GLOBAL CROP CONSERVATION AND USE METRICS

CARROTS
(*Daucus* L.)

CROP TRUST

Cover photo: Michael Major for Crop Trust

Crop Trust
Platz der Vereinten Nationen 7
53113 Bonn, Germany

General Contact
+49 (0) 228 85427 118
info@croptrust.org

Suggested Citation
Khoury CK, Gora, S and Giovannini, P (2025) Global crop conservation and use metrics: Carrots (*Daucus* L.). 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

CARROTS
(*Daucus* L.)

With support from

CROP TRUST

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 carrots and their 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 carrots

The cultivated carrot [*Daucus carota* L. subsp. *sativus* (Hoffm.) Schübl. & G. Martens] was domesticated in Central Asia around the 10th century CE, though wild carrots were used as medicinal plants for at least 2000 years before that (Coe *et al.*, 2023; Selvakumar and Kalia, 2025). The earliest domesticated carrots were predominantly purple and yellow, with the orange carrot being selected during the Renaissance period, likely in western Europe (Coe *et al.*, 2023; Iorizzo *et al.,* 2013). Today, carrots are nutritionally important sources of beta-carotene, which is converted into vitamin A, a nutrient that promotes good vision and is essential for growth, development, and immune function, and they are recognized as an important source of natural antioxidants with anticancer activity (Sharma *et al.*, 2011; Kamel *et al.*, 2023).

Based on the most recently available production statistics from FAOSTAT (which report carrots combined with turnips) for the year 2023, carrots are cultivated in at least 131 countries on over 1.1 million hectares worldwide, producing 41.4 million tonnes at a value of USD 16.2 billion (FAO, 2025a). The largest producers include China, Uzbekistan, Russian Federation, USA, Ukraine, UK, Germany, Türkiye, Pakistan, Indonesia, France, Japan, Poland, and Kazakhstan, each producing over 500,000 tonnes per annum.

International trade in carrots (also combined with turnips in FAOSTAT data) amounts to around 3 million tonnes exported and imported per annum, with China, Netherlands, Mexico, Spain, Belgium, and Canada reporting exporting over 100,000 tonnes each year (FAO, 2025a). Among the 157 countries reporting importing carrots, the top recipients include the USA, Germany, Belgium, Viet Nam, France, and Thailand, all importing over 100,000 tonnes each year.

Global consumption statistics are imprecise, with FAOSTAT reporting carrots under its "Vegetables, Other" category (Khoury *et al.*, 2023). Estimates derived from these data for the years 2015-2018 indicate that carrots are a major contributor to food weight in the food supplies of 142 countries (Table 1). Production, trade, and food supply metrics all indicate that carrots are widely utilized outside of their regions of origin, implying significant international interdependence with regard to crop genetic resources.

Table 1. Global status of carrot 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)	1,147,820	23.50	0.29	0.81
Total production (tonnes)	41,507,288	65.75	0.21	0.83
Gross production value (current thousand USD)	13,677,888	57.00	0.20	0.88
Export quantity (tonnes)	2,755,204	25.75	0.26	0.75
Export value (current thousand USD)	1,316,229	14.25	0.22	0.79
Import quantity (tonnes)	2,564,653	70.00	0.32	0.72
Import value (current thousand USD)	1,260,917	52.50	0.30	0.75
Contribution to calories in food supplies (kcal/capita/day)	2.47	14.50	0.65	1.00
Contribution to protein in food supplies (g/capita/day)	0.13	69.50	0.63	1.00
Contribution to fat in food supplies (g/capita/day)	0.02	4.25	0.63	1.00
Contribution to food weight in food supplies (g/capita/day)	3.59	142.50	0.63	1.00
Number of public pageviews on Wikipedia over one year	179,255			

Identity and composition of *ex situ* collections

Based on the latest data in global genetic resource databases, germplasm collections of carrots and their wild relatives (i.e., genus *Daucus* L.) are present in at least 111 institutions worldwide, collectively maintaining 9,158 accessions (Table 2, Table 3; Supplementary Table 1). The institutions are mainly distributed in Europe as well as in the USA and Japan, with the largest collections in the USA (at least 19.7% of total accessions worldwide), UK (19%), Poland (7.2%), Japan (6.6%), and Germany (5.6%), as well as Czechia, Pakistan, Tunisia, Hungary, Sweden, Ukraine, and Uzbekistan; these collectively maintain over three-quarters 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 carrot collections without information on MLS status are in countries that are contracting parties to the Plant Treaty (such as USA and Japan) and distribute samples using the Standard Material Transfer Agreement (SMTA).

The total number of accessions represented in the global genetic resource databases is more than the number of accessions reported for the crop (8,445) listed as major germplasm collections in *The Third Report on the State of the World's Plant Genetic Resources for Food and*

Table 2. Major *ex situ* collections of carrot 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)
USA020	North Central Regional Plant Introduction Station, USDA-ARS, NCRPIS	1,563	17.1%	17.1%	1,339	0	0
GBR006	Warwick Genetic Resources Unit	1,509	16.5%	33.5%	Not listed*	0	1,424
POL003	Plant Breeding and Acclimatization Institute	660	7.2%	40.8%	659	0	495
JPN183	NARO Genebank	606	6.6%	47.4%	48	0	0
DEU146	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	509	5.6%	52.9%	491	495	508
CZE122	Gene bank	404	4.4%	57.3%	401	37	404
PAK001	Plant Genetic Resources Program	264	2.9%	60.2%	66	0	102
USA974	Seed Savers Exchange	239	2.6%	62.8%	Not listed	0	0
GBR004	Millennium Seed Bank - Royal Botanic Gardens, Kew	229	2.5%	65.3%	Not listed*	0	84
TUN029	Banque Nationale de Gènes de Tunisie	214	2.3%	67.7%	214	0	213
HUN003	Centre for Plant Diversity	208	2.3%	69.9%	68	0	20
SWE054	Nordic Genetic Resource Center	202	2.2%	72.1%	202	202	202
UKR021	Institute of Vegetable and Melon Growing	186	2.0%	74.2%	71	0	0
UZB006	Uzbek Research Institute of Plant Industry	163	1.8%	76.0%	Not listed	0	0
PRT001	Banco Português de Germoplasma Vegetal	145	1.6%	77.5%	11	0	0
NLD037	Centre for Genetic Resources, the Netherlands	125	1.4%	78.9%	125	18	18
FRA250	Institut Agro, Angers	123	1.3%	80.2%	Not listed	0	123
IND001	National Bureau of Plant Genetic Resources	123	1.3%	81.6%	123	0	0
MAR088	Centre Régional de la Recherche Agronomique de Settat	114	1.2%	82.8%	9	0	114
BGR001	Institute for Plant Genetic Resources 'K.Malkov'	112	1.2%	84.1%	2	0	0
	Other institutions (n = 92)	1,460	15.8%	100.0%	697	52	450

*confirmed by institution or otherwise known to store collections in long term conditions

Table 3. Composition of *ex situ* collections of carrot 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	9,158	
Number of institutions holding genebank collections	111	
Number of distinct taxonomic names in genebank collections	50	
Number of accessions of crop wild relatives (CWR) in genebank collections	2,823	30.8%
Number of accessions of weedy materials in genebank collections	19	0.2%
Number of accessions of landraces in genebank collections	1,481	16.2%
Number of accessions of breeding materials in genebank collections	734	8.0%
Number of accessions of improved varieties in genebank collections	2,920	31.9%
Number of accessions of other materials in genebank collections	233	2.5%
Number of accessions not marked with an improvement type in genebank collections	948	10.3%
Number of countries where germplasm has been collected for genebank collections	85	
Number of accessions in genebank collections from the primary region(s) of diversity	2,701	29.5%
Number of taxa in botanic garden collections	45	
Number of botanic gardens holding collections of crop or its wild relatives	158	

Agriculture (FAO, 2025b). This said, although the listed institutions likely represent the great majority of existing carrot collections worldwide, they are not fully comprehensive of all *Daucus* germplasm collections. Selvakumar and Kalia (2025), for example, documented 13,400 *Daucus* accessions in 62 institutions, including in Côte d'Ivoire and the Russian Federation.

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 carrot, the Warwick Genetic Resources Unit (UK) as a global collection with an agreement dated 1989. This genebank currently maintains one of the largest carrot collections worldwide, based on contemporary germplasm databases (Table 2).

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 carrot, the Warwick Genetic Resources Unit (UK) as a global collection with an agreement dated 1989. This genebank currently maintains one of the largest carrot collections worldwide, based on contemporary germplasm databases (Table 2).

Daucus L. (Apiaceae) contains around 45 species, distributed worldwide, with species richness concentrated in the Mediterranean (USDA, 2025; WFO, 2025). A published

genepool concept is available for the crop [*Daucus carota* L. subsp. *sativus* (Hoffm.) Schübl. & G. Martens] (USDA, 2025).

The primary genepool contains:
Daucus annuus (Bég.) Wojew. et al.
Daucus carota L. subsp. *azoricus* Franco
Daucus carota L. subsp. *cantabricus* A. Pujadas
Daucus carota L. subsp. *capillifolius* (Gilli) Arbizu
Daucus carota L. subsp. *carota*
Daucus carota L. subsp. *commutatus* (Paol.) Thell.
Daucus carota L. subsp. *drepanensis* (Arcang.) Heywood
Daucus carota L. subsp. *fontanesii* Thell.
Daucus carota L. subsp. *gadecaei* (Rouy & E. G. Camus) Heywood
Daucus carota L. subsp. *gummifer* (Syme) Hook. f.
Daucus carota L. subsp. *halophilus* (Brot.) A. Pujadas
Daucus carota L. subsp. *hispanicus* (Gouan) Thell.
Daucus carota L. subsp. *major (Vis.)* Arcang.
Daucus carota L. subsp. *majoricus* A. Pujadas
Daucus carota L. subsp. *maritimus* (Lam.) Batt.
Daucus carota L. subsp. *maximus* (Desf.) Ball
Daucus carota L. subsp. *parviflorus* (Desf.) Thell.
Daucus carota L. subsp. *rupestris* (Guss.) Heywood
Daucus insularis (Parl.) Spalik et al.
Daucus syrticus Murb.
Daucus tenuissimus (A. Chev.) Spalik et al.
Daucus virgatus (Poir.) Maire

The secondary genepool contains:
Daucus gracilis Steinh.
Daucus jordanicus Post
Daucus rouyi Spalik & Reduron
Daucus sahariensis Murb.

The tertiary genepool contains:
Daucus arcanus García-Martín & Silvestre
Daucus aureus Desf.
Daucus biseriatus Murb.
Daucus crinitus Desf.
Daucus della-cellae (Asch. & Barbey ex E. A. Durand & Barratte) Spalik et al.
Daucus mauritii (Maire) Sennen
Daucus minusculus Pau
Daucus mirabilis (Maire & Pamp.) Reduron et al.
Daucus muricatus (L.) L.
Daucus pumilus (L.) Ball
Daucus pusillus Michx.
Daucus setifolius Desf.
Daucus tenuisectus Coss. ex Batt.

The quaternary genepool contains:
Daucus glochidiatus (Labill.) Fisch. & C. A. Mey.
Daucus guttatus Sm.

Data compilation for this report on carrot genetic resources included all taxa in *Daucus*. Around 50 taxonomic names are present in germplasm collections, including the crop, wild relatives, a few hybrid accessions, and accessions only determined to the genus level (Supplementary Table 2). These include large collections of the crop, wild taxa in the primary genepool, and accessions classified only at the genus level.

Improved varieties make up the largest proportion of collections (31.9%), followed by wild relatives (30.8%), landraces (16.2%), and breeding materials (8%) (Table 3); these percentages are estimates based on available data, noting that 10.3% of accessions do not have biological status data. *Daucus* germplasm has been collected from at least 85 countries, with approximately 29.5% of accessions originating from the primary region of diversity of the crop (i.e. Central and West Asia, Southern Europe, and the Mediterranean); these statistics are also estimates, as 9.4% of carrot landrace accessions and 3.3% 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 158 botanic gardens collectively conserve 45 *Daucus* taxa; all of these are also present in genebank 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* conservation gap analysis of the wild relatives of major crops, Castañeda-Álvarez *et al.* (2016), assessing 18 carrot wild relatives in *Daucus* and three additional species in *Tornabenea*, listed all but one of the taxa as high priority for further collecting. Some progress has been made recently in filling carrot 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 86 seed samples of six carrot wild relative taxa (all in *D. carota*) from eight countries as well as the development of new varieties with introgressions from wild germplasm (Eastwood *et al.*, 2022). This said, Mezghani *et al.* (2019), assessing 13 wild *Daucus* taxa native to Tunisia, found five to be of high priority for further collecting, and another three to be of medium priority.

Table 4. Representation of carrot 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	108	1.2%
Number of accessions in genebank collections in national or other institutions	9,050	98.8%
Number of accessions in genebank collections in Annex I	9,158	100%
Number of accessions with DOI (Plant Treaty GLIS 2025)	1,299	
Number of accessions included in the Multilateral System (MLS) (Plant Treaty GLIS 2025)	804	
Number of accessions included in the Multilateral System (MLS) (genebank collections databases)	4,157	45.4%
Number of accessions included in the Multilateral System (MLS) that are in international collections (genebank collections databases)	20	0.2%
Number of accessions not included in the Multilateral System (MLS) (genebank collections databases)	817	8.9%
Number of accessions without information regarding inclusion in the Multilateral System (MLS) (genebank collections databases)	4,184	45.7%

Multilateral System status of accessions in *ex situ* collections

The genus *Daucus* 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 9,158 accessions conserved globally, approximately 1.2% are held in international institutions (i.e., the World Vegetable Center), and may be included in the MLS of the Plant Treaty, with the remainder maintained in national and other collections (Table 4).

As of 2025, 804 accessions are formally included in the MLS according to the Plant Treaty's GLIS database, and 1,299 accessions have been assigned Digital Object Identifiers (DOIs). Per the relevant fields in the global genetic resources databases, 4,157 accessions (45.4% of world total) are listed as included in the MLS; this is likely an underestimate, noting that 45.7% of accessions do not have MLS status data. The discrepancies between the GLIS data and the global genetic resources data indicates that several institutions have not registered or recently updated their registrations in the GLIS portal.

Storage conditions, regeneration status, and safety duplication

As expected for an orthodox seed crop, the great majority (at least 94.3%) of *Daucus* accessions are conserved as seed, with 52.4% of these accessions listed as conserved under long-term cold-storage conditions and a substantial proportion of additional accessions also likely conserved in long-term conditions, even though they are not reported as such in global germplasm databases (Table 2, Table 5). Information on storage in general is missing for 5.7% of all accessions, and information on seed storage type (i.e., long, medium, or short term) is missing for 26.2% 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 194 carrot accessions regenerated during this time by reporting institutions, with 411 accessions identified as needing regeneration and 312 of these lacking funds to conduct the regeneration.

Analysis of the location of safety duplication sites of carrot germplasm, as listed in Genesys, indicates that at least 28.1% 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 carrot germplasm accessions worldwide, when also considering safety duplication within the same country, may be higher than this estimate, given that some national genebanks, such as the USA, typically provide safety backup of their collections in a different location within the country. Information from the SGSV database from 2025 indicates that approximately 19.9% of total accessions worldwide are duplicated in Svalbard.

Table 5. Storage conditions of carrot *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 (2025) data. Svalbard Global Seed Vault data from SGSV portal (2025).

Metric	Number	Percentage
Number of accessions held in seed storage in genebank collections	8,636	94.3%
Number of accessions held in short-term seed storage in genebank collections	1	0.0%
Number of accessions held in medium-term seed storage in genebank collections	1,850	21.4%
Number of accessions held in long-term seed storage in genebank collections	4,526	52.4%
Number of accessions held in seed storage of undefined type in genebank collections	2,259	26.2%
Number of accessions held in field storage in genebank collections	3	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	78	0.8%
Number of accessions held as DNA in genebank collections	21	0.2%
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	519	5.7%
Number of accessions in genebank collections regenerated 2014–2019	194	19.3
Number of accessions in genebank collections in need of regeneration 2014–2019	411	40.9%
Number of accessions in genebank collections in need of regeneration without budget for regeneration 2014–2019	312	31.1%
Number of accessions safety duplicated out of the country in genebank collections	1,572	28.1%
Number of accessions in genebank collections safety duplicated in Svalbard	1,818	19.9%

Documentation, information systems, and research resources

A descriptor list for carrot was published by the international agricultural research community in 1998 and is available online in English, French, and Spanish (IPGRI, 1998).

The estimated completeness of passport information for carrot accessions listed in Genesys is 6.5 on a scale of 0 (no data) to 10 (complete data), which indicates that a sizable amount of data is available, but also that there are gaps that it would be valuable to fill. Four metrics of the current degree of digital sequence information (DSI) for carrots (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 carrots. 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	6.5
Number of genes as recorded in NCBI's Entrez database as of 2022	36,343
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	98,934
Number of proteins as recorded in NCBI's Entrez database as of 2022	143,358
Number of publications listed in Google Scholar with taxon name in title published between 2009 and 2019	1,940
Number of publications listed in PubMed Central with taxon name in text as of 2022	5,554
Number of research materials as recorded in GBIF (2025)	907,140

Germplasm distributions and varietal registrations and releases

Germplasm distributions and varietal development statistics for carrots 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 15 countries, with the largest numbers of samples distributed from institutions in Germany, Sweden, Poland, Spain, and India, and were primarily to stakeholders in other countries and to within-country national agricultural research centers (Khoury *et al.*, 2025). In the Plant Treaty dataset, the providers of the most samples were located in Germany, the UK, the Netherlands, Sweden, and Spain, and the recipients of the most samples were located in the Netherlands, France, Germany, USA, Denmark, UK, Spain, and the Russian Federation.

Table 7. Carrot 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	272.7
Average annual number of samples distributed worldwide as recorded in FAO WIEWS	703.5
Average annual number of samples distributed worldwide as recorded in the Plant Treaty Data Store	449.4
Number of countries receiving germplasm as recorded in the Plant Treaty Data Store	13.3
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	106.2
Average annual number of varietal releases worldwide as recorded in FAO WIEWS	57.0

Networks and partnerships

Currently active networks include:

- The European Cooperative Programme for Plant Genetic Resources (ECPGR) Umbellifer Crops Working Group
- The USDA ARS Root & Bulb Crop Germplasm Committee (also here)
- Communities related to carrot genetics, e.g. Rolling *et al.* (2022)

Conclusions

Carrots are very important vegetable crops in many world regions. Their genetic resources are bolstered by the activities taking place in collections in several national and subnational agricultural research organizations, particularly in the USA, UK, Poland, Japan, Germany, and a few other countries; there are no major international collections for the crop. 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 45.4% are currently included). 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: identify/determine taxa within current *ex situ* accessions; regenerate accessions in need; 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 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.

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 the International Treaty on Plant Genetic Resources for Food and Agriculture in the development of this document.

MICHAEL MAJOR

References

Castañeda-Álvarez NP, Khoury CK, Achicanoy HA, Bernau V, Dempewolf H, Eastwood RJ, Guarino L, Harker RH, Jarvis A, Maxted N, Mueller JV, Ramírez-Villegas J, Sosa CC, Struik PC, Vincent H, and Toll J (2016) Global conservation priorities for crop wild relatives. *Nature Plants* 2(4): 16022. https://doi.org/10.1038/nplants.2016.22

Coe K, Bostan H, Rolling W, Turner-Hisson S, Macko-Podgórni A, Senalik D, *et al.* (2023) Population genomics identifies genetic signatures of carrot domestication and improvement and uncovers the origin of high-carotenoid orange carrots. *Nat Plants* 9(10): 1643–1658. https://doi.org/10.1038/s41477-023-01526-6

Eastwood RJ, Tambam BB, Aboagye LM, Akparov ZI, Aladele SE, Allen R, *et al.* (2022) Adapting Agriculture to Climate Change: A Synopsis of Coordinated National Crop Wild Relative Seed Collecting Programs across Five Continents. *Plants* 11(14): 1840. https://doi.org/10.3390/plants11141840

FAO (2009) *The International Treaty on Plant Genetic Resources for Food and Agriculture*. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. https://openknowledge.fao.org/server/api/core/bitstreams/a9d0de2a-8e98-4f75-98a8-673078841030/content

FAO (2025a) FAOSTAT. https://www.fao.org/faostat/en/#data (accessed September 2025)

FAO (2025b) *The Third Report on The State of the World's Plant Genetic Resources for Food and Agriculture*. FAO: Rome. https://doi.org/10.4060/cd4711en

International Plant Genetic Resources Institute (IPGRI) (1998) Descriptors for wild and cultivated Carrots (*Daucus carota* L.). International Plant Genetic Resources Institute 65 pp. https://hdl.handle.net/10568/72729

Iorizzo M, Senalik DA, Ellison SL, Grzebelus D, Cavagnaro PF, Allender C, *et al.* (2013) Genetic structure and domestication of carrot (*Daucus carota* subsp. *sativus*) (Apiaceae). *American J of Botany* 100(5)930–938. https://doi.org/10.3732/ajb.1300055

Kamel DG, Hammam ARA, Nagm El-diin MAH, Awasti N, and Abdel-Rahman AM (2023) Nutritional, antioxidant, and antimicrobial assessment of carrot powder and its application as a functional ingredient in probiotic soft cheese. *Journal of Dairy Science* 106(3): 1672–1686. https://doi.org/10.3168/jds.2022-22090

Khoury CK, Sotelo S, Amariles D, and Hawtin G (2023) *The Plants That Feed the World: baseline data and metrics to inform strategies for the conservation and use of plant genetic resources for food and agriculture*. International Treaty on Plant Genetic Resources for Food and Agriculture Rome: Food and Agricultural Organization of the United Nations. doi: 10.4060/cc6876en. https://www.fao.org/documents/card/en/c/cc6876en

Khoury CK, Sotelo S, Hawtin G, Halewood M, Lopez Noriega I, and Lusty C (2025) Germplasm exchange: Thematic Study for *The Third Report on the State of the World's Plant Genetic Resources for Food and Agriculture*. Rome: Food and Agricultural Organization of the United Nations. doi: 10.4060/cd4850en. https://doi.org/10.4060/cd4850en

Mezghani N, Khoury CK, Carver D, Achicanoy HA, Simon P, Flores FM, and Spooner D (2019) Distributions and Conservation Status of Carrot Wild Relatives in Tunisia: A Case Study in the Western Mediterranean Basin. *Crop Science* 59(6): 2317–2328. https://doi.org/10.2135/cropsci2019.05.0333

Rolling WR, Senalik D, Iorizzo M, Ellison S, van Deynze A, and Simon PW (2022) CarrotOmics: a genetics and comparative genomics database for carrot (*Daucus carota*). *Database* 2022: baac079. https://doi.org/10.1093/database/baac079

Selvakumar R and Kalia P (2025). Genetic Resources, Biodiversity, Conservation, and Utilization in the Improvement of Carrot (*Daucus carota* L.). In: Kalia P, ed. *Vegetable Crops*. Springer Nature Singapore; pp. 817–861 (Handbooks of Crop Diversity: Conservation and Use of Plant Genetic Resources). https://doi.org/10.1007/978-981-97-8949-8_25

Sharma KD, Karki S, Thakur NS, and Attri S (2012) Chemical composition, functional properties and processing of carrot—a review. *J Food Sci Technol.* 49(1): 22–32. https://doi.org/10.1007/s13197-011-0310-7

USDA (2025) Global Global Taxonomy. https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch (accessed September 2025)

Van Hintum T, Menting F, and Van Strien E (2011) Quality indicators for passport data in *ex situ* genebanks. *Plant Genetic Resources* 9(3): 478–485. https://doi.org/10.1017/S1479262111000682

World Flora Online (WFO) (2025) *Daucus* L. https://www.worldfloraonline.org/taxon/wfo-4000010858 (accessed October 2025)

Supplementary information

Supplementary Table 1: Full list of *ex situ* collections of carrot 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)
USA020	North Central Regional Plant Introduction Station, USDA-ARS, NCRPIS	1,563	17.1%	17.1%	1,339	0	0
GBR006	Warwick Genetic Resources Unit	1,509	16.5%	33.5%	Not listed	0	1,424
POL003	Plant Breeding and Acclimatization Institute	660	7.2%	40.8%	659	0	495
JPN183	NARO Genebank	606	6.6%	47.4%	48	0	0
DEU146	Genebank, Leibniz Institute of Plant Genetics and Crop Plant Research	509	5.6%	52.9%	491	495	508
CZE122	Gene bank	404	4.4%	57.3%	401	37	404
PAK001	Plant Genetic Resources Program	264	2.9%	60.2%	66	0	102
USA974	Seed Savers Exchange	239	2.6%	62.8%	Not listed	0	0
GBR004	Millennium Seed Bank - Royal Botanic Gardens Kew	229	2.5%	65.3%	Not listed	0	84
TUN029	Banque Nationale de Gènes de Tunisie	214	2.3%	67.7%	214	0	213
HUN003	Centre for Plant Diversity	208	2.3%	69.9%	68	0	20
SWE054	Nordic Genetic Resource Center	202	2.2%	72.1%	202	202	202
UKR021	Institute of Vegetable and Melon Growing	186	2.0%	74.2%	71	0	0
UZB006	Uzbek Research Institute of Plant Industry	163	1.8%	76.0%	Not listed	0	0
PRT001	Banco Português de Germoplasma Vegetal	145	1.6%	77.5%	11	0	0
NLD037	Centre for Genetic Resources, the Netherlands	125	1.4%	78.9%	125	18	18
FRA250	Institut Agro, Angers	123	1.3%	80.2%	Not listed	0	123
IND001	National Bureau of Plant Genetic Resources	123	1.3%	81.6%	123	0	0
MAR088	Centre Régional de la Recherche Agronomique de Settat	114	1.2%	82.8%	9	0	114
BGR001	Institute for Plant Genetic Resources 'K.Malkov'	112	1.2%	84.1%	2	0	0
MNG030	Institute of Plant and Agricultural Science	107	1.2%	85.2%	Not listed	0	0
TWN001	World Vegetable Center	106	1.2%	86.4%	105	18	20
CYP004	National (CYPARI) Genebank, Agricultural Research Institute, Ministry of Agriculture, Rural Development and Environment	105	1.1%	87.5%	78	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	98	1.1%	88.6%	Not listed	0	0
ESP004	Centro Nacional de Recursos Fitogenéticos	92	1.0%	89.6%	92	0	91
ESP027	Gobierno de Aragón. Centro de Investigación y Tecnología Agroalimentaria. Banco de Germoplasma de Hortícolas	79	0.9%	90.5%	75	0	77
ISR002	Israel Gene Bank for Agricultural Crops, Agricultural Research Organisation, Volcani Center	73	0.8%	91.3%	50	0	0
ARG1350	Banco Activo de Germoplasma de La Consulta	60	0.7%	91.9%		0	0
UKR008	Ustymivka Experimental Station of Plant Production	55	0.6%	92.5%	13	0	0
ROM007	Suceava Genebank	53	0.6%	93.1%	Not listed	3	3
TUR001	Plant Genetic Resources Department	48	0.5%	93.6%	48	0	0
ARM059	Agrobiotechnology Scientific Center	42	0.5%	94.1%		0	13
CHE001	Agroscope Changins	38	0.4%	94.5%	38	0	38
KGZ040	Bank-Laboratory of Plant Genetic Resources of the KR	38	0.4%	94.9%	6	0	38
AZE015	Genetic Resources Institute	33	0.4%	95.3%	6	0	0
CHL171	Banco de Semillas SAG Magallanes	33	0.4%	95.6%	33	0	0
POL102	Warsaw University of Life Sciences – SGGW	27	0.3%	95.9%	27	0	27
HRV041	Faculty of Agriculture, University of Zagreb	26	0.3%	96.2%	Not listed	0	0
BRA012	Embrapa Hortaliças	25	0.3%	96.5%	Not listed	0	25
URY002	Facultad de Agronomía	16	0.2%	96.7%	Not listed	0	0
ALB026	Plant Genetic Resources Center	15	0.2%	96.8%	15	0	15
JOR105	National Agricultural Research Center	13	0.1%	97.0%	Not listed	13	0
BGD028	Bangladesh Institute of Nuclear Agriculture (BINA)	12	0.1%	97.1%	Not listed	0	0
ESP026	Generalidad Valenciana. Universidad Politécnica de Valencia. Escuela Técnica Superior de Ingenieros Agrónomos. Banco de Germoplasma	12	0.1%	97.2%	11	0	7
GBR017	Henry Doubleday Research Association	12	0.1%	97.4%		0	0
LTU001	Lithuanian Institute of Agriculture	12	0.1%	97.5%	12	0	12

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)
CAN004	Plant Gene Resources of Canada, Saskatoon Research and Development Centre	11	0.1%	97.6%	11	0	11
AUT047	HBLFA Gartenbau Schönbrunn	10	0.1%	97.7%	10	0	0
LTU006	Lithuanian Institute of Horticulture	10	0.1%	97.8%	4	0	5
GRC005	Greek Genebank, Institute of Plant Breeding and Genetic Resources	9	0.1%	97.9%	Not listed	0	0
IRL029	Department of Agriculture, Fisheries and Food, National Crop Variety Testing Centre	8	0.1%	98.0%	Not listed	0	8
USA022	Western Regional Plant Introduction Station, USDA-ARS, Washington State University	8	0.1%	98.1%	Not listed	0	0
ALB037	National Agency of Protected Areas	7	0.1%	98.2%	Not listed	0	0
EGY087	National Gene Bank	7	0.1%	98.3%	Not listed	7	7
MLT003	Plant Protection Directorate, Veterinary and Phytosanitary Regulation Department	7	0.1%	98.3%	Not listed	0	0
ARM005	Institute of Botany	6	0.1%	98.4%	Not listed	0	0
CUB014	Instituto de Investigaciones Fundamentales en Agricultura Tropical	6	0.1%	98.5%	Not listed	0	0
FRA366	Conservatoire botanique national de Bailleul	6	0.1%	98.5%	6	0	0
GHA091	Plant Genetic Resources Research Institute	6	0.1%	98.6%	Not listed	6	6
SVK001	National Agricultural and Food Centre (NPPC), Research Institute of Plant Production (RIPP)	6	0.1%	98.7%	Not listed	0	6
SVN019	Crops and Seed Production Department, Agricultural Institute of Slovenia	6	0.1%	98.7%	Not listed	0	1
AUT060	HBLFA Raumberg-Gumpenstein	5	0.0%	98.8%	5	0	0
BGD016	Bangladesh Agricultural University (BAU)	5	0.0%	98.8%	5	0	0
LBY006	National Bank for Plant Genetic Resources	5	0.0%	98.9%	Not listed	0	0
PRT102	Banco de Germoplasma - Universidade da Madeira	5	0.0%	98.9%	Not listed	0	5
TJK027	National Center for Genetic Resources	5	0.0%	99.0%	5	0	5
BLR014	State research institution 'Institute of Experimental Botany of the National Academy of Sciences of Belarus'	4	0.0%	99.0%	4	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)
DEU502	Botanical Garden of the University of Osnabrück	4	0.0%	99.1%	Not listed	0	3
GUY021	National Agricultural Research and Extension Institute	4	0.0%	99.1%	Not listed	0	0
LBN020	Lebanese Agricultural Research Institute	4	0.0%	99.2%	4	4	4
MDG048	Laboratoire des semences et ressources phytogénétiques, FOFIFA	4	0.0%	99.2%	Not listed	0	0
TUR034	Field Crop Central Research Institute	4	0.0%	99.3%	4	0	0
ARM010	Armenian Botanical Society	3	0.0%	99.3%	Not listed	0	0
BEL002	Gembloux agro-biotech, Université de Liège, département des Sciences agronomiques, Phytotechnie tropicale et Horticulture	3	0.0%	99.3%	Not listed	0	3
ESP109	Junta de Castilla y León. Instituto Tecnológico Agrario de Castilla y León. Centro de Investigación de Zamadueñas	3	0.0%	99.4%	3	0	3
ESP200	Govern de les Illes Balears. Conselleria de Presidència. Direcció General d'Agricultura i Desenvolupament Rural. Institut de recerca i formació agrària i pesquera	3	0.0%	99.4%	Not listed	0	3
GRC044	Balkan Botanic Garden of Kroussia, Institute of Plant Breeding and Genetic Resources	3	0.0%	99.4%	Not listed	0	0
NPL069	National Agriculture Genetic Resources Centre-Genebank	3	0.0%	99.5%	3	0	0
SAU015	Plant Genetic Resources Bank	3	0.0%	99.5%		0	3
UKR063	Branch of the Institute of Sugarbeet	3	0.0%	99.5%	3	0	0
USA151	National Arboretum-Germplasm Unit, USDA/ARS	3	0.0%	99.6%	Not listed	0	0
AUT001	Austrian Agency for Health and Food Safety	2	0.0%	99.6%	2	0	2
AZE005	Vegetable Growing Research Institute Public Leqal Entity	2	0.0%	99.6%	Not listed	0	0
AZE014	Azerbaijan State Agrarian University	2	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)
BLR011	Republican Unitary Enterprise 'Research and Practical Centre of the National Academy of Sciences of Belarus for Arable Farming'	2	0.0%	99.6%	2	0	0
ESP003	Comunidad de Madrid. Universidad Politécnica de Madrid. Escuela Técnica Superior de Ingeniería Agronómica, Alimentaria y de Biosistemas . Banco de Germoplasma César Gómez Campo	2	0.0%	99.7%	2	0	0
NZL001	Margot Forde Genebank, AgResearch Ltd	2	0.0%	99.7%	Not listed	0	0
ROM055	Research and Development Station for Vegetables - Bacau	2	0.0%	99.7%	Not listed	0	0
URY003	INIA La Estanzuela	2	0.0%	99.7%	2	0	0
ZMB030	SADC Plant Genetic Resources Centre	2	0.0%	99.8%	2	0	0
AUS167	Australian Pastures Genebank	1	0.0%	99.8%	1	1	1
AUT025	Referat Pflanzengesundheit und Spezialkulturen	1	0.0%	99.8%	1	0	1
AZE004	Institute of Botany	1	0.0%	99.8%	Not listed	0	0
CUB005	Instituto Nacional de Ciencias Agrícolas	1	0.0%	99.8%	Not listed	0	0
ESP010	Junta de Extremadura. Dirección General de Ciencia y Tecnología. Centro de Investigación Agraria Finca La Orden - Valdesequera.	1	0.0%	99.8%	1	0	1
EST019	Estonian Crop Research Institute	1	0.0%	99.8%	1	0	1
FRA097	Conservatoire Botanique National Alpin de Gap-Charance	1	0.0%	99.8%	1	0	1
GBR016	Genetic Resources Unit, Institute of Biological, Environmental & Rural Sciences, Aberystwyth University	1	0.0%	99.9%	Not listed	0	0
GEO001	I.Lomouri Institute of Crop Science	1	0.0%	99.9%	Not listed	0	0
GRC047	Vegetable Department, Institute of Plant Breeding and Genetic Resources	1	0.0%	99.9%	Not listed	0	0
GRC102	Hellenic Mediterranean University	1	0.0%	99.9%	Not listed	0	0
HRV053	Center for Seed and Seedlings	1	0.0%	99.9%	1	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)
ITA435	Banca del Germoplasma Vegetale	1	0.0%	99.9%	1	0	1
KGZ034	Botanical Garden named after E.Z.Gareev	1	0.0%	99.9%	Not listed	0	1
LKA036	Plant Genetic Resources Centre	1	0.0%	99.9%	Not listed	0	0
MKD001	Faculty of Agriculture, University Ss. Cyril and Methodius	1	0.0%	99.9%	Not listed	0	0
UGA132	Plant Genetic Resource Centre	1	0.0%	100.0%	1	0	0
UGA528	Uganda National Genebank	1	0.0%	100.0%	Not listed	0	0
UKR019	Research Station of Medicinal Crops	1	0.0%	100.0%	1	0	0
UKR081	Experimental Station 'Maiak'	1	0.0%	100.0%	1	0	0
ZAF062	RSA National Plant Genetic Resources Centre	1	0.0%	100.0%	1	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)
Daucus carota L.	6,201
Daucus carota subsp. *sativus* (Hoffm.) Schübl. & G. Martens	991
Daucus carota subsp. *carota*	436
Daucus carota subsp. *maximus* (Desf.) Ball	231
Daucus L.	183
Daucus carota f. *carota*	125
Daucus muricatus (L.) L.	98
Daucus carota subsp. *capillifolius* (Gilli) Arbizu	86
Daucus carota subsp. *maritimus* (Lam.) Batt.	76
Daucus pusillus Michx.	70
Daucus carota subsp. *gummifer* (Syme) Hook. f.	63
Daucus aureus Desf.	61
Daucus crinitus Desf.	58
Daucus broteri Ten.	35
Daucus guttatus Sm.	35
Daucus montanus Humb. & Bonpl. ex Schult.	35
Daucus bicolor Sm.	34
Daucus sativus (Hoffm.) Röhl. ex Pass.	34
Daucus carota subsp. *majoricus* A. Pujadas	29
Daucus pumilus Ball	21
Daucus carota subsp. *hispanicus* (Gouan) Thell.	19
Daucus setulosus Guss. ex DC.	19
Daucus conchitae Greuter	18
Daucus hybr.	18
Daucus carota subsp. *fontanesii* Thell.	17
Daucus syrticus Murb.	16
Daucus durieua Lange	14
Daucus glaber Thell.	14
Daucus carota subsp. *azoricus* Franco	13
Daucus carota subsp. *halophilus* (Brot.) A. Pujadas	13
Daucus sahariensis Murb.	13
Daucus carota subsp. *commutatus* (Paol.) Thell.	12
Daucus carota subsp. *drepanensis* (Arcang.) Heywood	9
Daucus carota subsp. *major* (Vis.) Arcang.	9
Daucus involucratus Sm.	9
Daucus setifolius Desf.	8
Daucus carota subsp. *gadecaei* (Rouy & E. G. Camus) Heywood	6
Daucus tenuisectus Coss. ex Batt.	6
Daucus glochidiatus (Labill.) Fisch., C. A. Mey. & Avé-Lall.	5
Daucus carota subsp. *cantabricus* A. Pujadas	3

Daucus minusculus Pau ex Font Quer	3
Daucus elegans (Webb ex Bolle) Spalik, Banasiak & Reduron	2
Daucus incognitus (C. Norman) Spalik, Reduron & Banasiak	2
Daucus rouyi Spalik & Reduron	2
Daucus carota subsp. *rupestris* (Guss.) Heywood	1
Daucus decipiens (Schrad. & J. C. Wendl.) Spalik, Wojew., Banasiak & Reduron	1
Daucus gracilis Steinh.	1
Daucus guttatus subsp. *guttatus*	1
Daucus jordanicus Post	1
Daucus mauritii Sennen	1

THE GLOBAL CROP DIVERSITY TRUST
Platz der Vereinten Nationen 7
53113 Bonn
Germany

PUBLICATIONS CONTACT
publications@croptrust.org

GENERAL CONTACT
info@croptrust.org

CROP TRUST