GLOBAL CROP CONSERVATION AND USE METRICS

BAOBABS
(*Adansonia* L.)

CROP TRUST

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Global crop conservation and use metrics

BAOBABS
(*Adansonia* L.)

With support from

Federal Ministry of Agriculture, Food and Regional Identity

Description

This report provides an up-to-date overview of the global status of *ex situ* conservation of genetic resources of baobab, including key metrics on:

- the identity and composition of genebank collections;
- the Multilateral System (MLS) status of accessions in these collections;
- storage, regeneration, and safety duplication status;
- documentation, information systems, and research resources; and
- crop networks and partnerships

Introduction and background on baobabs

Baobabs (genus *Adansonia* L.), native to Madagascar, mainland Africa, and Australia, have been a cornerstone of human life in these regions for millennia (Wan *et al*., 2024). These iconic trees, which can live for thousands of years and store large quantities of water in their massive trunks, originated in Madagascar before spreading to Africa and Australia through ancient seed dispersal (Wan *et al*., 2024).

Baobab are extraordinarily versatile: their nutrient-rich fruit pulp is consumed fresh or processed into beverages and is exceptionally high in vitamin C, antioxidants, and fiber; the leaves are eaten as vegetables or dried for medicinal teas; the bark provides fiber for rope, cloth, and baskets; and the seeds yield edible oil (Kamatou *et al.*, 2011; Offiah and Falade, 2023; Abdulwaliyu *et al.*, 2024; Kitony *et al.*, 2024). The trees also serve crucial ecological roles as water sources during droughts, habitat for wildlife, and shady gathering places for communities (Wiehle *et al.*, 2014).

Their cultural importance is profound, featuring prominently in traditional African folklore and medicine systems, and serving as sacred sites and natural landmarks (Wan *et al.*, 2024).

Today, the baobab is found as a health supplement in global markets, while conservation efforts have intensified as several species face threats from climate change and habitat loss (Offiah and Falade, 2023; Abdulwaliyu *et al.*, 2024; Wan *et al.*, 2024).

Global cultivation and consumption statistics are extremely limited for baobab, and it is not tracked in FAOSTAT.

Identity and composition of *ex situ* collections

Based on the latest data in global crop genetic resource databases, germplasm collections of baobab and wild relatives (i.e., genus *Adansonia* L.) are present in 12 institutions worldwide, collectively maintaining 462 accessions (Table 1, Table 2). The World Agroforestry Centre maintains an international collection, which comprises over 85% of all germplasm accessions worldwide.

Adansonia L. (Malvaceae) contains around eight species, native to Africa (including and

Table 1. *Ex situ* collections of baobab genetic resources listed in descending order by total number of accessions. Number of accessions and storage condition information from Genesys and FAO WIEWS (2025), with supplementary information as noted. Multilateral System (MLS) status from Plant Treaty GLIS (2025) and from Genesys and FAO WIEWS (2025).

Institution Code	Institution name	Number of accessions	Percent of total	Cumulative percent	Number of accessions in long term storage (-18-20 C)	Number of accessions included in MLS (from Plant Treaty GLIS)	Number of accessions included in MLS (from genebank collections databases)
KEN023	World Agroforestry Centre (Headquarters)	401	86.8%	86.8%	277*	401	401
GBR004	Millennium Seed Bank - Royal Botanic Gardens Kew	34	7.4%	94.2%	Not listed*	0	0
USA047	Subtropical Horticultural Research Unit, National Germplasm Repository - Miami, USDA	6	1.3%	95.5%	Not listed	0	0
ETH085	Ethiopian Biodiversity Institute	5	1.1%	96.5%	Not listed	0	0
ZAF062	RSA National Plant Genetic Resources Centre	5	1.1%	97.6%	5	0	0
IND001	National Bureau of Plant Genetic Resources	4	0.9%	98.5%	4	0	0
KEN212	Genetic Resources Research Institute	2	0.4%	98.9%	Not listed	0	0
COL004	Centro de Investigaciones de Palmira, Corporación Colombiana de Investigación Agropecuaria	1	0.2%	99.1%	Not listed	0	0
CUB003	Instituto de Investigaciones en Fruticultura Tropical	1	0.2%	99.4%	Not listed	0	0
CUB014	Instituto de Investigaciones Fundamentales en Agricultura Tropical	1	0.2%	99.6%	Not listed	0	0
USA108	Tropical Agricultural Research Station, Clonal Repository USDA/ARS	1	0.2%	99.8%	Not listed	0	0
ZWE049	Genetic Resources and Biotechnology Institute-Department of Research and Specialist Services	1	0.2%	100.0%	Not listed	1	0

* not listed in the global databases, but confirmed by relevant curators or otherwise known to be conserved in long-term storage condition

especially Madagascar) and Australia (USDA, 2025; WFO, 2025). A published genepool concept is not available for baobab, but phylogenetic studies indicate that the closest relative to *Adansonia digitata* L. (the most widespread and culturally important of baobabs) is *Adansonia gregorii* F. Muell. (native to Australia), followed by *Adansonia rubrostipa* Jum. & H. Perrier; *Adansonia grandidieri* Baill. and *Adansonia suarezensis* H. Perrier; and finally *Adansonia perrieri* Capuron, *Adansonia za* Baill., and *Adansonia madagascariensis* Baill. (the final six species native to Madagascar) (Wan *et al.*, 2024).

Data compilation for this report on baobab genetic resources included all taxa in *Adansonia*. Eight taxa in the genus, along with a few accessions only recognized to the genus level, are present in germplasm collections (Supplementary Table 1). The largest collection by far is of *A. digitata*. Wild materials make up almost the entirety (95.7%) of collections (Table 2).

Adansonia germplasm has been collected from at least 15 countries, with approximately 92% of accessions originating from Africa, including Madagascar; these statistics are estimates, as 10.5% of wild *Adansonia* accessions do not contain information even of the country where the accession was collected. Information on botanic garden collections from BGCI PlantSearch indicate that 181 botanic gardens collectively conserve 11 *Adansonia* taxa; all of these are also found in genebank collections.

Table 2. Composition of *ex situ* collections of baobab genetic resources. Main *ex situ* collections data from Genesys and FAO WIEWS (2025). Primary and secondary regions information from Khoury *et al.* (2023) and subsequent research for this summary. Botanic gardens data from BGCI PlantSearch (2025).

Metric	Number	Percentage
Total number of accessions in genebank collections	462	
Number of institutions holding genebank collections	12	
Number of distinct taxonomic names in genebank collections	9	
Number of accessions of wild materials in genebank collections	442	95.7%
Number of accessions of weedy materials in genebank collections	0	0.0%
Number of accessions of landraces in genebank collections	2	0.4%
Number of accessions of breeding materials in genebank collections	2	0.4%
Number of accessions of improved varieties in genebank collections	0	0.0%
Number of accessions of other materials in genebank collections	1	0.2%
Number of accessions not marked with an improvement type in genebank collections	15	3.2%
Number of countries where germplasm has been collected for genebank collections	15	
Number of accessions in genebank collections from the primary region(s) of diversity	425	92.0%
Number of taxa in botanic garden collections	11	
Number of botanic gardens holding collections	181	

Multilateral System status of accessions in *ex situ* collections

The genus *Adansonia* is not listed in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty) and is thus not included in its Multilateral System of Access and Benefit Sharing (MLS). This said, institutions can voluntarily place their collections under the MLS. Of the 462 accessions conserved in germplasm collections, approximately 86.8% are held in international institutions (i.e., World Agroforestry Centre), and are included in the MLS under Article 15 of the Plant Treaty, with the remainder maintained in national and other collections (Table 3).

As of 2025, 402 accessions are formally included in the MLS according to the Plant Treaty's GLIS database, and 404 accessions have been assigned Digital Object Identifiers (DOIs). Per the relevant fields in the global genetic resources databases, 401 accessions (86.8% of world total) are listed as included in the MLS.

Table 3. Representation of baobab accessions in international and national institutions, number of accessions with DOIs, and representation of accessions in the Multilateral System of Access and Benefit Sharing of the International Treaty on Plant Genetic Resources for Food and Agriculture. Main *ex situ* collections data from Genesys and FAO WIEWS (2025). DOI and MLS data from Plant Treaty GLIS (2025).

Metric	Number	Percentage
Number of accessions in genebank collections in international institutions	401	86.8%
Number of accessions in genebank collections in national or other institutions	61	13.2%
Number of accessions in genebank collections in Annex I	0	0%
Number of accessions with DOI (Plant Treaty GLIS 2025)	404	
Number of accessions included in the Multilateral System (MLS) (Plant Treaty GLIS 2025)	402	
Number of accessions included in the Multilateral System (MLS) (genebank collections databases)	401	86.8%
Number of accessions included in the Multilateral System (MLS) that are in international collections (genebank collections databases)	401	86.8%
Number of accessions not included in the Multilateral System (MLS) (genebank collections databases)	36	7.8%
Number of accessions without information regarding inclusion in the Multilateral System (MLS) (genebank collections databases)	25	5.4%

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Storage conditions, regeneration status, and safety duplication

Adansonia is generally considered to have an orthodox seed (SER, INSER, and RBGK, 2023), and 69.5% of accessions are conserved as seed. Only 2.8% of these accessions are listed in the global germplasm databases as conserved under long-term cold-storage conditions (Table 2, Table 4), but we estimate at least 320 accessions (i.e., essentially all seed accessions) are actually stored in long-term conditions based on communications with germplasm curators and knowledge of genebank repositories. Some 30.1% of accessions are listed as conserved in the field, with extremely limited backup in *in vitro* or cryopreservation.

Current regeneration status and needs cannot be directly derived from the global germplasm databases. FAO WIEWS reporting for the *Third State of the World's Plant Genetic Resources for Food and Agriculture* (FAO, 2025b) for the years 2014 to 2019, documented zero *Adansonia* accessions regenerated during this time by reporting institutions, with one accession identified as needing regeneration, but lacking funds to conduct the regeneration.

Analysis of the location of safety duplication sites of *Adansonia* germplasm, as listed in Genesys, indicates that less than 1% of accessions listed are safety duplicated in an active collection (i.e., apart from potentially being duplicated at the Svalbard Global Seed Vault [SGSV]) outside of the country of the main collection (Table 4). Information from the SGSV database from 2025 indicates that approximately 36.4% of total accessions worldwide are duplicated in Svalbard.

Table 4. Storage conditions of baobab *ex situ* collections, regeneration status, and safety duplication status. Main *ex situ* collections data from Genesys and FAO WIEWS (2025). Regeneration status information from FAO WIEWS (2025); data from 2014 to 2019. Safety duplication out of the country data based only on Genesys (2025) data. Svalbard Global Seed Vault data from SGSV portal (2025).

Metric	Number	Percentage
Number of accessions held in seed storage in genebank collections	321	69.5%
Number of accessions held in short-term seed storage in genebank collections	0	0.0%
Number of accessions held in medium-term seed storage in genebank collections	278	86.6%
Number of accessions held in long-term seed storage in genebank collections	9	2.8%
Number of accessions held in seed storage of undefined type in genebank collections	34	10.6%
Number of accessions held in field storage in genebank collections	139	30.1%
Number of accessions held in in-vitro storage in genebank collections	0	0.0%
Number of accessions held in cryo storage in genebank collections	1	0.2%
Number of accessions held as DNA in genebank collections	0	0.0%
Number of accessions held in other storage in genebank collections	0	0.0%
Number of accessions not marked with a storage type in genebank collections	2	0.4%
Number of accessions in genebank collections regenerated 2014–2019	0	0%
Number of accessions in genebank collections in need of regeneration 2014–2019	1	100%
Number of accessions in genebank collections in need of regeneration without budget for regeneration 2014–2019	1	100%
Number of accessions safety duplicated out of the country in genebank collections	2	0.5%
Number of accessions in genebank collections safety duplicated in Svalbard	168	36.4%

Documentation, information systems, and research resources

A descriptor list for baobab was published by the international agricultural research community in 2015 and is available online (Kehlenbeck, *et al.*, 2015). The estimated completeness of passport information for baobab accessions listed in Genesys is 6.5 on a scale of 0 (no data) to 10 (complete data), which indicates that a sizable amount of passport data is available, but also that there are gaps that it would be valuable to fill. At least one *Adansonia* characterization and evaluation dataset, from the World Agroforestry Centre, is available via Genesys, covering a total of 81 accessions. Approximately 16,346 research resources such as herbarium specimens for the genus are available in the Global Biodiversity Information Facility (GBIF, 2025).

Germplasm distributions and varietal registrations and releases

Germplasm distribution data from the Plant Treaty Data Store, which includes all transfers made under the SMTA, encompassing distributions made by genebanks as well as by breeding programmes and other organizational types (Khoury *et al.*, 2025), documents an average of one sample distributed per year over years 2015 to 2021; these were distributed from providers in Kenya and Mali, and were sent to recipients in Mali, Kenya, China, and Ethiopia (Khoury *et al.*, 2023).

Networks and partnerships

Currently active networks include:

- The World Agroforestry Centre promotes baobab as a multi-use food tree
- The African Orphan Crops Consortium
- The Baobab Genome Project

Conclusions

Baobab is an iconic, culturally significant tree facing increasing threats from climate change and habitat loss. Its genetic resources in agricultural research organizations – comprising under 500 accessions globally – are bolstered by the activities mainly taking place at the World Agroforestry Centre. Lack of inclusion of baobab on Annex 1 of the Plant Treaty may constrain international access to germplasm, although the large proportion of accessions held at the World Agroforestry Centre translates to approximately 86.8% of total genetic resource accessions worldwide currently included in the MLS under its Article 15. Botanic garden collections of baobab probably represent important complementary *ex situ* resources, but further analysis is required to better understand the degree of complementarity and to reveal gaps in *ex situ* conservation. Information on production and consumption of the plant, associated research resources, and germplasm distributions and varietal development are limited. Further efforts are required to safety backup all unique accessions, including at the SGSV; and to provide more complete accession-level passport information as well as generate characterization and evaluation datasets.

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Methods and materials

Primary data sources for the metrics reported in this summary include: Genesys; World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture of the Food and Agriculture Organization of the United Nations (FAO WIEWS); Botanic Gardens Conservation International PlantSearch database (BGCI PlantSearch); Global Information System of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty GLIS); Data Store of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty Data Store); Svalbard Global Seed Vault portal (SGSV portal); and the Global Biodiversity Information Facility (GBIF). Data processing, metric calculation, and table generation were conducted in R, with code available on this GitLab repository. Extended methods are available here.

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MICHAEL MAJOR

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Supplementary information

Supplementary Table 1: Full list of taxonomic names in *ex situ* genetic resource collections, in descending order by number of accessions conserved. Germplasm data from Genesys and FAO WIEWS (2025).

Taxon	Number of accessions (from genebank collections databases)
Adansonia digitata L.	422
Adansonia za Baill.	11
Adansonia fony var. *rubrostipa* (Jum. & H. Perrier) H. Perrier	10
Adansonia madagascariensis Baill.	6
Adansonia gregorii F. Muell.	4
Adansonia suarezensis H. Perrier	3
Adansonia L.	2
Adansonia grandidieri Baill.	2
Adansonia perrieri Capuron	2

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