GLOBAL CROP CONSERVATION AND USE METRICS

EDIBLE AROIDS

CROP TRUST

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Global crop conservation and use metrics

EDIBLE AROIDS

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International Treaty on Plant Genetic Resources for Food and Agriculture

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Description

This report provides an up-to-date overview of the global status of *ex situ* conservation of genetic resources of edible aroids and their wild relatives, 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;
- germplasm distribution; and
- varietal registrations and releases.

The report also includes global statistics on crop production and availability in food supplies, as well as information about crop networks and partnerships. It is meant to provide an update to some of the information presented in the Global Conservation Strategy for edible aroids (Crop Trust, 2010), but is primarily based on publicly available datasets, rather than a new survey of genetic resource collections and expert consultations.

Introduction and background on edible aroids

Edible aroids such as taro or dasheen (*Colocasia esculenta* (L.) Schott) and yautia or tannia [*Xanthosoma sagittifolium* (L.) Schott] are important starchy crops in the global tropics, with taro likely originating in south-eastern Asia, and yautia in the American tropics (Ahmed *et al.*, 2020; Lebot *et al.,* 2024). The starchy underground corms and cormels are rich sources of carbohydrates, while the leaves and petioles provide protein, minerals, and vitamins (Lebot, 2019; Ferdaus *et al.*, 2023). Edible aroids provide sustenance for millions of people across Asia, Africa, and the American tropics, playing a crucial role in ensuring food security and generating income as a cash crop (Boakye *et al.*, 2018; Temesgen and Retta, 2015).

Based on the most recently available production statistics from FAOSTAT, reporting for the year 2023, taro is cultivated in at least 54 countries on over 2.4 million hectares, producing 18 million tonnes of edible corms and cormels at a value of almost USD 4 billion, while yautia is cultivated in at least 14 countries on almost 30,000 hectares worldwide, producing almost 370,000 tonnes at a value of $150 million USD (FAO, 2025a). The largest producers of taro include Nigeria, China, Cameroon, Ethiopia, and Ghana, each producing over one million tonnes per annum. The largest producers of yautia include Cuba, Venezuela, Dominican Republic, El Salvador, and Mexico, each producing over 35,000 tonnes per annum. Global average yield (per hectare) of yautia, in particular, is among the highest of root and tuber crops, equivalent to that of sweetpotatoes (FAO, 2025a).

International trade in taro amounts to over 117,000 tonnes per annum, with China, Ecuador, Nicaragua, Costa Rica, and Fiji reporting exporting over 5,000 tonnes each year (FAO, 2025a). Among the 86 countries reporting importing taro, the top recipients include USA, Japan, Malaysia, China, Viet Nam, United Arab Emirates, New Zealand, Saudi Arabia, Canada, Netherlands, Australia, Singapore, France, and UK, all importing over 1,500 tonnes each year. Trade in yautia is over 38,000 tonnes per annum, with Mexico, Costa Rica, Nicaragua, Ecuador, and Dominican Republic reporting exporting over 1,000

Table 1. Global status of edible aroid production, availability in food supplies, and public interest, based on available data for taro and yautia. Production and food supply statistics from FAOSTAT (2015 to 2018 average); trade statistics were not available for that time period. Production metrics are reported directly for the crops in FAOSTAT; for food supply, the crops are placed within "Roots, Other" and the estimates presented here were derived by disaggregating that generalized food supply statistic using a weighted average based on crop production statistics (Khoury *et al*., 2023). Number of countries refers to the count of countries where the crop was reported as within the top 95 percent of crops in terms of contribution to production or food supply, and is reported for whichever of the two crops has the higher number of countries reported. 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, and is reported as an average value across the two crops. The international interdependence metric quantifies 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, and is reported as an average value across the two crops. Wikipedia metric is pageviews over one year (2019) of the taxon name of crop, and is the sum of the two crops. 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)	1,843,947	20.25	0.11	0.47
Total production (tonnes)	10,894,237	25.25	0.13	0.46
Gross production value (current thousand USD)	3,511,627	12.50	0.10	0.49
Contribution to calories in food supplies (kcal/capita/day)	3.28	34.25	0.20	1.00
Contribution to protein in food supplies (g/capita/day)	0.05	29.50	0.21	1.00
Contribution to fat in food supplies (g/capita/day)	0.01	10.00	0.20	0.99
Contribution to food weight in food supplies (g/capita/day)	1.07	50.25	0.20	1.00
Number of public pageviews on Wikipedia over one year	259,763			

tonnes each year. Among the 35 countries reporting importing yautia, the top recipients include USA, Viet Nam, Canada, Netherlands, France, Belgium, Costa Rica, and Spain, all importing over 100 tonnes each year.

Global consumption statistics are imprecise, with FAOSTAT reporting taro and yautia under its "Roots, Other" category, and other edible aroids not recorded (Khoury *et al.*, 2023), and with several aroids sold under similar names, such as cocoyam (Crop Trust, 2010; Fang *et al.*, 2025). Estimates derived from these data for the years 2015-2018 indicate that the global per capita dietary contribution of taro – as measured in terms of both calories and food weight – is considerable, but much lower than that of potatoes, cassava, sweetpotatoes, yams, and plantains (Khoury *et al.*, 2023) (Table 1). Edible aroids are estimated to be a significant contributor to calories in the food supplies of 34 countries and to food weight in 50 countries. Food supply metrics indicate that edible aroids are widely utilized outside of their regions of origin, implying potentially significant international interdependence with regard to aroid genetic resources.

Identity and composition of *ex situ* collections

Edible aroid crops assessed in this report – i.e., mainly taro and yautia, but also compiling data for several additional crops – are the same as those of primary focus in the 2010 Strategy. Their genera (all in the family Araceae) and genepool concepts are described below, based on USDA (2025):

- The taro (*Colocasia esculenta* (L.) Schott) genus (*Colocasia* Schott) contains around six species, native to South and Southeast Asia. Taxonomy for the genus requires review (Crop Trust, 2010), and the genepool concept is poorly elaborated; the wild progenitor *C. esculenta* is listed in the primary genepool.
- The yautia or tannia [*Xanthosoma sagittifolium* (L.) Schott] genus (*Xanthosoma* Schott) contains around 80 species, native to the American tropics. The genepool concept for yautia is poorly elaborated; the wild progenitor *X. sagittifolium* is listed in the primary genepool.
- The elephant foot yam [*Amorphophallus paeoniifolius* (Dennst.) Nicolson] genus (*Amorphophallus* Blume ex Decne.) contains around 17 species, native to Asia, Africa, Australia, and the Pacific island region. A genepool concept is not available for the crop.
- The giant taro or elephant's ear [*Alocasia macrorrhizos* (L.) G. Don] genus [*Alocasia* (Schott) G. Don] contains around 40-70 species, native to tropical and subtropical Asia and eastern Australia, and with the center of species diversity in Borneo (Crop Trust, 2010). The genepool concept for the crop includes wild progenitor *A. macrorrhizos* as well as *Alocasia portei* Schott in the primary genepool, and *Alocasia atropurpurea* Engl., *Alocasia micholitziana* Sander, and *Alocasia robusta* M. Hotta in the secondary genepool.
- The swamp taro or giant swamp taro [*Cyrtosperma merkusii* (Hassk.) Schott] genus (*Cyrtosperma* Griff.) contains around up to 12 species, native to Southeast Asia and the Pacific island region. A genepool concept is not available for the crop.

Based on the latest data in global genetic resource databases, assessed edible aroids and their wild relatives germplasm collections are present in at least 39 institutions worldwide, collectively maintaining 4,934 accessions (Table 2, Table 3; Supplementary Table 1). This is somewhat more than the number of accessions reported for taro (4,169) 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 well distributed throughout the main cultivation regions, including major collections in Asia, the Americas, and Africa. The Centre for Pacific Crops and Trees (CePaCT) holds an international collection for aroids. The largest national collections include the Plant Resources Center (Vietnam), the Plant Genetic Resources Research Institute (Ghana), the Instituto Nacional de Investigaciones en Viandas Tropicales (Cuba), and the NARO Genebank (Japan); these international and national collections collectively maintain over three-quarters of documented edible aroid 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 edible aroid collections without information on MLS status are in countries that are contracting parties to the Plant Treaty (such as Cuba, Japan, and Philippines) and distribute samples using the Standard Material Transfer Agreement (SMTA).

The 2010 Strategy mentioned that edible aroid germplasm collections are difficult to track, as accessions (which are mainly conserved only in the field) are easily lost due to resource constraints as well as pests, diseases, and civil unrest, and these are rarely reported (Crop Trust, 2010). The Strategy remarked that although most countries in the Pacific and Southeast Asia have taro collections, these are not representative of extant genetic diversity, and several collections have been abandoned or reduced in size. Taro collections listed in the 2010 Strategy that are not currently reported in global genetic resource databases include those in New Caledonia (82 accessions), Vanuatu (200 accessions), Indonesia (64 accessions), China (296 accessions), and Thailand (202 accessions). The Strategy also listed priority taro collections identified by the Pacific Plant Genetic Resources Network (PAPGREN), including CePaCT and the National Agriculture Research Institute (Papua New Guinea); the network also identified Agriculture, Pohnpei, Federated States of Micronesia as the priority collection for giant swamp taro. Within the Regional Cooperation for Southeast Asia on Plant Genetic Resources (RECSEA-PGR) network, collections in the Philippines (283 accessions) and Viet Nam (400 accessions) were identified as the taro collections of greatest importance and in need of support.

For yautia, collections listed in the 2010 Strategy that are not currently reported in the online databases include those in Costa Rica, Nigeria, Puerto Rico, Sri Lanka, and Tonga (Crop Trust, 2010). For elephant foot yam (*A. paeoniifolius*), the 2010 Strategy mentions germplasm collections in India, as well as many collections in botanic gardens and nurseries. For giant taro or elephant's ear (*A. macrorrhizos*, referred to in the 2010 Strategy as *A. macrorrhiza*), the Strategy mentions that the only known crop collection was in India, while ornamental collections were present in botanic gardens and nurseries. For giant swamp taro (*C. merkusii*), the only collection identified was in Pohnpei, with 68 accessions.

Table 3. Composition of *ex situ* collections of edible aroid genetic resources. Main *ex situ* collections data from Genesys and FAO WIEWS (2024). Primary and secondary regions information from Khoury *et al*. (2023) and subsequent research for this summary. Botanic gardens data from BGCI PlantSearch (2024).

Metric	Number	Percentage
Total number of accessions in genebank collections	4,934	
Number of institutions holding genebank collections	39	
Number of distinct taxonomic names in genebank collections	24	
Number of accessions of crop wild relatives (CWR) in genebank collections	106	2.2%
Number of accessions of weedy materials in genebank collections	0	0%
Number of accessions of landraces in genebank collections	3,891	78.9%
Number of accessions of breeding materials in genebank collections	592	12.0%
Number of accessions of improved varieties in genebank collections	87	1.8%
Number of accessions of other materials in genebank collections	8	0.2%
Number of accessions not marked with an improvement type in genebank collections	250	5.1%
Number of countries where germplasm has been collected for genebank collections	40	
Number of accessions in genebank collections from the primary region(s) of diversity	2,782	56.4%
Number of accessions in genebank collections from the primary and secondary region(s) of diversity	3,376	68.4%
Number of taxa in botanic garden collections	271	
Number of botanic gardens holding collections of crop or its wild relatives	293	

Table 2. Major *ex situ* collections of edible aroids 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 (2024), with supplementary information as noted. Multilateral System (MLS) status from Plant Treaty GLIS (2025) and from Genesys and FAO WIEWS (2024).

Institution Code	Institution name	Number of accessions	Percent of total	Cumulative percent	Number of accessions conserved *in vitro* or in cryo storage	Number of accessions included in MLS (from Plant Treaty GLIS)	Number of accessions included in MLS (from genebank collections databases)
VNM049	Plant Resources Center	1,515	30.7%	30.7%	0	0	1,232
FJI049	Centre for Pacific Crops and Trees (CePaCT)	1,415	28.7%	59.4%	1,415	1,206	769
GHA091	Plant Genetic Resources Research Institute	330	6.7%	66.1%	240	316	317
CUB006	Instituto Nacional de Investigaciones en Viandas Tropicales	263	5.3%	71.4%	0	0	0
JPN183	NARO Genebank	252	5.1%	76.5%	0	0	0
PNG041	Momase Regional Centre, Bubia	218	4.4%	80.9%	0	0	218
PHL129	Institute of Plant Breeding-National Plant Genetic Resources Laboratory	194	3.9%	84.9%	0	0	0
ETH085	Ethiopian Biodiversity Institute	147	3.0%	87.8%	0	0	138
MWI041	Malawi Plant Genetic Resources Centre	111	2.3%	90.1%	0	0	111
MYS220	Genebank and Seed Centre	84	1.7%	91.8%	51	0	0
PNG004	Southern Regional Centre Laloki (NARI)	72	1.5%	93.3%	0	0	72
PRT102	Banco de Germoplasma - Universidade da Madeira	67	1.4%	94.6%	0	0	67
ZAF062	RSA National Plant Genetic Resources Centre	59	1.2%	95.8%	0	0	0
BRA012	Embrapa Hortaliças	19	0.4%	96.2%	17	0	19
PNG001	Islands Regional Centre Keravat	19	0.4%	96.6%	0	0	19
USA151	National Arboretum-Germplasm Unit, USDA/ARS	17	0.3%	96.9%	0	0	0
BGD003	Bangladesh Agricultural Research Institute	16	0.3%	97.2%	0	0	0
PHL303	Northern Philippines Root Crops Research and Training Center	16	0.3%	97.6%	0	0	0
ECU023	Departamento Nacional de Recursos Fitogenéticos	15	0.3%	97.9%	0	0	15
USA047	Subtropical Horticultural Research Unit, National Germplasm Repository - Miami, USDA	14	0.3%	98.2%	0	0	0
	Other institutions (n = 19)	91	1.8%	100%	14	2	8

In total, 20 species in the five assessed genera, as well as accessions only recognized to the genus level, are present in germplasm collections (Supplementary Table 2). The largest collections are of taro, yautia, and accessions of *Colocasia* and *Xanthosoma* only identified at the genus level. Landraces make up the largest proportion of collections (78.9%), followed by breeding materials (12%), and wild relatives (2.2%) (Table 3); these percentages are estimates based on available data, noting that 5.1% of accessions do not have biological status data.

Edible aroid germplasm has been collected from at least 40 countries, with approximately 56.4% of accessions originating from the primary region of diversity of the crop in question and 68.4% from primary and secondary regions. Information on botanic garden collections from BGCI PlantSearch indicate that 293 botanic gardens collectively conserve 271 taxa; comparing these to genebank collections, 248 are only present in botanic gardens. These large numbers in botanic gardens are not surprising given that there are many ornamental and otherwise outstanding species in these genera, for example one of the world's largest (and most pungent) flowers - *Amorphophallus titanum* (Becc.) Becc. ex Arcang.

Aside from the large numbers of species in the five assessed genera 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. The 2010 Strategy recognized that many gaps likely exist in germplasm collections for the major edible aroids, if these collections were to represent extant genetic diversity. Prior to further collecting, considerable further work to understand existing collections and assess and compare their diversity was advised.

In a global *ex situ* conservation gap analysis of the wild relatives of major crops, Castañeda-Álvarez *et al.* (2016), assessing one yautia wild relative (*X. sagittifolium*), listed it as of high priority for further collecting. Ramirez-Villegas *et al.* (2022) identified geographic gaps for taro landrace groups in India, Japan, and Indonesia.

Multilateral System status of accessions in *ex situ* collections

The genera *Colocasia* and *Xanthosoma* are listed in Annex I of the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty) as "Major aroids" and are thus included in its Multilateral System of Access and Benefit Sharing (MLS). Other edible aroid genera are not currently included. Of the 4,934 accessions conserved globally, approximately 28.7% are held in international institutions (mainly CePaCT), 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, 1,524 accessions are formally included in the MLS according to the Plant Treaty's GLIS database, and 1,548 accessions have been assigned Digital Object Identifiers (DOIs) (Table 4). Per the relevant fields in the global genetic resources databases, 2,985 accessions (60.5% of world total) are listed as included in the MLS; this is likely an underestimate, noting that 17.8% of accessions do not have MLS status data. The discrepancies between the GLIS data and the global genetic resources data indicate that several institutions have not registered or recently updated their registrations in the GLIS portal.

Table 4. Representation of edible aroid 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 (2024). DOI and MLS data from Plant Treaty GLIS (2025).

Metric	Number	Percentage
Number of accessions in genebank collections in international institutions	1,418	28.7%
Number of accessions in genebank collections in national or other institutions	3,516	71.3%
Number of accessions in genebank collections in Annex I	4,658	94.4%
Number of accessions with DOI (Plant Treaty GLIS 2025)	1,548	
Number of accessions included in the Multilateral System (MLS) (Plant Treaty GLIS 2025)	1,524	
Number of accessions included in the Multilateral System (MLS) (genebank collections databases)	2,985	60.5%
Number of accessions included in the Multilateral System (MLS) that are in international collections (genebank collections databases)	771	15.6%
Number of accessions not included in the Multilateral System (MLS) (genebank collections databases)	1,071	21.7%
Number of accessions without information regarding inclusion in the Multilateral System (MLS) (genebank collections databases)	878	17.8%

Storage conditions, regeneration status, and safety duplication

Edible aroid crop germplasm collections are mainly maintained in field conditions (69.2% of accessions). The 35.2% of accessions recorded as maintained *in vitro* likely represents considerable progress compared to the status of *in vitro* storage as reported at the time of the 2010 Strategy (Crop Trust, 2010) (Table 5). Only 0.5% of accessions are recorded as conserved in seed collections and no accessions were recorded as conserved in cryopreservation. Information on storage type is not available for 1.2% of accessions.

Current regeneration status and needs cannot be directly derived from the global germplasm databases. The 2010 Strategy remarked that many collections were threatened with loss or had been lost (for example, the 2007 Typhoon Milenyo inflicted heavy losses on the Philippine taro collection in Los Banos), and that moving the collections into (or backing them up in) in vitro conditions was a priority (Crop Trust, 2010). 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 207 edible aroid accessions regenerated during this time by reporting institutions; information was not available regarding whether these were field, *in vitro*, seed, or other collections. However, the likelihood is that these are for the most part in the field.

Analysis of the location of safety duplication sites of edible aroid germplasm, as listed in Genesys, indicates that none of the accessions listed are safety duplicated in an active collection outside of the country of the main collection (Table 5). Information from the Svalbard Global Seed Vault (SGSV) database from 2024 similarly indicated that no edible aroid accessions were duplicated in Svalbard.

The 2010 Strategy placed major emphasis on the need to safety duplicate unique field collections under *in vitro* and cryopreservation conditions, as well as to continue to back up collections in institutions such as CePaCT

(Crop Trust, 2010). It further mentioned that for additional security, a secondary backup at another site aside from CePaCT might be worth consideration. For some of the aroids, taking better stock of their representation in botanic gardens, commercial nurseries, and other institutions is needed, with commercialization considered a potentially useful avenue for overall conservation of these species.

Table 5. Storage conditions of edible aroid *ex situ* collections, regeneration status, and safety duplication status. Main *ex situ* collections data from Genesys and FAO WIEWS (2024). Regeneration status information from FAO WIEWS (2025); data from 2014 to 2019. Safety duplication out of the country data based only on Genesys (2024) data. Svalbard Global Seed Vault data from SGSV portal (2024).

Metric	Number	Percentage
Number of accessions held in seed storage in genebank collections	23	0.5%
Number of accessions held in short-term seed storage in genebank collections	0	0%
Number of accessions held in medium-term seed storage in genebank collections	5	21.7%
Number of accessions held in long-term seed storage in genebank collections	18	78.3%
Number of accessions held in seed storage of undefined type in genebank collections	0	0%
Number of accessions held in field storage in genebank collections	3,414	69.2%
Number of accessions held in in-vitro storage in genebank collections	1,737	35.2%
Number of accessions held in cryo storage in genebank collections	0	0%
Number of accessions held as DNA in genebank collections	0	0%
Number of accessions held in other storage in genebank collections	0	0%
Number of accessions not marked with a storage type in genebank collections	59	1.2%
Number of accessions in genebank collections regenerated 2014–2019	207	87.3%
Number of accessions in genebank collections in need of regeneration 2014–2019	0	0%
Number of accessions in genebank collections in need of regeneration without budget for regeneration 2014–2019	0	0%
Number of accessions safety duplicated out of the country in genebank collections	0	0%
Number of accessions in genebank collections safety duplicated in Svalbard	0	0%

Documentation, information systems, and research resources

A descriptor list for *Xanthosoma* was first published in 1989 (IBPGR, 1989). Descriptors for taro were first published in 1999 (IPGRI, 1999), with a prioritized list of characterization and evaluation descriptors published in 2009 (Bioversity International, 2009), and an additional descriptor list for taro published by the National Plant Genetic Resources Laboratory (Philippines) in 2018 (NPGRL, 2018). A descriptor list for Giant Swamp Taro (*C. merkusii*) in the Federated States of Micronesia is also available (Rao *et al.*, 2014).

The estimated completeness of passport information for edible aroid accessions listed in Genesys was 3.4 on a scale of 0 (no data) to 10 (complete data), which indicates that there are major gaps that it would be valuable to fill. Four metrics of the current degree of digital sequence information (DSI) for *Colocasia* and *Xanthosoma* (from the National Center for Biotechnology Information USA database), two metrics of published literature on the crops (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) (this final metric, for all assessed edible aroid genera), are listed in Table 6.

The 2010 Strategy recognized that lack of access to information about edible aroid collections constrained the ability to understand the status of collections, determine gaps, and strategize about future actions. Information management for crop genetic resources has evolved substantially since the 2010 Strategy. The current Genesys and FAO WIEWS databases may offer some essential taxonomic, institutional, and passport data, assuming that status of accessions is relatively current in those databases, but a dedicated online information system including complete accession-level characterization and evaluation data for edible aroid germplasm collections remains a gap.

Table 6. Documentation, information systems, and research resources for edible aroids. Passport data completeness index (PDCI) from Genesys (2024), 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	3.4
Number of genes as recorded in NCBI's Entrez database as of 2022	150
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	3,079
Number of proteins as recorded in NCBI's Entrez database as of 2022	39,555
Number of publications listed in Google Scholar with taxon name in title published between 2009 and 2019	1,620
Number of publications listed in PubMed Central with taxon name in text as of 2022	1,273
Number of research materials as recorded in GBIF (2025)	238,892

Germplasm distributions and varietal registrations and releases

Germplasm distributions and varietal development statistics for edible aroids 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).

Table 7. Edible aroid 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	14.4
Average annual number of samples distributed worldwide as recorded in FAO WIEWS	62.9
Average annual number of samples distributed worldwide as recorded in the Plant Treaty Data Store	13.3
Number of countries receiving germplasm as recorded in the Plant Treaty Data Store	2.7
Evenness of distributions across world regions as recorded in the Plant Treaty Data Store	0.0
Average annual number of varietal registrations worldwide as recorded in UPOV's PLUTO	0.5
Average annual number of varietal releases worldwide as recorded in FAO WIEWS	6.5

Networks and partnerships

- CePaCT continues to play a critical role in edible aroid germplasm conservation, maintaining active partnerships with national agricultural research organizations and other institutions, mainly in the Pacific region.
- The 2010 Strategy mentioned two main crop networks relevant to edible aroids:
  - The Taro Network for Southeast Asia and Oceania (TANSAO) was established in 1998 with support from the European Commission INCO-DC program, and administered by CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement). Under this network, 2,300 accessions and elite cultivars were collected from Southeast Asia and the Pacific, and a core set of 168 accessions was established based on morphological and isozyme data, aimed to be representative of the genetic diversity of the countries involved. The core set was transferred to the CePaCT genebank, and virus tested, and selected accessions were made available by CePaCT for use by national breeding programs. TANSAO phase I finished in 2001; a phase II proposal was not funded (Crop Trust, 2010).
  - TaroGen (Taro Genetic Resources: Conservation and Utilisation) was a regional project funded by AusAID that created a core collection maintained *in vitro* at CePaCT and supported breeding. The project commenced in 1998 and ended in late 2003.
- Currently active networks include The International Aroid Society, which "provides aroid enthusiasts with practical, informative content while championing research, conservation, and environmental stewardship."
- Information on other networks active in edible aroid conservation or use is not readily available online.

Conclusions

Edible aroids continue to be central food crops in the tropics and it is likely that they will grow in importance in future food systems. Their genetic resources are bolstered by the activities taking place at the international collection at CePaCT and in several national and subnational agricultural research organizations. Botanic gardens and commercial nurseries also conserve edible aroid diversity, but they are not well linked with crop genetic resources efforts, and the diversity held in these collections is less well documented. Available data provides relatively little insight on progress made in germplasm conservation since the 2010 Strategy. It is very likely that major efforts are needed to fully understand the status of existing collections, fill gaps in those collections through collecting of wild relatives and landraces, to more fully include edible aroid germplasm collections under the MLS of the Plant Treaty, to make the information accompanying accessions more complete and/or more accessible in online databases, and to address safety duplication backlogs. The reestablishment of active regional networks for edible aroid crops may be a useful pathway toward those aims.

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 GitHub repository. Extended methods are available here.

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Supplementary information

Supplementary Table 1. Full list of *ex situ* collections of edible aroid genetic resources, in descending order by total number of accessions. Number of accessions and storage condition information from Genesys and FAO WIEWS (2024), with supplementary information as noted. Multilateral System (MLS) status from Plant Treaty GLIS (2025) and from Genesys and FAO WIEWS (2024).

Institution Code	Institution name	Number of accessions	Percent of total	Cumulative percent	Number of accessions conserved *in vitro* or in cryo storage	Number of accessions included in MLS (from Plant Treaty GLIS)	Number of accessions included in MLS (from genebank collections databases)
VNM049	Plant Resources Center	1,515	30.7%	30.7%	0	0	1,232
FJI049	Centre for Pacific Crops and Trees	1,415	28.7%	59.4%	1,415	1,206	769
GHA091	Plant Genetic Resources Research Institute	330	6.7%	66.1%	240	316	317
CUB006	Instituto Nacional de Investigaciones en Viandas Tropicales	263	5.3%	71.4%	0	0	0
JPN183	NARO Genebank	252	5.1%	76.5%	0	0	0
PNG041	Momase Regional Centre, Bubia	218	4.4%	80.9%	0	0	218
PHL129	Institute of Plant Breeding-National Plant Genetic Resources Laboratory	194	3.9%	84.9%	0	0	0
ETH085	Ethiopian Biodiversity Institute	147	3.0%	87.8%	0	0	138
MWI041	Malawi Plant Genetic Resources Centre	111	2.2%	90.1%	0	0	111
MYS220	Genebank and Seed Centre	84	1.7%	91.8%	51	0	0
PNG004	Southern Regional Centre Laloki (NARI)	72	1.5%	93.3%	0	0	72
PRT102	Banco de Germoplasma - Universidade da Madeira	67	1.4%	94.6%	0	0	67
ZAF062	RSA National Plant Genetic Resources Centre	59	1.2%	95.8%	0	0	0
BRA012	Embrapa Hortaliças	19	0.4%	96.2%	17	0	19
PNG001	Islands Regional Centre Keravat	19	0.4%	96.6%	0	0	19
USA151	National Arboretum-Germplasm Unit, USDA/ARS	17	0.3%	96.9%	0	0	0
BGD003	Bangladesh Agricultural Research Institute	16	0.3%	97.2%	0	0	0
PHL303	Northern Philippines Root Crops Research and Training Center	16	0.3%	97.6%	0	0	0
ECU023	Departamento Nacional de Recursos Fitogenéticos	15	0.3%	97.9%	0	0	15
USA047	Subtropical Horticultural Research Unit, National Germplasm Repository - Miami, USDA	14	0.3%	98.2%	0	0	0
GUY021	National Agricultural Research and Extension Institute	11	0.2%	98.4%	0	0	0

Institution Code	Institution name	Number of accessions	Percent of total	Cumulative percent	Number of accessions conserved *in vitro* or in cryo storage	Number of accessions included in MLS (from Plant Treaty GLIS)	Number of accessions included in MLS (from genebank collections databases)
SWZ015	National Plant Genetic Resources Centre	11	0.2%	98.6%	0	0	0
PER045	Estación Experimental Agraria Pucallpa	10	0.2%	98.8%	0	0	0
IND001	National Bureau of Plant Genetic Resources	9	0.2%	99.0%	7	0	0
FRA098	Station de la Réunion, CIRAD-FLHOR	8	0.2%	99.1%	0	0	0
PAN172	Subcentro de Investigación Agropecuaria de San Félix	7	0.1%	99.3%	7	0	0
ECU308	Estación Experimental Central de la Amazonia	6	0.1%	99.4%	0	0	6
BGD016	Bangladesh Agricultural University (BAU)	4	0.1%	99.5%	0	0	0
GBR004	Millennium Seed Bank - Royal Botanic Gardens Kew	4	0.1%	99.6%	0	0	0
USA108	Tropical Agricultural Research Station, Clonal Repository USDA/ARS	4	0.1%	99.7%	0	0	0
ESP172	Cabildo Insular de Tenerife. Centro de Conservación de la Biodiversidad Agrícola de Tenerife	3	0.1%	99.7%	0	0	0
NIC014	Centro Nacional de Investigación Agropecuaria (INTA-CNIA)	3	0.1%	99.8%	0	0	0
TTO010	Central Experiment Station, Research Division, Ministry of Agriculture, Land and Fisheries	3	0.1%	99.8%	0	0	0
SLV050	CENTA - Banco de Germoplasma	2	0.0%	99.9%	0	0	0
TWN001	World Vegetable Center	2	0.0%	99.9%	0	2	2
BGD014	Bangladesh Forest Research Institute (BFRI)	1	0.0%	99.9%	0	0	0
CRI001	Centro Agronómico Tropical de Investigación y Enseñanza	1	0.0%	100.0%	0	0	0
ECU331	Granja experimental Socavón	1	0.0%	100.0%	0	0	0
GRC005	Greek Genebank, Institute of Plant Breeding and Genetic Resources	1	0.0%	100.0%	0	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 (2024).

Taxon	Number of accessions (from genebank collections databases)
Colocasia esculenta (L.) Schott	4,003
Xanthosoma sagittifolium (L.) Schott	407
Colocasia sp.	148
Xanthosoma sp.	89
Cyrtosperma merkusii (Hassk.) Schott	85
Alocasia sp.	49
Alocasia macrorrhizos (L.) G. Don	39
Amorphophallus sp.	31
Alocasia odora (Lodd. et al.) Spach	26
Amorphophallus konjac K. Koch	22
Amorphophallus paeoniifolius (Dennst.) Nicolson	10
Xanthosoma violaceum Schott	5
Amorphophallus longituberosus (Engl.) Engl. & Gehrm.	3
Amorphophallus bulbifer (Roxb.) Blume	2
Amorphophallus dracontioides (Engl.) N. E. Br.	2
Amorphophallus harmandii Engl. & Gehrm.	2
Amorphophallus kiusianus (Makino) Makino	2
Xanthosoma atrovirens K. Koch & C. D. Bouché	2
Xanthosoma riedelianum (Schott) Schott	2
Alocasia amazonica Reark	1
Amorphophallus aphyllus (Hook.) Hutch.	1
Amorphophallus lambii Mayo & Widjaja	1
Xanthosoma brasiliense (Desf.) Engl.	1
Xanthosoma cubense (Schott) Schott	1

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