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# SCREENING FOR ANTIMALARIAL ACTIVITY OF CRUDE EXTRACTS FROM AFRICAN MEDICINAL PLANTS


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## INTRODUCTION

Malaria a serious parasitic disease, spread by mosquitoes from Anopheles species, is still the most devastating in the world. It has been estimated that in the last 20 years mortality from malaria has doubled (it is currently 3 millions deaths annually), and a major factor responsible for this increase is the resistance of malaria parasites to antimalarial drugs.[1] Consequently, there is an urgent need to discover new and affordable antimalarials. Antimalarial drugs derived from plants appear to be promising therapeutic candidates as exemplified by artemisinin and quinine, two of the most effective drugs against *Plasmodium falciparum*.

In Africa, up to 80% of the population use traditional medicines for primary health care.[2] However, few scientific data are available to validate the antimalarial properties of medicinal plants.

The aim of this study was to carry out a scientific evaluation of the claimed antimalarial properties of plants used in traditional medicine against malaria and fever, in order to validate their use and to determine their potential as new sources of antimalarial drugs.

**Figure 1-** Some of the most active plants.

**Figure 2-** *Anopheles gambiae.*

## RESULTS AND DISCUSSION

The antimalarial activity of fifty seven extracts, prepared by sequential extraction with solvents of increased polarity (hexane, dichloromethane, ethyl acetate and methanol) was evaluated against 3D7 *P. falciparum* strain. The experimental procedure is summarized in scheme 1.

As illustrated in Table 1, from the fifty seven extracts tested, two of them (4 %) showed a significant activity (IC50 < 5 mg/ml), 14 extracts (25%) showed moderate activity (10 <IC50 < 50 mg/ml), 20 (35 %) weak activity (50 <IC50 < 100 mg/ml) and 21 extracts (36%) were inactive (IC50 > 100 mg/ml).

A bioassay-guided fractionation of the most active extracts (*Momordica balsamina* L. and *Pittosporum tobira* W. T. Aiton.) is ongoing; several active compounds were already isolated.

**Table 1- Antimalarial activity of crude extracts against *P. falciparum* 3D7.**

| Species | Family | $IC_{50}$ (µg/ml) | | | |
|---|---|---|---|---|---|
| | | Hexane Extract | $CH_2Cl_2$ Extract | AcOEt Extract | MeOH Ectract |
| ***Acacia Karroo* Hayne** | Fabaceae | 99 | 60 | 52 | >100 |
| ***Aloe parvibracteata* Schonland** | Aloaceae | >100 | >100 | >100 | - |
| ***Bridelia cathartica* Bertol. f.** | Euphorbiaceae | 99 | >100 | 44 | >100 |
| ***Cassia abbreviata* Oliv.** | Fabaceae | >100 | 40 | >100 | >100 |
| ***Cassia occidentalis* L.** | Fabaceae | **36** | 60 | 48 | 88 |
| ***Crossopteryx febriguga* Benth** | Rubiaceae | - | 59 | - | >100 |
| ***Leonotis leonurus* R. Br.** | Lamiaceae | >100 | 61 | **31** | >100 |
| ***Momordica balsamina* L.** | Cucurbitaceae | >100 | **22** | **1** | 75± |
| ***Parkinsonia aculeata* L.** | Caesalpiniaceae | 32 | 66 | **35** | 80 |
| ***Pittosporum tobira* W. T. Aiton** | Pittosporaceae | **28** | 57 | **5** | >100 |
| ***Plumbago auriculata* Lam.** | Plumbaginaceae | 67 | 46 | 35 | 80 |
| ***Schlefflera actinophylla* Harms** | Araliaceae | **22** | 34 | 41 | >100 |
| ***Senna didymobotrya* Fresen.** | Fabaceae | 64 | 92 | 99 | 75 |
| ***Tabernaemontana elegans* Strapt.** | Apocynaceae | 59 | **27** | 99 | >100 |
| ***Trichilia emetica* Vahl** | Meliaceae | >100 | >100 | >100 | >100 |

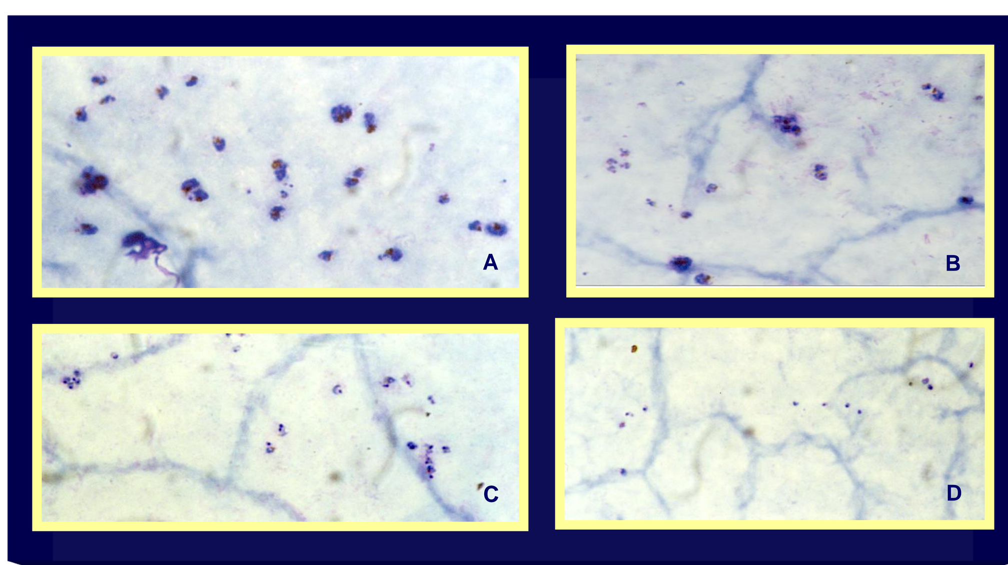
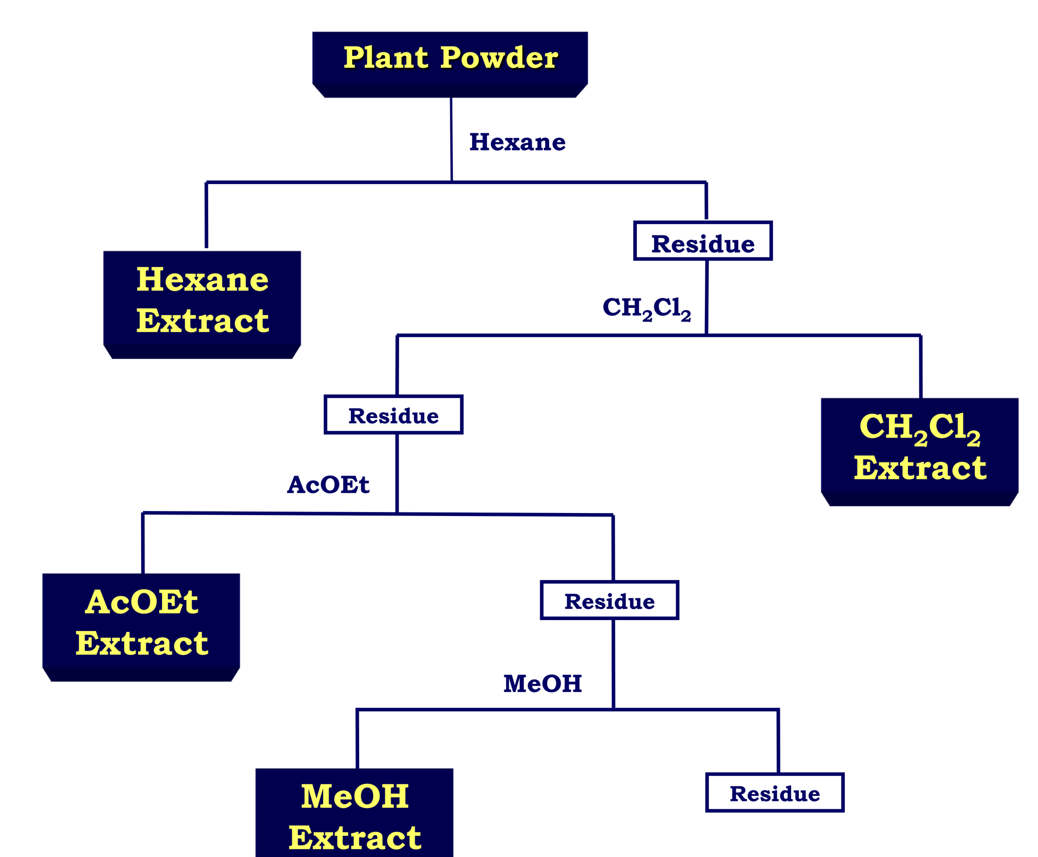



**Figure 3-** Thick blood film of the *Pittosporum tobira* AcOEt extract demonstrating a significant decrease in schizonts with the increase of extract concentration (A- Controlo -; B- 1 µg/ml; C- 25 µg/ml; D- 100 µg/ml). (oil immersion x 1000).

**Scheme 1- Extraction methodology.**




## MATERIALS AND METHODS

**Preparation of plant extracts:** The air-dried powdered plant parts (roots, leaves, seeds, and bark) or whole plant were sequentially extracted, with hexane, dichloromethane ($CH_2Cl_2$), ethyl acetate (AcOEt), and methanol (MeOH), at room temperature, according to the scheme 1 .

**Antimalarial test:** The *in vitro* antimalarial activity of crude extracts was evaluated by means of the Mark III test, as developed by the WHO.[3] *Plasmodium falciparum* strain 3D7, sensitive to chloroquine was cultured in RPMI 1640 medium containing 25 mm HEPES and 6.8 m hipoxantin supplemented with 0.5% AlbuMax II at 37 °C and under atmosphere of 5% O2, 3-5% CO2, and N2. The crude extracts solutions (5mg/ml) were prepared by dissolution in DMSO or Ethanol followed by dilution in RPMI.


**References:**[1] WHO 2007, Facts sheet nº94; [2] WHO 2002. WHO Traditional Medicine strategy 2002-2005. WHO, Geneva, Traditional medicine. 73 pp; 3 WHO/CTD/MAL/97 20 Rev 2, Geneva, WHO, 2001.