

Aflatoxin distribution in crop products from Burundi and Eastern Democratic Republic of Congo

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Abstract

Aflatoxins (AFs) are noxious secondary metabolites of certain fungal species found in food and feed. Contamination of a commodity is associated with production and storage losses, and subsequently less food availability. AFs can also pose human health risks and represent a barrier to the development of trade, in both domestic and international markets. In this study, samples of cassava, maize, groundnuts, beans, soybeans, and sorghum, and their processed products were collected from local markets in Burundi and Eastern DRC. In order to investigate the levels of AF, samples were analysed using a single step lateral flow immunochromatographic assay (Reveal Q+). The results revealed the presence of AFs in all samples from both countries, with levels ranging from 1.5 to 2781 µg/kg. Samples collected from Burundi contained relatively higher levels of AFs. In 51% of all the crops samples, total AF contamination was above the EU maximum tolerable level of 4 µg/kg. Processed products, particularly from groundnut, maize and sorghum, had the highest incidence of AF contamination when compared to dried seeds. These results can serve as the basis for strategic and systematic approaches to reduce AF contamination in agricultural commodities in Burundi and Eastern DRC in order to reduce health risk, avoid reduced production in livestock, and open up export markets.

Introduction

- Food insecurity and malnutrition, especially among children, in resource-poor households are also common occurrence in Burundi and Eastern DRC.
- The interplay between the safety of food and the adequacy of food is therefore crucial when addressing the AFs problem in these low-income countries.
- To expand insight, we conducted a comprehensive investigation of AF contamination in raw and processed materials from cassava, maize, sorghum, soybean, and groundnuts from the local markets of Burundi and Eastern DRC.

Materials and methods

- A total of 218 crop samples were randomly collected from local markets in Burundi and Eastern DRC during May-July in 2016 (Fig. 1).
- Samples were analyzed using a single step lateral flow immunochromatographic assay (Reveal Q+).
- The validation of Reveal Q+ method was carried out with the determination of the recoveries and the coefficient of variation (%CV).

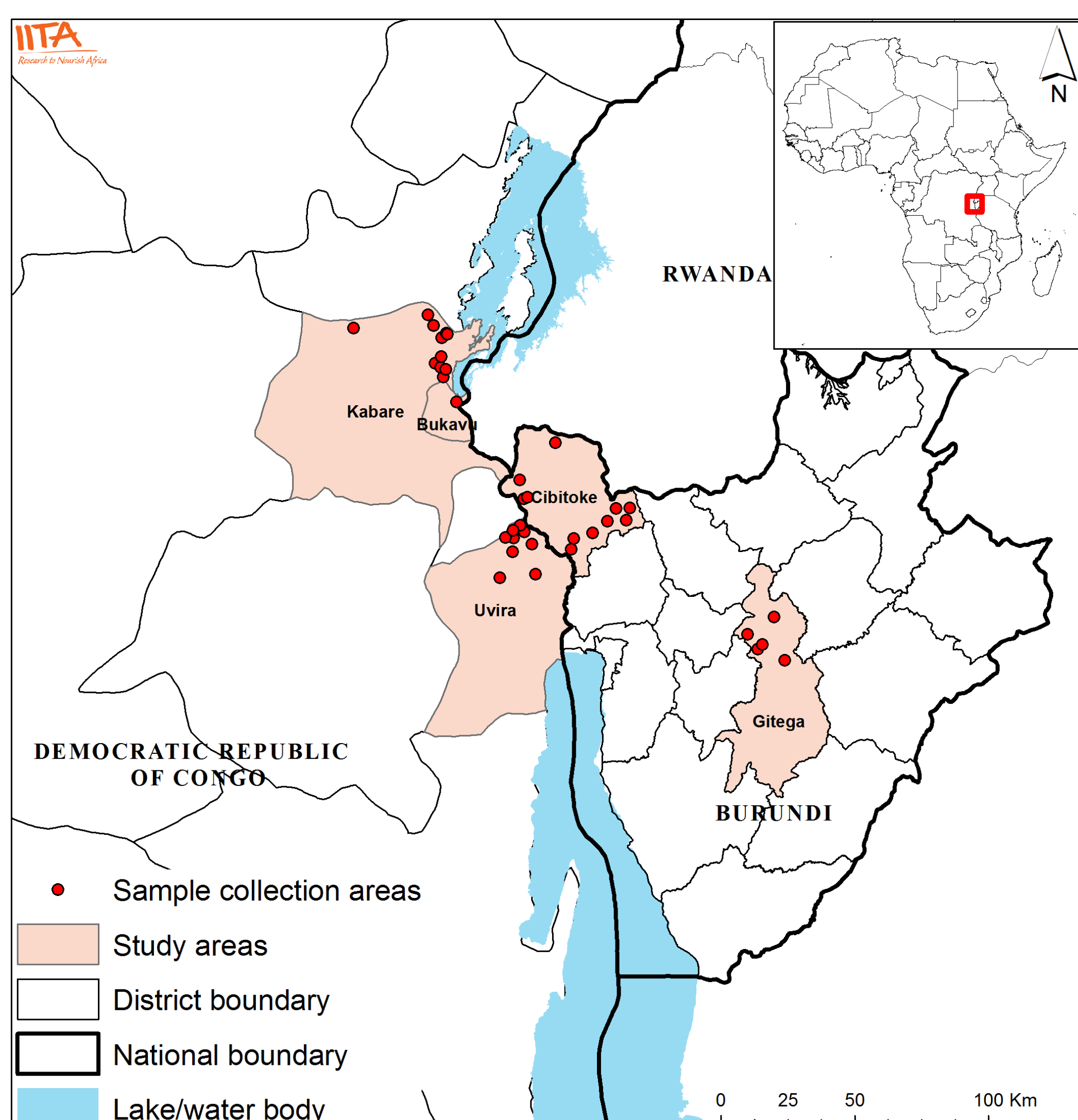


Fig. 1: Sampling areas in Burundi and Eastern DRC

Results and discussion

- All the crop samples were contaminated with aflatoxins, which ranged from 1.5 µg/kg to 2781.3 µg/kg.
- About 51% of these samples contained AFs above the EU maximum permissible limit (4 µg/kg) for total AFs in maize intended for human consumption.
- The average AF contamination was high in the samples from Burundi (117.0 µg/kg) when compared to those of Eastern DRC (34.4 µg/kg).
- This result can be explained by the fact that Burundi is relatively hotter and dryer, a situation that favors the growth of mycotoxin-producing fungi.
- The processed samples (flour) presented higher AF contamination when compared to unprocessed samples (dried).

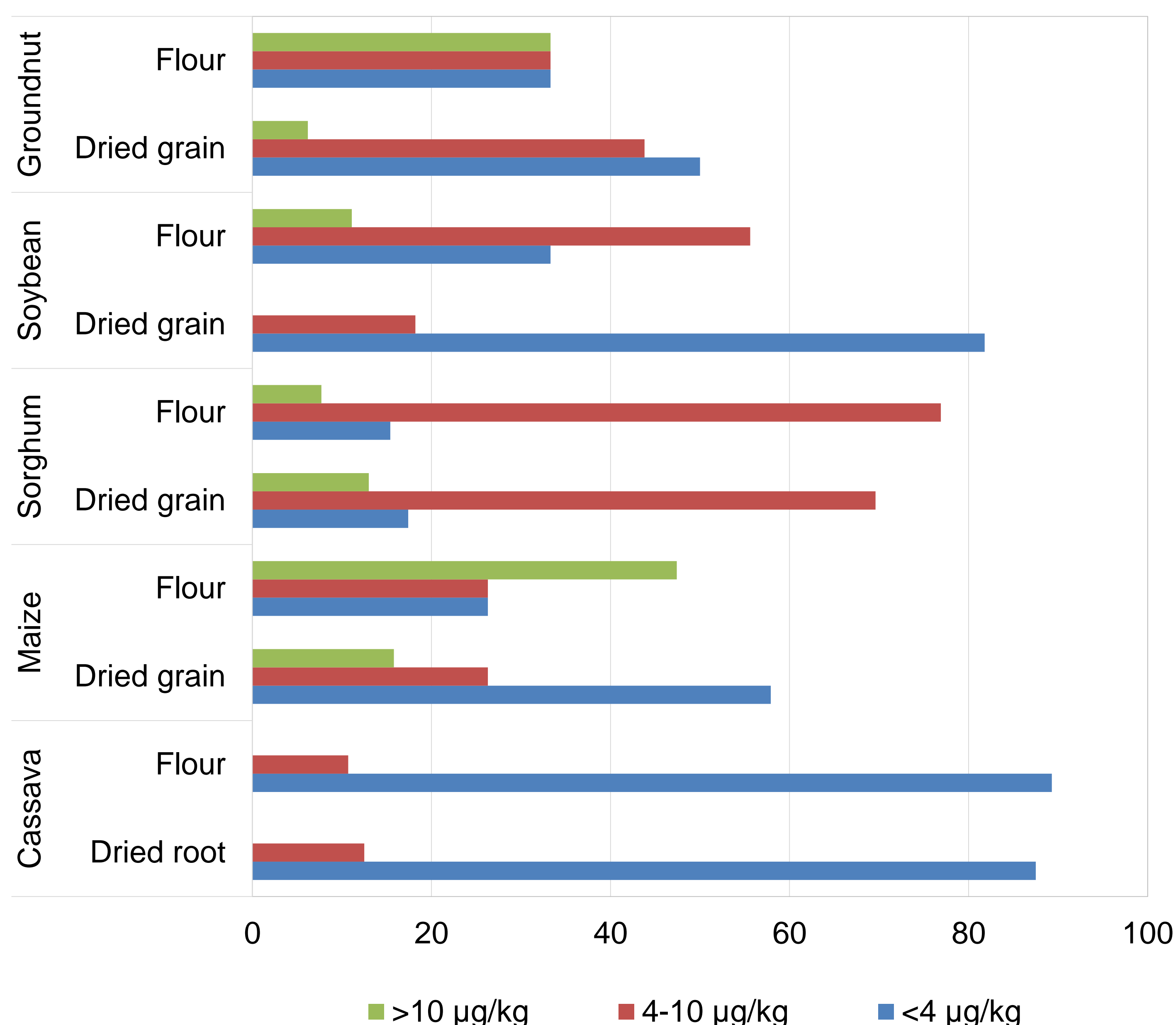


Fig. 2: Percentage of total AFs contamination in crop samples marketed in Burundi and Eastern DRC

Conclusion

- The presence of total AFs in crop products from Burundi and Eastern DRC is a problem in the context of food sufficiency, public health, and economic benefits.
- Biological control in conjunction with other management practices need to be promoted among actors along the food value chains, especially farmers and processors, to achieve significant reduction in AF contamination.
- Further work, for example, on the microbiology, especially on aetiology, on-farm, and post-harvest as well as marketing structures need to be studied further.
- To further strengthen the county's efforts in abating contamination, risk assessments are proposed in order to establish country regulatory thresholds that the local consumer population can depend on.
- These thresholds can also be used to monitor safety of food commodities across the county's borders.

Acknowledgements

