



Plant Extracts as Ecological Sterilants for Farm Tools Contaminated with Banana and Potato Wilt Pathogens in the East Democratic Republic of Congo

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1. Introduction

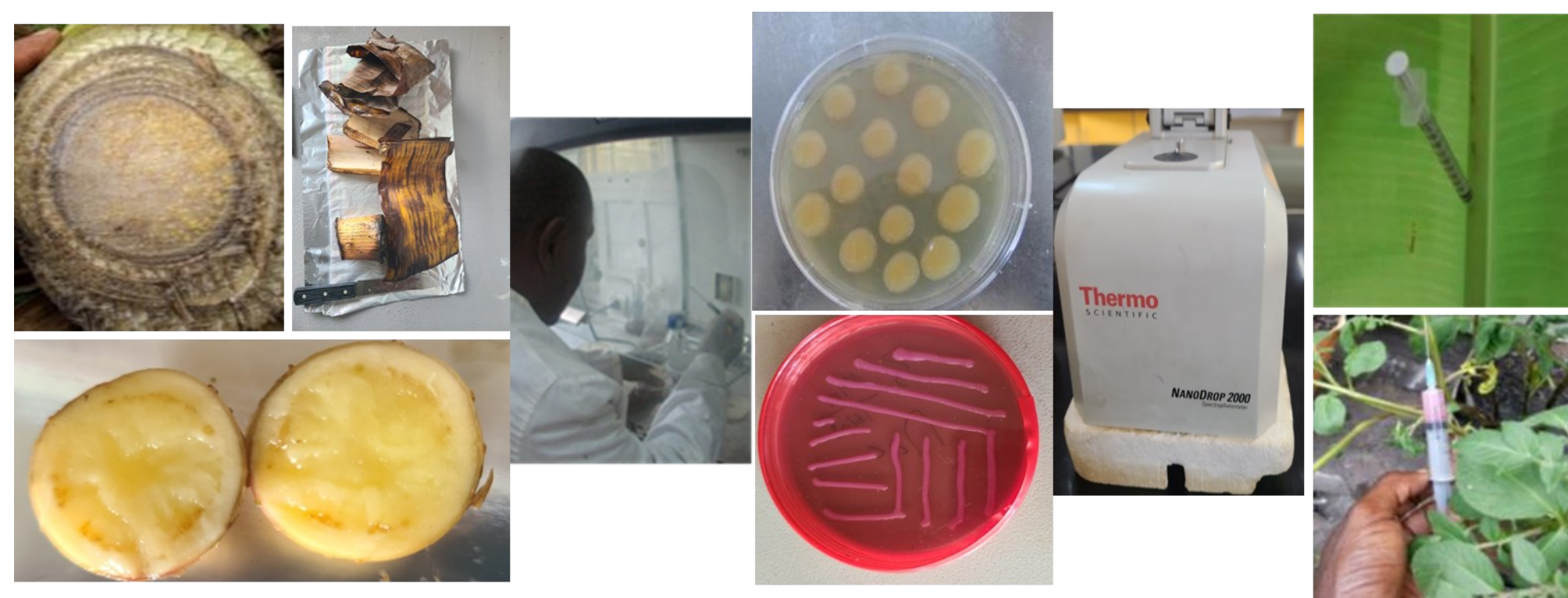
In the East African region, annual per capital consumption of banana reaches up to 600 Kg, while for potato (*Solanum tuberosum*) consumption is about 300 Kg per person per year. Unfortunately, production of both crops is severely constrained by bacterial wilts, caused by *Xanthomonas vasicola* pv. *musacearum* (*Xvm*) in banana and *Ralstonia solanacearum* phylotype IIB (*RslIB*) in potato. These diseases are mostly spread by farmer tools (over 51%). Thus, this study aimed to identify effective plant extracts for disinfecting (sterilizing) contaminated tools under *in vitro* conditions.

2. Materials and methods

The experiment was conducted, in the "National Crops Resources Research Institute" (NaCRRI) in Namulonge, Kampala : Uganda.

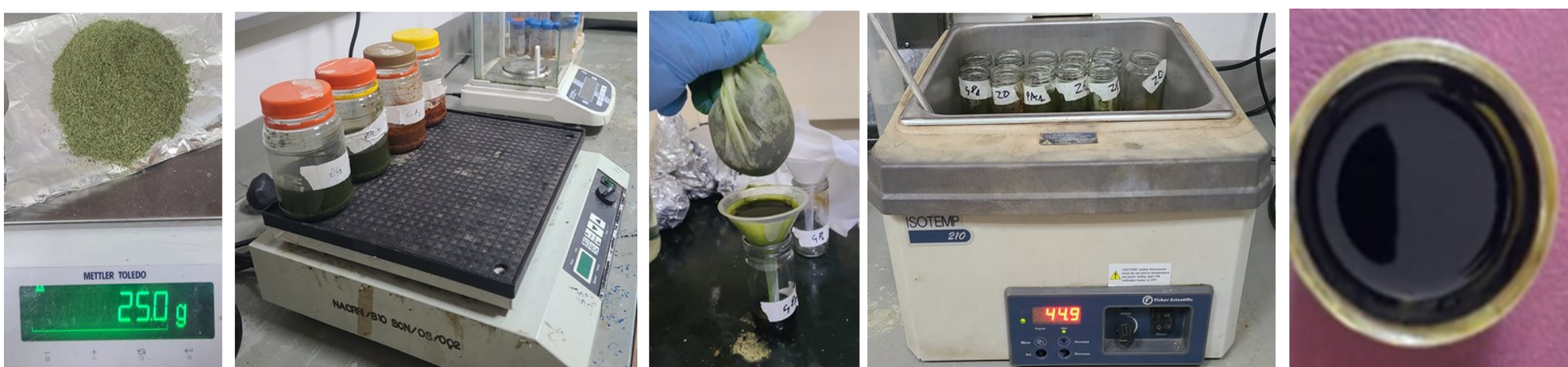
A. Pathogenic isolation and identification

Both pathogens were identified through Polymerase Chain Reaction (PCR) and greenhouse inoculation trials.



Symptomatic wilt plants Isolation Purification Inoculum Koch test

B. Plant extraction process



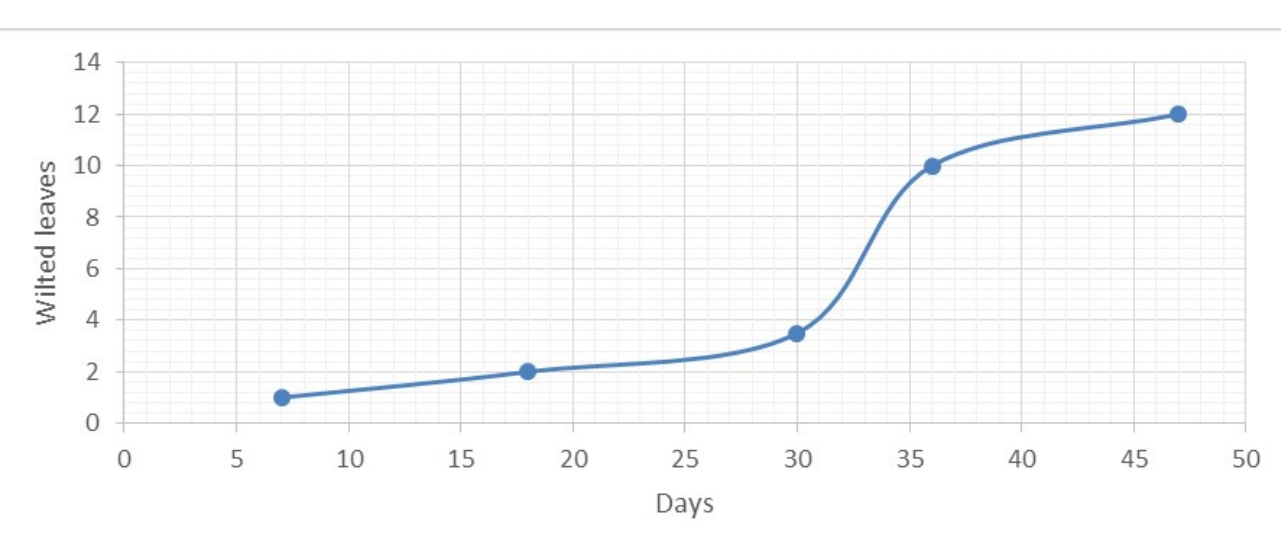
Weighing Maceration Filtration Evaporation

C. Sterilization test

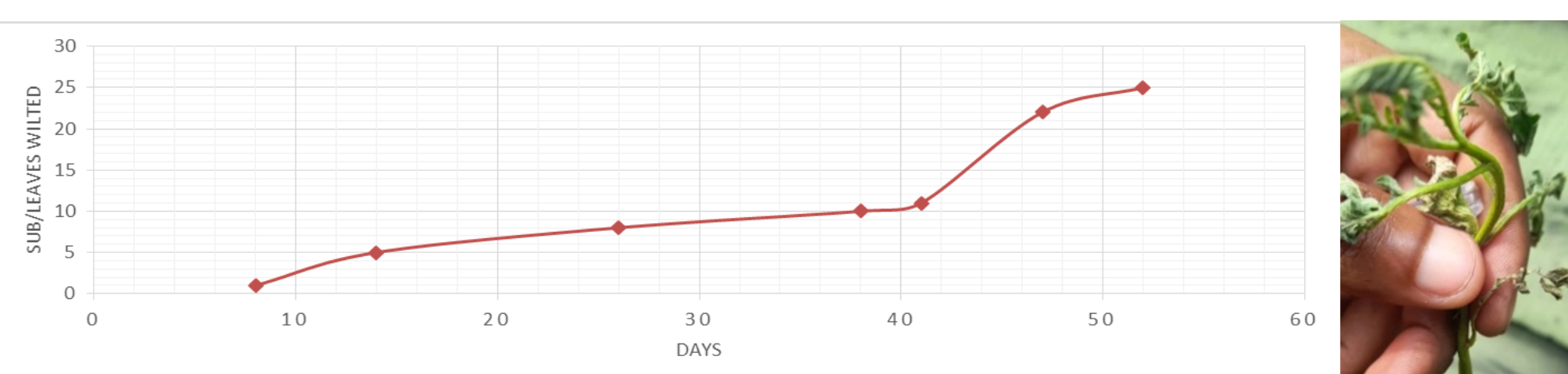
Sterile scalpels were used as alternative to farmer tool, contaminated with bacteria for 2 minutes and then disinfected in various plant extracts solutions for 3 minutes. The experimental design was completely randomized with 14 treatments: 12 plants extracts, one negative control (distilled water) and one positive control (sodium hypochlorite: jik) each replicated 3 times. Bacterial survival was assessed by counting colonies growth on Mueller Hinton Agar after 48 hours

3. Results & Discussion

A. Bacteria identification



Xvm identification



RslIB identification

B. Bacteria colonies grows after sterilization

Tab. 1 : Colonies bacteria after sterilization

Extract	Xcm (colonies number)	Extract	RslIB (colonies number)
NC	+300	NC	+300
JIK	0,00 a	JIK	0,00 a
ZP	+300	ZO	+300
PA	+300	ZP	+300
CF	+300	RC	28,33 b
DS	+300	PA	75,00 c
GP	4,33 a	PN	+300
PN	5,33 a	CF	78,00 c
EG	0,00 a	GP	30,33 b
EH	46,33 b	EH	+300
MG	4,33 a	DS	77,67 c
RC	11,3 a	MG	+300
ZO	2,67 a	EG	0,00 a
TC+	24,00 b	TC+	102,33 c

The means followed by the letter a with the same letter are not different according to the Tukey test at 0.05

Legend : " CF : *C. frutescens* L.", " DS : *D. stramonium* L." " EG : *E. globulus*", " EH : *E. heterophylla* L.", " GP : *G. parviflora* C.", " MG : *M. glaziovii* M." " RC : *R. communis* L.", " PA : *P. aquilinum* L.", " PN : *Piper nigrum* L.", "ZO : *Z. officinale* R." et "ZP : *Z. pustulata*"

C. Extract proprieties

Tab. 2: Yield, pH and Phenol OD_{715p}

Ext	Yield in %	pH	OD _{715p}
GP	4.64 a	5.90 b c	1.63 g
EH	7.96 a b	5.95 b c	1.96 h
ZP	9.44 a b c	5.95 b c	0.77 b c
MG	9.80 a b c	5.75 b	0.99 c d e
ZO	9.96 a b c	8.00 d	0.51 a
PN	10.6 b c	6.35 c	1.86 g h
RC	11.28 b c d	5.70 b	1.20 f
DS	13.56 b c d f	5.80 b	1.09 d e
EG	14.44 c d f	5.0 a	1.84 g h
PA	16.28 d f	6.05 b c	0.82 d e
CF	16.92 f	5.80 b	0.82 c d

Means followed by the same letter are not significantly different according to the Tukey test at 0.05.

Correge *et al.* (2003), classified disinfectants into four classes. According to such classification *E. globulus*, *Z. officinale*, *G. parviflora*, and *R. communis* are considered highly effective disinfectants for tools contaminated with *Xvm*, while the *E. globulus*, *G. parviflora* and *R. communis* are also highly effective against *RslIB*.

As found by Horner *et al.*, (2024), in only 3 minutes scalpels were oxidized in sodium hypochloride.

4. Conclusion

Eucalyptus globulus extract proved the most effective disinfecting scalpels contaminated with both pathogens, further *In vivo* tests are required to evaluate its practical application in the field.

5. References

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- De Marco E., Savarese M., Paduano A. & Sacchi R. (2007). Characterization and fractionation of phenolic compounds extracted from olive oil mill wastewaters. *Food chemistry*, 104, (2), 858-867.
- Horner M. B., Newland J. & McCourt T. (2024). Efficacy of sterilants to kill *Erwinia amylovora*. *Journal of Plant Pathology*, 1-6.