

GLOBAL CROP CONSERVATION AND USE METRICS

# SOYBEAN

(*Glycine Willd.*)



Cover photo: iStockphoto

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### **Suggested Citation**

Khoury CK, Gora, S and Giovannini, P (2025) Global crop conservation and use metrics: Soybean (*Glycine* Willd.). Bonn, Germany: Global Crop Diversity Trust.

### **Funding Source**

The development of this document was funded by the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) as part of the project *Mainstreaming Global Crop Conservation Strategies in Plant Treaty Processes* led by the Crop Trust.

## Global crop conservation and use metrics

# SOYBEAN

(*Glycine Willd.*)



With support from



## Description

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

- global statistics on crop production, trade, 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 soybean

Soybean [*Glycine max* (L.) Merr.] originated in East Asia, likely in central or northeastern China, where it was domesticated more than 6,000 years ago from its putative wild ancestor *Glycine soja* Siebold & Zucc. (Hymowitz, 1970; Sedivy *et al.*, 2017). Today, soybeans serve as one of the world's most versatile and economically important crops, used primarily for animal feed (accounting for about 70% of global soybean meal consumption), human food products including edible oil, tofu, soy sauce, tempeh, and soy milk, and industrial applications such as biodiesel fuel, lubricants, and biodegradable plastics. Soybeans are an exceptional source of balanced protein, containing all essential amino acids, fix atmospheric nitrogen through symbiotic relationships with rhizobia bacteria thereby improving soil fertility, and are a common component of crop rotation systems that help maintain agricultural productivity while reducing reliance on synthetic fertilizers.

Based on the most recently available production statistics from FAOSTAT, reporting for the year 2023, soybeans are cultivated in at least 103 countries on a total of 136.9 million hectares worldwide, producing over 371 million tonnes of grain at a value of over \$195 billion USD (FAO, 2025). Soybeans are first among legume crops in total production and harvested area (Khoury *et al.*, 2023). Production is truly global, with the largest producers including Brazil (38.9% of global production),

and USA (29%), as well as Argentina, China, India, Paraguay, Canada, Russian Federation, Ukraine, Bolivia, South Africa, Nigeria, Italy, Zambia, Uruguay, Serbia, and Benin - each producing over 500,000 tonnes per annum. Global production continues to expand significantly, as demonstrated by the difference between the most current (2023) reported values and those reported in 2015–2018 (Table 1). Global average yield (per hectare) of the crop – at 2711 kg/ha – is among the highest of grain legumes, trailing only common beans and faba beans (FAO, 2025).

There is extensive international trade in the crop (173.5 million tonnes per annum, representing 46.7% of global production), with seven countries reporting exporting over one million tonnes each year. The vast majority is exported from Brazil (58.7%) and USA (28.1%) (FAO, 2025). Among the 175 countries reporting importing soybeans, the major recipients include China, Argentina, Mexico, Netherlands, Spain, Thailand, Germany, and Japan.

The global per capita dietary contribution of the crop reported for the year 2022 - as measured in terms of calories (97 kcal/capita/day), fat (10 g/capita/day), and protein (2 g/capita/day) - is among the most significant of pulses. Soybeans are a major contributor to calories in the food supplies of 136 countries and to fat in 150 countries. These contribu-

tions have risen enormously in the past half century, for example with a 284% increase in global per capita dietary contribution to calories (Khoury *et al.*, 2014). Production, trade, and food supply metrics all indicate

that soybeans are widely utilized outside of their regions of origin, implying significant international interdependence with regard to crop genetic resources (Table 1).

**Table 1.** Global status of soybean production, trade, availability in food supplies, and public interest. Production, trade, and food supply statistics from FAOSTAT (2015 to 2018 average). 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, trade, or food supply. The evenness metric quantifies evenness of production, trade, or availability in food supplies across world regions, where 0 equals highly uneven and 1 equals completely even. The international interdependence metric quantifies degree of production, trade, 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)	123,195,312	46.50	0.21	0.89
Total production (tonnes)	340,845,430	32.75	0.17	0.92
Gross production value (current thousand USD)	107,531,877	33.75	0.17	0.84
Export quantity (tonnes)	222,727,856	71.75	0.16	0.98
Export value (current thousand USD)	90,061,235	72.25	0.17	0.97
Import quantity (tonnes)	220,487,672	169.00	0.24	0.42
Import value (current thousand USD)	98,311,844	174.50	0.25	0.44
Contribution to calories in food supplies (kcal/capita/day)	97.25	136.75	0.49	0.95
Contribution to protein in food supplies (g/capita/day)	1.25	58.25	0.31	0.35
Contribution to fat in food supplies (g/capita/day)	10.04	150.25	0.48	1.00
Contribution to food weight in food supplies (g/capita/day)	4.38	110.75	0.55	0.77
Number of public pageviews on Wikipedia over one year	5,610			

## Identity and composition of *ex situ* collections

Based on the latest data in global genetic resource databases, germplasm collections of soybeans and their wild relatives (i.e., genus *Glycine* Willd.) are present in at least 115 institutions worldwide, collectively maintaining 129,886 accessions (Table 2, Table 3; Supplementary Table 1). This is somewhat more than the number of accessions reported for the crop (117,835) 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 distributed globally, including large collections in the Americas, Asia, Europe, Australia, and Africa. The World Vegetable Center, International Institute of Tropical Agriculture (IITA), and International Livestock Research Institute (ILRI) maintain international collections for the crop, while the largest national collections are in the USA, Brazil, Japan, Russian Federation, India, and Nigeria; these international and national collections collectively maintain over three-quarters of documented accessions worldwide.

**Table 2.** Major *ex situ* collections of soybean 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)
USA033	Soybean Germplasm Collection, USDA-ARS	22,988	17.7%	17.7%	Not listed*	0	0
BRA014	Embrapa Soja	21,984^	16.9%	34.6%	Not listed#	0	0
JPN183	NARO Genebank	14,486	11.2%	45.8%	5,402	0	0
TWN001	World Vegetable Center	13,724	10.6%	56.3%	13,020	12,994	13,100
BRA003	Embrapa Recursos Genéticos e Biotecnologia	9,889	7.6%	64.0%	Not listed*	0	0
RUS001	N.I. Vavilov All-Russian Research Institute of Plant Industry	7,109	5.5%	69.4%	Not listed	0	0
IND001	National Bureau of Plant Genetic Resources	5,394	4.2%	73.6%	5,394	0	0
NGA039	International Institute of Tropical Agriculture (IITA)	4,955	3.8%	77.4%	900	4,955	4,948
ARG1345	Banco Activo de Germoplasma de Trigo y Soja	2,486	1.9%	79.3%	Not listed	0	0
AUS165	Australian Grains Genebank, Agriculture Victoria	2,433	1.9%	81.2%	2,412	2,379	2,381
UKR001	Institute of Plant Production n.a. V.Y. Yurjev of UAAS	2,398	1.8%	83.0%	1,155	0	0
THA300	Genebank	2,153	1.7%	84.7%	2,058	0	0
DEU146	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	1,912	1.5%	86.2%	1,911	0	0
PAK001	Plant Genetic Resources Program	1,294	1.0%	87.2%	295	0	297
COL017	Corporación Colombiana de Investigación Agropecuaria, AGROSAVIA	1,235	0.9%	88.1%	1,147	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)
POL003	Plant Breeding and Acclimatization Institute	1,225	0.9%	89.1%	1,225	0	0
CAN004	Plant Gene Resources of Canada, Saskatoon Research and Development Centre	1,125	0.9%	89.9%	1,125	0	1,125
IDN179	Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development	884	0.7%	90.6%	884	0	0
BGR001	Institute for Plant Genetic Resources 'K.Malkov'	765	0.6%	91.2%	687	0	0
HUN003	Centre for Plant Diversity	741	0.6%	91.8%	278	0	9
	Other institutions (n = 95)	10,706	8.2%	100.0%	3,701	715	1,029

\* but confirmed by curators or otherwise known to conserve accessions in long-term storage conditions

# confirmed by curator as maintained in medium-term storage conditions; long-term storage is conducted at BRA003

^ publicly available germplasm totals 21,984 accessions. Total accessions in genebank amount to 56,758 accessions. See <https://av.cenargen.embrapa.br/avconsulta/Passaporte/banco.do?idi=18>.

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 gene pools on global or regional bases during the 1970s through 1990s (IBPGR/IPGRI, 1993; Thormann *et al.*, 2019), listed, for soybean:

- Commonwealth Scientific and Industrial Research Organization (CSIRO) Division of Plant Industry, Canberra (Australia) - global collection of wild perennial soybean (agreement dated 1984)
- National Institute of Agrobiological Science (NIAS) (Japan) - global collection (agreement dated 1985)
- USDA National Plant Germplasm System (NPGS) (USA) - global collection (agreement dated 1983)

Based on the number of current accessions (Table 2, Supplementary Table 1), it appears that all of these collections continue to maintain diverse soybean germplasm, noting that names of some institutions have changed.

*Glycine* Willd. (Fabaceae) contains around 28 species, native to East and Southeast Asia and Australia (WFO, 2025). A published gene pool concept is available for soybeans [*Glycine max* (L.) Merr.] (USDA, 2025).

The primary gene pool contains the putative progenitor:  
*Glycine soja* Siebold & Zucc.

No species are currently assigned to the secondary gene pool. The tertiary gene pool contains:  
*Glycine albicans* Tindale & Craven  
*Glycine aphyonotos* B. E. Pfeil

**Table 3.** Composition of *ex situ* collections of soybean 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	129,886	
Number of institutions holding genebank collections	115	
Number of distinct taxonomic names in genebank collections	25	
Number of accessions of crop wild relatives (CWR) in genebank collections	14,208	10.9%
Number of accessions of weedy materials in genebank collections	253	0.2%
Number of accessions of landraces in genebank collections	24,260	18.7%
Number of accessions of breeding materials in genebank collections	20,777	16.0%
Number of accessions of improved varieties in genebank collections	13,283	10.2%
Number of accessions of other materials in genebank collections	20,041	15.4%
Number of accessions not marked with an improvement type in genebank collections	36,828	28.4%
Number of countries where germplasm has been collected for genebank collections	123	
Number of accessions in genebank collections from the primary region(s) of diversity	18,500	14.2%
Number of taxa in botanic garden collections	21	
Number of botanic gardens holding collections of crop or its wild relatives	85	

*Glycine arenaria* Tindale  
*Glycine argyrea* Tindale  
*Glycine canescens* F. J. Herm.  
*Glycine clandestina* J. C. Wendl.  
*Glycine curvata* Tindale  
*Glycine cyrtoloba* Tindale  
*Glycine dolichocarpa* Tateishi & H. Ohashi  
*Glycine falcata* Benth.  
*Glycine gracei* B. E. Pfeil & Craven  
*Glycine hirticaulis* Tindale & Craven  
*Glycine lactivirens* Tindale & Craven  
*Glycine latifolia* (Benth.) C. A. Newell & Hymowitz  
*Glycine latrobeana* (Meisn.) Benth.  
*Glycine microphylla* (Benth.) Tindale  
*Glycine montis-douglas* B. E. Pfeil & Craven  
*Glycine peratosa* B. E. Pfeil & Tindale  
*Glycine pescadrensis* Hayata  
*Glycine pindanica* Tindale & Craven  
*Glycine pullenii* B. E. Pfeil et al.  
*Glycine remota* M. D. Barrett & R. L. Barrett  
*Glycine rubiginosa* Tindale & B. E. Pfeil  
*Glycine stenophita* B. E. Pfeil & Tindale  
*Glycine syndetika* B. E. Pfeil & Craven  
*Glycine tabacina* (Labill.) Benth.  
*Glycine tomentella* Hayata

Data compilation for this report on soybean genetic resources included all taxa in *Glycine*. Around 24 taxonomic names are present in germplasm collections, as well as accessions only determined to the genus level (Supplementary Table 2). Landraces make up the largest proportion of collections (18.7%), followed by breeding materials (16%), wild relatives (10.9%), and improved varieties (10.2%) (Table 3); these percentages are estimates based on available data, noting that 28.4% of accessions do not have biological status data and another 15.4% are marked as “other” materials.

*Glycine* germplasm has been collected from at least 123 countries, with approximately 14.2% of accessions originating from the primary region of diversity of the crop (i.e. East Asia); these statistics are also estimates, as 28% of soybean landrace accessions and 66.6% 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 85 botanic gardens collectively conserve 21 *Glycine* taxa. All of these taxa are also conserved in genebank collections.

Aside from the taxa that appear to be entirely missing from, or with limited 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. In a global *ex situ* conser-

vation gap analysis of the wild relatives of major crops, Castañeda-Álvarez *et al.* (2016), assessing five soybean wild relative taxa, listed three (*G. argyrea*, *G. canescens*, and *G. cyrtoloba*) as of medium priority for further collecting, and two other taxa as of low priority.

## Multilateral System status of accessions in *ex situ* collections

The genus *Glycine* 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 129,886 accessions conserved globally, approximately 14% are held in international institutions (i.e., the World Vegetable Center, IITA, and ILRI), and are included in the MLS of the Plant Treaty, with the remainder maintained in national and other collections (Table 4).

As of 2025, 21,043 accessions are formally included in the MLS according to the Plant Treaty's GLIS database, and 25,629 accessions have been assigned Digital Object Identifiers (DOIs). Per the relevant fields in the global genetic resources databases, 22,889 accessions (17.6% of world total) are listed as included in the MLS; this may be an underestimate, noting that 53.6% of accessions do not have MLS status data. Among twelve non-Annex 1 crops analyzed in reports equivalent to this one, soybeans have among the highest proportions of accessions recorded as included in the MLS.

**Table 4.** Representation of soybean 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	18,904	14.6%
Number of accessions in genebank collections in national or other institutions	110,982	85.5%
Number of accessions in genebank collections in Annex I	0	0%
Number of accessions with DOI (Plant Treaty GLIS 2025)	25,629	
Number of accessions included in the Multilateral System (MLS) (Plant Treaty GLIS 2025)	21,043	
Number of accessions included in the Multilateral System (MLS) (genebank collections databases)	22,889	17.6%
Number of accessions included in the Multilateral System (MLS) that are in international collections (genebank collections databases)	18,248	14.0%
Number of accessions not included in the Multilateral System (MLS) (genebank collections databases)	37,407	28.8%
Number of accessions without information regarding inclusion in the Multilateral System (MLS) (genebank collections databases)	69,590	53.6%

## Storage conditions, regeneration status, and safety duplication

As expected for an orthodox seed crop, the great majority (at least 72.2%) of *Glycine* accessions are conserved as seed, with 44.4% of these accessions listed as conserved under long-term cold-storage conditions (Table 5). Information on storage in general is missing for 27.8% of all accessions, and information on seed storage type (i.e., long, medium, or short term) is missing for 32.3% 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 59,677 soybean accessions regenerated during this time by reporting institutions, with 4,229 accessions identified as needing regeneration and 2,749 of these lacking funds to conduct the regeneration.

Analysis of the location of safety duplication sites of soybean germplasm, as listed in Genesys, indicates that at least 11.8% 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). The actual extent of safety duplication of soybean accessions worldwide, when also considering safety duplication within the same country, may be higher than this estimate, given that a number of national genebanks, such as the USA and Russian Federation, provide safety backup of their collections in a different location within the country. Information from the SGSV database from 2025 indicates that approximately 42.1% of total accessions worldwide are duplicated in Svalbard.

**Table 5.** Storage conditions of soybean *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	93,769	72.2%
Number of accessions held in short-term seed storage in genebank collections	12	0.0%
Number of accessions held in medium-term seed storage in genebank collections	21,884	23.3%
Number of accessions held in long-term seed storage in genebank collections	41,594	44.4%
Number of accessions held in seed storage of undefined type in genebank collections	30,279	32.3%
Number of accessions held in field storage in genebank collections	56	0.0%
Number of accessions held in <i>in vitro</i> storage in genebank collections	1	0.0%
Number of accessions held in cryo storage in genebank collections	1	0.0%
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	36,068	27.8%
Number of accessions in genebank collections regenerated 2014-2019	59,673	82.8%
Number of accessions in genebank collections in need of regeneration 2014-2019	4,229	5.9%
Number of accessions in genebank collections in need of regeneration without budget for regeneration 2014-2019	2,749	3.8%
Number of accessions safety duplicated out of the country in genebank collections	11,333	11.8%
Number of accessions in genebank collections safety duplicated in Svalbard	54,717	42.1%

## Documentation, information systems, and research resources

A descriptor list for soybean was published by the international agricultural research community in 1984 (IBPGR, 1984). The World Vegetable Center also published a descriptor list in 2015 (WorldVeg, 2015). To support vegetable soybean germplasm research, a characterized core collection for soybean was also established at the World Vegetable Center (Nair *et al.*, 2023).

The estimated completeness of passport information for soybean accessions listed in Genesys is 5.5 on a scale of 0 (no data) to 10 (complete data), which indicates that there are significant gaps that it would be valuable to fill. At least seven soybean characteriza-

tion and evaluation datasets are available via Genesys, covering a total of 6,739 accessions. Four metrics of the current degree of digital sequence information (DSI) for soybeans (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. Soybeans stand out compared to many other pluses as well as oil crops in terms of the degree of DSI resources, published literature, and research resources in GBIF (Khoury *et al.*, 2023).

**Table 6.** Documentation, information systems, and research resources for soybeans. 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	5.5
Number of genes as recorded in NCBI's Entrez database as of 2022	114,981
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	2,442,759
Number of proteins as recorded in NCBI's Entrez database as of 2022	1,392,173
Number of publications listed in Google Scholar with taxon name in title published between 2009 and 2019	9,460
Number of publications listed in PubMed Central with taxon name in text as of 2022	62,992
Number of research materials as recorded in GBIF (2025)	292,518

## Germplasm distributions and varietal registrations and releases

Germplasm distributions and varietal development statistics for soybean 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 programs and other organizational types (Khoury *et al.*, 2025). Distributions as reported in the FAO WIEWS dataset were made from institutions in 27 countries, with the largest numbers of samples distributed from institutions in China, Brazil, Indonesia, Canada, India, Australia, Nigeria, Sweden, and Poland, and were primarily to within-country national agricultural research centers, the private

sector, farmers or non-governmental organizations (NGOs), and to other (unspecified) users (Khoury *et al.*, 2025). In the Plant Treaty dataset, the providers of the most samples were located in Canada, Nigeria, and China, and the recipients of the most samples were located in Canada, Zambia, Pakistan, Ghana, China, Nigeria, Iran, Brazil, Bangladesh, India, Ethiopia, Poland, Benin, and Germany. Soybean is among the most distributed pulse and oil crops in the FAO WIEWS dataset, but is well below many other pulses in the Plant Treaty dataset, likely reflecting its lack of inclusion in Annex 1 of the Plant Treaty (Khoury *et al.*, 2023) (Table 7). Information on varietal registrations and releases indicate that soybean is among the pulses and oil crops with the largest numbers of varieties in development.

**Table 7.** Soybean 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	17,948.2
Average annual number of samples distributed worldwide as recorded in FAO WIEWS	30,518.0
Average annual number of samples distributed worldwide as recorded in the Plant Treaty Data Store	1,525.1
Number of countries receiving germplasm as recorded in the Plant Treaty Data Store	12.9
Evenness of distributions across world regions as recorded in the Plant Treaty Data Store	0.7
Average annual number of varietal registrations worldwide as recorded in UPOV's PLUTO	585.0
Average annual number of varietal releases worldwide as recorded in FAO WIEWS	350.2

## Networks and partnerships

Currently active networks include:

- The USDA ARS [Soybean Crop Germplasm Committee](#) (also [here](#))
- Communities related to soybean genetics and genomics, e.g. [soybase](#)

## Conclusions

Soybean continues to be one of the most important pulse and oil crops, as well as sources of animal feed, worldwide. Its genetic resources are bolstered by the activities taking place in collections in national and subnational agricultural research organizations as well as at the World Vegetable Center, IITA, and ILRI. 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. Lack of inclusion of the crop in Annex 1 of the Plant Treaty constrains international access to germplasm, with only around 17.6% of total accessions worldwide currently included in the MLS. There are considerable amounts of associated research resources, and there has been significant activity in germplasm distributions and varietal development for the crop. Further efforts are required to: regenerate accessions in need; more fully secure these accessions in long-term seed storage conditions and safety backup all unique accessions, including at the SGSV; and provide more complete accession-level passport information as well as generate further characterization and evaluation datasets.



## 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 Plant-Search 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](#).

## Acknowledgements

The development of this document was funded by the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH) as part of the project *Mainstreaming Global Crop Conservation Strategies in Plant*

*Treaty Processes* led by the Crop Trust. The Crop Trust cooperated with the Secretariat of the International Treaty on Plant Genetic Resources for Food and Agriculture in the development of this document.

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## Supplementary information

**Supplementary Table 1:** Full list of *ex situ* collections of soybean 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)
USA033	Soybean Germplasm Collection, USDA-ARS	22,988	17.7%	17.7%	Not listed	0	0
BRA014	Embrapa Soja	21,984	16.9%	34.6%	Not listed	0	0
JPN183	NARO Genebank	14,486	11.2%	45.8%	5,402	0	0
TWN001	World Vegetable Center	13,724	10.6%	56.3%	13,020	12,994	13,100
BRA003	Embrapa Recursos Genéticos e Biotecnologia	9,889	7.6%	64.0%	Not listed	0	0
RUS001	N.I. Vavilov All-Russian Research Institute of Plant Industry	7,109	5.5%	69.4%	Not listed	0	0
IND001	National Bureau of Plant Genetic Resources	5,394	4.2%	73.6%	5,394	0	0
NGA039	International Institute of Tropical Agriculture	4,955	3.8%	77.4%	900	4,955	4,948
ARG1345	Banco Activo de Germoplasma de Trigo y Soja	2,486	1.9%	79.3%	Not listed	0	0
AUS165	Australian Grains Genebank, Agriculture Victoria	2,433	1.9%	81.2%	2,412	2,379	2,381
UKR001	Institute of Plant Production n.a. V.Y. Yurjev of UAAS	2,398	1.8%	83.0%	1,155	0	0
THA300	Genebank	2,153	1.7%	84.7%	2,058	0	0
DEU146	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	1,912	1.5%	86.2%	1,911	0	0
PAK001	Plant Genetic Resources Program	1,294	1.0%	87.2%	295	0	297
COL017	Corporación Colombiana de Investigación Agropecuaria, AGROSAVIA	1,235	0.9%	88.1%	1,147	0	0
POL003	Plant Breeding and Acclimatization Institute	1,225	0.9%	89.1%	1,225	0	0
CAN004	Plant Gene Resources of Canada, Saskatoon Research and Development Centre	1,125	0.9%	89.9%	1,125	0	1,125
IDN179	Indonesian Center for Agricultural Biotechnology and Genetic Resources Research and Development	884	0.7%	90.6%	884	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)
BGR001	Institute for Plant Genetic Resources 'K.Malkov'	765	0.6%	91.2%	687	0	0
HUN003	Centre for Plant Diversity	741	0.6%	91.8%	278	0	9
URY003	INIA La Estanzuela	715	0.6%	92.3%	715	0	0
ITA394	CREA-Centro di Ricerca Zootecnia e Acquacoltura - Sede di Lodi	692	0.5%	92.8%	Not listed	0	0
UGA132	Plant Genetic Resource Centre	681	0.5%	93.4%	681	0	1
UGA528	Uganda National Genebank	681	0.5%	93.9%	Not listed	0	0
EGY087	National Gene Bank	655	0.5%	94.4%	Not listed	0	0
ROM002	National Agricultural Research and Development Institute - Fundulea	645	0.5%	94.9%	Not listed	0	0
SVK001	National Agricultural and Food Centre (NPPC), Research Institute of Plant Production (RIPP)	544	0.4%	95.3%	Not listed	0	31
VNM049	Plant Resources Center	520	0.4%	95.7%	10	0	0
MDA011	Institute of Genetics, Physiology and Plant Protection	481	0.4%	96.1%	Not listed	0	0
AUS167	Australian Pastures Genebank	408	0.3%	96.4%	407	370	370
BEN097	Unité de Génétique, Biotechnologie et Science des Semences	258	0.2%	96.6%	Not listed	0	0
CZE122	Gene bank	257	0.2%	96.8%	257	13	257
MNG030	Institute of Plant and Agricultural Science	249	0.2%	97.0%	Not listed	0	0
CUB014	Instituto de Investigaciones Fundamentales en Agricultura Tropical	241	0.2%	97.2%	Not listed	0	0
CHL028	Banco Base de Semillas INIA Intihuasi	240	0.2%	97.4%	240	0	0
ECU023	Departamento Nacional de Recursos Fitogenéticos	228	0.2%	97.5%	228	0	0
BLR011	Republican Unitary Enterprise 'Research and Practical Centre of the National Academy of Sciences of Belarus for Arable Farming'	214	0.2%	97.7%	54	0	0
USA974	Seed Savers Exchange	208	0.2%	97.9%	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)
USA995	National Center for Genetic Resources Preservation	199	0.1%	98.0%	Not listed	0	0
UZB006	Uzbek Research Institute of Plant Industry	199	0.1%	98.2%	Not listed	0	0
ETH013	International Livestock Research Institute	184	0.1%	98.3%	Not listed	184	184
SWE054	Nordic Genetic Resource Center	161	0.1%	98.4%	161	0	0
UKR012	Institute of Oil Crops	149	0.1%	98.5%	83	0	0
KEN212	Genetic Resources Research Institute	140	0.1%	98.6%	140	0	0
ESP004	Centro Nacional de Recursos Fitogenéticos	129	0.1%	98.7%	Not listed	0	0
BEN098	Groupe de Recherche, Innovation agricole, Gestion de la Biodiversité et Action pour un Développement durable et Équitable à la Base	121	0.1%	98.8%	Not listed	0	0
UKR004	Institute of Agriculture	119	0.1%	98.9%	112	0	0
NGA010	National Centre for Genetic Resources and Biotechnology	103	0.1%	99.0%	103	103	103
GHA091	Plant Genetic Resources Research Institute	102	0.1%	99.1%	Not listed	5	5
NPL069	National Agriculture Genetic Resources Centre-Genebank	94	0.1%	99.2%	94	0	0
UKR006	Institute of Agriculture of the Southern Region	82	0.1%	99.2%	54	0	0
CMR205	Ecogerm Farmers	64	0.0%	99.3%	Not listed	0	0
AUT001	Austrian Agency for Health and Food Safety	62	0.0%	99.3%	44	0	1
MMR015	Myanmar SeedBank	58	0.0%	99.4%	Not listed	0	0
BLR026	The Polesye Institute of Plant Growing	55	0.0%	99.4%	40	0	0
AZE015	Genetic Resources Institute	46	0.0%	99.4%	Not listed	0	0
PHL200	Department of Agriculture - Region 2	45	0.0%	99.5%	Not listed	0	0
ZWE049	Genetic Resources and Biotechnology Institute-Department of Research and Specialist Services	43	0.0%	99.5%	Not listed	0	0
BGD003	Bangladesh Agricultural Research Institute	34	0.0%	99.5%	34	0	0
CUB005	Instituto Nacional de Ciencias Agrícolas	34	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)
KGZ040	Bank-Laboratory of Plant Genetic Resources of the KR	34	0.0%	99.6%	34	0	0
BDI003	Institut des Sciences Agronomiques du Burundi	33	0.0%	99.6%	Not listed	0	0
GUY021	National Agricultural Research and Extension Institute	32	0.0%	99.6%	Not listed	0	8
ALB026	Plant Genetic Resources Center	31	0.0%	99.7%	31	0	0
USA971	Desert Legume Program	29	0.0%	99.7%	Not listed	0	0
HRV053	Center for Seed and Seedlings	28	0.0%	99.7%	28	0	0
MDG048	Laboratoire des semences et ressources phylogénétiques, FOFIFA	26	0.0%	99.7%	Not listed	0	0
ZMB030	SADC Plant Genetic Resources Centre	25	0.0%	99.7%	25	0	0
ARM008	Scientific Centre of Vegetable and Industrial Crops	24	0.0%	99.8%	8	16	16
CUB251	Instituto de Investigaciones Agropecuarias Jorge Dimitrov	24	0.0%	99.8%	Not listed	0	0
PRT001	Banco Português de Germoplasma Vegetal	21	0.0%	99.8%	17	0	0
NGA136	Biodiversity Education and Resource Centre	20	0.0%	99.8%	Not listed	0	0
LKA036	Plant Genetic Resources Centre	19	0.0%	99.8%	Not listed	0	0
TGO044	Centre de Recherche Agronomique Savane Sèche	17	0.0%	99.8%	Not listed	0	17
ITA395	CREA-Centro di Ricerca Cerealicoltura e Colture Industriali - Sede di Bologna	14	0.0%	99.9%	14	0	0
ROM007	Suceava Genebank	13	0.0%	99.9%	5	3	3
TUR034	Field Crop Central Research Institute	13	0.0%	99.9%	13	0	0
PAN098	Centro de Investigación Agropecuaria de Azuero	12	0.0%	99.9%	Not listed	0	12
TZA016	National Plant Genetic Resources Centre	12	0.0%	99.9%	12	0	0
CRI001	Centro Agronómico Tropical de Investigación y Enseñanza	10	0.0%	99.9%	10	10	10
TJK027	National Center for Genetic Resources	9	0.0%	99.9%	9	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)
CUB010	Estación Experimental de Pastos y Forrajes Indio Hatuey	8	0.0%	99.9%	Not listed	0	0
CUB030	Instituto de Investigaciones de Granos	8	0.0%	99.9%	Not listed	0	0
ETH085	Ethiopian Biodiversity Institute	8	0.0%	99.9%	2	0	0
GBR004	Millennium Seed Bank - Royal Botanic Gardens Kew	8	0.0%	99.9%	Not listed	0	0
LVA009	Latvian State Forest Research Institute 'Silava'	8	0.0%	99.9%	8	0	0
NZL001	Margot Forde Genebank, AgResearch Ltd	8	0.0%	99.9%	Not listed	0	0
ARM005	Institute of Botany	7	0.0%	99.9%	Not listed	0	1
BFA057	Institut National de l'Environnement et de Recherches Agricoles	6	0.0%	100.0%	Not listed	0	0
COL003	Centro Internacional de Agricultura Tropical	6	0.0%	100.0%	Not listed	6	6
CUB284	Centro de Investigaciones Agropecuarias	6	0.0%	100.0%	Not listed	0	0
ZAF062	RSA National Plant Genetic Resources Centre	5	0.0%	100.0%	5	0	0
ARM059	Agrobiotechnology Scientific Center	4	0.0%	100.0%	4	0	0
LBY006	National Bank for Plant Genetic Resources	4	0.0%	100.0%	Not listed	0	0
AUT025	Referat Pflanzengesundheit und Spezialkulturen	3	0.0%	100.0%	3	0	0
MEX208	INIFAP, Centro Nacional de Recursos Genéticos (CNRG)	3	0.0%	100.0%	3	0	0
PRT102	Banco de Germoplasma - Universidade da Madeira	3	0.0%	100.0%	Not listed	0	3
TCD022	Institut Tchadien de Recherche Agronomique pour le Développement	3	0.0%	100.0%	Not listed	3	0
BFA084	Commission nationale de gestion des ressources phytogenetiques	2	0.0%	100.0%	Not listed	0	0
ITA368	Banca del germoplasma autoctono vegetale regionale	2	0.0%	100.0%	2	0	0
SWZ015	National Plant Genetic Resources Centre	2	0.0%	100.0%	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)
TUN029	Banque Nationale de Gènes de Tunisie	2	0.0%	100.0%	2	0	0
ZMB048	National Plant Genetic Resources Centre	2	0.0%	100.0%	2	2	0
AUT005	Genebank Tirol	1	0.0%	100.0%	Not listed	0	0
BEL014	Botanic Garden Meise	1	0.0%	100.0%	1	0	1
CRI009	Centro de Investigación en Granos y Semillas, Universidad de Costa Rica	1	0.0%	100.0%	Not listed	0	0
ITA363	Dipartimento di Chimica, Biologia e Biotecnologie, Università degli Studi Perugia	1	0.0%	100.0%	1	0	0
LSO015	Lesotho National Plant Genetic Resources Centre	1	0.0%	100.0%	Not listed	0	0
MLT003	Plant Protection Directorate, Veterinary and Phytosanitary Regulation Department	1	0.0%	100.0%	Not listed	0	0
NER001	Institut national de la recherche agronomique du Niger	1	0.0%	100.0%	1	0	0
SDN002	Agricultural Plant Genetic Resources Conservation and Research Centre	1	0.0%	100.0%	1	0	0
SVN019	Crops and Seed Production Department, Agricultural Institute of Slovenia	1	0.0%	100.0%	Not listed	0	0
URY002	Facultad de Agronomía	1	0.0%	100.0%	1	0	0
USA151	National Arboretum-Germplasm Unit, USDA/ARS	1	0.0%	100.0%	Not listed	0	0
VNM072	National Institute for Soils and Fertilizers	1	0.0%	100.0%	Not listed	0	0

**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)
<i>Glycine max</i> (L.) Merr.	113,727
<i>Glycine max</i> subsp. <i>soja</i> (Siebold & Zucc.) H. Ohashi	8,056
<i>Glycine</i> Willd.	3,987
<i>Glycine max</i> subsp. <i>max</i>	1,452
<i>Glycine tomentella</i> Hayata	818
<i>Glycine tabacina</i> (Labill.) Benth.	626
<i>Glycine clandestina</i> J. C. Wendl.	280
<i>Glycine canescens</i> F. J. Herm.	272
<i>Glycine latifolia</i> (Benth.) Newell & T. Hymowitz	157
<i>Glycine cyrtoloba</i> Tindale	111
<i>Glycine rubiginosa</i> Tindale & B. E. Pfeil	74
<i>Glycine microphylla</i> (Benth.) Tindale	72
<i>Glycine falcata</i> Benth.	67
<i>Glycine stenophita</i> B. E. Pfeil & Tindale	54
<i>Glycine argyrea</i> Tindale	36
<i>Glycine curvata</i> Tindale	27
<i>Glycine latrobeana</i> (Meisn.) Benth.	20
<i>Glycine dolichocarpa</i> Tateishi & H. Ohashi	14
<i>Glycine arenaria</i> Tindale	13
<i>Glycine max</i> subsp. <i>gracilis</i> (Skvortsov) H. Ohashi	11
<i>Glycine peratosa</i> B. E. Pfeil & Tindale	7
<i>Glycine syndetika</i> B. E. Pfeil & Craven	7
<i>Glycine pindanica</i> Tindale & Craven	6
<i>Glycine hirticaulis</i> Tindale & Craven	1
<i>Glycine max</i> subsp. <i>formosana</i> (Hosok.) Tateishi & H. Ohashi	1

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