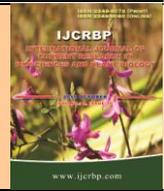




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Original Research Article

Distribution, Exploitation and Regeneration Situations of *Prunus africana* (Pygeum or African Cherry) in the Adamawa Region, Cameroon

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Abstract	Keywords
<p>The world's resources are dwindling at an alarming rate, and this is a serious cause for concern. <i>Prunus africana</i> belonging to Rosaceae family is one of the resources declining as a result on human pressure for its multiple uses and its geographic limitation to higher altitudes. This study was aimed to evaluate the number of tree species at the different altitudinal gradients, assess the health of exploited tree species at the different forest sites and compare natural regeneration at different altitudinal forest sites. Inventory of <i>Prunus africana</i> was carried out in three forest galleries (1ha, 1.2ha and 2ha) at different altitudinal ranges. The diameter was taken at breast height (DBH) using a diameter tape, the height of each tree species was estimated by observation. Percentage germination under each tree was recorded as zero (0) if no germination, 1-25% poor, 25-50% fair, 50-75% good and 75- 100% very good. Tree condition was assessed as follow: tree felled, total debarked, trucked debarked, tree not exploited and estimated bark recovered. The exploitation of <i>P. africana</i> in the Banyo and Tignere areas is threatened. Most of the harvesters are not trained on sustainable techniques of harvesting. Most of the stems in the field are highly injured if not dead due to poor harvesting methods. Therefore if management strategies are not put in place there is the risk of losing most of the stems in the nearest future.</p>	<p>Debarking Harvesting Management <i>Prunus africana</i> Regeneration</p>

Introduction

The world's resources are dwindling at an alarming rate, and this is a serious cause for concern. Some natural resources are renewable, usually at very high costs, whereas others are completely irreplaceable. Therefore, it is imperative that resource management

should fully involve the consideration of long-term resource costs (Cunningham et al., 1997). Management plans, programs and schemes without long-term considerations are bound to be very expensive, if not disastrous for the future (Cunningham and Mbenkum, 1993; Ewusi et al., 1996).

Prunus africana is a species of the Rosaceae family, known under its trade/pilot name as pygeum or African cherry (Ingram and Nsawir, 2007). It is a montane tree species of the tropical Africa including the Côte d'Ivoire, Bioko, Sao Tome, Ethiopia, Kenya, Uganda, South Africa, Madagascar, Congo, the Democratic Republic of Congo, and Cameroon (Betti, 2008). *Prunus africana* is classified by the World Alliance for Nature (IUCN) as vulnerable species (IUCN, 2002) which led to its listing in the Appendix II of the Convention on International Trade in endangered species of Fauna and Flora (CITES).

In Cameroon, majority of *Prunus africana* populations are in the North West (NW), South West (SW) and Adamawa regions of Cameroon, where they have been extensively exploited for its bark (Graham, 1960). *P. africana* is a multiple-use species, locally used as fuel wood and for charcoal, for poles, hoe and axes handles, as a bee loving plant in honey production, in protecting water catchments, as a boundary marker, and especially medicinally for humans and animals; powdered into a tea for genito-urinary complaints, allergies, inflammation, kidney disease, malaria, stomach ache, fever, chest pain, heart burn, madness and for animal medicines (Cunningham and Mbenkum 1993; Sunderland and Nkefor 1995; Sunderland and Tako, 1999; Nkuinkeu, 1999).

Recently, in the Adamaoua region of Cameroon and particularly in Banyo and Tignere divisions exploitation of the bark of this species have been alarming with the coming of AFRIMED (Societe Africaine de Medicament) and SGP (Societe Generale de Produits) companies who utilize and export the bark of this tree species for the production of varieties of substances. The high demands and uncontrollable exploitation of this species has led to most of the individual tree species in the respective forest galleries dried up and most of the standing trees are at the verge of drying up.

This study aims to examine the number of exploited *P. africana* in the three sites and the implementation of the management plan by the licensed companies, under the control of MINFOF (Ministry of Forestry and Wildlife) Banyo and Tignere. This study aims to evaluate the number of tree species at the different altitudinal gradients, assess the health of the exploited tree species at the different forest sites, compare natural regeneration at different altitudinal gradients or forest sites, locate if artificial regeneration is practiced within the area, find

out the number of companies carrying out exploitation and annual exploitation quantities, find out the stand or activities of MINFOF Banyo and Tignere on *Prunus africana* conservation in the region and find out the stand of the companies on exploitation of *Prunus africana* in the region.

Materials and methods

Study site

This study was carried out in Banyo (Tchaba Gandaba) and Tignere (Tchaba Mbabo) villages of the Adamaoua region of Cameroon (Fig. 1). The terrain made of long plain and mountain ranges which have favoured its rich diversity of flora and fauna. The area has two distinct seasons (rainy and dry) with most of the rainfall occurring between May to September. The temperatures are cooler in the evening and warmer in the day. The main crops cultivated in the area is maize, groundnut, beans, coco-yams, plantains, vegetables and sweet potatoes along the low land areas while in the mountain range cattle rearing is the main activity done mostly by the Fulani.

Fig. 1: One of the study site in a disturbed state.



The region was selected based on the favourable conditions which allow the growth of *Prunus africana* in the area. Information was collected using field survey, field observation, group discussion, interviews and reviewing literature from Ministry of forestry and wild life (MINFOF).

Table 1. Number of *P. africana* species sampled in three forest gallery with different altitudinal gradients

Sites	Altitude (m)	Longitude (UTM)	Latitude (UTM)	No. of trees sampled
Horikwi	2065	176616	800464	1
Horikwi	2063	176613	800463	1
Horikwi	2064	176612	800466	1
Horikwi	2068	1766114	800461	1
Horikwi	2062	176619	800465	1
Horikwi	2038	177296	800714	1
Horikwi	2054	177258	800755	1
Horikwi	2033	177302	800673	1
Horikwi	2033	177306	800693	1
Horikwi	2034	178009	800604	1
Mbabo	2028	178000	800593	1
Mbabo	2025	177946	800593	1
Mbabo	2047	178042	800673	1
Mbabo	2048	178027	800691	1
Mbabo	2051	178052	800720	1
Mbabo	2006	180207	800481	1
Mbabo	2002	180209	800488	1
Mbabo	2005	180206	800483	1
Mbabo	2009	180204	800482	1
Ngandaba	1922	180207	800481	1
Ngandaba	1923	180203	800488	1
Ngandaba	1929	180209	800486	1
Ngandaba	1926	180202	800485	1
Ngandaba	1836	180374	800876	1
Ngandaba	1836	180379	800876	1
Ngandaba	1829	180457	800823	1
Ngandaba	1819	180461	800842	1
Ngandaba	1813	180480	800847	1
Ngandaba	1807	180510	800817	1
Ngandaba	1807	180535	800836	1
Ngandaba	1805	180555	800822	1
Ngandaba	1805	180561	800809	1
Ngandaba	1807	180565	800827	1
Ngandaba	1803	180562	8008619	1
Ngandaba	1809	180530	800795	1
Ngandaba	1804	810555	800880	1
Total				37

Vegetation assessment

Inventory of *Prunus africana* was carried out in the three forest galleries (1ha, 1.2ha and 2ha) at different altitudinal ranges. Information was collected randomly by two Botanists and three experience field guides who had some knowledge of *P. africana* exploitation. All *P. africana* were counted and geo-referenced. The diameters were taken at breast height (DBH 1.3) using a diameter tape, the height of each tree species was estimated by observation and altitude of each tree species was recorded. Percentage germination under each tree was recorded as zero (0) if no germination, 1-25% poor, 25-50% fair, 50-75% good and 75- 100% very good. Tree condition was assessed as follow: tree felled, total debarked, trucked debarked, tree not exploited and estimated bark recovered. Most of the tree conditions were scored on a scale of 5, using fractions (1/5, 2/5, 3/5, 4/5 and 5/5) on increasing level of total debarked, trunked debarked and Vis versa for estimated bark recovery. Records were taken on the health of the exploited trees. Information which were recorded included number of branches dead on a scale of 5, if tree is 1/5 alive, 2/5 alive, 3/5 alive, 4/5 alive and 5/5 (healthy).

Focus group discussions

Focus group discussions, interviews and literature reviewed from MINFOF staff on the exploitation of *P. africana* were used. Information gathered from MINFOF was the history of the exploitation of *P. africana* in this region, *P. africana* allocated units under exploitation, and number of plots already exploited, quantity of barks harvested over the years, licensed companies under exploitation, noticed of illegal exploitation and management plan under taken by staff or communities.

Personal observation and interviews to exploiters

Artificial regeneration by seed was observed in Sambolabo with 3000 seedlings in nursery. This nursery was under the supervision of the chief of post of forestry funded by AFRIMED to raise 50000 seedlings. Harvesting of *P. africana* was carried out in Two phases between January to May before the heavy rains and from October to December during the dry period and all tree diameter size classes were noticed to be debarked. Harvesters had no training on *P. africana* harvesting and regeneration, 85frs CFA was given for a kilogram of *P. africana* bark and a total of 22 harvesters were

mentioned to be in the field during each harvesting period and harvester supplies 6 tones of bark during this period. It was mentioned that a control team of MINFOF staff visited the site of exploitation.

Results and discussion

Richness of *P. africana* at different forest galleries

A total of 37 individuals of *P. africana* were recorded in the three forest sites (Table 1). Ngandaba forest gallery recorded the highest (17) individuals of *P. africana* at altitudinal ranges of 1803-1929. This was closely followed by Horikwi forest gallery which recorded 10 individuals of *P. africana* at altitudinal range 2028-2068. The lowest of 9 individuals of *P. africana* was recorded for Mbabo forest gallery with altitudinal ranges of 2002-2051 (Table 1). The highest number of individuals of *P. africana* in Ngandaba forest gallery could be attributed to the topographic nature of the terrain which makes accessibility to the site difficult. The low number of individuals of *P. africana* in Horikwi and Mbabo forest gallery could be attributed to the harvesting technique where the entire trunk is debarked and also because of the easy accessibility to these sites.

Diameter size class distribution of *P. africana* at the different forest galleries

The lower size classes (1-100cm) and (101-200cm) were represented in the three forest galleries (Fig. 1). Horikwi forest gallery recorded the highest individuals (6) of *P. africana* in size class distribution 1-100cm and the lowest individuals (2) of *P. africana* was recorded in Ngandaba forest gallery. The high number of individuals of *P. africana* at high altitude with low ground vegetation cover could have favoured the growth of the lower class sizes with limited competition. The class size 201-300cm recorded only individuals in the Ngandaba gallery forest at low altitudes (Fig. 1). Probably this may be due to rugged terrain which hindered exploitation.

Tree condition of *P. africana* observed

Of the 37 *P. africana* tree species encountered in the three forest galleries about 85% were debarked (Fig. 2). Total debarked of trees and trunk (5/5) had the highest with 9 and 12 species of *P. africana* respectively (Fig. 2). This was closely followed by the level 2/5 and

3/5 which had debarked of 11 and 14 for total and trunk debarked (Fig. 2). The least level of debarked were recorded for 1/5 and 2/5 of trees. The high values for total debarking of trees and trucks could be attributed to the fact that most of the harvesters are not trained. Also, both the companies and the harvesters are interested in the income generated and not on the sustainability aspect of the plants.

Fig. 1: Diameter size class distribution of *P. africana* in the three forest sites.

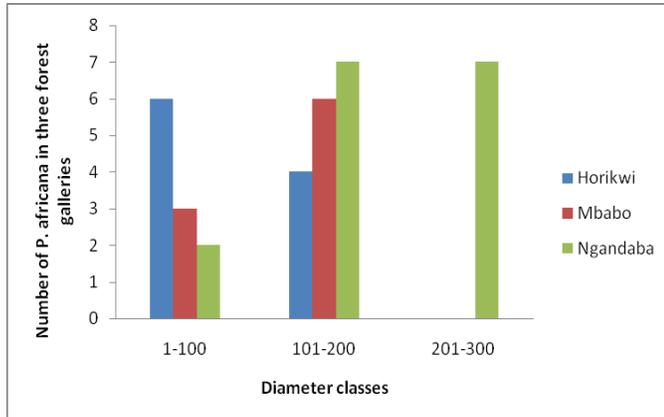
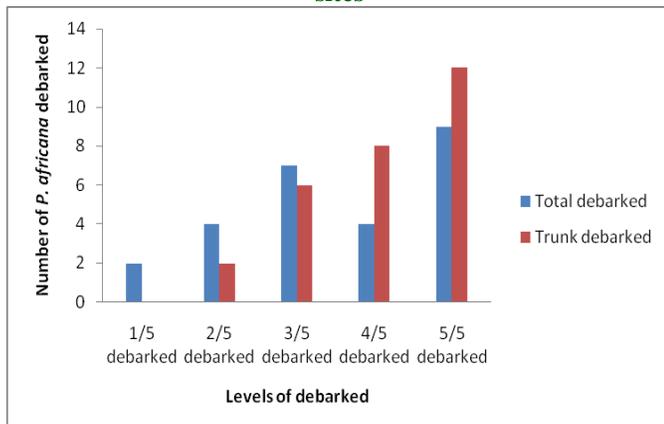


Fig. 2: Levels of debarked of *P. africana* in the three forest sites

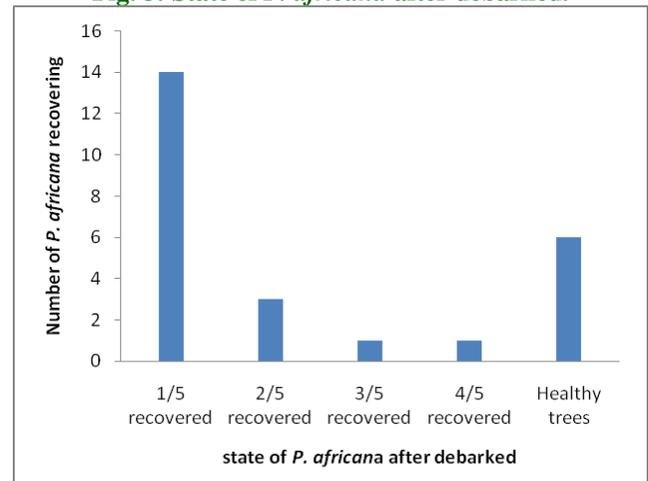


Level of *P. africana* recovery after debarked

Generally, the level of recovery from trunk and tree debarked *P. africana* was low in the three forest sites (Fig. 3). A large population of *P. africana* recovered just 1/5 after debarked (Fig. 3). Twelve (12) individuals of *P. africana* were recorded dead after debarked. It was noticed that the entire plant trunk was debarked and most of the plant vascular tissues destroyed. Only two of the *P. africana* individuals were recorded to recover to 4/5 of the bark rejuvenated after debarked (Fig. 3). Six (6) of the *P. africana* were recorded to be health (Fig. 3).

This is mainly due to the fact that these individuals have not reached exploited sizes.

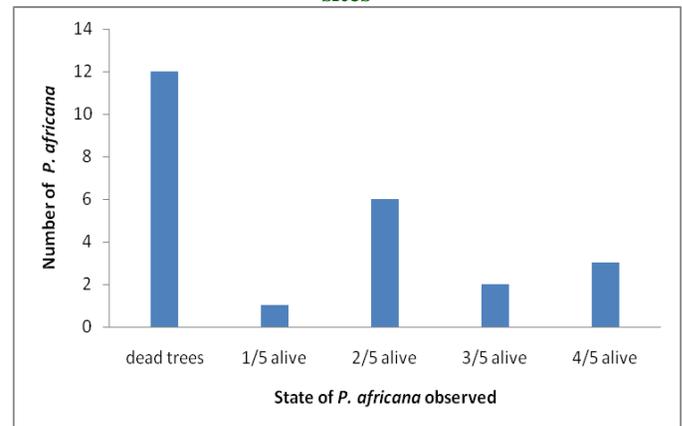
Fig. 3: State of *P. africana* after debarked.



Health of exploited trees

Generally, most of the individuals of *P. africana* were not healthy (Fig. 4). Most of the tree species were injured by debarking, branches dead, and affected by parasites. Twelve (12) of the individuals were recorded dead (Fig. 4). The health situation of most of the individuals was poor. This may be due to the techniques used in debarking.

Fig. 4: Health situation of *P. africana* in the three forest sites



Natural regeneration of *P. africana* in the three forest galleries

Natural regeneration of wildings of *P. africana* was observed during the survey (Fig. 5). Wildings of *P. africana* were noticed at Horikwi forest gallery and Mbabo with higher altitudinal gradients of 2028-2068

and 2002-2051 respectively. Most of the *P. africana* encountered with wildlings at Horikwi recorded 75-100% germination success (Fig. 5). At lower altitude gradient of 1803-1926 in forest gallery Ngandaba regeneration of seeds to wildlings were not observed. Probably at low altitudinal gradients the ground vegetation cover was recorded and canopy cover were highest and might have affected germination of the seeds to wildlings. The poor debarking, girth measurement, regeneration and recovery after debarking of *Prunus* is shown in Fig. 6.

Fig. 5: Natural regeneration of wildlings of *P. africana*.



Artificial regeneration

Artificial regeneration of seed to seedlings was recorded at Sambolabo. A total of about 3000 seedlings were observed in the nursery under the supervision of the chief of post of MINFOF Sambolabo. It was mentioned by MINFOF staff that it is the first phase of seedlings to be produced out of a total 25000 seedlings. Based on our observation on the nursery management, the success rate will be less than 50%. The funding for this production of seedlings of *P. africana* was given by AFRIMED. It was mentioned that the site for establishment of seedlings have been allocated in Sambolobo where nursery is raised. Based on our discussion with the MINFOF staff it was recommended that the council should be involve since they have to play important role in the sustainable management and raising income from the plantation after exploiting companies have left the sites.

Exploitation companies and quantity of *Prunus* harvested

They are two main companies carrying out exploitation of *P. africana*. The companies are AFRIMED and SGP. From personal discussion with some harvesters, it was

mentioned that the two companies belong to the same person.

Based on information gathered from MINFOF Banyo on quantity of barks harvested by the two companies within 2013, AFRIMED had to exploit 87.3 tones of barks but actual bark harvested was 32 tones. SGP had 66.68 tones to harvest and actually harvested 64.68 tones. For the year 2014 quarters for exploitation by the different companies have not been determined by MINFOF. However, from group discussion with some *Prunus* exploiters in the early months of 2014 (January- April), each harvester harvested about six tones of bark for the entire working period. Total number of harvester within each season of harvesting was mentioned to be 22. Harvesters mentioned that a total of four 20 tone vehicles were loaded with *P. africana* bark s during this period.

History of exploitation of *P. africana* in the area

The exploitation of *P. africana* started in 2004 in the Banyo and Tignere areas. During this period exploitation of the barks of *P. africana* was open with little influence from MINFOF. From observation in the field most of the trunks and branches of *P. africana* were totally debarked resulting to the dry up of most of the *P. africana* individuals. Recently, the massive rates of exploitation limits were put in place to regulate exploitation quantities. Annual targets were given to companies. From 2010 regular visits to sites were done by MINFOF Banyo and Tignere. Check forms on conservation modalities were entered to check if rules were not followed and report written to MINFOF head office in Yaoundé. Based on discussion With MINFOF officials they mentioned that they have been lapses in the follow up of *P. africana* due to transportation, low cost, inadequate staff at the delegation and the nature of the terrain and transportation means to visit the sites regularly to managed exploitation.

Conclusion

The exploitation of *P. africana* in the Banyo and Tignere areas is threatened. Most of the harvesters were not trained on sustainable techniques of harvesting. Most of the stems in the field are highly injured if not dead due to poor harvesting methods. The Staff of MINFOF in the area needs training to build up capacity to manage *P. africana* activities in the area. The two companies involve play minor role in the management of *P. africana* exploitation in the area. Therefore if management strategies are not put in place there is the risk of losing most of the trees in the nearest future.

Fig. 6: Debarked and regenerating *P. africana* in the study site.



Poorly debarked *P. africana*



DBH measurement



Regeneration of *P. africana*



P. africana recovering from debarking

Acknowledgement

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