated on the medium. Dominant fungi were selected for studying their effect on carbohydrate, lipids & proteins contents (Ward & Diner, 1961) and Singh *et al.* (1974). 20 gm healthy sterilized seeds of groundnut were inoculated with 2 ml. as of individual fungal spores' suspension. Seeds were previously moistened with Czapek Dox liquid medium.

Flask was incubated for 14 days at room temperature (26 +/- °C). Mycelial mat was removed by washing the seeds with sterile water, dried at 60 °C and powdered sample were analyzed for primary contents detection. Crude fat content was estimated by Soxhlet extractor and defatted samples were analyzed for estimation of total carbohydrates Dubois *et al.* (1956) and total crude proteins Nagel, (1981) as described by Oser, (1960) and AOAC (1975).

### Results and Discussion

From the concealed pre-harvest kernels of groundnut pod a total of 51 samples from East Khandesh were studied and 17 fungi were recorded. *Fusarium oxysporum* showed its highest frequency followed by *Rhizoctonia bataticola*, *Aspergillus flavus*, *A. niger*, *F. solani*, *R. solani*, *Penicillium funiculosum*, *Rhizopus stolonifer*, *A. ustus*, *R. nigricans*, *Sclerotium rolfsii*, *F. semitectum*, *Mucor* sp., *Phoma herbarum*, *Pythium aphanidermatum*, *Pythium* sp. and *Chetonium globosum* in decreasing order. Most of them cause diseases and damages to the kernels. The organisms reported here are also reported by Joffe and Borut (1966), Waliyar (1979) and, Kang and Chohan (1966) from kernels. However, variations in the species may be attributed to the country, variety of groundnut, ecological factors, handling, transport, storage, soil type, methods of study etc. These organisms transmit the disease in the seeds.

13 organisms were selected for studying their effects on primary contents of kernels (Table 1) such as structural carbohydrate, crude proteins and fats. The results depict those total nonstructural carbohydrates were reduced by all fungi but highest was in *Penicillium varians* (65%) and least by *Absidia corymbifera* (25%). Proteins were increased in *A. flavus* and *F. oxysporum* in higher amount than others. While fats were more in *A. flavus* and less amount in *F. oxysporum*

when compared. The results are optimistic. Nager and Chauhan (1977) reported losses in proteins due to fungal growth on groundnut kernels. In different metabolic and catabolic process of fungal organisms' source, elements are utilized while others are prepared and stored. This might be possible reason why there was a variation in the composition of kernels due to attack of different fungi (Foster, 1958)

**Table 1 :** % Changes in primary metabolites contents of groundnut kernels infected with different fungal species.

Sr.No.	Fungal species	Carbohydrates (+ / -)	Proteins (+ / -)	Crude fats (+ / -)
1	<i>Absidia corymbifera</i>	19.17 (-28.56)	44.36 (+11.34)	30.81 (-25.76)
2	<i>Aspergillus aculeatas</i>	13.21 (-50.74)	23.35 (-41.38)	15.34 (-62.93)
3	<i>A. flavus</i>	17.80 (-33.67)	46.63 (+17.04)	38.09 (-08.21)
4	<i>A. niger</i>	09.40 (-66.21)	34.12 (-14.36)	19.59 (-52.80)
5	<i>A. terrus</i>	12.35 (-53.94)	42.98 (+07.88)	36.40 (-12.29)
6	<i>A. ustus</i>	12.95 (-51.70)	37.90 (-04.87)	24.78 (-40.27)
7	<i>Curvularia lunata</i>	11.74 (-56.20)	38.27 (-03.94)	34.31 (-17.33)
8	<i>Fusarium chlamyosporum</i>	14.96 (-44.97)	28.37 (-28.79)	15.15 (-28.19)
9	<i>F. oxysporum</i>	17.38 (-35.22)	45.06 (+13.10)	33.31 (-19.74)
10	<i>Humicola</i> sp.	14.27 (-46.79)	24.75 (-37.87)	21.99 (-47.02)
11	<i>Penicillium funiculosum</i>	08.85 (-66.96)	40.38 (+01.36)	20.66 (-50.36)
12	<i>P. varians</i>	08.92 (-66.68)	41.94 (+05.27)	29.80 (-11.70)
13	<i>Rhizoctonia bataticola</i>	11.62 (-56.65)	40.16 (+00.80)	29.01 (-30.11)
CD at 5 %		3.90	2.67	4.05
at 1%		5.28	3.61	5.47

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