PREVALENCE OF AFLATOXIN IN KENYA:
SUMMARY OF FINDINGS JANUARY - JUNE 2010

THE AFLACONTROL PROJECT: REDUCING THE SPREAD OF AFLATOXINS

BACKGROUND
Maize is the main dietary staple in Kenya, and it is also one of the crops most susceptible to infection by Aspergillus flavus and contamination by aflatoxin. In Kenya, occasional epidemics of aflatoxicosis receive media attention, but awareness of the probability and effects of chronic exposure are low.

This project note describes the preliminary results of a survey on the prevalence of Aflatoxin along the value chain, undertaken as part of the Aflacontrol Project—a collaborative research project developed to evaluate the prevalence of aflatoxins along the maize value chain and identify critical points where intervention strategies are likely to have the greatest impact. 1

Since May 2009, scientists from KARI and CIMMYT, with support from ACDI/VOCA have been collecting samples to map the prevalence of aflatoxins along the maize value chain in three areas in Kenya, considered at high risk and at low risk of Aflatoxin contamination.

- In southwestern Kenya, considered low-risk for Aflatoxin, samples were carried out along a transect running across three agro-ecological zones between Kisii and Homabay (including Homa Bay, Rongo, Migori and Kisii districts in Nyanza Province). Samples were also taken from markets in Rodi, Raneni and Opapo
- In eastern Kenya, considered high risk for aflatoxins, samples were collected from along two transects along different agro ecological zones: (from Mbeere to Embu and in Makueni). (Map 1). Pre- and post-harvest samples were collected from Mbooni, Kaiti, Mbeere North, while market samples were collected in Mbeere North, Imenti North, Embu, Meru, and Kaiti and Makueni.

In each sampling area, participants (farmers or vendors) were randomly selected, a one kg maize sample randomly collected and the respondent compensated at the prevailing market value of maize grain. Information was collected on the varieties grown, the source of the maize for market samples, condition, and moisture content of the grain, the storage structure, and the period that the maize had been stored. GPS data was recorded for each sample.2

PREVALENCE OF AFLATOXINS ALONG THE VALUE CHAIN BETWEEN JANUARY AND MAY 2010

The results presented here refer to samples collected during and after the January-March 2010 harvest, between January and May 2010.3 A total of 823 samples were collected in the study areas between January and May 2010 from farmers’ fields (pre- harvest), farmer stores (post-harvest), and from wholesalers, retailers, and open-air vendors.

Prevalence of aflatoxin in farmers’ field - pre-harvest.
The highest level of Aflatoxin contamination in a farmer’s field was 1455ppb, found in Mbooni East in eastern Kenya. However, the difference between the western sites and the eastern sites was not a marked as might have been expected given the common assumption that Aflatoxin is not considered a significant problem in western Kenya. Mean Aflatoxin levels in the Homa Bay and Rongo were 37ppb and 54ppb respectively, compared to 21ppb in Makueni, 25ppb in Mbeere North and 44ppb in Mbooni East. And more samples from the western sites were unfit for human consumption (i.e. contamination levels greater than 10ppb) than from the eastern sites (Figure 1).

Figure 1: Percent of maize samples from farmer fields with aflatoxin levels above and below 10ppb, 1 month post harvest (Jan - Feb 2010)

1 The Aflacontrol project aims to reduce the risk of aflatoxin contamination of maize and groundnuts along each value chain. Other research activities undertaken in the context of the study include analyses to estimate the economic impacts of Aflatoxin in terms of health consequences and livelihoods, identify critical control points, and evaluate various control strategies, based on an understanding of knowledge, attitudes, perceptions, and practices along the value chain.

2 Further details on methodology for the prevalence data collection are available at: http://programs.ifpri.org/afla/pdf/aflacontrol_wp01.pdf

3 Results from 2009 are summarized in the Aflacontrol Kenya Project Note #1, 2010.
Prevalence of aflatoxin in farmers’ stores - Post harvest

A total of 241 samples were collected following completion of pre-harvest activities in April and May 2010. Farmers in eastern regions of Kenya are highly aware of the problems of Aflatoxin and many practice post harvest techniques to mitigate for it, such as drying maize properly before storage, storing maize on raised timber platforms inside the house, sorting grain before storage, and leaving the visibly discolored grain for animal feed. However, even with such practices, 38% of samples from this region had aflatoxin levels greater than 10ppb. The problem was most acute in Makueni where 87% of samples were unfit for human consumption and the maximum aflatoxin level was 1777ppb. In Mbooni East and Mbeere North, the proportion with levels above 10ppb were 29% and 7% respectively. Overall, the proportion of samples unfit for human consumption was higher in the eastern sites than the western sites but there was considerable variation across the different areas sampled (Figure 2).

Figure 2: Percent of maize samples from farmer stores with aflatoxin levels above and below 10ppb, 1 month post harvest (April-May 2010)

Excluding Makueni, mean Aflatoxin content was higher in the western sites than in the eastern sites (Table 1)

Table 1 Aflatoxin content (ppb) post harvest (N=241)

<table>
<thead>
<tr>
<th>Province</th>
<th>District</th>
<th>No of Samples</th>
<th>Mean content</th>
<th>Aflatoxin content (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>Mbeere North</td>
<td>31</td>
<td>17.9</td>
<td>199.3</td>
</tr>
<tr>
<td></td>
<td>Mbooni East</td>
<td>43</td>
<td>5.00</td>
<td>87.6</td>
</tr>
<tr>
<td></td>
<td>Imenti North</td>
<td>3</td>
<td>4.7</td>
<td>12.1</td>
</tr>
<tr>
<td></td>
<td>Makueni</td>
<td>32</td>
<td>245</td>
<td>1776.6</td>
</tr>
<tr>
<td>South Western</td>
<td>Hbay/Rongo</td>
<td>61</td>
<td>45.18</td>
<td>268.1</td>
</tr>
<tr>
<td></td>
<td>Kisi Central</td>
<td>66</td>
<td>40.55</td>
<td>611.8</td>
</tr>
<tr>
<td></td>
<td>Transmara</td>
<td>5</td>
<td>3.72</td>
<td>12.9</td>
</tr>
</tbody>
</table>

Prevalence of aflatoxin among wholesalers, retailers, and open-air vendors

A total of 306 samples were collected from markets in upper eastern Kenya (101), lower eastern Kenya (87), Homabay/Rongo (102) and Kisii Central (21) from the February/March (2010) harvest. The majority of the samples (206) had aflatoxin levels below the 10 μg/kg considered safe for human consumption – i.e. were safe for human consumption (Figure 3). The proportion of samples unsafe for human consumption from market samples was greater from the eastern sites than the western sites. Likewise, mean levels of contamination were also much higher in eastern sites, with a maximum of 1633 ppb, 163 times the allowed level of contamination and mean levels of 114ppb in Upper Eastern sites and 25ppb in Lower Eastern sites compared to just 1ppb and 5ppb in Kisii and Homa Bay.

Figure 3: Percent of maize samples from market traders, wholesalers and retailers with aflatoxin levels above and below 10ppb, 1 month post harvest (April-May 2010)

These aggregated market data hide some serious variation between sites. For example, in Upper Eastern Kenya, in Kanyuambora all 5 markets sampled had Aflatoxin levels greater than 10ppb, with a mean of 337ppb and a maximum of 1454ppb. In Ishiara, 65% of samples had Aflatoxin contamination greater than 10ppb, with a mean of 118ppb and a maximum of 1633ppb. And while almost 10% of samples from western sites had levels above 10ppb, the maximum across all western sites was 59ppb compared to 435 in Lower Eastern and 1633ppb in Upper Eastern (Ishiara).

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This publication has been prepared as an output of the Aflacontrol Project which is facilitated by IFPRI. It has not been peer reviewed. Any opinions stated herein are those of the authors and do not necessarily reflect the policies of the International Food Policy Research Institute (www.ifpri.org), its partners, or its collaborators.

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