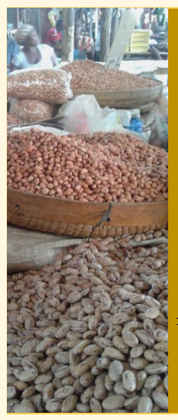

Isolation of filamentous fungi from different food matrices from Angola and Mozambique

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MYCOTOX-PALOP

fct Fundação para a Ciência e a Tecnologia

AKDN Aga Khan Development Network

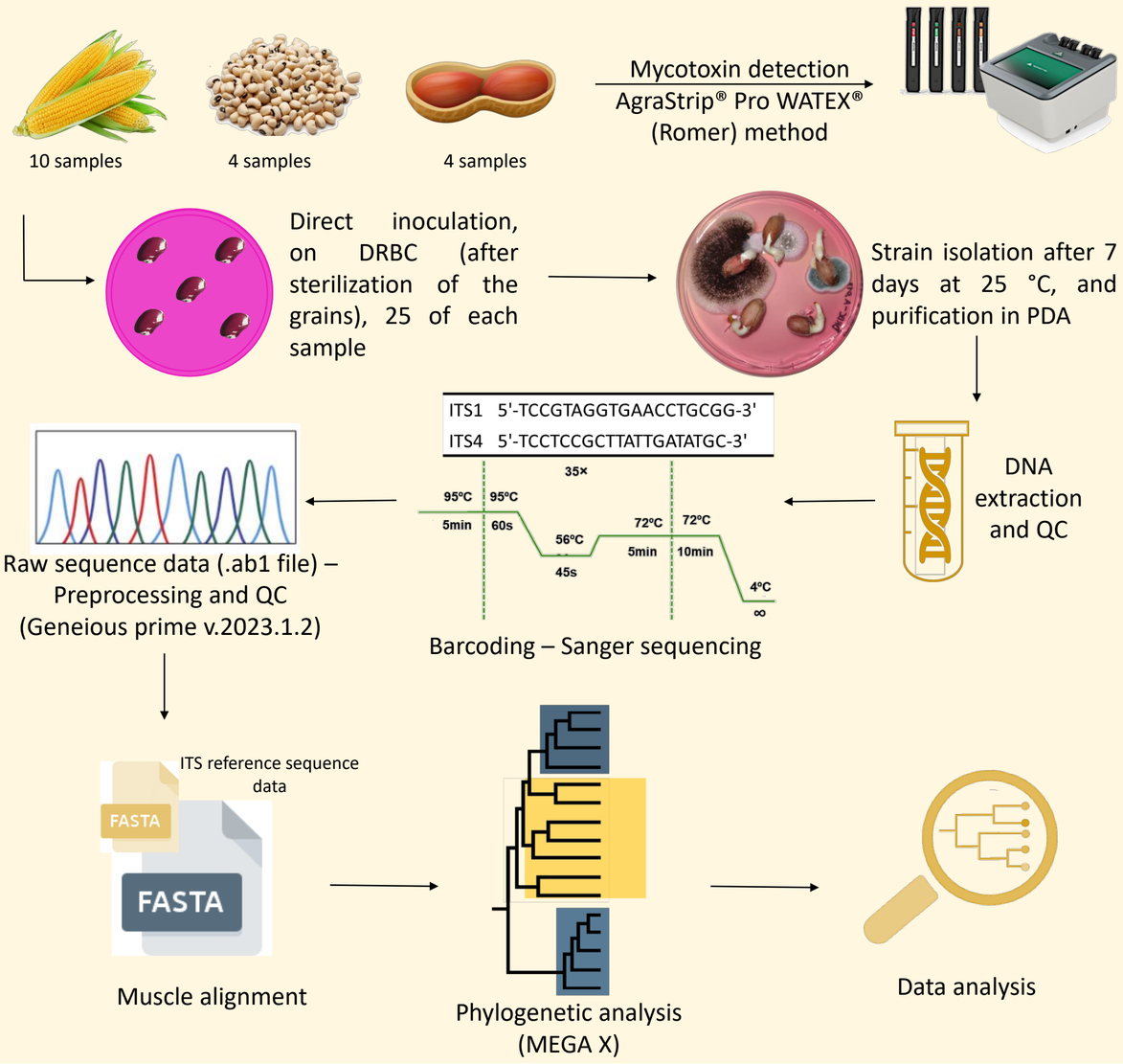
Introduction

The project MYCOTOX-PALOP - multi-actor partnership for the risk assessment of mycotoxins along the food chain in African Portuguese-speaking countries (PALOP), aims to gather knowledge on food and feed fungal losses and mycotoxin contamination in Mozambique (MZ) and Angola (AN). Its goal is to set mycotoxin risk assessment programs; and establish intervention strategies to reduce human and animal exposure to mycotoxins.

Little is known about the mycotoxigenic fungi contaminating the most relevant crops in MZ and AN. Since mycotoxins are carcinogenic, teratogenic, hepatotoxic, etc., and even at low levels they can cause adverse effects due to chronic exposure[1], several food commodities were collected from these countries to isolate an identify fungi and assess the mycotoxin risk.

Materials and Methods

- 3 food matrices – Corn (C) from MZ and peanuts (P) and beans (B) from AN;



Discussion and Conclusion

The presence of several phytopathogenic fungi (Fig. 1) is a concern since they cause the loss of crops, in a population were agriculture remains the main economic activity.

Aspergillus sp. ser. *Flavi* and *Fusarium* sp. isolated in corn explain the levels of Aflatoxins and Fumonisins.

Aflatoxins levels present in the samples, particularly in corn, are extremely concerning, once they were all above the MLT, ranging from 6.3 times higher to almost 2300, and one sample of peanuts has 13 times more than the MTL. These levels are higher than what has been previously reported[3].

The health impact of mycotoxin exposure is grossly underreported in AN and MZ, and this study shows the importance of the matter, exposing the current fragilities that the local populations are facing. It is urgent to promote actions and create policies to ensure food safety and food security.

Results

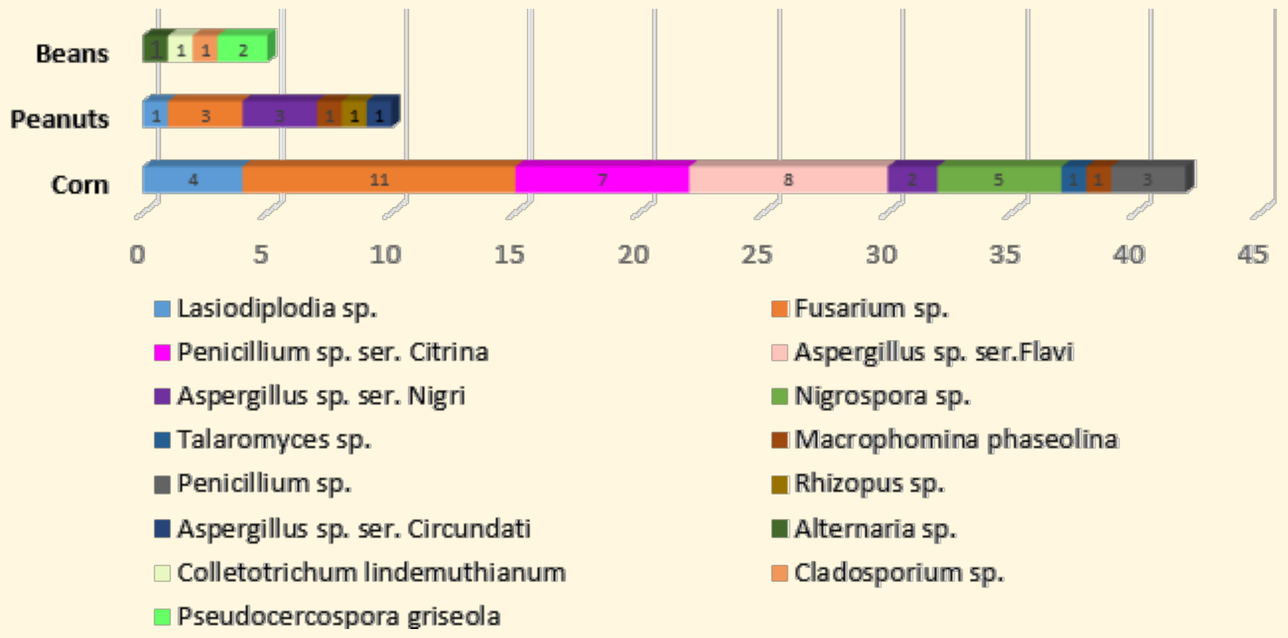


Figure 1 – Isolate's identity for each food commodity.

- ❖ None of the isolated strains were common to the 3 food matrices, and *Fusarium* sp. had the highest number of isolates. The identification of the isolates of beans and peanuts is still ongoing.
- ❖ *Fusarium*, *Penicillium* and *Aspergillus* dominated the mycobiota of corn.
- ❖ Other known genera of phytopathogenic fungi were also isolated in all commodities.

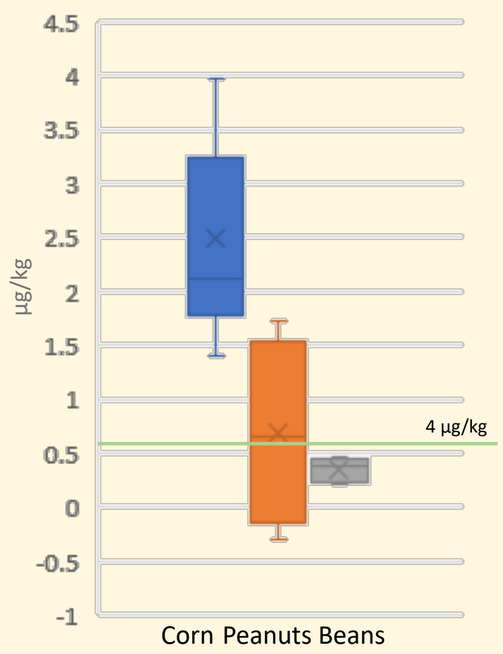


Figure 2 – Aflatoxins test results from AgraStrip® Pro WATEX® (Romer) method, represented in a logarithmic scale. The green line represents the maximum tolerable level (MTL) for corn and peanuts.

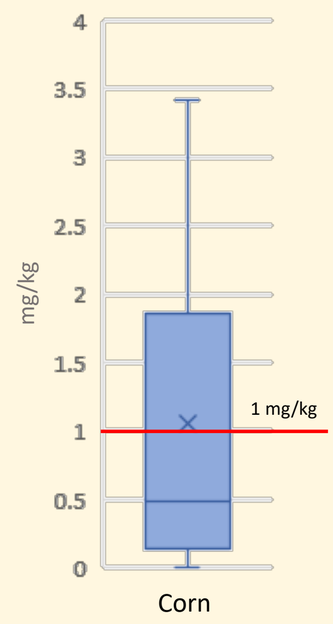


Figure 3 – Fumonisins test results from AgraStrip® Pro WATEX® (Romer) method. The red line represents the MTL for corn.

- ❖ All samples from the 3 commodities tested positive for Aflatoxins, being the highest value from one sample of corn - >9200 µg/kg.
- ❖ Deoxinivalenol (DON), T-2/HT-2 and Zearalenone (ZEA) were also analysed in corn (data not shown), but were negative, below LOQ or at low levels, apart from one sample that had a ZEA level above the MTL (100 µg/kg)[2].
- ❖ Aflatoxins levels for corn varied between 25.2 µg/kg and >9200 µg/kg, being all above the MTL set by European law (4 µg/kg)[2]. Half of the peanut samples also had values above the MTL (4 µg/kg)[2].
- ❖ All samples of corn, apart from one, tested positive for Fumonisins, 4 of which were above MTL (1 mg/kg)[2].
- ❖ More data is still being collected regarding these and other samples, and other food matrices.

References

[1]Yang, Y., Li, G., Wu, D., Liu, J., Li, X., Luo, P., ... & Wu, Y. (2020). Recent advances on toxicity and determination methods of mycotoxins in foodstuffs. Trends in food science & Technology, 96, 233-252.

[2]European Commission. (2023). Commission Regulation (EU) 2023/915 of 25 April 2023 on maximum levels for certain contaminants in food and repealing Regulation (EC) No 1881/2006. Amended in July 2023. Off. J. Eur. Union, 119, 103-157.

[3]Jallow, A., Xie, H., Tang, X., Qi, Z., & Li, P. (2021). Worldwide aflatoxin contamination of agricultural products and foods: From occurrence to control. Comprehensive reviews in food science and food safety, 20(3), 2332-2381.

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