



Groundnut seeds showing *Aspergillus niger* (black spores) and *A. flavus* (green spores) infection

### Project R7809

Strategies for reducing aflatoxin levels in groundnut-based foods and feeds in India: A step towards improving health of humans and livestock

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## Avoiding Aflatoxin in Groundnuts

Groundnuts (or peanuts) provide an excellent source of protein and are a valuable cash crop for millions of small-scale farmers in the semi-arid tropics. As a groundnut-based fodder they are consumed by animals in India and elsewhere. Contamination of the groundnut by aflatoxin (complex chemical that can cause cancer) poses a serious threat to human and animal health – not only from eating the diseased groundnuts themselves but also indirectly from drinking milk from cows that have eaten infected material. Aflatoxin is produced by the fungus *Aspergillus* which enters the plant, usually through the wounds left by an insect pest.



Groundnut pods containing seeds infected with *Aspergillus flavus*

### Problems that contribute to the aflatoxin problem:

- The fungus can infect groundnut seeds (kernels) during pre-harvest pod growth, during harvesting and field drying, and during post-harvest storage.



Sample of groundnuts showing discoloured nuts (grey/white) contaminated with aflatoxin

- When the crop is growing, high soil temperature and prolonged end-of-season drought lead to an increased risk of aflatoxin contamination, particularly when there are many small and/or damaged pods.
- During harvesting and storage, high moisture content of the seed, high temperature and relative humidity (RH), and insect or mechanical damage increase aflatoxin contamination.
- Although aflatoxin contamination is fairly easy to detect in the kernel, it cannot be seen in the growing crop or in the groundnut-based fodder that is fed to livestock – this is of particular significance for dairy cows.

In addition to health issues, aflatoxin contamination results in loss of income through production losses and restrictions to access to international markets. However, neither farmers nor traders perceive aflatoxin contamination as a problem.

### Current research on aflatoxin

This CPP/CPHP project is investigating ways to reduce the impact of aflatoxin contamination on the livelihoods of poor groundnut producers – and consumers. It is organised in two phases, with a developmental management framework to integrate socio-economic and technical activities. In the first phase, stakeholders' pre- and post-harvest practices are being studied in terms of the prevailing social and economic context.

Analysis of 100 milk samples in peri-urban areas of Hyderabad City showed that, in four villages, the majority of the samples contained extremely high levels of aflatoxin. The levels were so high that the milk should not be drunk. Measures must be taken to reduce aflatoxin levels in the fodder that is fed to the



Farmer in Anantapur District, Andhra Pradesh, harvesting groundnuts



Highly magnified view of the fungus

cows. Another example of project findings showed that in on-farm trials, high pre-harvest aflatoxin levels in groundnut fields using 'farmer cultivation' practices were reduced when 'improved' practices were employed.

### Practical measures to reduce the risk of aflatoxin contamination include:

- **avoiding drought stress during pod growth – by adding organic matter and gypsum to increase soil moisture holding capacity and promote good pod and seed growth; by harvesting early to escape a prolonged drought**
- **controlling other stresses caused by pests and diseases**
- **careful harvesting to avoid mechanical damage to pods**
- **proper drying of pods in the field prior to stacking and stripping – by drying plants upside down so that pods are exposed to the sun**
- **removing all damaged/shriveled/unfilled and small pods prior to storage or feeding haulms to livestock**
- **storing pods in well-ventilated, dry and low RH conditions free from storage pests.**