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# Radiocarbon dating of old African baobabs from Xangongo, Cunene, Angola

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**Abstract**
The Cunene region of southern Angola, especially the area around Xangongo, hosts a large number of African baobabs, including several superlative specimens. Our research reports the investigation of the three biggest specimens from Xangongo Grove, named XG-1 (11 stems; circumference 26.34 m), XG-2 (5 stems; 22.70 m) and XG-3 (9 stems; 27.73 m), and of the largest baobab from Xangongo town, named XT-1 (7 stems; 21.02 m). Several wood samples were collected from these four baobabs mainly as cores from trunks and/or primary branches and then radiocarbon-dated by AMS. The two oldest samples were extracted from two primary branches of baobab XG-1. These have practically identical radiocarbon dates of 1822 ± 19 BP and 1822 ± 10 BP, which correspond to identical calibrated ages of 1785 ± 15 and 1785 ± 10 calendar years. The calculated age of baobab XG-1 is 2100 ± 50 years. Thus, XG-1, which is called by the locals "The biggest baobab of Africa", becomes the oldest living African baobab with accurate dating results. The results indicate ages of 1100 years for baobab XG-2, 850 years for baobab XG-3 and 550 years for baobab XT-1.

## Introduction

The genus *Adansonia*, a subdivision of the Bombacoideae subfamily of Malvaceae, comprises eight species. The African baobab (*Adansonia digitata* L.), which is endemic to the arid savanna of mainland Africa, is the best-known and most widespread of all *Adansonia* species (Wickens and Lowe 2008; Baum 1995; Baum et al. 1998; Cron et al. 2016; Petignat and Jasper 2016). In 2005, we initiated a comprehensive research project aimed to clarify various controversial and/or poorly understood aspects related to the architecture, growth, and age of the African baobab. Our original methodology enables investigation and dating of standing live specimens in Angola by using AMS (accelerator mass spectrometry) radiocarbon dating of small wood samples. The samples are collected primarily from inner cavities, deep incisions in the stems, fractured stems or from the exterior of large baobabs (Patrut et al. 2007, 2010, 2011, 2013, 2015, 2017, 2018, 2019, 2020, 2022a). According to research results, all large and old baobabs are multi-stemmed and have preferentially closed or open ring-shaped structures (Patrut et al. 2015, 2018). The largest and oldest individuals may have wood volumes up to 300–500 $m^3$

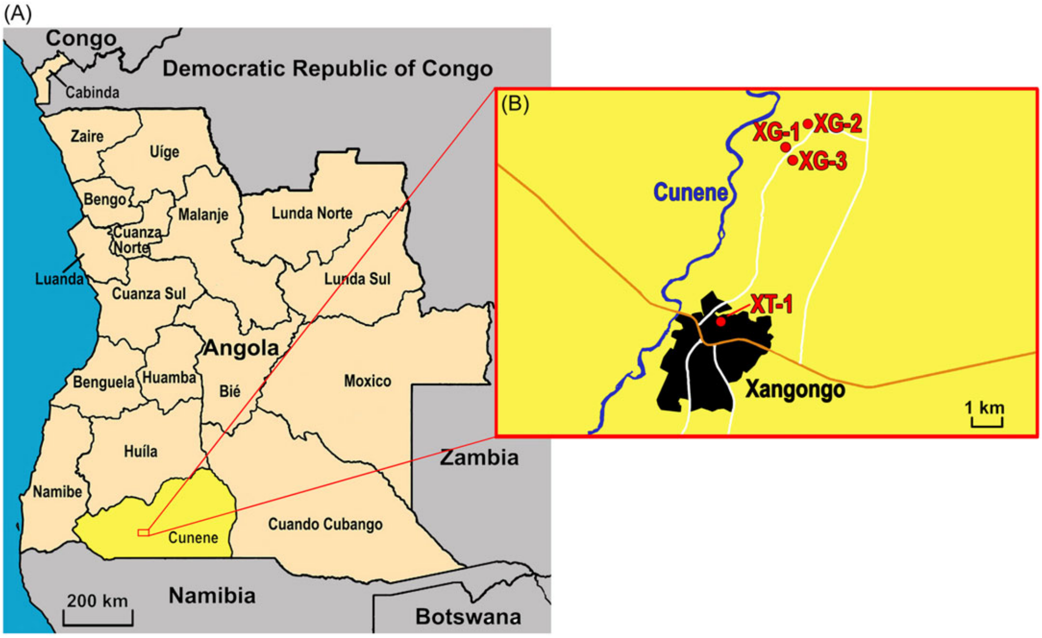


***Figure 1.*** *(A) Map showing Angola and its 18 provinces. The Cunene province is displayed in yellow. (B) Close-up of the Xangongo area, Angola. The four investigated baobabs are marked by red dots.*

and may reach ages up to 2500 years. These values indicate the African baobab is the largest and oldest angiosperm tree (Patrut et al. 2013, 2017a, 2018). By this remarkable longevity and the positive correlation of growth episodes with rainfall availability, the African baobab has become a valuable environmental proxy for high-resolution paleoclimate reconstructions in regions with a scarcity of climate archives (Robertson et al. 2006; Slotta et al. 2017, 2021).

Angola is located on the west-central coast of Southern Africa and hosts several million African baobabs distributed in the savanna areas and open forests of 11 of its 18 provinces (Cabinda, Zaire, Cuanza Norte, Malanje, Bengo, Luanda, Cuanza Sul, Benguela, Namibe, Huila and Cunene) (Figure 1A). The baobab is called by the local inhabitants imbondeiro ("giant tree" in Kimbundu), and is the national tree of Angola (Muanza and Guima 2020).The concentration of baobabs increases towards the south of the country, especially towards the border with Namibia. The largest number of baobabs can be found in the Cunene province. Thus, over a distance of almost 50 km, between Uia and Xangongo, along the Cunene river, there are dozens of superlative specimens. The well known giant baobabs can be found in a grove close to Xangongo (Figure 1B).

The Province of Cunene, like the rest of Angola, was the seat of violent conflicts in the second half of the 20th century and the beginning of the 21st century. The formation of the state of Angola began with the Portuguese colonization in the 16th century. The Portuguese colony reached the current borders of Angola at the beginning of the 20th century. In 1951, the colony received the status of a Portuguese province and was known as Portuguese Southwest Africa. Angola gained its independence from Portugal on 11 November 1975 (Cardina 2023; Telepneva 2022; Weigert 2011).

Unfortunately, immediately after, Angola descended into a devastating civil war that ended only in 2002. Several million were killed and injured during this period (Weigert 2011).

Angola, and especially its southwestern provinces, including Cunene, has been undergoing a period of severe to extreme drought over the last decade. The drought has caused a major humanitarian and environmental disaster. The peak of this crisis took place in 2016 and, especially, in 2019 (Blanes et al. 2022).

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Xangongo (called Vila Roçadas until 1975) is a town (with a population of 35,000) and a commune (population 70,500) in the municipality of Ombadja, Cunene province. It is located ca. 900 km south of the capital Luanda. The Xangongo area has a subtropical semi-arid steppe climate. The Kőppen-Geiger climate classification is BSh. The mean annual temperature in Xangongo is 27.3°C and the average annual rainfall is 399 mm. Xangongo was the site of important fighting during the Independence War and also during the civil war. Immediately after the end of the civil war most war remnant ammunition and explosive devices were removed. Cunene Province and Xangongo in particular, including the baobab grove, are exceptions, which made scientific investigations difficult. Only recently, the area around Xangongo has been considered free of live ammunition, bombs and landmines. However, caution is mandatory when visiting places such as the baobab grove that were once battlefields. Traveling on obvious paths and roads is recommended, following the advice of locals and avoiding touching anything resembling an explosive war remnant.

To reach the baobab grove from the center of Xangongo, we drove 2 km to the east on road EN 110, then continued for ca. 6 km north on a dirt road. The baobab grove stretches along the left shore of the Cunene river. The grove occupies a surface of over 2 $km^2$, with a length of almost 4 km and a width of 0.5–0.8 km. It hosts over 400 mature baobabs, out of which 200 specimens have circumferences exceeding 10 m, while 20 exceed 15 m, and 3 are superlative baobabs with circumferences over 22 m.

In this paper we report the investigation and the AMS radiocarbon dating results of the three superlative baobabs from the Xangongo Grove (XG-1, XG-2 and XG-3) and of the very large baobab from Xangongo town (XT-1).

## Materials and methods

### *The four baobabs and their location*

The biggest baobab, which we named **XG-1** (from Xangongo Grove No.1), is mistakenly called "The biggest baobab of Africa" (in Portuguese, "Il piu grande imbondeiro di Africa") (Jornal de Angola, 2023). Currently, there are at least 10 larger live *A. digitata* specimens in Africa in terms of girth, out of which the largest are Sagole Big tree (cbh = 34.35 m, located in South Africa) and Makuri Lê boom (cbh = 34.23 m, located in Namibia) (Patrut et al. 2018). XG-1 is located in the baobab grove, at 1.3 km from a side branch of Cunene river. Its GPS coordinates are 16º41.292'S, 015º00.138'E and the altitude is 1139 m (Figure 2). Baobab XG-1 has a maximum height h = 21.0 m, a circumference at breast height (i.e., at 1.30 m above ground level) cbh = 26.34 m and an overall wood volume V = 300 $m^3$. It is a very old, reconstructed tree, with several missing stems that were replaced by younger stems. XG-1 exhibits an incomplete open ring-shaped structure (RSS), which consists of 11 fused stems, out of which 5 are ordinary (common) stems and 6 are false stems, i.e., a structural feature that resembles a stem but is triangular or tetragonal in a horizontal section, having emerged from an adjacent stem and ultimately fused with the radicular system; the oldest age of a false stem can always be found towards the upper contact with the adjacent stem. The 11 remaining stems and many branches of XG-1 are severely damaged and partially broken. The horizontal dimensions of the canopy are 33.6 (NS) × 36.7 (WE) m.

The second largest baobab, named **XG-2** (from Xangongo Grove No.2), has the GPS coordinates 16º40.937'S, 015º00.468'E and the altitude is 1133 m (Figure 3). Its dimensions are: h = 23.8 m, restored cbh = 22.70 m, V = 220 $m^3$. XG-2 is composed of 5 fused ordinary stems, out of which one is a relict stem. It exhibits a closed RSS, with an open false cavity which is surrounded by 4 stems. The stems and the false cavity are also damaged and partially broken. The horizontal dimensions of the large canopy are 40.2 (NS) × 38.6 (WE) m.

The third largest baobab, named **XG-3** (from Xangongo Grove No.3) can be found in a private courtyard on the southeastern edge of the grove. The GPS coordinates are 16º41.422'S, 015º00.178'E and the altitude is 1128 m. Its dimensions are h = 17.8 m, cbh = 27.73 m, V = 160 $m^3$ (Figure 4A). Apparently, baobab XG-3 contains a leaning stem detached from the other stems that is about to collapse. In fact, baobab XG-3 consists of two units. The largest unit, with a cbh = 17.88 m, is

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*Figure 2. (A) The image shows the multi-stemmed trunk of baobab XG-1, which is reconstructed. (B) Collecting sample XG-1-A from XG-1. (C) View of the research team in front of the huge trunk of XG-1 facing south. (D) View of the irregular canopy of XG-1 facing north.*

composed of 8 stems, out of which 6 are ordinary and 2 are false stems. The second unit, with a cbh = 6.10 m, consists only of the mentioned leaning stem, which developed in this position since the beginning of its life. Thus, the total circumference becomes 27.73 m, the largest of the grove. However, the total volume of XG-3 is considerably smaller than that of XG-1 and XG-2. The dimensions of the canopy are 20.5 (NS) × 31.8 (WE) m.

The large baobab, which we called **XT-1** (from Xangongo Town No.1), is located in an empty urban space of Xangongo town. The GPS coordinates are 16º44.440'S, 014º58.838'E and the altitude is 1132 m (Figure 4B). Its dimensions are h = 16.0 m, cbh = 21.02 m, V = 140 $m^3$. Baobab XT-1 exhibits a cluster structure and is composed of 7 perfectly fused ordinary stems. On the wall of one large stem there is a 4 m tall termite mound. The dimensions of the canopy are 27.6 (NS) × 24.2 (WE) m.

### *Investigation of the four baobabs*

#### *Sample collection*

The sampling was difficult, because the 3 specimens from the baobab grove are partially hollow, with large amounts of missing wood. Therefore, some of the collected wood samples were too short to be investigated. Nine of the longer samples, labeled A, B, C . . . ., were extracted from the 4 baobabs,

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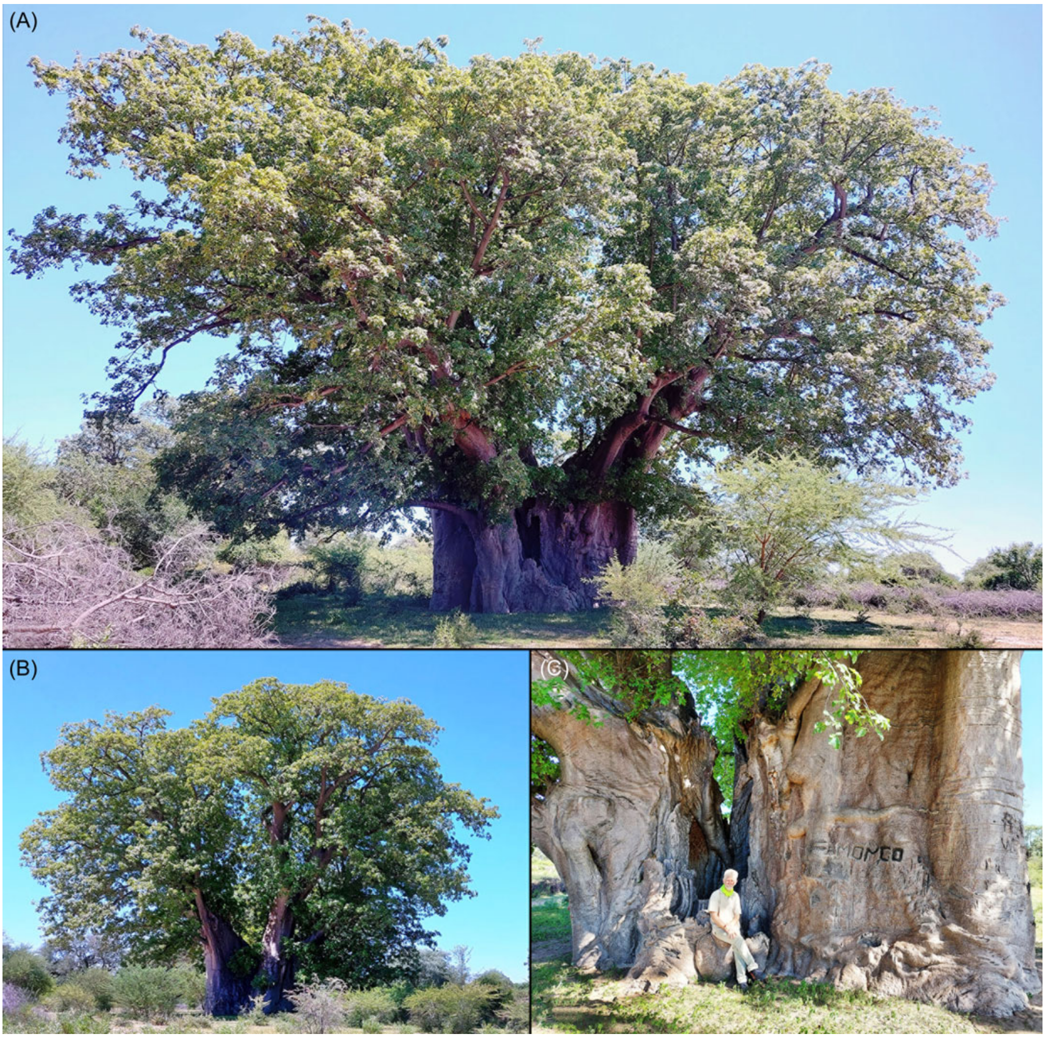


***Figure 3.*** *(A) General view of baobab XG-2 showing its open false cavity. (B) General view of XG-2 taken from the opposite side, showing its huge canopy. (C) Member of the research team sitting on the relict stem of the false cavity of XG-2.*

investigated and dated by AMS radiocarbon. A Haglöf increment borer, 0.80 m (800 mm) long with an 0.0108 m (10.8 mm) inner diameter, was used for sampling. After each coring, the borer was cleaned and disinfected with methanol (methyl alcohol). The small coring holes were sealed with Steriseal, a special polymer, which prevents infection. Several tiny $10^{-3}$ m (1 mm) long pieces/segments were extracted from the investigated samples. We report the dating results of the deepest, which is also the oldest segment of each sample, denoted by x, and also, for one sample, the dating results of the youngest segment, denoted by y.

### *Sample preparation*

A modified α-cellulose method was used for removing soluble and mobile organic components. In this modified method, called BABAB, an additional bleaching step was added (Molnar et al. 2013a). The resulting cellulose samples were combusted to $CO_2$ with $MnO_2$ as oxidant in a modified sealed

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***Figure 4.*** *(A) General view of baobab XG-3, which consists of two distinct units. (B) The image shows the multi-stemmed trunk of the baobab XT-1 with a tall termite mound formed next to it.*

combustion tube. The gaseous $CO_2$ was analyzed by $^{14}C$ AMS (Molnar et al. 2013a, 2013b; Janovics et al. 2018).

### *$^{14}C$ AMS measurements*

The $^{14}C$ AMS measurements were performed at the Ede Hertelendi Laboratory of Environmental Studies (HEKAL), Debrecen, Hungary, by an EnvironMICADAS, which is a coupled AMS mini carbon dating system (200 kV power system) with enhanced gas ion source (GIS). The GIS allows measurements directly from gaseous $CO_2$. The EnvironMICADAS was developed and built by ETH Laboratory, Zürich, Switzerland, especially for Environmental studies (Molnar et al. 2013b, 2021).

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The obtained fraction modern values were finally converted to a conventional radiocarbon date. The radiocarbon dates are corrected for isotopic fractionation to a $\delta^{13}C$ value of –25‰ (NOSAMS Facility 1999). The radiocarbon dates and errors were rounded to the nearest year.

*Calibration*

Radiocarbon dates were calibrated and converted into calendar ages with the OxCal v4.4 for Windows by using the SHCal20 atmospheric data set (Bronk Ramsey 2009; Hogg et al. 2020).

## Results and discussion

### *Radiocarbon dates and calibrated ages*

Radiocarbon dating results of the 10 sample segments extracted from the four African baobabs from the Xangongo area are displayed in Table 1. The radiocarbon dates ($^{14}C$ dates) are expressed in $^{14}C$ yr BP (radiocarbon years before present, i.e., before the reference year 1950). Radiocarbon dates and the corresponding errors were rounded to the nearest year.

Calibrated (cal) ages, expressed in calendar years AD, are also presented in Table 1. The 1σ probability distribution (68.3%) was selected to derive calibrated age ranges. For two sample segments (XG-2-Bx, XT-1-Ax) the 1σ distribution corresponds to one range of calendar years, for seven sample segments (XG-1-Ax, XG-1-Ay, XG-1-Bx, XG-1-Dx, XG-1-Ex, XG-2-Ax, XG-3-Ax) the 1σ distribution is consistent with two ranges of calendar years and for one sample segment (XG-1-Cx) it corresponds to three ranges. In the last eight cases, the confidence interval (probability) of one range is considerably greater than that of the other(s); therefore, it was selected as the cal AD range of the segment for the purpose of this discussion. The selected age ranges are marked in bold in Table 1. We derived an assigned year for each sample, which corresponds to the mean value of the selected age range. Sample ages, expressed in calendar years, represent the difference between the year AD 2024 and the assigned year. Sample ages and errors were rounded to the nearest 5 years. We used this approach for selecting calibrated age ranges and single values for sample ages in all our previous articles on AMS radiocarbon dating of large angiosperms, especially baobabs (A Patrut et al. 2007, 2010, 2013, 2017a, 2017b, 2018, 2019, 2021b, 2022b; RT Patrut et al. 2023). Our original approach was discussed and agreed upon by Karl von Reden and Timothy Jull at the 13th AMS Conference, Aix en Provence, 2014 and at the 22nd Radiocarbon Conference, Dakar, 2015.

### *Stem and tree ages*

Nine wood samples were extracted from ordinary stems, false stems, false cavities or primary branches at selected heights, where the morphology of the four large baobabs from the Xangongo area allowed sampling. We investigated five wood samples from **XG-1**, the largest baobab from Xangongo Grove and also from Angola. The largest and oldest ordinary stem (cbh = 7.8 m) contains over 60% empty space. Thus, sample XG-1-A was collected from the biggest primary branch, at the height of 5.41 m. The sample had a length of 0.47 m. We dated the farthest and the closest segment from the sampling point. The deepest segment XG-1-Ax, which represents the innermost sample end, has a conventional radiocarbon date of 1822 ± 19 BP, which corresponds to a calibrated age of 1785 ± 15 calendar yr. On the other hand, the closest segment XG-1-Ay (adjacent to the bark) has a radiocarbon date of 345 ± 18 BP, corresponding to a calibrated age of 425 ± 30 calendar yr. The last value indicates that the sampled branch stopped growing around the year 1600. The age of the oldest part of this primary branch can be calculated by extrapolating the position and age of the oldest sample segment, XG-1-Ax, to the theoretical point of maximum branch age; this corresponds to its center at sampling height, which is positioned at 0.62 m from the sampling point. The growth stop phenomenon must also be considered.

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***Table 1.*** *Radiocarbon dating results and calibrated ages of samples collected from the largest baobabs from the Xangongo area*

| Sample segment code | Depth[1] [height[2]] (m) | Radiocarbon date [error] ($^{14}$C yr BP) | AD range 1σ [confidence interval] (yr AD) | Assigned year [error] (yr AD) | Sample segment age [error] (yr AD) | Accession # |
|---|---|---|---|---|---|---|
| XG-1-Ax | 0.47<br>[5.41] | 1822 [± 19] | **225–253 (38.5%)**<br>300–325 (29.7%) | 239<br>[± 14] | 1785<br>[± 15] | DeA-36624 |
| XG-1-Ay | 0.01<br>[5.41] | 345 [± 18] | 1491–1523 (25.7%)<br>**1243–1269 (42.6%)** | 1601<br>[± 29] | 425<br>[± 30] | DeA-33394 |
| XG-1-Bx | 0.40<br>[4.65] | 1822 [± 10] | **229–252 (45.8%)**<br>304–316 (22.5%) | 240<br>[± 11] | 1785<br>[± 10] | DeA-42706 |
| XG-1-Cx | 0.33<br>[3.80] | 943 [± 17] | 1054–1061 (7.5%)<br>1070–1080 (12.7%)<br>**1150–1182 (48.1%)** | 1166<br>[± 16] | 870<br>[± 15] | DeA-42710 |
| XG-1-Dx | 0.34<br>[1.80] | 250 [± 35] | 1650–1674 (21.0%)<br>**1739–1795 (47.3%)** | 1767<br>[± 28] | 255<br>[± 30] | DeA-13859 |
| XG-1-Ex | 0.28<br>[2.80] | 842 [± 17] | 1221–1234 (21.2%)<br>**1572–1630 (47.0%)** | 1256<br>[± 13] | 770<br>[± 15] | DeA-42709 |
| XG-2-Ax | 0.30<br>[1.67] | 866 [± 10] | **1211–1229 (48.0%)**<br>1251–1264 (20.3%) | 1220<br>[± 9] | 805<br>[± 10] | DeA-36612 |
| XG-2-Bx | 0.34<br>[1.66] | 888 [± 17] | **1185–1219 (68.3%)** | 1202<br>[± 17] | 822<br>[± 30] | DeA-42711 |
| XG-3-Ax | 0.68<br>[1.70] | 742 [± 17] | **1260–1299 (48.4%)**<br>1366–1378 (19.6%) | 1279<br>[± 20] | 745<br>[± 20] | DeA-42707 |
| XT-1-Ax | 0.44<br>[1.74] | 289 [± 16] | **1641–1661 (68.3%)** | 1651<br>[± 10] | 375<br>[± 10] | DeA-42705 |

[1]Depth in wood from the sampling point.
[2]Height above ground level.

Hence, there are around 1785 – 425 = 1360 yr of growth from the sample end to the sampling point, on a distance of 0.47 m. Based on previous research on baobab growth rates, we estimated that the branch and also its corresponding stem XG-1 are around 2100 ± 50 yr old (Patrut et al. 2010, 2011).

Sample XG-1-B also originates from a primary branch of the second largest ordinary stem of baobab XG-1, from the height of 4.65 m. Surprisingly, its innermost end, XG-1-Bx, located at 0.40 m from the sampling point, has exactly the same radiocarbon date and calibrated age as the sample segment XG-1-Ax, i.e., 1822 ± 10 BP and 1785 ± 10 calendar yr. Consequently, the stems XG-1-A and XG-1-B developed at the same time.

Sample XG-1-C, with a length of 0.33 m was also collected from a primary branch of the third largest ordinary stem of XG-1, at the height of 3.80 m. The innermost sample segment XG-1-Cx has a radiocarbon date of 943 ± 19 BP, which translates to a calibrated age of 870 ± 15 calendar yr. The theoretical center of the branch is located at 0.54 m from the sampling point (Patrut et al. 2010, 2011). Following these values, the branch and the corresponding stem XG-1-C are about 1300 ± 50 yr old.

Sample XG-1-D, with a length of 0.34 m, was collected from a smaller and much younger ordinary stem, at the height of 1.80 m. The innermost segment, XG-1-Dx, has a radiocarbon date of 250 ± 35 BP, which corresponds to a calibrated age of 255 ± 30 calendar yr. The pith of the stem is located at 0.70 m from the sampling point (Patrut et al. 2010, 2011). Consequently, stem XG-1-D is 400 ± 50 yr old.

Sample XG-1-E, with a length of 0.28 m, originates from the largest false stem, close to its emergence point from the adjacent ordinary stem, at the height of 2.80 m. The innermost sample segment XG-1-Ex exhibits a radiocarbon date of 842 ± 17 BP, which translates to a calibrated age of 770 ± 15 calendar yr. This value is very close to the age of the false stem. We note that the false stem is a special type of buttress, which plays the role of an anchor and provides better stability to the tree (Patrut et al. 2017b, 2018, 2021a).

By these results, Xangongo Grove No.1 (XG-1) becomes the oldest living African baobab with accurate dating results (Patrut et al. 2018). Several centuries ago, the tree must have been considerably larger, very probably having had a circumference of 28–30 m. Several old stems are missing and the remaining stems and branches are broken and severely damaged. Unfortunately, the big baobab seems to be close to the end of its life cycle. The strong El Niño event of 2023–2024 resulted in a prolonged dry spell in early 2024, intense heatwaves, and the lowest recorded February rainfall in 40 years in most of southern Africa, including the Xangongo area of Angola (NASA 2024). Such conditions of reduced moisture availability and increases in temperature impact tree longevity and are particularly stressful to large trees, which are more vulnerable to droughts (Bennett et al. 2015; Ryan 2015).

We investigated two wood samples extracted from **XG-2**, the second largest baobab of the grove. Baobab XG-2, which exhibits a closed ring-shaped structure, has a damaged false cavity surrounded by 4 stems, out of which one is a relict stem. The cavity has a length of 2.73 m (NS), a width of 2.87 m (WE) and a height of 5.50 m (in its remaining covered part).

A first sample XG-2-A, with the length of 0.30 m, was collected from the inner cavity walls toward E, at the height of 1.67 m. The innermost segment XG-2-Ax has a radiocarbon date of 866 ± 10 BP, which corresponds to a calibrated age of 805 ± 10 calendar yr. In this direction, the cavity walls have a thickness of 0.94 m. For false cavities, the point of maximum age is always situated closer to the inner cavity walls than to the exterior (Patrut et al. 2015, 2018). By extrapolating the sample end to the point of maximum age, an age of 1010 ± 50 yr is obtained for the stem of the cavity facing east.

The second sample XG-2-B, with a length of 0.34 m, originates from the inner cavity walls toward N, at the height of 1.66 m. The innermost segment XG-2-Bx has a radiocarbon date of 888 ± 10 BP, corresponding to a calibrated age of 822 ± 30 calendar yr. In this direction, the cavity walls have a thickness of 1.14 m. By extrapolating the sample end to the point of maximum age, an age of 1100 ± 50 yr is obtained for the northern stem of the cavity. This value can also be applied for the oldest part of XG-2.

We investigated a wood sample collected from **XG-3**, the third largest baobab of Xangongo Grove. Sample XG-3-A originates from the smaller unit of the baobab, which consists only of the leaning stem that is also the biggest of the tree. It was collected at the height of 1.70 m from a broken part in this stem

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and had a length of 0.68 m. It has a radiocarbon date of 742 ± 17 BP, which corresponds to a calibrated age of 750 ± 20 calendar yr. The innermost segment XG-3-Ax is located at 0.12 m from the theoretical pith of the stem. These values indicate an age 850 ± 50 yr for baobab XG-3.

Eventually, we investigated a wood sample from **XT-1**, the largest baobab of Xangongo town. Sample XT-1-A, with the length of 0.44 m, was collected at the height of 1.74 m from a stem. The inner sample end XT-1-Ax has a radiocarbon date of 289 ± 16 BP, which translates to a calibrated age of 375 ± 10 calendar yr. The theoretical pith of the corresponding stem is situated at around 0.65 m from the sampling point. The presented values indicate an age of 550 ± 10 yr for baobab XT-1.

## Conclusions

Angola hosts several million African baobabs. The greatest density of baobabs and the biggest specimens can be found in the Cunene province, especially around the town and commune of Xangongo. Our research reports the AMS radiocarbon investigation results of the largest three specimens from the Xangongo Grove, called XG-1 (circumference 26.34 m), XG-2 (circumference 22.70 m), XG-3 (circumference 27.73 m) and of the largest baobab from Xangongo town, named XT-1 (circumference 21.02 m). All four baobabs are multi-stemmed and consist of 11 (XG-1), 5 (XG-2), 9 (XG-3) and 7 (XT-1) fused stems.

Several wood samples collected from these four baobabs were prepared and analyzed by AMS radiocarbon. Results show that the two oldest samples originate from two primary branches of baobab XG-1. They have practically identical radiocarbon dates of 1822 ± 19 BP and 1822 ± 10 BP, which correspond to identical calibrated ages of 1785 ± 15 and 1785 ± 10 calendar years. According to dating results, the first dated primary branch of baobab XG-1 stopped growing 425 years ago, thus showing that the growth stop phenomenon can affect not only big stems of baobabs, but also their large branches. By these results, XG-1, mistakenly referred to as "The biggest baobab of Africa," becomes the oldest living African baobab with accurate dating results. Its calculated age is of 2100 ± 50 calendar years. According to this value, the oldest part of XG-1 started growing around the year 75 BC. The calculated maximum ages of the other investigated baobabs are 1100 ± 50 years for XG-2, 850 ± 50 years for XG-3 and 550 ± 50 years for XT-1.

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