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Tree response to bark harvest: the case of a medicinal species, *Garcinia lucida*, as source of raw materials for plant-based drug development

Nicole Marie GUEDJE [1*], **Nicodeme TCHAMOU** [2], **Jean LEJOLY** [3]

[1.] Department of Pharmacognosy and Pharmaceutical Chemistry, Faculty of Medicine and Biomedical Sciences, University of Yaounde 1; manique@hotmail.com ; +237 676075355

[2.] USAID Regional Office, Accra – Ghana; ntchamou@usaid.gov; +233 24 4313 549

[3.] Laboratoire de Botanique Systématique et de Phytosociologie, CP 169, Université Libre de Bruxelles" / GI Agro ONG, Ibi, Kinshasa, RD Congo ; jeanl@ibi-village-cd / jlejoly@ulb.ac.be ; +243 81 6566 781 / +32 479 99 0362

*** Corresponding author:** Nicole Marie **GUEDJE,** PO Box: 25645 Messa - Yaounde, Cameroon

E-mail: manique@hotmail.com , Phone : + 237 699 685 850 / 676 075 355

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ABSTRACT

Objectives: There is a huge demand for medicinal bark in developing countries and this demand is growing fast due to it high market values. To assess the effects of bark functions and tree capacities to recover from various debarking practices, a two-year experiment was conducted and several local harvest practices were tested on *Garcinia lucida*.

Methodology and Results: For each practice, 20 healthy trees were selected and harvested. Tree health was monitored every month and the total bark regrowth was calculated using planimetric techniques. In response to bark removal, *G. lucida* trees produced stilt-roots, sprouts and bark. Re-growth of bark was the most common strategy developed, with mean values ranging from 80 to 100% of trees. All stumps have developed sprouts, with an average number of 6 shoots per stump. The percentage of bark regrowth varies from 45 to 62% of the initial surface debarked for small trees and from 24 to 37% for large trees. A high rate of bark regeneration was found if narrow strips of bark remained on trees, from which bark was hardly removed from wood during harvest, ***probably*** characterized physiologically by a downward sap flow due to poor water supply in trees.

Conclusions and application of findings: The study has discussed main findings on the experimental debarking of *G. lucida* and management implications**, which** would also apply to other species with the same response to bark stripping as source of raw materials for plant-based drug prospects in developing countries. Bark strip harvesting requires species-specific parameters to make it sustainable, taking into account : (i) the bark regeneration capacity (edge growth), which may allow repeated harvest on the same tree; and (ii) the physiological status (downward sap flow) of the tree at the time of harvest, as decisive factor triggering bark regrowth. Partial bark strip harvesting show good prospects for the implementation of long-term sustainable strip harvesting prescriptions, while sustainable stripping through ring-barking practice is unsuitable. Shoot growth and stilt-root development in *G. lucida* species allows for other management options than strip harvesting, including coppice management and domestication. However,

there are major limitations in using regenerated bark, as the time required to re-attain preharvest bark thickness, as well as the chemical composition due to stress-releasing mechanisms remain unknown.
Key-words: medicinal bark regrowth, harvest practices, plant-based drug prospects, species recovering capacity, sprouting capacity.