



Ethnomedicinal survey and in vitro anti-plasmodial activity of the palm *Borassus aethiopum* Mart

Marta Gruca^a, Wanwan Yu^b, Patrick Amoateng^c, Morten Agertoug Nielsen^d, Thomas B. Poulsen^b, Henrik Balslev^{a,*}



^a Section for Ecoinformatics and Biodiversity, Department of Bioscience, Aarhus University, Ny Munkegade 114, Aarhus C DK 8000, Denmark

^b Chemical Biology Laboratory, Department of Chemistry, Aarhus University, Langelandsgade 140, Aarhus C DK 8000, Denmark

^c Department of Pharmacology & Toxicology, University of Ghana, School of Pharmacy, P.O. Box LG 43, Legon, Accra, Ghana

^d Department of International Health, Immunology and Microbiology, Centre for Medical Parasitology, University of Copenhagen, Øster Farimagsgade 5, 1014 Copenhagen K, Denmark

ARTICLE INFO

Article history:

Received 28 July 2015

Accepted 8 September 2015

Available online 14 September 2015

Keywords:

Arecaceae

Ethnopharmacology

Ghana

Malaria

Plasmodium falciparum

Traditional medicine

ABSTRACT

Ethnopharmacological relevance: Malaria remains a major global health threat, with the heaviest burden of disease in sub-Saharan Africa. Effective treatment is not available in many affected areas, and the *Plasmodium falciparum* parasite is becoming resistant to existing drugs. Alternative therapies are necessary to overcome these challenges. *Borassus aethiopum* is the third most used palm species in traditional medicines in Africa. Yet, there is only limited information substantiating medicinal properties of the palm. The objective of this study was to document medicinal uses of *B. aethiopum* and investigate anti-plasmodial activity of the palm extracts used in traditional medicine to treat malaria.

Materials and methods: The fieldwork and collection of samples was done in Ghana in the Greater Accra, Brong Ahafo, and Volta regions. Our ethnomedicinal survey did not specifically focus on medicinal uses against malaria; any medicinal application of *B. aethiopum* was of interest. Data collection employed a structured questionnaire, open-ended questions, and group discussion. The experimental extraction of samples was carried out using three common solvents: distilled water, absolute ethanol, and dichloromethane (CH₂Cl₂). Anti-plasmodial activity of compounds was determined against erythrocytic stages of the FCR3 strain of *P. falciparum* by a [3H]-hypoxanthine incorporation assay.

Results: A total of 37 use records were documented regarding the medicinal uses of *B. aethiopum* for the management of 24 different disorders. The highest medicinal use value was recorded for the use of *B. aethiopum* against malaria, and a subsequent laboratory investigation focused on evaluating anti-plasmodial activity of the palm. Several root and leaf extracts displayed anti-plasmodial activity, with the highest (78% at 50 µg/mL) elicited by one of the dichloromethane root extracts.

Conclusion: Our results demonstrate the value of integrating ethnobotanical and pharmacological research in the study of beneficial effects of palm products on human health. While the high inhibitory activity found in dichloromethane extracts cannot validate the ethnomedicinal use, the anti-plasmodial effect observed cannot be nullified. We brought preliminary evidence that this palm is a promising source of alternative medicines that could contribute to improving health conditions in malaria endemic areas of sub-Saharan Africa.

© 2015 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

For millennia, species of the Palm family (Arecaceae) have played a prominent role to traditional cultures as a source of medicines. Palms are used throughout the tropics and subtropics to cure a series of diseases and disorders (Hamill et al., 2003;

* Corresponding author.

E-mail address: henrik.balslev@bios.au.dk (H. Balslev).

Macía, 2004; Macía et al., 2011; Nadembega et al., 2011; Sosnowska and Balslev, 2009; Zambrana et al., 2007). A number of pharmacological studies have proven the effectiveness of traditional uses of palms (Abedi et al., 2014; Akinyele et al., 2011; Al-Qarawi et al., 2003; Chong et al., 2008; Elegami et al., 2001; Rinaldi et al., 2009; Sasidharan et al., 2012; Vijayarathna et al., 2012). Nevertheless, countless healing properties of palms that have been reported in the ethnobotanical literature remain to be investigated through precise laboratory investigations.

There were 198 million cases of malaria globally in 2013 and the disease led to 584,000 deaths (WHO, 2014a). The burden is heaviest in sub-Saharan Africa, where nine out of ten deaths caused by malaria occur, mostly among children under five years of age (WHO, 2014a). Although the same person can be infected several times in a year, malaria is a curable disease if promptly diagnosed and adequately treated. However, effective treatment is not available in many rural areas including ones that are most affected (Bodeker and Willcox, 2000). Additionally, the *Plasmodium falciparum* parasite is becoming increasingly resistant to the commonly used drugs, which presents a serious threat to successful treatment. For decades chloroquine was the main anti-malarial drug, but the resistance of *P. falciparum* was already reported in Africa in the late 1970s (Campbell et al., 1979; Fogh et al., 1979). By the 1990s *P. falciparum* had developed resistance to the second-line drug sulfadoxine/pyrimethamine (Landgraf et al., 1994; Rønn et al., 1996). Alternative therapies are necessary to overcome these challenges, which is one of the reasons why self-

prescribed medication derived from local plants is widespread (Asase et al., 2010; Asante and Asenso-Okyere, 2003). In fact, most useful drugs derived from plants have been discovered by follow-up of ethnobotanical studies (Fabricant and Farnsworth, 2001). The two most effective drugs for malaria originate from plants: quinine from *Cinchona* trees, and artemisinin from *Artemisia annua* L. Presumably other plants used to treat malaria in traditional medicines contain as yet undiscovered potent substances (Bodeker and Willcox, 2000). Therefore, ethnobotanical research combined with pharmacological validation could help to fill the gap of effective, affordable and safe medicines available to people in need.

Borassus aethiopum is the third most used palm species in traditional medicines in Africa (equal to *Cocos nucifera* L., and preceded by *Phoenix dactylifera* L. and *Elaeis guineensis* Jacq.; Gruca et al., 2015). Despite extensive use of *B. aethiopum* in traditional medicines, limited information validating its medicinal properties is available in the literature (Amoateng et al., 2010; Sakandé et al., 2012). Some of the available ethnobotanical surveys were too

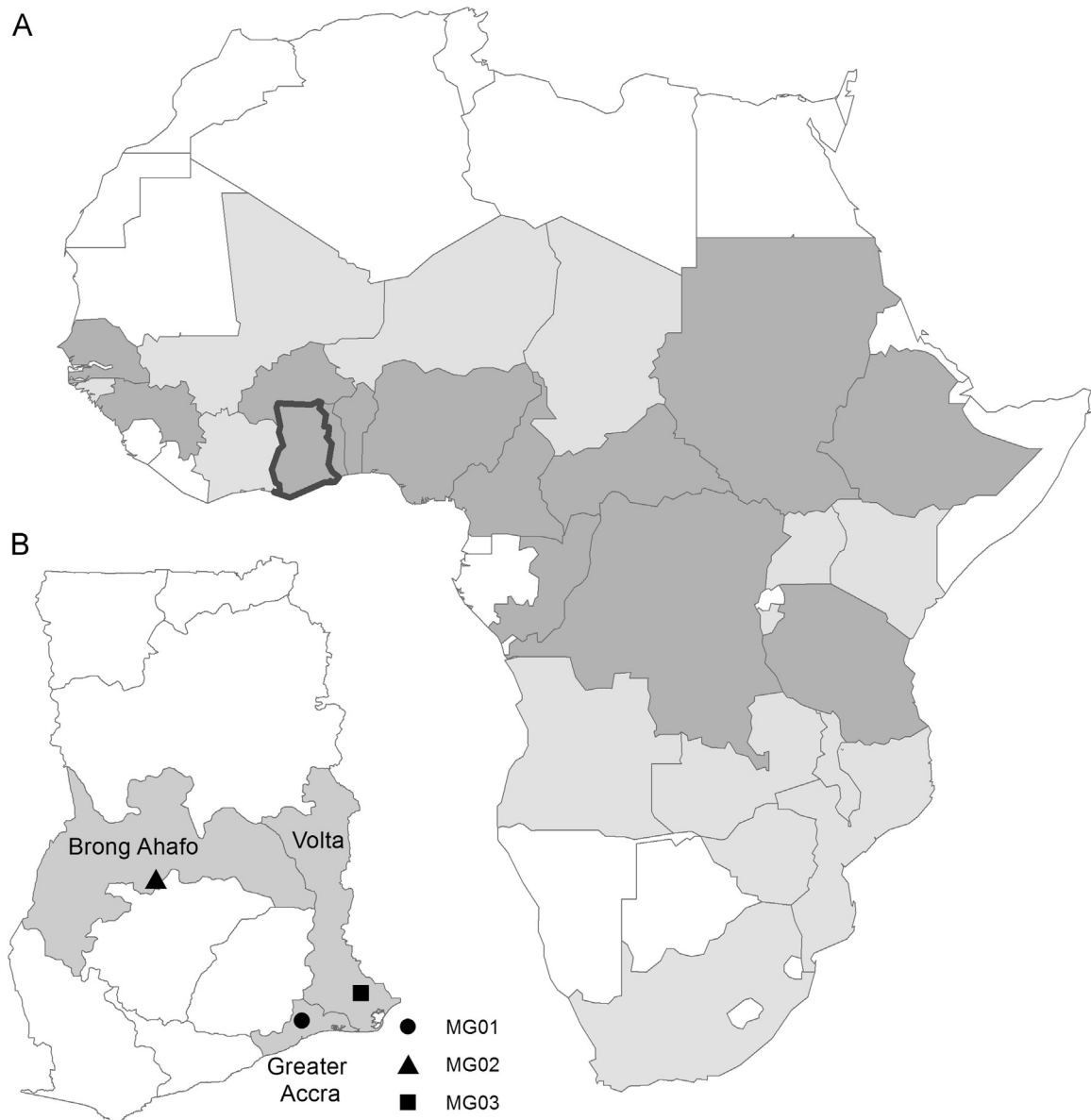


Fig. 1. (A) Country-level distribution of *Borassus aethiopum* and its medicinal uses across Africa. Dark gray indicates countries where *B. aethiopum* occurs (Blach-Overgaard et al., 2010, 2013; Govaerts et al., 2014) and was recorded to be used medicinally (Gruca et al., 2015); light gray indicates countries where *B. aethiopum* occurs; blank: occurrence not documented. (B) Map of Ghana indicating study area regions and *B. aethiopum* collection sites.

Download English Version:

<https://daneshyari.com/en/article/2544931>

Download Persian Version:

<https://daneshyari.com/article/2544931>

[Daneshyari.com](https://daneshyari.com)