Peanut contamination by *Aspergillus flavus* and aflatoxin B1 in granaries of villages and markets of Mali, West Africa

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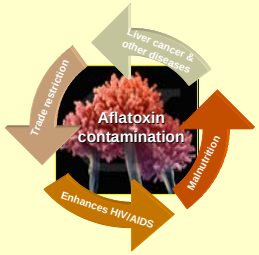
Introduction

- ✓ Peanut is an important crop in Mali and other countries in West Africa.
- ✓ One of the main problems is the occurrence of high levels of Aflatoxin B1.
- ✓ Aflatoxin B1 contamination in grain poses a great threat to human and livestock health as well as international trade.

The objectives of this study were to determine:

1) The rate of progress of the Aflatoxin B1 in rustic granaries located in 26 villages and in the granaries located in the corresponding 26 markets.

2) The association between Aflatoxin B1 with environmental variables outside the peanut granaries.



Waliyar, et al. http://www.icrisat.org/aflatoxin/

Materials and Methods

✓Peanut samples were collected every three months from 26 granaries located in villages and from 26 granaries located at local markets for *Aspergillus flavus* and Aflatoxin B1 determination for the periods 1999/2000, 2000/2001 and 2001/2002. The Aflatoxin B1 was determined by the ELISA test developed by ICRISAT.

✓Hobos (weather station data loggers), were installed in granaries aiming to monitor the temperature and air moisture.

✓A statistical analysis (t-Test) of the weather variables for the locations with the highest levels and the lowest levels of Aflatoxin B1 was conducted.

Peanut granaries in Mali

Farmer and granaries at Zangasso, Mali

Peanut infected with Aspergillus flavus

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Results

✓In Mali, the rainy season starts in May and ends in October (Figure 1). The highest temperatures occur in April and the lowest in July and August.

✓The Aflatoxin B1 levels were low in February for all granaries. There was a consistent increase in Aflatoxin B1 from April to December for the villages and market granaries, reaching levels above the international standard (20 ppb) (Figures 2).

✓The granaries located at the market showed higher values of Aflatoxin B1 than the granaries located at the villages.

✓The correlation coefficient (r) between the average number of *Aspergillus flavus* in the village's granaries and the Aflatoxin B1 amount was 0.85, 0.83 and 0.85 for years 1999, 2000 and 2001, respectively. This indicated that on average, the infection with *Aspergillus flavus* was related to the presence of Aflatoxin B1 in the granaries for the three years of the experiment.

✓One village (Tiele) had very high levels of Aflatoxin B1 for year 2000. Significantly different air relative humidity values were found between year 1999 and 2000 for June at that location (Figure 3).

✓For the village Lofigué, the maximum relative air humidity inside the granaries reached 70% in August (Figure 4). For this village, the Aflatoxin B1 levels were above the accepted international standards from August 2001 to December 2001. However, the levels of Aflatoxin B1 in Lofigué were low when compared to other village's granaries (Table 1).

Figure 1. Average maximum and minimum air temperature and average precipitation for Bamako, Mali

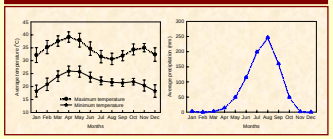

Figure 2. Average and standard deviation for Aflatoxin B1 for granaries in villages and markets in Mali for 1999, 2000 and 2001.

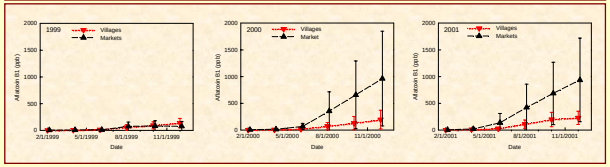

Figure 3. Relative air humidity, precipitation, temperature and Aflatoxin B1 for the village granaries of Tiele for 1999, 2000 and 2001.

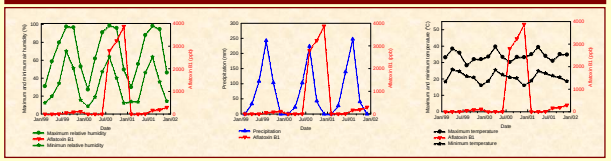

Figure 4. Temperature and relative air humidity inside granaries located in Lofigué's village.

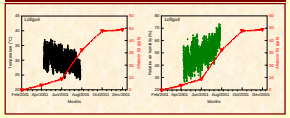

Figure 5. Mali map showing major Peanut production region.

Table 1. Average Aflatoxin B1 for 3 years at the granaries in the 26 villages.

Village Name	Aflatoxin B1 (ppb)
Diaka	1679.0
Tiele	605.0
N'tomsoni	550.6
Konko	160.6
Sonougoba2	133.1
Zangasso	130.7
Soukoumba	119.5
Kebila	102.6
Fouya	95.6

Village Name	Aflatoxin B1 (ppb)
Namala	92.9
Sonougoba1	87.7
Manbri	80.6
Balandou	80.1
Bindougo	77.3
Koni	74.3
Bafaga	71.2
Diou	67.8
Bougoula	65.9

Village Name	Aflatoxin B1 (ppb)
Karangaso	57.6
Sgikoloma	39.4
Diomatene	36.1
Sotuba	33.4
Bogi	32.8
Louloumi	24.3
Lofiné	19.6
Lofigué	19.2

Conclusions

✓Peanut stored in rural areas are highly contaminated by Aflatoxin B1 with levels significantly above the accepted international standards especially between the months of June and December.

✓For one village (Tiele) high air humidity values were associated with high levels of Aflatoxin B1 in the granaries.

✓In general the environmental conditions inside the granaries, e.g., temperature and relative humidity, are suitable for the development of the *Aspergillus flavus* fungus in peanut granaries of Mali.

✓The storage conditions should be improved in order to decrease the infection with *Aspergillus flavus*.

References
F Waliyar, B R Natre, A Traoré, B Diarra, O Kodio and P Lava Kumar. Pre and postharvest management of Aflatoxin contamination in Groundnut. http://www.icrisat.org/aflatoxin/

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