Isolation and chemical characterization of insect antifeedants from *Melia volkensii* against fall armyworm, *Spodoptera frugiperda*, and red flour beetle, *Tribolium castaneum*

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Introduction

Fall armyworm is an invasive polyphagous pest causing up to 100% yield loss in cereals.

Red flour beetle infests stored grains and is found in granaries, mills, warehouses causing 10 – 40 % loss.

Application of synthetic pesticides to control these pests have raised concerns about pesticide residues, toxicity to non-target organisms and environmental problems.

Therefore, plant-based pesticides have emerged as safer alternatives

Fall armyworm damage

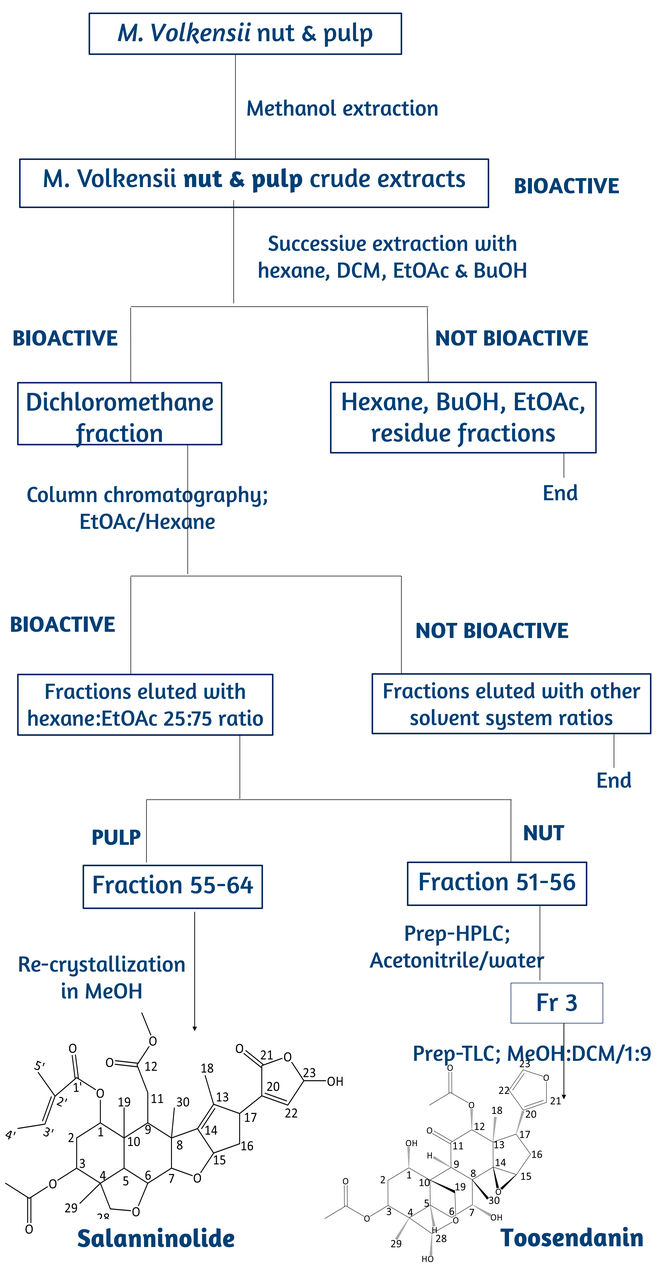
Red flour beetle damage

This study evaluated insecticidal potential and bioactive constituents of *Melia volkensii*, an indigenous tree native to semi-arid areas of East Africa.

Melia volkensii

Methodology

This study employed a bioactivity-guided strategy to isolate and identify insect antifeedants from *M. volkensii*



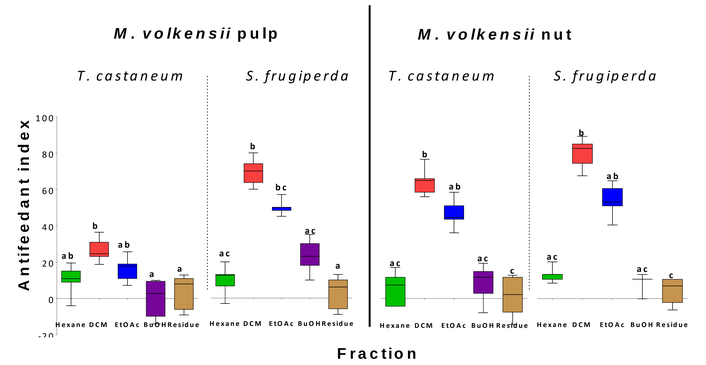
Results

1. Antifeedant activity of *M. volkensii* crude extracts against *S. frugiperda* and *T. castaneum*

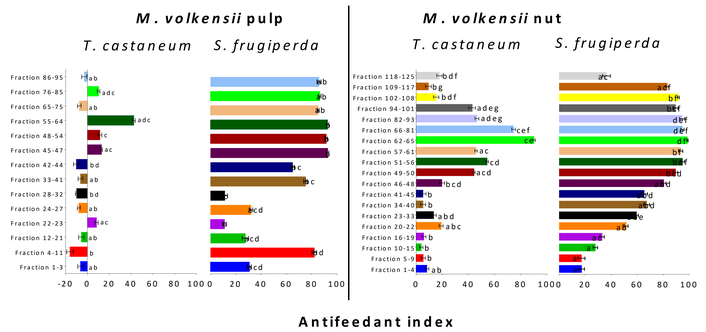
Plant part	Pulp	Nut
S. frugiperda	57.8 ± 2.4[a]	56.6 ±2.2[a]
T. castaneum	46.2 ±1.3[a]	70.7 ± 1.4[b]

Values are antifeedant indices at 2% ± SEM. Means followed by same superscript are not significantly different

2. Antifeedant activity various fractions against *S. frugiperda* and *T. castaneum*



3. Antifeedant activity various column chromatography fractions against *S. frugiperda* and *T. castaneum*



4. EC_{50} toosendanin & salanninolide against *T. castaneum* & *S. frugiperda*

Compound	Insect pest	EC_{50} (%)
Toosendanin	*T. castaneum*	0.04
	S. frugiperda	0.03
Salanninolide	*T. castaneum*	0.10
	S. frugiperda	0.02

Conclusion

1. *M. volkensii* crude extracts showed antifeedant activity against *S. frugiperda* and *T. castaneum*
2. The activity was retained in the dichloromethane fraction
3. Fractions eluted with hexane:EtOAc 25:75 from column chromatography had highest activity; implying that bioactive fractions are of mid-polarity
4. Pure compond salanninolide was isolated from pulp while toosendanin was isolated from nut
5. EC_{50} values of pure compounds indicate their high potency against the insect pests
6. Salanninolide and toosendanin could be used in formulation of botanical pesticides

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