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Title : *In vitro* insecticidal potentiality of essential oils of aromatic plants on the main pests of cotton plant in Côte d'Ivoire

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Background

In the face of the abusive and repeated use of synthetic insecticides that are harmful to human health and to the viability of the cotton production system in Côte d'Ivoire, finding alternatives becomes imperative.

Objective

The objective of this study was to study the chemical composition and biological activity of essential oils of *Lippia multiflora* (Verbenaceae) and *Eucalyptus globulus* (Myrtaceae) and to evaluate their insecticidal potential in the laboratory on three main carp pests of cotton (*Pectinophora gossypiella*, *Thaumatotibia leucotreta* and *Helicoverpa armigera*).

Methodology

After extraction of essential oils by the chemical composition of these was determined. Also, their antioxidant and anti-acetyl cholinerase activities were evaluated. Subsequently, different concentrations of the two essential oils were prepared and applied by contact on batches of insects constituted by ten.

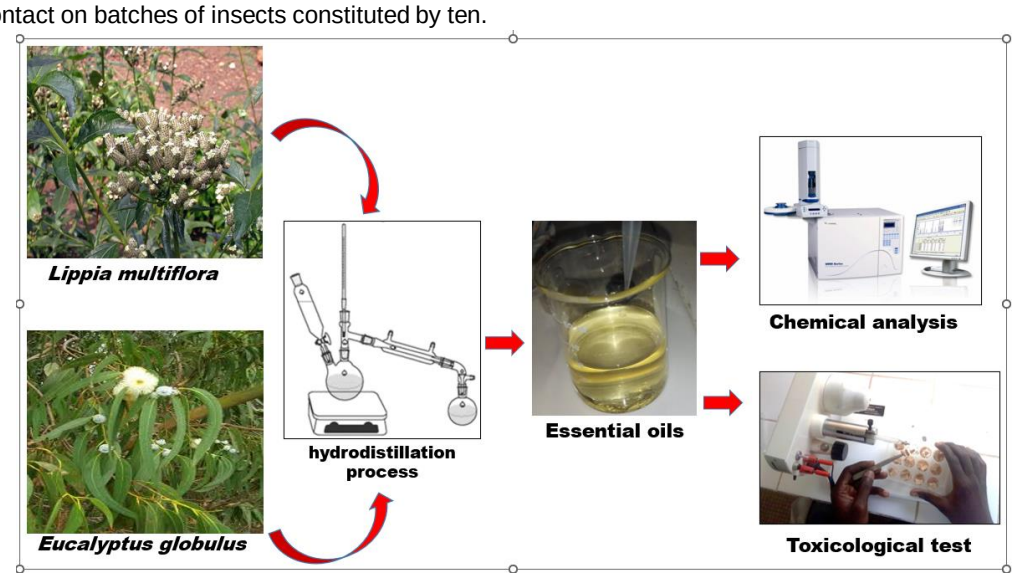

Fig. 1. Graphical abstract of the methodology applied in the study

Results

► Toxicity of essential oils according to the insects tested

The essential oil of *L. multiflora* was the most toxic for the three pests tested. Indeed, the lethal concentrations (LC_{50}) determined were 1.74 %, 1.39 and 7.20 % respectively on *Pectinophora gossypiella*, *Thaumatotibia leucotreta* and *Helicoverpa armigera*.

Table 1. Lethal concentration of essential oil in relation to the insect pests tested

Aromatic plants	*P. gossypiella* LC_{50} (%)	*T. leucotreta* LC_{90} (%)	*H. armigera* LC_{90} (%)
L. multiflora	1.74[a]	1.39[a]	7.20[a]
E. globulus	16.05[b]	10.23[b]	16.32[b]

► Enzymatic activities of essentials oil

The EOs of *L. multiflora* and *E. globulus* also showed significant inhibitors of acetyl (2.13 and 2.16 mg GALAE/g, respectively) and butyryl cholinesterase (4.03 and 3.61 mg GALAE, respectively). *L. multiflora* was differentiated by its good inactivation of tyrosinases (163.46 versus 58.95 Mg KAE/g in *E. globulus*). Better antioxidant activity was observed with *L. multiflora* EO relative to DPPH (7.05±0.34 mg TE/g).

Table 2. Enzyme inhibitory activities of the tested Essential oils

Aromatic plants	AchE	BchE	Tyrosinase
	(mg GALAE/g)		(mg KAE/g)
L. multiflora	2.13±0.30[a]	4.03±0.44[a]	163.46±11.49[a]
E. globulus	2.16±0.19[a]	3.61±0.36[a]	58.95±12.55[b]
Probability (p)	0.887	0.265	0.0001

Values are reported as mean ±SD. GALAE: Galantamine equivalent. Different letters indicate significant differences in the essential oils ($p < 0.05$) (Mann-Whitney test).

Conclusion

Biopesticides based on *L. multiflora* essential oil could be developed for the phytosanitary protection of cotton plant.