Phytochemical investigation and biological activities from *Lantana rhodesiensis* Moldenke.

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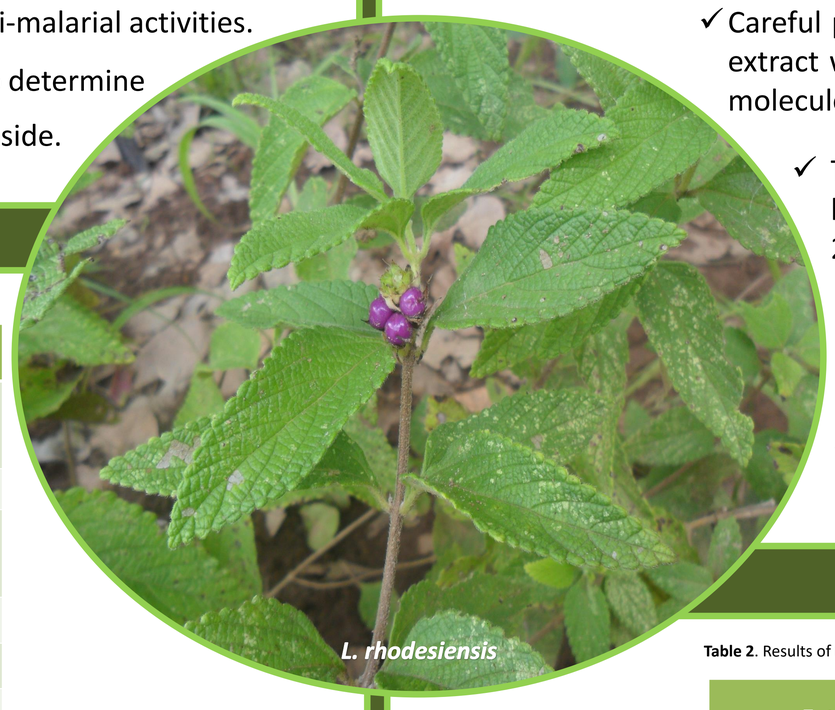
Introduction & Objectives

In traditional medicine numerous plants are used in decoction, infusion, emulsion, and powdered forms for the treatment of several diseases. The study of the chemical composition of medicinal plants is of the utmost importance if one wants to value these medicinal plants in the best possible way. *Lantana rhodesiensis* Moldenke (*L. rhodesiensis*) is an herb or small shrub under two meters tall which is often multi-stemmed [1]. It is used in traditional medicine to treat malaria[2], cancer[3], diabetes[1], rheumatism[1]. The main purpose of the present research was to correlate the traditional medicine uses of *L. rhodesiensis* for treating rheumatism and malaria with the phytochemical composition of *L. rhodesiensis* organs extracts and with their antioxidant and anti-malarial activities. The different plant organs were considered separately in order to determine the most active part of the plant and to isolate the compounds inside.

Methods

- ✓ The phytochemical families in leaves, stems and roots from *L. rhodesiensis* were determined using reaction in tubes tests .
- ✓ Total phenolic and total flavonoid content was performed using Folin-Ciocalteu and aluminum chloride method respectively.
- ✓ The antioxidant activity of organs was determined using three different assays: DPPH, FRAP and β-carotene bleaching test.
- ✓ Anti-malarial activity of each organs extract was also evaluated using asexual erythrocyte stages of *Plasmodium falciparum*, chloroquine sensitive strain 3D7.
- ✓ Careful phytochemical investigation of the leaf hydro-methanolic extract were performed to isolate and characterize the bioactive molecules.
- ✓ The structures of isolated compounds were established by spectral analysis, mainly HR ESI-MS, Q-TOF, ^{1}H, ^{13}C and 2D-NMR (COSY, HSQC and HMBC).
- ✓ Compounds spectroscopic data were also compared with those reported in the literature.
- ✓ The antioxidant potential of all purified compounds was determined based on the DPPH method (1mg/mL).



L. rhodesiensis

Results

Table 1. Phytochemical screening of *L. rhodesiensis* organs

Phytochemical classes		Test performed	Leaves	Stems	Roots
Polyphenols		Iron chloride 2%	+++	++	+
Flavonoids		Cyanidin	+++	+	+
Terpenes/sterols		Leiberman and Bürchard	++	+	++
Tannins	catechin	Stiasny	++	+	+
	gallic	Stiasny	++	++	+
Saponins		Foam formation	+	+	++
Alkaloids		Dragendorff	+	+	+
Leucoanthocyanins		Cyanidin	-	-	-
Anthocyanins		Cyanidin	-	-	-

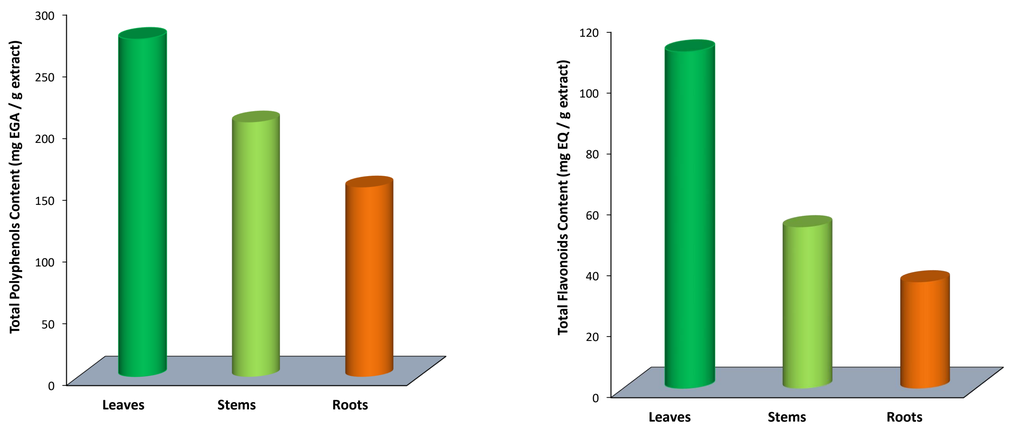


Figure 1. Polyphenolic compound assay results. GAE: gallic acid equivalents, QE: quercetin equivalents

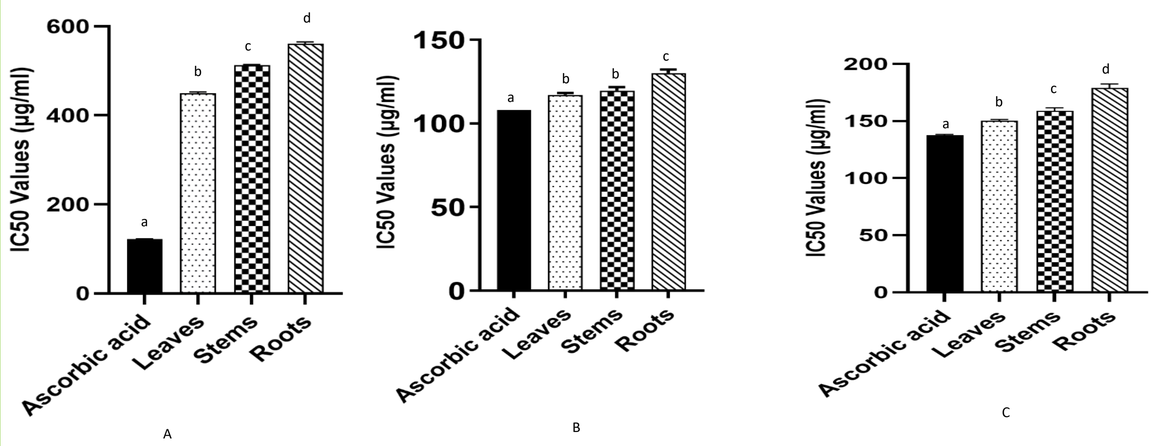
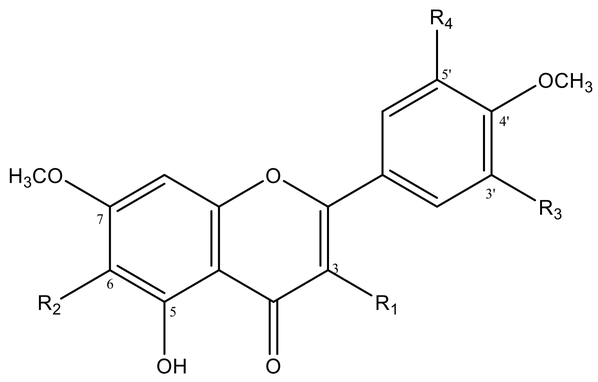


Figure 2. Antioxidant activity values of the methanolic extracts of *L. rhodesiensis* organs and ascorbic acid, A. DPPH method, B. FRAP method and C. β-carotene method. Each result is the average of three values (n = 3). Histograms that do not share any letters are significantly different (p-value<0.05).

Results (continued)

Table 2. Results of the anti-malarial activity of the different extracts obtained by non-sequential extraction

Extract (MeOH/H_2O)	3D7, IC_{50} (µg/mL)
Leaves	12.5 ± 2.5
Stems	> 100
Roots	> 100
Artemisinin	0.004 ± 0.001



Compounds	R_1	R_2	R_3	R_4	% I
1	H	OCH_3	OCH_3	OCH_3	0.57 ± 0.04
2	H	OCH_3	OCH_3	H	1.98 ± 0.64
3	H	OH	OH	H	61.77 ± 3.53

Figure 3. Molecular structure of purified flavones and their antioxidant potential

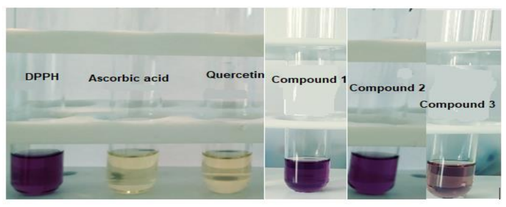


Figure 4. DPPH assay test of compounds and standards

Conclusion

In the present study, different *L. rhodesiensis* organs were submitted to hydro-methanolic extraction and the antioxidant and anti-malarial activities of those extracts were evaluated. The present study showed variable results depending on the plant organ. Leaf and stem extract showed an interesting phenolic compound content correlated with robust antioxidant and anti-malarial activities, while the root extract displayed lower activities. The present study thus supports the claim regarding the traditional use of *L. rhodesiensis* leaves to treat malaria and rheumatism. Hence, *L. rhodesiensis* is a potential source for isolating antioxidant and anti-malarial molecules. Moreover, this is the first report on the in vitro anti-malarial activity of L. rhodesiensis. Among the three compounds isolated from the *L. rhodesiensis* leaf extract, Compounds 2 and 3 were reported for the first time in this plant. Compound 3, which displayed the highest number of free hydroxyl groups on the benzene rings among all the purified molecules, had an average antioxidant potential.

References

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For further informations

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