



# Plant Pathology Journal

ISSN 1812-5387

**science**  
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## Identification of Fungi Associated with Storage Rot of Groundnut in Imo State South Eastern Nigeria

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**Abstract:** Storage studies of groundnut (*Arachis hypogaeae* L) in South B Eastern Nigeria were conducted to find out the rate of rot disease and the fungi responsible for the disease. Twenty-five storage locations were investigated. They were seriously infected with rot disease. On isolation on Potalo Dextrose Agar, the injected material yielded three different fungi all of which were *Aspergillus flavus* link. 60% of the fungi were *Aspergillus niger* Van Tiegh, 25% *Aspergillus versicolor* (Vuill) Tirab. While *Aspergillus fresen* was 15%. The *Aspergillus niger* Van Tiegh was 5-6 cm with brownish colour at center and whitish at edge. *A. versicolor* (Vuill) Tirah was 4-5 cm still with brownish colour but shades of white at edge while *A. fresen* was 3.5-4 cm with light brown at center and whitish at edges.

**Key words:** Identification, fungi associated with groundnut, storage rot, Imo State B Nigeria

### INTRODUCTION

Groundnut (*Arachis hypogaeae* L) is one of the most widespread and potentially most important food legumes in the world<sup>[1]</sup>. It is also a well-known oil crop, which is used directly as food although most are processed by pressing and/or extracting to obtain fat, oil and cake or meal. These joint products are consumed for nutritional purpose and used in technical products.

Groundnut also supplies high quantity of protein<sup>[2]</sup> and human diet must contain fat and protein. For the primitive men, the supply of protein was not great problem as he was a hunter and animals, provided him with proteins. But as population increases and as men changed to a settled agricultural one, it became necessary for plants to furnish a greater proportion of his protein intake. Recently groundnut cultivation has become commercialized in South Eastern Nigeria because of its wide industrial use. Unfortunately, its production is hampered due to attack by different diseases. These include bacterial, fungal, nematode and viral diseases<sup>[3,4]</sup>.

Rot diseases are mostly fungal disease, which are soil and seed borne. It causes disintegration of fruit and seed tissues. The seeds are covered with yellow or green spores. Some strains of the mould produce highly toxic aflatoxin. About 360 species of arthropod pests attack

groundnut before harvest of these termites and *Spodoptera* sp. have a relatively high damage potential in most groundnut growing area which expose the pods and seeds to rot ICRISAT<sup>[5]</sup>. They cause direct damage as well as act as fungal and virus vectors.

### MATERIALS AND METHODS

During the investigation five zones were used and in each zone, five groundnut stores were inspected to determine the rate of spread of storage rot disease. Infected seeds were obtained and wrapped in polythene bags and brought to the laboratory for further investigation.

The zones include Owerri, Orlu, Okigwe, Mbaise and Ikeduru all in Imo State.

Isolation of fungi associated with the infected groundnut seeds in each zone were made. The sections of the seeds affected with rots were cut with a sharp and sterilized knife. These were surface sterilized in 0.5% sodium hypochlorite. They were then placed in Potato Dextrose Agar (CDA) in petridishes. The dishes were incubated at room temperature (22-25%) and relative humidity 68-75% under continuous light for five days. The experiments were repeated three times and cultures were incubated at room temperature up to three weeks.

All the isolated species were later sub-cultured and transferred into Mc Cartney bottles with Potato Dextrose Agar for storage at 4°C in a refrigerator.

**Isolation of fungi:** The preparations of slides were carried out firstly; the glass slides were sterilized in an oven at 1600°C for one hour and later allowed to cool<sup>[6]</sup>.

Then small portion of mycelium of the organism were collected from the stock in McCartney bottle with the help of sterilized platinum wire and observed under the microscope and characteristic such as size, shape and colour of conidia, conidiophore were studied as well as colony size observed from culture. They were subsequently identified using the criteria adopted by Raper and Fennel<sup>[7]</sup>.

### RESULTS

The result of the investigation revealed that the severity of storage rot were high 40.2% in Owerri in comparison with Mbaise 28.8% followed Ikeduru 14.4%, Orlu 11.4% then when Okigwe 7.6% were lowest (Table 1). It was also observed that groundnut grown in Owerri, Mbaise and Ikeduru are seriously affected with foliar diseases with highest severity recorded in Owerri.

Three different fungi isolated from the infected seeds collected from each zone were observed to be *Aspergillus flavus* link. These are *Aspergillus niger* Van Tiegh 60% which are highest followed by *Aspergillus versicolor* (Vuill) Tirab 25% when *Aspergillus fresen* 15% were lowest. Table 2 *Aspergillus niger* Van Tiegh were 5-6 cm

Table 1: Severity of storage rot of groundnut at different zones in Imo State

S/No.	Owerri	Orlu	Okigwe	Mbaise	Ikeduru
1	35	15	10	35	18
2	45	11	5	28	22
3	28	19	19	31	15
4	50	10	8	26	10
5	40	12	6	24	7
X	40.2	11.4	7.6	28.8	14.4

Table 2: Fungi Identified from groundnut affected with storage rot with their destructive characteristics

Isolate	Conidia	Colony shape and colour	Percentage occurrence
<i>Aspergillus flavus</i> Link	4-5 µm	6 cm in diameter, greenish-yellow with light purplish edges	92
<i>Aspergillus niger</i>	4-5 µm	45-55 cm brownish in the center and whitish at the edges	60
<i>Aspergillus versicolor</i> Vuill (Tirab)	2-3.5 µm	2-3 cm brownish colonies with shades of white at the edges	25
<i>Aspergillus fresen</i>	3-4 µm	3-4 cm light brownish in the center and whitish at the edges	15

with brownish colour at the center and whitish at the edge. *A. versicolor* (Vuill) Tirab was 4-5 cm, also with brownish but shades of white at the adage while *A. fresen* was 3-4 cm with light brown at center and whitish at the edge (Table 2).

### DISCUSSION

The high severity of storage rot of groundnut recorded in Owerri and Mbaise more than any other zone may be attributed to some climatic factors such as high relative humidity, high rainfall, low temperature observed in these zones. They encourage microbial respiration, growth and spread resulting in disintegration of the seed tissues as proposed by Ihejirika and Nwifo<sup>[8]</sup>. This is quite unlike Okigwe with low rainfall, relative humidity and high temperature. The seeds remained dry with the surrounding dry environment, thus, making it difficult for microbial growth and development and action.

The results of the investigation revealed that *Aspergillus* species predominated the isolates. This indicates that this group possibly acts as pioneer organisms in the colonization of wounds of tropical crops and damage of stored seeds. This is in line with Kalu<sup>[9]</sup>. Also Kalu and Khan<sup>[10]</sup> investigation on die back infected grape vine wood, observed that *Aspergillus* and other micro-organism is ever changing depending on the age of wood and prevailing environmental factors. Nwifo and Fajola<sup>[11]</sup> investigation on storage rot disease of cocoyam also observed *Aspergillus niger* and *Fusarium solani* as two micro-organisms responsible for dry rots of Cocoyam (*Calocasia esculenta*).

In conclusion, the severity of storage rot of groundnut was high in Owerri in comparison with Orlu when Okigwe were lowest. The Fungus responsible for storage rot of groundnut is *Aspergillus flavus* Link with *Aspergillus niger* Van Tiegh as highest and they are mostly favoured by low temperature and high relative humidity.

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