GLOBAL CROP CONSERVATION AND USE METRICS

PIGEONPEA
(*Cajanus* Adans.)

CROP TRUST

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Global crop conservation and use metrics

PIGEONPEA
(*Cajunus* Adans.)

With support from

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International Treaty on Plant Genetic Resources for Food and Agriculture

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 pigeonpea and its wild relatives, including key metrics on:

- global statistics on crop production and availability in food supplies;
- 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;
- germplasm distribution;
- varietal registrations and releases; and
- crop networks and partnerships

Introduction and background on pigeonpea

Pigeonpea [*Cajanus cajun* (L.) Huth], also known as Congo pea, Angola pea, and red gram, is a sub-tropical and tropical grain legume that originated in the northern region of the Indian sub-continent, spreading to East Africa at least 4000 years BCE, and then to Southeast Asia, West Africa, Latin America, and the Caribbean (Khoury *et al*., 2015). The seed is eaten both as a green vegetable and dry pulse and is an important source of protein, vitamin B, carotene, and ascorbic acid (Odeny, 2007; Choudhary *et al.*, 2013). The pods and foliage of the plant are used as livestock forage and fodder, the crop is cultivated as a green manure, and its woody stem is used as fuel and construction material (Mallikarjuna *et al.*, 2011). Pigeonpea is an important income generator, particularly in Tanzania, Malawi, and Myanmar, with these countries exporting mainly to India (Odeny, 2007).

Pigeonpea is generally planted by smallholder farmers in low input, rain-fed conditions. The crop is well suited to a wide range of agricultural systems, including intercropping and no-till. Cultivation improves soil fertility through biological nitrogen fixation as well as through the solubilization of soil-bound phosphorus (Mallikarjuna *et al.*, 2011, Choudhary *et al*., 2013), increasing the yield of intercropped cereals, other pulses, and vegetables, and the crop has been shown to enhance the control of *Striga* (Odeny, 2007). Pigeonpea is more heat tolerant than most grain legume crops and is regarded as drought-resistant. These traits are associated with the ability to maintain or regulate transpiration under high temperatures and/or low soil moisture, for example through adjustment of leaf osmotic pressure (Subbarao et al., 2000), maintenance of photosynthetic function under stress (Lopez et al., 1987), and deep root systems (Flower and Ludlow, 1987).

Based on the most recently available production statistics from FAOSTAT, reporting for the year 2023, pigeonpea is cultivated in at least 24 countries on a total of almost 5.4 million hectares worldwide, producing over 4.5 million tonnes of dry grain at a value of over $2.8 billion USD (FAO, 2025). Production is concentrated in India (with approximately three-quarters of global production and of harvested area), as well as in Malawi, Myanmar, Tanzania, Kenya, Dominican Republic, Uganda, and Nepal, with each of these producing over 10,000 tonnes per annum.

Approximately 20% of global production of pigeonpea is internationally traded, with over 615,000 tonnes exported and 925,000 tonnes imported annually. The main exporters include Myanmar (40% of total exports globally) and Tanzania (30.6%), as well as Sudan, Malawi, and India (FAO, 2025). Among the 100 countries reporting importing the crop, the major recipients include India (95% of total imports globally), as well as USA, Nepal, UK, United Arab Emirates (likely as a re-export hub), Kenya, Tanzania, Canada, Australia, and Belgium. Global average yield (per hectare) of the crop is the lowest among major grain legumes (FAO, 2025) and has been stagnant for a number of decades, with increased production during this time mainly due to an expansion of harvested area (Saxena, 2005, Odeny, 2007, Jones *et al.*, 2002).

Global consumption statistics are imprecise, with FAOSTAT reporting the grain legume under its "Pulses, Other" category (Khoury *et al.*, 2023). Estimates derived from these data for the years 2015-2018 indicate that the per capita dietary contribution of the crop world-wide - as measured in terms of both calories and protein - is lower than that of other major pulses. This said, the crop is a significant contributor to protein in the food supplies of at least 67 countries.

Table 1. Global status of pigeonpea production, availability in food supplies, and public interest. Production and food supply statistics from FAOSTAT (2015 to 2018 average); trade data for pigeonpea was not available in this time frame. Production metrics are reported directly for the crop in FAOSTAT; for food supply the crop is placed within "Pulses, Other" and the estimates presented here were derived by disaggregating those generalized food supply statistics using a weighted average based on production statistics (Khoury *et al.*, 2023). Number of countries refers to the count of countries where the crop is reported as within the top 95 percent of crops in terms of contribution to production or food supply. The evenness metric quantifies evenness of production or availability in food supplies across world regions, where 0 equals highly uneven and 1 equals completely even. The international interdependence metric quantifies the degree of production or availability in food supplies outside of the primary region of diversity of the crop, where 0 equals low estimated international interdependence and 1 equals high estimated international interdependence. Wikipedia metric is public pageviews over one year (2019) of the taxon name of the crop. All values from Khoury *et al.* (2023).

Metric	Global value	Number of countries where significant contributor	Evenness of contribution across world regions	Estimated international interdependence
Harvested area (ha)	5,777,499	11.00	0.08	0.24
Total production (tonnes)	5,056,169	4.25	0.09	0.29
Gross production value (current thousand USD)	3,139,583	5.25	0.06	0.17
Contribution to calories in food supplies (kcal/capita/day)	4.10	26.25	0.50	0.66
Contribution to protein in food supplies (g/capita/day)	0.25	67.00	0.51	0.70
Contribution to fat in food supplies (g/capita/day)	0.03	3.50	0.47	0.53
Contribution to food weight in food supplies (g/capita/day)	0.43	21.25	0.50	0.66
Number of public pageviews on Wikipedia over one year	3,150			

Identity and composition of *ex situ* collections

Based on the latest data in global genetic resource databases, germplasm collections of pigeonpea and its wild relatives (i.e., genus *Cajanus* Adans.) are present in at least 84 institutions worldwide, collectively maintaining 30,918 accessions (Table 2, Table 3; Supplementary Table 1). This is slightly more than the number of accessions reported for the crop (29,734) in the major germplasm collections listed in *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture* (FAO, 2025b).

The institutions are mainly distributed in Asia, Africa, and Australia. The International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) maintains the major international collection of pigeonpea (holding 43.4% of total accessions worldwide), with the World Vegetable Center, International Livestock Research Institute (ILRI), and International Center for Tropical Agriculture (CIAT) also maintaining smaller international collections. The largest national and other collections are in India (holding 27% of total accessions), Kenya (4.5%), and Australia (2.6%), as well as the Philippines, Benin, and Brazil; these international and national collections collectively maintain over 90% of documented accessions worldwide.

Reported information on the status of accessions under the Multilateral System of Access and Benefit Sharing (MLS) of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty), as recorded in the Global Information System (GLIS) and in pertinent fields in Genesys and FAO WIEWS (Table 2; Table 4), likely underestimate the full degree to which accessions are currently included in the MLS, as several of the pigeonpea collections without information on MLS status are in countries that are contracting parties to the Plant Treaty (such as Philippines, Brazil, Tanzania, and Zimbabwe) and distribute samples using the Standard Material Transfer Agreement (SMTA).

The International Board for Plant Genetic Resources (IBPGR)/International Plant Genetic Resources Institute (IPGRI) Register of Base Collections, which included collections that had formed (or had been proposed for) agreements with the international institutions based on long-term conservation of crop genepools on global or regional bases during the 1970s through 1990s (IBPGR/IPGRI, 1993; Thormann *et al.*, 2019), listed, for pigeonpea:

- National Bureau of Plant Genetic Resources (NBPGR) (India) - global collection (agreement dated 1987)
- ICRISAT - global collection (agreement dated 1984)

Cajanus Adans. (Fabaceae) contains around 32-34 species, divided into three clades (Indian, Australian, and Scarabaeoides), native to South and Southeast Asia, Australia, Madagascar, and potentially West Africa (Khoury *et al.,* 2015; WFO, 2025). A published genepool concept is available for pigeonpea [*Cajanus cajan* (L.) Huth] (USDA, 2025).

The primary genepool contains:
Cajanus cajan (L.) Huth

The secondary genepool contains:
Cajanus acutifolius (F. Muell.) Maesen
Cajanus albicans (Wight & Arn.) Maesen
Cajanus aromaticus Maesen
Cajanus cajanifolius (Haines) Maesen (putative progenitor, native to South Asia)
Cajanus cinereus (F. Muell.) F. Muell.
Cajanus confertiflorus F. Muell.
Cajanus goensis Dalzell
Cajanus lanceolatus (W. Fitzg.) Maesen
Cajanus latisepalus (S. T. Reynolds & Pedley) Maesen
Cajanus lineatus (Wight & Arn.) Maesen

Table 2. Major *ex situ* collections of pigeonpea genetic resources. Top 20 institutions 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)
IND002	International Crop Research Institute for the Semi-Arid Tropics	13,430	43.4%	43.4%	13,250	13,367	13,367
IND001	National Bureau of Plant Genetic Resources	11,427	37.0%	80.4%	11,427	0	0
KEN212	Genetic Resources Research Institute	1,397	4.5%	84.9%	748	613	1,236
AUS165	Australian Grains Genebank, Agriculture Victoria	807	2.6%	87.5%	611	634	638
PHL129	Institute of Plant Breeding-National Plant Genetic Resources Laboratory	481	1.6%	89.1%	19	0	0
BEN097	Unité de Génétique, Biotechnologie et Science des Semences	260	0.8%	89.9%	Not listed	170	0
BRA003	Embrapa Recursos Genéticos e Biotecnologia	236	0.8%	90.7%	Not listed	0	0
TZA016	National Plant Genetic Resources Centre	210	0.7%	91.4%	210	0	0
ZMB030	SADC Plant Genetic Resources Centre	174	0.6%	91.9%	174	0	0
KEN214	Seed Savers Network Kenya	161	0.5%	92.4%	Not listed	0	0
TWN001	World Vegetable Center	160	0.5%	93.0%	144	141	160
GHA091	Plant Genetic Resources Research Institute	159	0.5%	93.5%	Not listed	152	152
MMR015	Myanmar SeedBank	143	0.5%	93.9%	Not listed	0	0
ETH013	International Livestock Research Institute (ILRI)	140	0.4%	94.4%	Not listed*	139	139
ZMB048	National Plant Genetic Resources Centre	140	0.4%	94.8%	140	18	124
ARE003	International Center for Biosaline Agriculture	137	0.4%	95.3%	Not listed	137	137
COL003	International Center for Tropical Agriculture	134	0.4%	95.7%	Not listed*	133	134
MAR088	Centre Régional de la Recherche Agronomique de Settat	91	0.3%	96.0%	89	0	91
SDN002	Agricultural Plant Genetic Resources Conservation and Research Centre	89	0.3%	96.3%	89	0	81
BGD003	Bangladesh Agricultural Research Institute	84	0.3%	96.6%	84	0	75
	Other institutions (n = 64)	1,058	3.4%	100.0%	259	128	352

*But known to maintain collections in long-term conditions

Cajanus reticulatus (Aiton) F. Muell. (and subspecies)
Cajanus scarabaeoides (L.) Thouars
Cajanus sericeus (Benth. ex Baker) Maesen
Cajanus trinervius (DC.) Maesen

The tertiary genepool contains:
Cajanus crassicaulis Maesen
Cajanus crassus (Prain ex King) Maesen
Cajanus elongatus (Benth.) Maesen
Cajanus geminatus Pedley ex Maesen
Cajanus grandiflorus (Benth. ex Baker) Maesen
Cajanus heynei (Wight & Arn.) Maesen
Cajanus hirtopilosus Maesen
Cajanus kerstingii Harms
Cajanus lanuginosus Maesen
Cajanus mareebensis (S. T. Reynolds & Pedley) Maesen
Cajanus marmoratus (R. Br. ex Benth.) F. Muell.
Cajanus mollis (Benth.) Maesen
Cajanus niveus (Benth.) Maesen
Cajanus platycarpus (Benth.) Maesen
Cajanus pubescens (Ewart & J. L. Morrison) Maesen
Cajanus rugosus (Wight & Arn.) Maesen
Cajanus villosus (Benth. ex Baker) Maesen
Cajanus viscidus Maesen
Cajanus volubilis (Blanco) Blanco

Data compilation for this report on pigeonpea genetic resources included all taxa in *Cajanus*. Along with the crop, 26 taxa as well as accessions only determined to the genus level are present in germplasm collections (Supplementary Table 2). These include large collections of the crop, *C. scarabaeoides*, and accessions determined at the genus level.

Landraces make up the largest proportion of collections (37.5%), followed by breeding materials (17.5%), and wild relatives (2.4%) (Table 3); these percentages are estimates based on available data, noting that 41% of accessions do not have biological status data. *Cajanus* germplasm has been collected from at least 84 countries, with approximately 28.7% of accessions originating from the primary regions of diversity of pigeonpea (i.e. South Asia and East Africa) and 29.8% from primary and secondary (i.e. Caribbean) regions; these statistics are also estimates, as 7.3% of pigeonpea landrace accessions and 3.5% of wild relative accessions do not contain information even of the country where the accession was collected. Information on botanic garden collections from BGCI PlantSearch indicate that 65 botanic gardens collectively conserve 17 *Cajanus* taxa; of these, one [*Cajanus grandiflorus* (Benth. ex Baker) Maesen] is conserved only in botanic gardens and not found in genebank collections.

Aside from the taxa that appear to be entirely missing from, or with very small representation in, germplasm collections, the global genetic resources databases do not offer insights on diversity gaps, but published research has indicated specific priority species and geographic regions for further collecting for conservation. Khoury *et al.* (2015) and Castañeda-Álvarez *et al.* (2016), both assessing 15 pigeonpea wild relatives, listed 12 of these (80%) as of high priority for further collecting. Some progress has been made recently in filling pigeonpea wild relative gaps, including via the Adapting Agriculture to Climate Change: Collecting, Protecting and Preparing Crop Wild Relatives project (Crop Trust, 2025), which resulted in the collecting of 30 seed samples of 4 wild relative taxa from 3 countries (including 23 samples of *C. scarabaeoides* and 5 samples of *C. mollis*, among others) as well as the development of new varieties with introgressions from wild germplasm (Eastwood *et al.*, 2022).

Ramirez-Villegas *et al.* (2022) identified potential geographic gaps for pigeonpea landrace groups in South (especially India) and Southeast Asia (especially Thailand, Myanmar, and the Philippines), as well as in East Africa (especially Ethiopia, Kenya, Tanzania, Malawi, and Mozambique).

Table 3. Composition of *ex situ* collections of pigeonpea 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	30,918	
Number of institutions holding genebank collections	84	
Number of distinct taxonomic names in genebank collections	29	
Number of accessions of crop wild relatives (CWR) in genebank collections	746	2.4%
Number of accessions of weedy materials in genebank collections	6	0.0%
Number of accessions of landraces in genebank collections	11,592	37.5%
Number of accessions of breeding materials in genebank collections	5,407	17.5%
Number of accessions of improved varieties in genebank collections	273	0.9%
Number of accessions of other materials in genebank collections	221	0.7%
Number of accessions not marked with an improvement type in genebank collections	12,673	41.0%
Number of countries where germplasm has been collected for genebank collections	84	
Number of accessions in genebank collections from the primary region(s) of diversity	8,879	28.7%
Number of accessions in genebank collections from the primary and secondary region(s) of diversity	9,214	29.8%
Number of taxa in botanic garden collections	17	
Number of botanic gardens holding collections of crop or its wild relatives	65	

Multilateral System status of accessions in *ex situ* collections

The genus *Cajanus* is listed in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty) and is thus included in its Multilateral System of Access and Benefit Sharing (MLS). Of the 30,918 accessions conserved globally, approximately 45% are held in international institutions (i.e., ICRISAT, World Vegetable Center, ILRI, and CIAT), and are included in the MLS under Article 15 of the Plant Treaty or similar arrangements, with the remainder maintained in national and other collections (Table 4).

As of 2025, 15,634 accessions are formally included in the MLS according to the Plant Treaty's GLIS database, and 16,094 accessions have been assigned Digital Object Identifiers (DOIs). Per the relevant fields in the global genetic resources databases, 16,686 accessions (54% of world total) are listed as included in the MLS; this may be an underestimate, noting that 43.9% of accessions do not have MLS status data.

Table 4. Representation of pigeonpea 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	14,233	46.0%
Number of accessions in genebank collections in national or other institutions	16,685	54.0%
Number of accessions in genebank collections in Annex I	30,918	100%
Number of accessions with DOI (Plant Treaty GLIS 2025)	16,094	
Number of accessions included in the Multilateral System (MLS) (Plant Treaty GLIS 2025)	15,634	
Number of accessions included in the Multilateral System (MLS) (genebank collections databases)	16,686	54.0%
Number of accessions included in the Multilateral System (MLS) that are in international collections (genebank collections databases)	13,988	45.2%
Number of accessions not included in the Multilateral System (MLS) (genebank collections databases)	667	2.2%
Number of accessions without information regarding inclusion in the Multilateral System (MLS) (genebank collections databases)	13,565	43.9%

Storage conditions, regeneration status, and safety duplication

As expected for an orthodox seed crop, the great majority (at least 93.7%) of *Cajanus* accessions are conserved as seed, with 94% of these accessions listed as conserved under long-term cold-storage conditions (Table 5). Information on storage in general is missing for 6.2% of all accessions, and information on seed storage type (i.e., long, medium, or short term) is missing for 1.6% of seed accessions.

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 349 pigeonpea accessions regenerated during this time by reporting institutions, with 451 accessions identified as needing regeneration and 270 of these lacking funds to conduct the regeneration.

Analysis of the location of safety duplication sites of pigeonpea germplasm, as listed in Genesys, indicates that at least 66.8% of accessions 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 5). Information from the SGSV database from 2025 indicates that approximately 46.6% of total accessions worldwide are duplicated in Svalbard.

Table 5. Storage conditions of pigeonpea *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	28,982	93.7%
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	1,259	4.3%
Number of accessions held in long-term seed storage in genebank collections	27,244	94.0%
Number of accessions held in seed storage of undefined type in genebank collections	479	1.6%
Number of accessions held in field storage in genebank collections	7	0.0%
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	0.0%
Number of accessions held as DNA in genebank collections	1	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	1,933	6.2%
Number of accessions in genebank collections regenerated 2014-2019	349	48.1%
Number of accessions in genebank collections in need of regeneration 2014-2019	451	62.2%
Number of accessions in genebank collections in need of regeneration without budget for regeneration 2014-2019	270	37.2%
Number of accessions safety duplicated out of the country in genebank collections	12,084	66.8%
Number of accessions in genebank collections safety duplicated in Svalbard	14,417	46.6%

Documentation, information systems, and research resources

A descriptor list for pigeonpea was published in 1993 (IBPGR and ICRISAT, 1993), and a prioritized list of characterization and evaluation descriptors was published in 2010 (Bioversity International, ICRISAT, and ICAR, 2010).

The estimated completeness of passport information for pigeonpea accessions listed in Genesys is 7.3 on a scale of 0 (no data) to 10 (complete data), which indicates that substantial data is available, but also that there are gaps remaining that it would be valuable to fill. At least 12 pigeonpea characterization and evaluation datasets are available via Genesys, covering a total of 114,630 accessions. Four metrics of the current degree of digital sequence information (DSI) for pigeonpea (from the National Center for Biotechnology Information USA database), two metrics of published literature on the crop (Google Scholar and PubMed Central), and one metric of the degree of research resources such as herbarium specimens (from the Global Biodiversity Information Facility - GBIF), are listed in Table 6.

Table 6. Documentation, information systems, and research resources for pigeonpea. Passport data completeness index (PDCI) from Genesys (2025), based on the methods outlined in van Hintum *et al.* (2011). Global Biodiversity Information Facility data from GBIF (2025). All other metrics data from Khoury *et al.* (2023).

Metric	Number
Passport data completeness index (range 0-10) as a median value across accessions in genebank collections	7.3
Number of genes as recorded in NCBI's Entrez database as of 2022	34,127
Number of genomes as recorded in NCBI's Entrez database as of 2022	1
Number of nucleotides as recorded in NCBI's Entrez database as of 2022	276,476
Number of proteins as recorded in NCBI's Entrez database as of 2022	119,480
Number of publications listed in Google Scholar with taxon name in title published between 2009 and 2019	2,240
Number of publications listed in PubMed Central with taxon name in text as of 2022	3,154
Number of research materials as recorded in GBIF (2025)	78,960

Germplasm distributions and varietal registrations and releases

Germplasm distributions and varietal development statistics for pigeonpea are listed in Table 7. Germplasm distribution data from FAO WIEWS and the Plant Treaty Data Store reflect different reporting scopes: FAO WIEWS primarily reports distributions from national genebanks, while the Plant Treaty Data Store 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).

Distributions as reported in the FAO WIEWS dataset were made from institutions in 14 countries, with the largest numbers of samples distributed from institutions in India, Australia, Indonesia, Nigeria, Kenya, and Bangladesh, and were primarily to within-country national agricultural research centers and to other (unspecified) users (Khoury *et al.*, 2025). In the Plant Treaty dataset, the providers of the most samples were located in India, Kenya, Niger, Ethiopia, Sudan, Nigeria, and China, and the recipients of the most samples were located in India, Nigeria, Niger, Malawi, Tanzania, Myanmar, Zambia, Mozambique, Uganda, China, Sudan, and Benin.

Table 7. Pigeonpea germplasm distributions and varietal registrations and releases. FAO WIEWS distributions data is annual average over years 2014 to 2019. Plant Treaty Data Store distributions data is annual average over years 2015 to 2021. Evenness metric quantifies evenness of germplasm distributions across world regions, where 0 equals highly uneven and 1 equals completely even. International Union for the Protection of New Varieties of Plants (UPOV) PLUTO data is annual average over years 2014 to 2018. FAO WIEWS varietal releases data is annual average over years 2015 to 2019. All metrics data from Khoury *et al.* (2023), with Plant Treaty Data Store additions for more recent years (2019 to 2021).

Metric	Number
Average annual number of accessions distributed worldwide as recorded in FAO WIEWS	734.2
Average annual number of samples distributed worldwide as recorded in FAO WIEWS	963.8
Average annual number of samples distributed worldwide as recorded in the Plant Treaty Data Store	2,221.1
Number of countries receiving germplasm as recorded in the Plant Treaty Data Store	14.0
Evenness of distributions across world regions as recorded in the Plant Treaty Data Store	0.8
Average annual number of varietal registrations worldwide as recorded in UPOV's PLUTO	0.0
Average annual number of varietal releases worldwide as recorded in FAO WIEWS	5.0

Networks and partnerships

ICRISAT in particular continues to play a critical role in pigeonpea germplasm conservation and varietal development, maintaining active partnerships with national agricultural research organizations, other international centers, and several academic and industry institutions.

Currently active networks include:

Communities related to pigeonpea genetics, genomics, and other -omics information, e.g. Varshney *et al.* (2010) and Singh *et al.* (2024).

Conclusions

Pigeonpea continues to be an important pulse crop in its areas of production and it is likely that it will grow in importance in future food systems for both human health and environmental sustainability. Its genetic resources are bolstered by the activities taking place in ICRISAT, with several other international centers holding small collections, as well as in national and subnational agricultural research organizations. Available data indicates that these collections, in combination, are diverse and extensive, although they do not represent the full range of crop varieties as well as species and populations of wild relatives that could be conserved *ex situ* and made available for use. The genus is included in the MLS of the Plant Treaty, although further efforts are needed to include all accessions in the MLS (approximately 54% are currently included). Long-term seed storage of pigeonpea collections appears to be very well established, with around 94% of accessions maintained as seed conserved in these conditions, and safety duplication of collections is fairly well advanced. There are considerable amounts of associated research resources, and there has been significant activity in germplasm distributions. Further efforts are required to: identify/determine taxa within current *ex situ* accessions; regenerate accessions in need; safety backup all unique accessions, including at the SGSV; and continue to provide more complete accession-level passport information as well as generate further 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); International Union for the Protection of New Varieties of Plants (UPOV) PLUTO database; FAOSTAT; National Center for Biotechnology Information's Entrez database (NCBI Entrez); Google Scholar; PubMed Central; Wikipedia; and the Global Biodiversity Information Facility (GBIF). Some of these data were acquired from literature/databases including Khoury et al. (2023) and Khoury et al. (2025). 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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Supplementary information

Supplementary Table 1: Full list of *ex situ* collections of pigeonpea genetic resources, 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)
IND002	International Crop Research Institute for the Semi-Arid Tropics	13,430	43.4%	43.4%	13,250	13,367	13,367
IND001	National Bureau of Plant Genetic Resources	11,427	37.0%	80.4%	11,427	0	0
KEN212	Genetic Resources Research Institute	1,397	4.5%	84.9%	748	613	1,236
AUS165	Australian Grains Genebank, Agriculture Victoria	807	2.6%	87.5%	611	634	638
PHL129	Institute of Plant Breeding-National Plant Genetic Resources Laboratory	481	1.6%	89.1%	19	0	0
BEN097	Unité de Génétique, Biotechnologie et Science des Semences	260	0.8%	89.9%	Not listed	170	0
BRA003	Embrapa Recursos Genéticos e Biotecnologia	236	0.8%	90.7%	Not listed	0	0
TZA016	National Plant Genetic Resources Centre	210	0.7%	91.4%	210	0	0
ZMB030	SADC Plant Genetic Resources Centre	174	0.6%	91.9%	174	0	0
KEN214	Seed Savers Network Kenya	161	0.5%	92.4%	Not listed	0	0
TWN001	World Vegetable Center	160	0.5%	93.0%	144	141	160
GHA091	Plant Genetic Resources Research Institute	159	0.5%	93.5%	Not listed	152	152
MMR015	Myanmar SeedBank	143	0.5%	93.9%	Not listed	0	0
ETH013	International Livestock Research Institute	140	0.4%	94.4%	Not listed	139	139
ZMB048	National Plant Genetic Resources Centre	140	0.4%	94.8%	140	18	124
ARE003	International Center for Biosaline Agriculture	137	0.4%	95.3%	Not listed	137	137
COL003	Centro Internacional de Agricultura Tropical	134	0.4%	95.7%	Not listed	133	134
MAR088	Centre Régional de la Recherche Agronomique de Settat	91	0.3%	96.0%	89	0	91
SDN002	Agricultural Plant Genetic Resources Conservation and Research Centre	89	0.3%	96.3%	89	0	81
BGD003	Bangladesh Agricultural Research Institute	84	0.3%	96.6%	84	0	75

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)
LKA036	Plant Genetic Resources Centre	82	0.3%	96.8%	Not listed	0	0
UZB006	Uzbek Research Institute of Plant Industry	72	0.2%	97.1%	Not listed	0	0
JPN183	NARO Genebank	70	0.2%	97.3%	24	0	0
NGA010	National Centre for Genetic Resources and Biotechnology	57	0.2%	97.5%	57	57	57
NGA026	Obafemi Awolowo University	57	0.2%	97.7%	Not listed	0	0
VNM049	Plant Resources Center	51	0.2%	97.8%	Not listed	0	51
ETH085	Ethiopian Biodiversity Institute	50	0.2%	98.0%	2	0	50
THA300	Genebank	49	0.2%	98.2%	49	0	0
NGA039	International Institute of Tropical Agriculture	48	0.2%	98.3%	Not listed	48	41
GBR004	Millennium Seed Bank - Royal Botanic Gardens Kew	47	0.1%	98.5%	Not listed	0	26
BDI003	Institut des Sciences Agronomiques du Burundi	46	0.1%	98.6%	Not listed	0	0
PAN075	Centro de Investigacion Agropecuaria de Recursos Geneticos	43	0.1%	98.8%	Not listed	0	43
TTO010	Central Experiment Station, Research Division, Ministry of Agriculture, Land and Fisheries	43	0.1%	98.9%	Not listed	0	0
MWI041	Malawi Plant Genetic Resources Centre	39	0.1%	99.0%	39	0	39
BEN098	Groupe de Recherche, Innovation agricole, Gestion de la Biodiversité et Action pour un Développement durable et Équitable à la Base	35	0.1%	99.1%	Not listed	0	0
PAK001	Plant Genetic Resources Program	24	0.1%	99.2%	7	0	7
MDG048	Laboratoire des semences et ressources phytogénétiques, FOFIFA	20	0.1%	99.3%	Not listed	0	0
UGA132	Plant Genetic Resource Centre	19	0.1%	99.3%	19	0	0
UGA528	Uganda National Genebank	19	0.1%	99.4%	Not listed	0	0
DEU146	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	14	0.0%	99.4%	13	13	14
CUB010	Estación Experimental de Pastos y Forrajes Indio Hatuey	12	0.0%	99.5%	Not listed	0	0
PAN172	Subcentro de Investigación Agropecuaria de San Félix	12	0.0%	99.5%	Not listed	0	0
PHL136	Bureau of Plant Industry-National Mango Research and Development Center	12	0.0%	99.6%	Not listed	0	0

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)
CUB014	Instituto de Investigaciones Fundamentales en Agricultura Tropical	9	0.0%	99.6%	Not listed	0	0
PHL008	Bureau of Plant Industry, Department of Agriculture	9	0.0%	99.6%	Not listed	0	0
CRI001	Centro Agronómico Tropical de Investigación y Enseñanza	8	0.0%	99.6%	8	8	8
ECU023	Departamento Nacional de Recursos Fitogenéticos	8	0.0%	99.7%	8	0	8
URY003	INIA La Estanzuela	8	0.0%	99.7%	8	0	0
COL017	Corporación Colombiana de Investigación Agropecuaria, AGROSAVIA	7	0.0%	99.7%	Not listed	0	0
NPL069	National Agriculture Genetic Resources Centre-Genebank	7	0.0%	99.7%	7	0	0
PRT001	Banco Português de Germoplasma Vegetal	7	0.0%	99.8%	Not listed	0	0
USA995	National Center for Genetic Resources Preservation	7	0.0%	99.8%	Not listed	0	0
ESP004	Centro Nacional de Recursos Fitogenéticos	6	0.0%	99.8%	Not listed	0	0
GUY021	National Agricultural Research and Extension Institute	5	0.0%	99.8%	Not listed	0	0
UGA394	National Semi Arid Agricultural Research Institute	4	0.0%	99.8%	Not listed	0	0
URY295	Instituto Tecnlógico Centro Sur, Universidad Tecnológica del Uruguay	4	0.0%	99.8%	Not listed	0	0
ZAF062	RSA National Plant Genetic Resources Centre	4	0.0%	99.9%	4	0	0
FRA098	Station de la Réunion, CIRAD-FLHOR	3	0.0%	99.9%	3	0	0
HUN003	Centre for Plant Diversity	3	0.0%	99.9%	Not listed	0	0
MEX166	Secretaría del Medio Ambiente e Historia Natural (SEMAHN), Gobierno de Chiapas	3	0.0%	99.9%	Not listed	0	0
SWZ015	National Plant Genetic Resources Centre	3	0.0%	99.9%	3	0	0
USA971	Desert Legume Program	3	0.0%	99.9%	Not listed	0	0
BEL014	Botanic Garden Meise	2	0.0%	99.9%	2	0	2
CUB284	Centro de Investigaciones Agropecuarias	2	0.0%	99.9%	Not listed	0	0
KEN023	World Agroforestry Centre (Headquarters)	2	0.0%	99.9%	Not listed	2	2
MEX208	INIFAP, Centro Nacional de Recursos Genéticos (CNRG)	2	0.0%	99.9%	2	0	0

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)
NER001	Institut national de la recherche agronomique du Niger	2	0.0%	99.9%	2	0	0
NZL001	Margot Forde Genebank, AgResearch Ltd	2	0.0%	99.9%	Not listed	0	0
PHL024	Bureau of Plant Industry-Davao National Crop Research and Development Center	2	0.0%	100.0%	Not listed	0	2
ARG1350	Banco Activo de Germoplasma de La Consulta	1	0.0%	100.0%	Not listed	0	0
BGD014	Bangladesh Forest Research Institute (BFRI)	1	0.0%	100.0%	Not listed	0	0
BGD189	Bangladesh Livestock Research Institute	1	0.0%	100.0%	Not listed	0	0
BRA008	Embrapa Arroz e Feijão	1	0.0%	100.0%	Not listed	0	0
BRA142	Embrapa Meio Norte	1	0.0%	100.0%	Not listed	0	1
ERI003	National Agricultural Research Institute	1	0.0%	100.0%	1	0	0
GBR016	Genetic Resources Unit, Institute of Biological, Environmental & Rural Sciences, Aberystwyth University	1	0.0%	100.0%	Not listed	0	0
ITA436	Istituto di Bioscienze e Biorisorse, Consiglio Nazionale delle Ricerche	1	0.0%	100.0%	Not listed	0	0
MEX201	UACh, Centro Regional Universitario Sur (CRUS)	1	0.0%	100.0%	Not listed	0	0
PAK034	Pakistan Agricultural Research Council	1	0.0%	100.0%	Not listed	0	0
SLV050	CENTA - Banco de Germoplasma	1	0.0%	100.0%	Not listed	0	0
UKR001	Institute of Plant Production n.a. V.Y. Yurjev of UAAS	1	0.0%	100.0%	1	0	0
USA016	Plant Genetic Resources Conservation Unit, Southern Regional Plant Introduction Station, University of Georgia, USDA-ARS	1	0.0%	100.0%	Not listed	0	0
USA974	Seed Savers Exchange	1	0.0%	100.0%	Not listed	0	0
VNM072	National Institute for Soils and Fertilizers	1	0.0%	100.0%	Not listed	0	1

Supplementary Table 2: 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)
Cajanus cajan (L.) Millsp.	15,451
Cajanus cajan (L.) Huth	14,458
Cajanus scarabaeoides (L.) Thouars	383
Cajanus Adans.	359
Cajanus acutifolius (F. Muell. ex Benth.) Maesen	37
Cajanus albicans (Wight & Arn.) Maesen	36
Cajanus platycarpus (Benth.) Maesen	30
Cajanus crassus (Prain ex King) Maesen	26
Cajanus mollis (Benth.) Maesen	23
Cajanus marmoratus (Banks ex Benth.) F. Muell.	21
Cajanus reticulatus (Aiton) F. Muell.	21
Cajanus cajanifolius (Haines) Maesen	9
Cajanus lineatus (Wight & Arn.) Maesen	9
Cajanus goensis Dalzell	8
Cajanus reticulatus var. *grandifolius* (F. Muell.) Maesen	7
Cajanus aromaticus Maesen	6
Cajanus cinereus (F. Muell. ex Benth.) F. Muell.	6
Cajanus lanuginosus Maesen	5
Cajanus latisepalus (S. T. Reynolds & Pedley) Maesen	5
Cajanus sericeus (Benth. ex Baker) Maesen	5
Cajanus lanceolatus (W. Fitzg.) Maesen	4
Cajanus rugosus (Wight & Arn.) Maesen	4
Cajanus kerstingii Harms	3
Cajanus trinervius (DC.) Maesen	3
Cajanus confertiflorus F. Muell.	2
Cajanus pubescens (Ewart & Morrison) Maesen	2
Cajanus elongatus (Benth.) Maesen	1
Cajanus reticulatus var. *reticulatus*	1
Cajanus volubilis (Blanco) Blanco	1

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