Post-harvest Loss Management Initiative in Senegal : Using Bio-pesticides for Sustainability and Food Security

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Context and objectives

Post-harvest losses pose a significant challenge to the sustainability of food systems. Globally, the FAO estimates that 14% of food is lost between harvest and retail. In Senegal, losses, estimated between 13 and 70% of production, primarily affect cereal and legume sectors, remaining high due to infestation by insects and fungi that produce mycotoxins. The excessive use of chemical pesticides to combat agricultural pests compromises both the environment and human health. Therefore, the importance of transitioning to sustainable agricultural practices, such as the use of bioactive molecules, especially essential oils with insecticidal and/or antifungal properties, highlights the need to address this issue. In this context, this project aims to explore the potential applications of essential oils in managing post-harvest losses during storage, thereby promoting a more competitive and environmentally friendly agriculture.

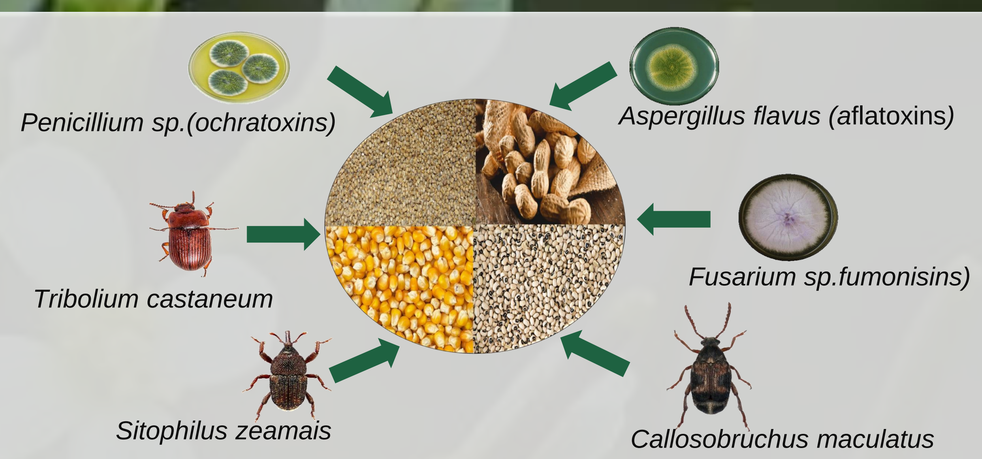

Fig.1 Pests and fungi commonly found in cereale stocks in Senegal

Key findings from previous researches

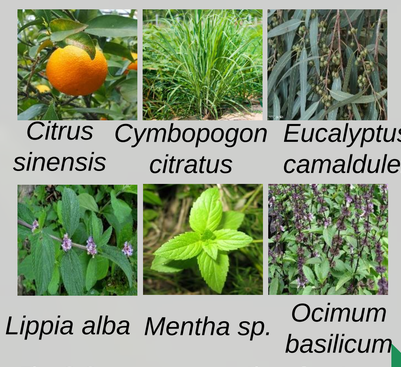

Fig.2 Some aromatic plants from Senegal

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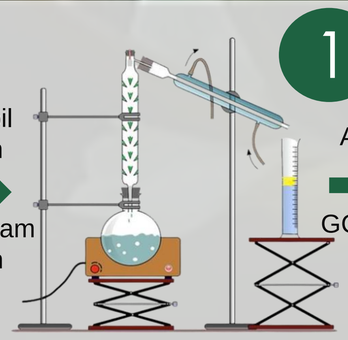
Essential oil extraction

Hydro or steam distillation



Analysis

GC-FID-MS

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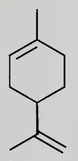
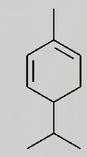
Lippia alba

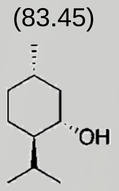


Limonene (83.45)

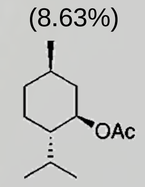


Phellandrene (8.63%)

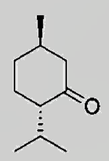
Mentha arvensis.



Menthol (68,4%)

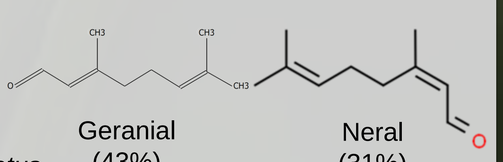


Menthyl acetate (16.9%)



Menthone (5%)

Cymbopogon citratus



Geranial (43%)

Neral (31%)

Fig.3 Chemical Composition of some essential oils from Senegal

3

Mentha arvensis

- Effect on the growth of *Aspergillus flavus* and its aflatoxin production
- Have insecticidal activity against *Sitophilus Zeamais* (Diop et al., 2021)

Lippia alba

- Has repellent activity against *S. zeamais* and *Tribolium castaneum* (Martini et Suffys, 2022)

C. citratus

- Efficacy against the growth and mycotoxin secretion (aflatoxin B1 and ochratoxins) of *Aspergillus sp.* (Sonker al., 2014; Diop et al.,2017)

Fig.4 Essential Compounds with insecticidal and fungicidal Activity

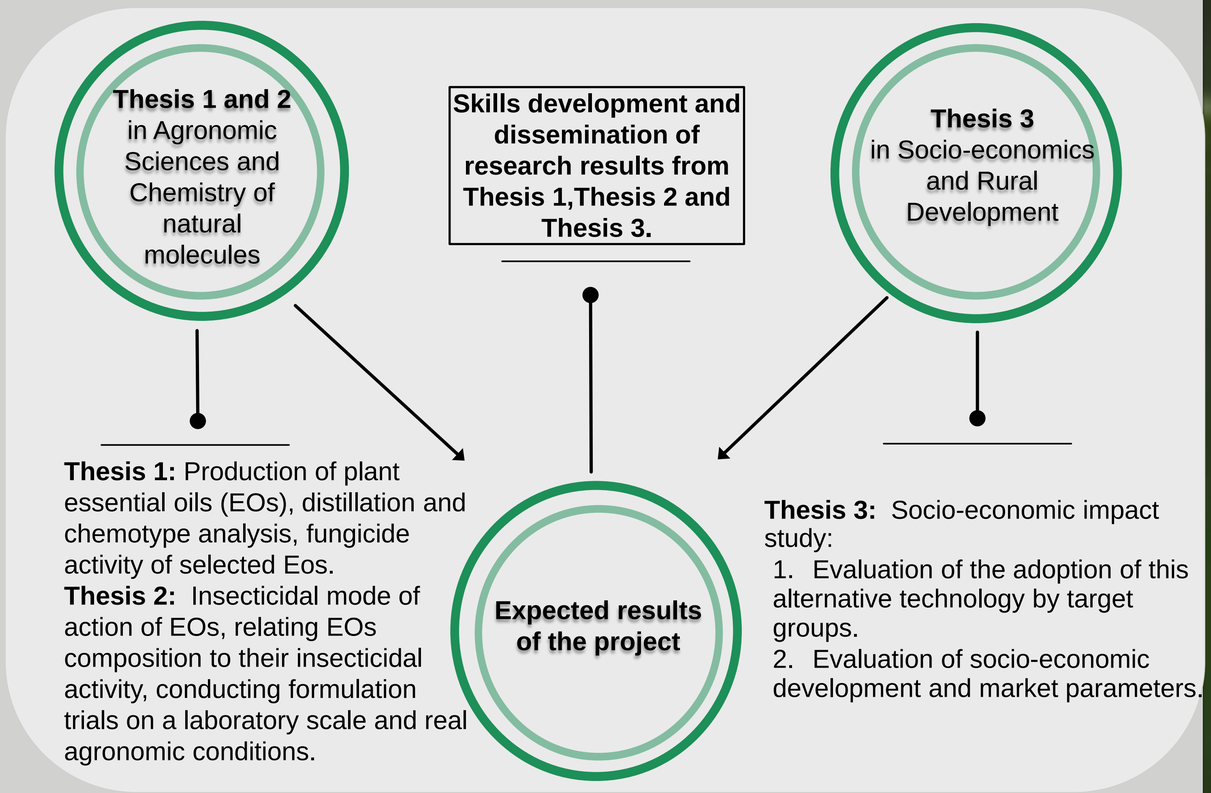
Project overview and expected results

Collaborate in applied research between North and South research centers to solve global agricultural challenges adapted to local contexts..

Emphasis on sustainable agricultural practices through approaches such as the use of plant extracts and essential oils as alternatives to chemical pesticides.

Enhanced scientific knowledge of the mechanisms of action of biopesticides and the capacity for adoption of new agricultural technologies.

Improve agricultural productivity by reducing post-harvest losses and strengthening the resilience of rural communities to climate change and economic challenges



Conclusion

The development of alternative pest control technologies, such as the use of EO, is crucial to ensuring food security and the sustainability of agricultural production in Senegal. Therefore, this collaborative research approach can offer effective, environmentally friendly solutions for reducing post-harvest losses while safeguarding human health and promoting the economic development of rural communities. .

References

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Sonker et al., (2014) Journ. Food Sci., 79(4), M628-M634

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