

**AFLATOXIGENIC STRAINS OF *ASPERGILLUS* SPECIES ISOLATED FROM SOIL,  
CEREALS (MAIZE, SORGHUM, MILLET) AND ANIMAL FEEDS IN NANDI  
COUNTY RIFT VALLEY PROVINCE, KENYA**

**BY**

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## ABSTRACT

*Aspergillus flavus* are fungi found naturally in the soil and they are associated with aflatoxin production which are of public health importance due to their effects on human health and also threaten food security and safety. Aflatoxins are produced over a temperature range of 25- 30°C with an optimal water activity for growth 0.99 for *A. flavus*. Aflatoxins have been a problem in Kenya especially in Eastern and Central Provinces resulting into aflatoxicosis. However the Rift Valley which is the main region that producing maize in Kenya, with suitable climate for the growth and proliferation of *Aspergillus* although there have been not reported cases of aflatoxicosis. This study aimed at establishing the distribution of aflatoxigenic strains of *Aspergillus* in soil, cereal grains and animal feeds in Nandi County, Rift Valley Province of Kenya. A cross section research design was applied within the County and purposive sampling used to determine the number of households to be included from the three sub locations, Kilibwoni, Laboret and Kaptumo. Quota sampling was used to determine the number of households from each sub location that gave a sample size of 255 qualifying households. Households were randomly selected Samples of soil, cereals grains and animal feeds, were collected from the 255 households together with the market samples. Isolation of *Aspergillus* species from the soil samples was done using dilution plating technique and the rest of the samples direct plating was used in the isolation. *Aspergillus* section *Flavi* was identified using morphological keys. The *aflQ* and *aflD* genes were amplified to identify toxigenic and non-toxigenic strains of *A. flavus* and *A. parasiticus* and the isolates screened for aflatoxin production using LCMSMS. All the food samples were analysed for aflatoxins using ELISA.

The results showed high incidence of *Aspergillus* section *Flavi* of both in maize (56.8%) and soil (57.7%). This group of *Aspergillus* were of the L strain. Out of 78 isolates of *A. flavus* 55% were toxigenic and the rest non-toxigenic. Two of the plugs produced considerable high

**amounts** of aflatoxins in vitro of 74367  $\mu\text{g}/\text{kg}$  and 80664  $\mu\text{g}/\text{Kg}$  when screened using **LCMSMS** technique. The household cereal grains had average levels of below 5  $\mu\text{g}/\text{kg}$  which **was less than** set legal limit for aflatoxins in foodstuff and feeds of 10  $\mu\text{g}/\text{kg}$  by the East **Africa** Community/Kenya Bureaus of Standard. The low levels of aflatoxins in cereal grain **samples** could be because of the low temperatures (25°C-30°C) in Nandi which did not **favour** aflatoxin production. The study has revealed a high incidence (78%) of aflatoxigenic **species** of *A. flavus* producing low levels of aflatoxins in household cereal grains and animal **feeds**. This explains why there have been no cases of aflatoxicosis in Nandi arising from **consumption** of maize grown by farmers in the region. The population had high exposure to **low** levels of aflatoxins through consumption of the maize, other foods and milk from the **animals** that have been fed on these feeds contaminated with aflatoxins. This chronic **exposure** and the accompanying health implications should be investigated and further **studies** should be carried out on field feasibility and strategies for developing biocontrol **methods** against aflatoxin producing fungi in Kenya.

**Key words:** *Aspergillus flavus*, Aflatoxins, *aflD* and *aflQ* genes, Maize, Soil.