MICROBIOLOGICAL SAFETY OF URBAN FARMS IN THE PORTO METROPOLITAN AREA

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Introduction

With new, more fast-paced lifestyles, the necessity for proximity to industrialized and highly populated cities has led to the migration of citizens from rural areas to urban centers in ever-growing numbers. These cities are, however, extremely dependent on external food resources. Urban food production has been encouraged to reduce this dependency on the rural agricultural output, with community, collective and private farms appearing throughout cities over the last few decades. Beyond enhancing food security, urban agriculture is recognized for promoting healthier lifestyles, fostering social interactions, and raising environmental awareness. Despite these advantages, the safety of consuming urban-grown produce remains a concern.

Methods

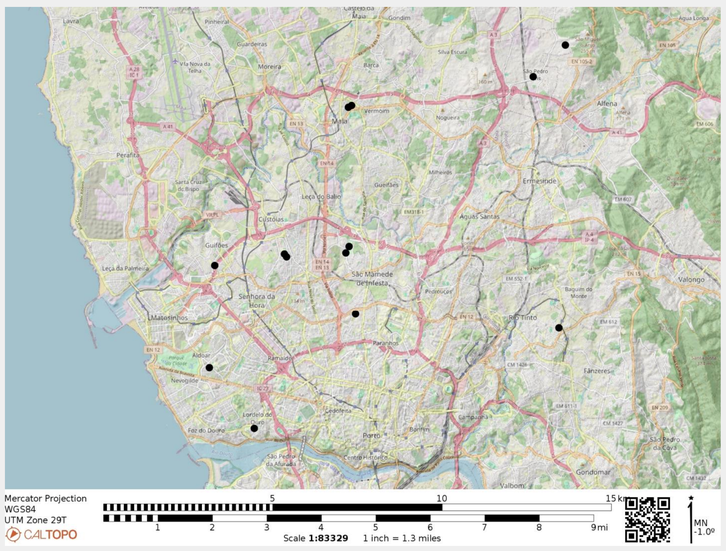

Figure 1 - Geographic distribution of urban farms in the Porto metropolitan area.

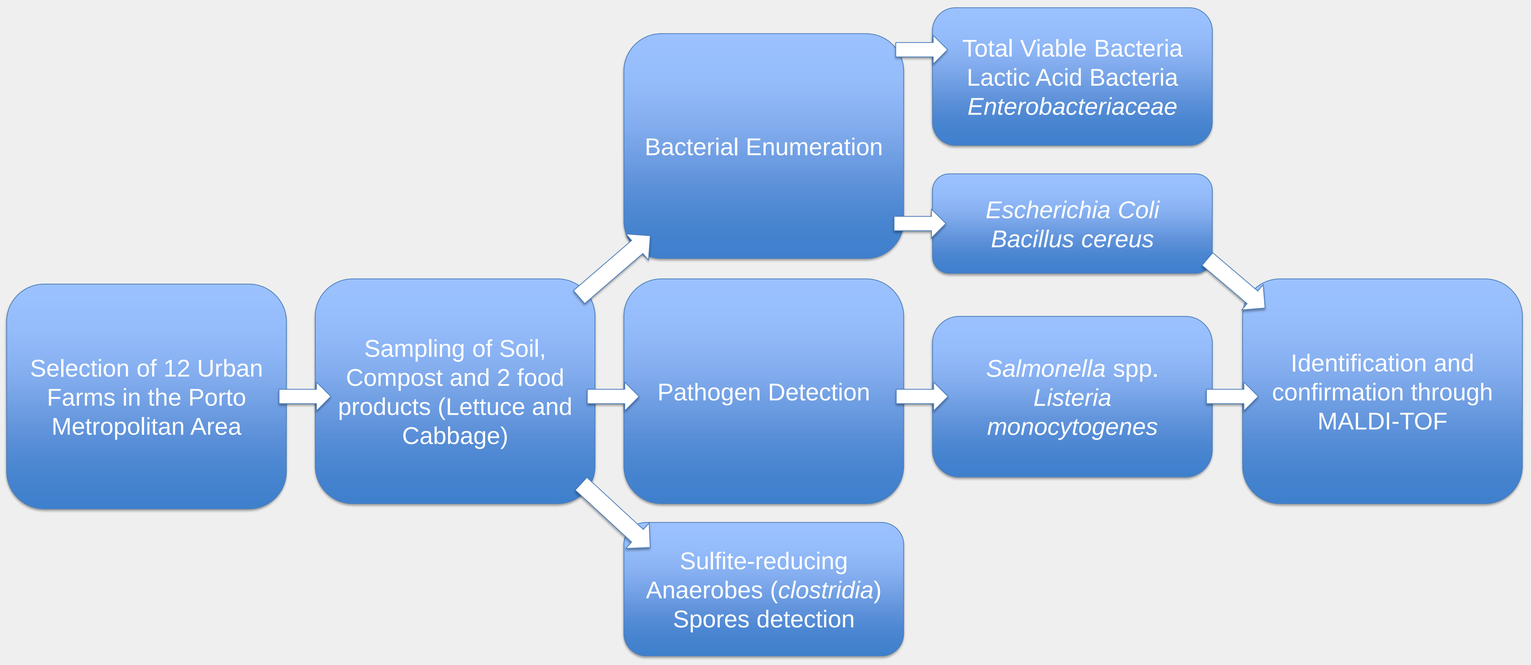

Figure 2 - Workflow for the microbiological analysis of samples collected from urban farms.

Results

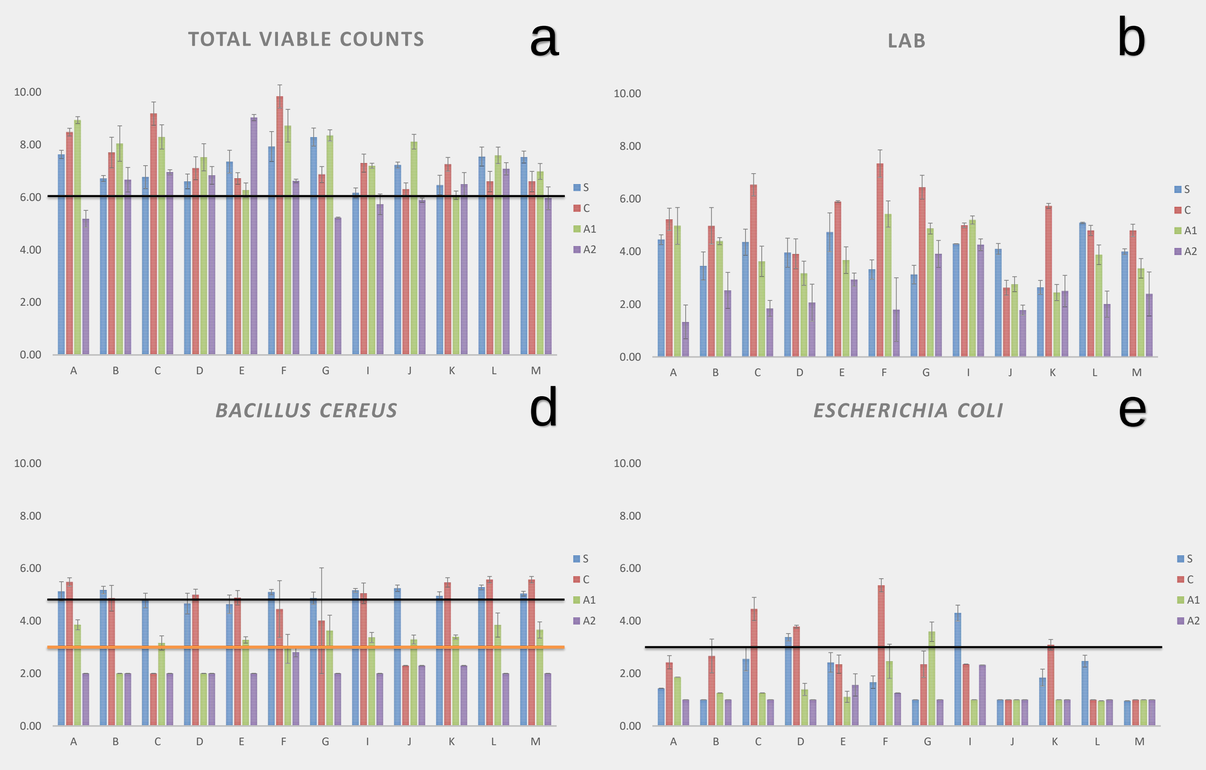

Figure 3 - Microbiological enumeration results for soil (S), compost (C), lettuce (A1) and cabbage (A2) from urban farms. (a – total viable bacteria; b – lactic acid bacteria; c – Enterobacteriaceae; d – Bacillus cereus; e – Escherichia coli)

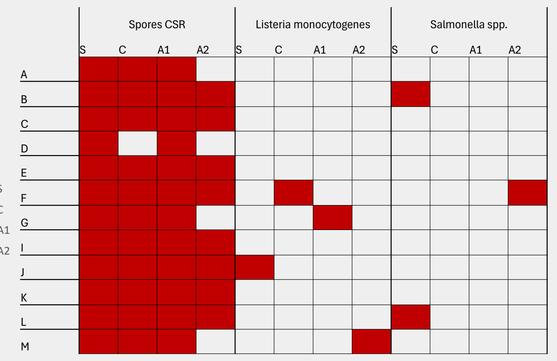

Figure 4 - Presence of microbial hazards in soil, compost, and produce samples from urban farms. (Red – positive)

- 10 out of 12 farms had lettuce samples exceeding acceptable TVC standards (6 log CFU/g).
- Six lettuce samples exceeded the limit of 4 log CFU/g for Enterobacteriaceae.
- Two lettuce samples exceeded the limit of 3 log CFU/g for *E. coli*.
- ***Bacillus cereus*** detected at high levels in soil, compost, and/or lettuce, often above satisfactory limits but below the estimated infectious dose of 5 log CFU/g.
- Contamination levels were significantly lower in the edible parts of wild cabbage compared to lettuce.
- ***Listeria monocytogenes*** was found in one lettuce and one cabbage sample.
- ***Salmonella*** *spp.* was detected in cabbage samples from one farm.

Conclusions

These findings call attention to the public health risks associated with the current state of urban farming in Porto, particularly due to the presence in high levels of E. coli, B. cereus, and the contamination with L. monocytogenes, and Salmonella spp. Although these products require washing and, in some cases, cooking before consumption, these high bacterial counts underscore the need for stricter hygiene protocols and better food safety practices. Therefore, improving on-farm sanitation and guiding both farmers and consumers in learning how to handle these products correctly is essential to mitigate risks and ensure the long-term sustainability of urban agriculture. Addressing these concerns will be crucial to guarantee public health and the benefits of urban agriculture.

Acknowledgements

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