

Full Length Research Paper

Mechanisms for sustainable use of biodiversity in and beyond natural ecosystems: A study on conservation and commercial production of *Prunus africana* in Uganda

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Accepted 15 February, 2010

The increasing demand for *Prunus africana* resources is an opportunity for its conservation and commercial use to support livelihoods in Africa. The objective for this study was to investigate major steps to advance production of *P. africana* for long-term commercial use in Uganda. Specific objectives were to explore potential production schemes, setbacks in production and strategies to advance it. The study was done by review of literature, documents and interviews with experts. Results indicated Agroforestry and large plantations to be useful schemes for production. Identified setbacks are: low trade in *P. africana*, unknown returns from production, competing land uses, long growth period, limited market assurance and information. The lack of a resource assessment for *P. africana* in forests contributes to its low trade which undermines related economic benefits for national development and incentives to commercial production. We propose that a national Quantitative resource assessment of *P. africana* in forests is one of the crucial steps that should be undertaken to carefully organise and advance sustainable trade to provide rational incentives for commercial production. Subsequently, production should be localised in suitable sites and producers be organised into cooperatives. Further research to improve returns from commercial production of *P. africana* is needed.

Key words: *Prunus africana*, sustainable use, biotrade, certification, agroforestry, natural resource management.

INTRODUCTION

Sustainable economic benefits from conservation of useful plants like *Prunus africana* create opportunities to improve livelihoods in Africa (Cunningham et al., 2002; Hamilton, 2003; Guillaume, Giuliani and Smale, 2006;

Tabuti and Mugula, 2007). The trade and production of wild plants can sustain ecological and economic benefits in low developed countries (ten Kate and Laird, 1999; Seely et al., 2003; Giuliani et al., 2005). For instance, the commercial use of *P. africana* promotes its conservation and also provide livelihoods to bark traders, private farmers and revenue to government through trade of its resources (Ekane, 2003; Muchugi et al., 2005; CITES, 2008). *P. africana* bark contains active ingredients (Docosanol and β -sistosterol) which are used to treat prostate cancer (Cunningham and Mbekum, 1993). As a result, the bark is traded internationally by major importers in Europe, Asia and USA (CITES, 2006). Therefore, the growing demand for *P. africana* provides

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Abbreviations: UEPB, Uganda export promotion board; CITES, convention on international trade in endangered species; NTSC, national tree seed center; NFA, national forestry authority; NaFORRI, national forestry resources research institute.

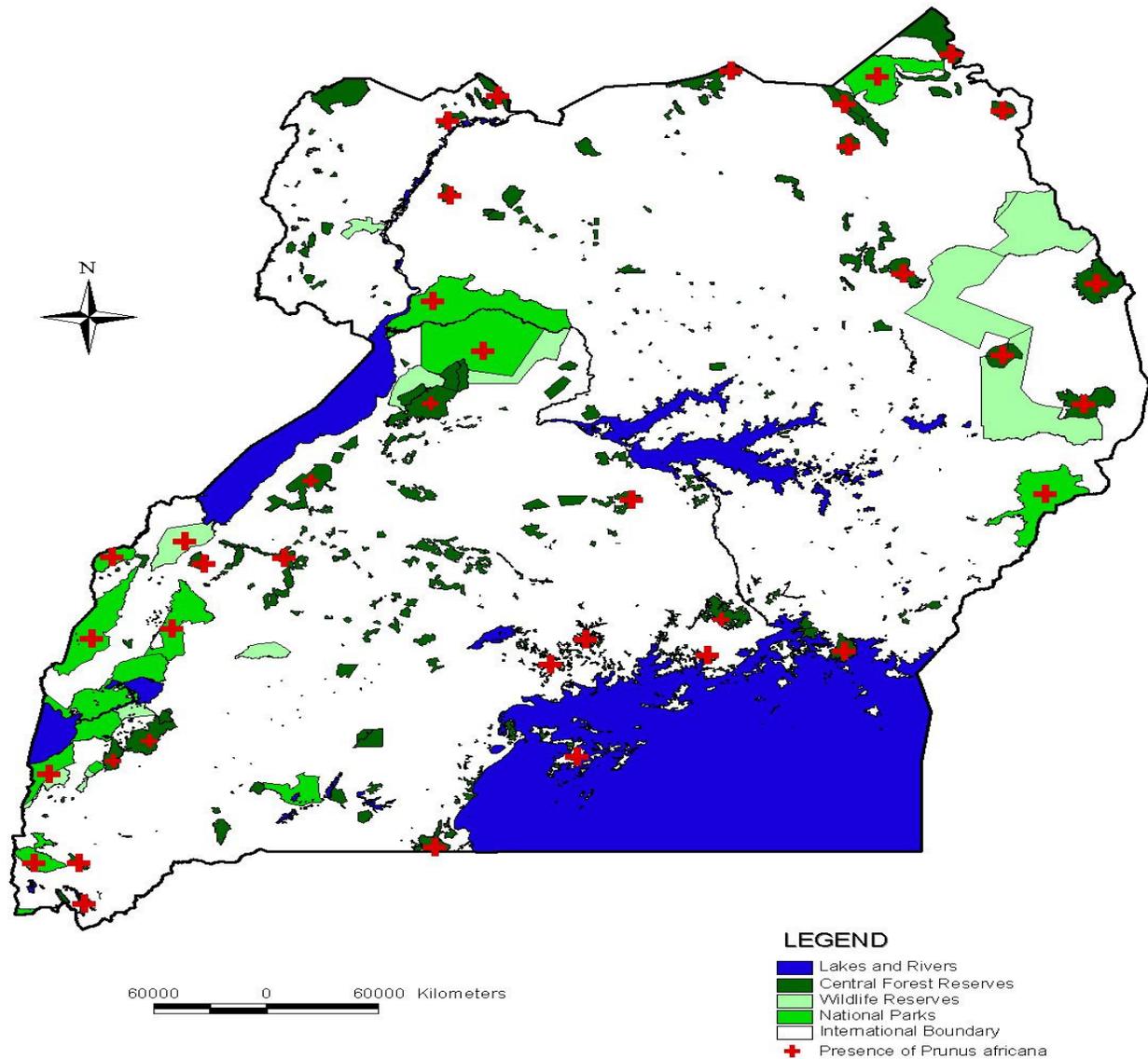


Figure 1. Map of Uganda showing distribution of *P. Africana* in protected areas covered by the national biodiversity inventory. Source: Hafashimana 2004.

an opportunity to improve livelihoods in Africa through sustainable trade and commercial conservation. The trade for *P. africana* resources in Uganda is low and only confined to private and communal lands, with no permitted access to collect commercial quantities from the government forests. Additionally, the national research on the bark quality of Uganda's *P. africana* revealed the availability of marketable provenances (suitable for commercial production) in different ecosystems (Malinga et al., 2004). However, some factors continue to retard the commercial use of such a useful resource (*P. africana*) for income and improvement of local livelihoods in Uganda. Therefore, the main objective for this study was to investigate major steps to promote commercial production of *P. africana* in Uganda.

Specific objectives were to identify constraints, opportunities and strategies for promoting sustainable commercial production of *P. africana* in Uganda.

MATERIAL AND METHODS

The research was carried out in Uganda, in close collaboration with the Uganda Export Promotion Board (UEPB) in Kampala from May to September 2008. The research methodology was based primarily on review of available literature and documents, and interviews with experts and key actors in the sector. Government reports on *P. africana*, BioTrade and CITES reports were used to describe the situation on commercial production of *P. africana* in Uganda (Figure 1).

A total of 14 respondents (experts) was selected from Kampala, Mukono and Jinja districts using references from UEPB, and

Table 1. Percentage of reported setbacks to production of *P. africana*.

Respondents (N=14)	Setbacks (%)							
	Competing uses on land	Not enough planting materials	Unknown economic returns	Low trade in <i>P. africana</i>	Limited market assurance	Strict cites rules	Limited on farm skills	Long growth period
Researchers (04)	100	50	100	75	100	25	25	75
Private sector experts (05)	100	40	60	80	80	40	20	100
Public sector experts (05)	100	60	80	80	100	20	60	60

included public officials and private sector. Primary data was collected through personal interviews with a checklist of open ended questions to get opinions from the experts on most important constraints, opportunities and strategies to promote commercial production of *P. africana*. In the selection of respondents, qualities like; affiliation to relevant institution, research experience on use of wild plants, expertise in BioTrade and private sector issues were used. The respondents were thus divided into three groups; researchers on use of wild plants (04), experts in BioTrade and Private sector (05), and experts from forestry institutions (Public sector) (05). Finally, experts were chosen from; National Forestry Resources Research Institute (NaFORRI) (02), District Forestry Services (DFS)-Mukono (01), Makerere University Department of Botany- (01), Faculty of Forestry-Makerere University (01), Makerere University Institute of Environment and Natural Resources (MUIENR) (02), National Tree Seed Center (NTSC)/ National Forestry Authority (NFA) (02), Lake Product Services (LPS) (01), Rwenzori Vanilla Growers Association (02) and UEPB (02). In all interviews, the same survey tool was used to collect information from the respondents. After interviews, the information was triangulated and clustered into sub themes that depicted strengths, weaknesses, and opportunities for investment in commercial production of wild plant species.

RESULTS

Production and commercial use of *P. africana* in Uganda

The study revealed that commercial production of *P. africana* was a recent and less developed activity with only four private sector groups involved. Production was scattered mainly in western districts of Kasese, Bundibugyo and Kabarole. Other initiatives for commercial production were found in Mukono district (central region), Jinja and Mbale-Mt. Elgon (eastern region). The producers were not well organised and coordinated. They lacked linkages to external support organisations such as CITES for legislative recognition. The private companies provide seedlings to small scale farmers who then raise the trees on their land under an “out growers scheme” (UEPB, 2004). In areas where *P. africana* was cultivated, the level of activity and information on scale of production was scanty.

Setbacks to production of *P. africana* in Uganda

Several setbacks were reported to affect the commercial

production of *P. africana* in Uganda (Table 1). Various expert opinions agreed that production of *P. africana* was given low priority because; land was scarce; higher and more immediate returns from cultivation of food crops; advantages of short-term growing tree species (Pine, Eucalyptus and cash crops like sugarcane), make production of *P. africana* a difficult choice for private sector.

The low trade in *P. africana* was attributed to lack of a national quantitative resource assessment for *P. africana* in forests which makes it difficult to set bark quotas for sustainable trade. Also, limited market assurance and information was reported to be a strong limitation by the majority of experts. However, different opinions were expressed towards planting materials as a setback to production of *P. africana*. Some experts claimed that planting materials were available at the National Tree Seed Centre (NTSC) but few private sector groups procure them compared to other tree species. They associated this phenomenon to the high prices of planting materials, lack of on farm guidelines for commercial production, limited market information and low trade. It was reported that guidelines for on farm management of *P. africana* are lacking because it is not considered a priority species for production and the scientific data to justify its commercial potential in the country is lacking. The researchers and private sector experts who did not support shortage of planting materials as a strong setback to production claimed that lack of clear returns and low trade for *P. africana* resources were stronger hindrances despite availability of planting materials at NTSC. This view was pointed out by more public sector experts who did not agree on CITES regulations to be stronger hindrances to production of *P. africana* because its commercial use is not banned in Uganda.

Opportunities to advance production of *P. africana*

Although a range of factors were reported to hinder production of *P. africana*, some opportunities were identified as indicated in Table 2. These opportunities are some of the existing initiatives that can be useful to support production of *P. africana*. A majority of

Table 2. Percentages of reported opportunities to advance production of *P. africana*.

Respondents (N=14)	Opportunities in (%)				
	Seed facility and research centers	BioTrade companies	Carbon credit scheme	NFA land lease scheme	Local planting initiatives
Researchers (04)	50	100	50	100	50
Private sector experts (05)	100	80	40	80	80
Public sector experts (05)	100	60	40	80	40
Total (%)	86	79	43	86	57

respondents claimed that the Land lease scheme of national forestry authority (NFA) can provide land opportunities for commercial production of *P. africana* because such schemes allow private individuals to plant trees in degraded forests. Another opportunity was the presence of research institutions like NaFORRI and NTSC to generate more knowledge on production of *P. africana* at low costs and more returns. It was reported that carbon credit certification schemes are new initiatives to Uganda which can be applied to increase returns from production of *P. africana*. However, feasibility of such initiatives requires further research. Besides, local initiatives to plant *P. africana* in western, central and eastern regions are opportunities to localise production in suitable sites and improve the knowledge. Experts emphasised that BioTrade companies in Uganda should be encouraged to invest in knowledge on new products from *P. africana* and how to market them in local and international markets.

Strategies to advance production of *P. africana*

Strategies were proposed as possible interventions to upscale and develop production of *P. africana* for commercial use even when the situation at present is far from commercialization. The proposed strategies are shown in the Table 3. Most experts agreed that improved trade is necessary to demonstrate economic benefits from commercial production of *P. africana*. They emphasised that quantities of harvestable *P. africana* in government forests should be established to set proper quotas for sustainable trade and encourage the private sector to start commercial production. To improve the availability of information on viable markets, and certification of planted *P. africana* for carbon trade coupled with new knowledge to extract active ingredients (Docosanol and β -sistosterol) from leaves, were reported to be important strategies for commercial production of *P. africana*. Besides, the experts emphasised that localising production of *P. africana* to suitable sites would create specialised knowledge and lead to quality production with more returns. Further, it would help to identify and organise producers into cooperatives to promote sharing of market information and ideas on how to increase returns from *P. africana*.

The producers may be linked to international trade support organisations for guidance on quality production and access to better markets. For instance, international Organisations such as the Union for Ethical BioTrade which promote sustainable trade in biodiversity, and CITES could be useful in this matter. Another strategy is to apply land lease schemes of the National Forestry Authority (NFA) to commercial production of *P. africana*. However, experts cautioned that suitability of the NFA land lease schemes would depend on conditions of tenure and concessions. Other favorable conditions projected to sustain production of *P. africana* by NFA land lease schemes are; permission to certify planted *P. africana* for carbon trade, harvesting of the bark and long - term ownership of land (preferably over 40 years). Also, more research to document on farm skills, and generate planting materials with faster growth, high concentration of active ingredients and disease resistance were reported to improve commercial production of *P. africana*. The documentation of on farm skills and practices would help liable institutions to develop guidelines for production of *P. africana* which are lacking in Uganda.

DISCUSSION

Findings from this study indicate agroforestry and large plantations to be potential schemes in production of *P. africana*. Though recent studies show agro forestry to have integrated benefits to farmers from tree resources, crops, and livestock (Cunningham et al., 2002; Muchugi et al., 2005), further studies can clarify whether agro forestry or plantations provide more returns in production of *P. africana*. The commercial production of *P. africana* in Uganda is given low priority mainly because of low incentives and unclear returns from production schemes. However, other setbacks to commercial production of wild plant species include; lack of processing industries, cultural perceptions and poor policies for use of natural resources (Seely et al., 2003; Schippman, Leamann and Cunningham, 2006). Hamilton (2003) reported that CITES regulations that ban trade in wild plant resources can discourage actors in commercial production of such plants.

In Uganda, CITES regulations provide for sustainable commercial use of *P. africana* resources and thus not a

Table 3. Percentages of reported strategies to advance Production of *P. africana*.

Respondents (N=14)	Strategies in %						
	Assess quantity of <i>P. africana</i> in forests	Improve trade in <i>P. africana</i>	Do sites matching studies for <i>P. africana</i>	Assess NFA land for <i>P. africana</i>	Use Carbon trade for <i>P. africana</i>	Study the market and returns of <i>P. africana</i>	Organise producers
Researchers (04)	75	100	100	75	75	100	75
Private sector experts (05)	80	80	80	60	80	100	80
Public sector experts (05)	80	100	60	80	80	80	60
Total (%)	76	93	76	71	76	93	71

hindrance to its production. The local and international trade for Uganda's *P. africana* is still low and mainly confined to small populations on private land. In 1990s, *P. africana* was unsustainably harvested from Uganda's natural ecosystems which led to its placement under appendix ii of CITES and use of CITES permits to regulate the commercial use. The major importer of Uganda's *P. africana* bark is France while the local markets are relatively small and not documented (CITES, 2006). For international trade, only one consignment was registered to France in 2003. Further consignments to the same destination were put on hold with the importer demanding information on quantities of *P. africana* available in potential government forests (Esegu and Hafashimana, undated). This also explains why commercial use of *P. africana* in government forests continues to be prohibited to date. Hence actual economic benefits from trade and commercial production of *P. africana* are difficult to ascertain in Uganda unlike other countries in Africa. The setbacks to production of *P. africana* as well affect its sustainable use, effective management of ecosystems where it occurs, and provision of sustainable economic benefits to support local livelihoods and national development. Therefore, the commercial use of

P. africana is necessary in Uganda despite the prevailing challenges. This is because such initiatives provide an alternative source of livelihood to the people; they strengthen economic benefits from conservation of *P. africana* to national development and stimulate production to ensure its long - term commercial use in the country. Besides, most populations of *P. africana* occur in ecosystems associated with multiple functions that limit their potential for long term commercial use of the resource (*P. africana*). These multiple use - ecosystems include: Bwindi Impenetrable National Park, Mabira Forest, Kibale National Park, Kalinzu, Kashoha and Mt. Elgon National Park. The commercial use of *P. africana* in such ecosystems is short - term but can create incentives to advance commercial production. These incentives can be realized after determination and allocation of proper quotas of *P. africana* resources to private sector for sustainable trade. This process also demonstrates provision of economic benefits from commercial use of *P. africana*. According to the current situation in Uganda's ecosystems, the determination and allocation of *P. africana* quotas for trade can be achieved after execution of a comprehensive resource assessment which can help to initiate sustainable trade and increase

chances for market assurance in international trade. A resource assessment of this kind is still lacking in Uganda's ecosystems. This has in turn retarded sustainable trade and commercial production of *P. africana* to-date. Therefore, the long-term commercial use of *P. africana* and its economic benefits are hard to expect before development of commercial production and reduction of market barriers in Uganda.

To increase credibility of trade in *P. africana* resources and returns from production, certification for ecological services and quality is also useful. The recent studies claim certification to be important in enhancing income and market access for natural resources (Lewandowski and Faaij, 2006; Walter, 2006; Guillaume, et al., 2006, and Chipeta and Joshi, 2001). For *P. africana*, certification is likely to be useful when done at low costs, and flexible conditions like allowing bark harvest are acceptable. This means that a certification scheme can be an additional incentive to commercial production of *P. africana* if it improves returns and market access for specific resources. As indicated in this study, the disincentives to sustainable commercial production of *P. africana* are mainly its low trade, poor organization of production initiatives and unclear returns from commercial use. The low

trade is largely due to lack of a quantitative resource assessment of *P. africana* in forests, and poor assurance of market for its resources. In such a scenario, the quantitative resource assessment is necessary to carefully organise sustainable trade and provide rational incentives for commercial production of *P. africana*. Therefore carefully organised trade of *P. africana* in forests, localisation of its production to suitable sites, a trial of ecological certification and proper organization of producers into cooperatives are proposed as crucial steps to advance commercial production of *P. africana* in Uganda. Further research to establish how returns from commercial production of *P. africana* can be improved is needed.

ACKNOWLEDGEMENTS

We are grateful to Dr. David NL. Hafashimana, Mr. Henry Kisu-Kisira, Dr. John RS. Tabuti, Dr. P. Mucunguzi, Drs. Martin Oyevaar and Ir. Harrie van Bommel for their advice that improved the quality of this manuscript. NUFFIC contributed funds to this study and Uganda Export Promotion Board provided logistic support.

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