



Agrobiodiversity Collection Guidelines

How to collect seed and herbarium specimens
of crop wild relatives and traditional crop
landraces from *in situ* populations.

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2025

Squareheads master wheat (*Triticum aestivum* subsp. *aestivum*) landrace, Suffolk (Photo J. Wheeler)

Who collects?

These guidelines are a resource for agrobiodiversity maintainers, landowners, and managers of areas where crop landraces (LR) and crop wild relatives (CWR) are found, either cultivated or wild. They outline the procedure for sampling, collecting and depositing seed and specimen samples in a gene / seed bank.

Why collect?

LR and CWR contain many diverse genes and alleles linked to traits that are not often found in modern crop cultivars, which are higher yielding but genetically uniform. Collecting seed samples and depositing them in a gene or seed bank means their genes are secured for potential reintroduction and are available for breeding new improved cultivars. This makes LR and CWR critical resources for sustaining food security and diversity. Seed and specimen donations ensure that genebanks can meet users' needs, enable identification confirmation, and the associated 'passport' data provides a reference for user selection and aids re-collections.

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Field bean (*Vicia faba*) landrace growers in North Suffolk (Photo N. Maxted)



Wild chives (*Allium schoenoprasum*) on the Lizard, Cornwall, UK (Photo N. Maxted)

Before you start collecting

Familiarise yourself with the annexes.

Look over the Data Collection and Consent Forms in Annexes 1 - 3 so you know what data you will need to collect. Information on where to send your samples is found in Annex 4.

Find and identify the population.

Go to the field or habitat where your target plants grow. Use GPS to record the latitude, longitude, and elevation. For CWR, use a field guide, magnifying glass, and/or ruler to help identify the plant. When pressed for time in the field, do a quick identification and check it using your specimen later.

Take clear photos.

Photograph the plant in its natural setting - get close-ups of flowers, fruits, and leaves, and include shots of the surrounding habitat and any visible threats.

If the plants vary in shape or size, take photos of several individuals to show the morphological variety.

Things you will need

Whilst in the field:

-  Mobile phone with GPS
-  Camera or a good camera on your phone
-  Small pieces of paper for labelling
-  Paper envelopes / cloth bags
-  Marker pen and pencil
-  Clean, sharp secateurs (CWR only)
-  Magnifying Glass (CWR only)
-  Taxonomic / Species keys (CWR only)
-  Ruler (CWR only)
-  Newspaper or blotting paper (CWR only)

At home after collecting:

- Completed data Collection Passport Data Form (Annex 1 or 2) and Material Transfer Form (Annex 3)
- Paper towel (if needed)
- Plant press (CWR only)
- Cardboard (CWR only)
- Stiff backed envelope (CWR only)

Labelling your collections

It's essential to label all your samples - seeds/propagules, plants, and specimens. Labels help keep your collection organised and ensure the genebank can use the material. Samples without labels or missing background information (called "passport data") are often unusable. The specimen label data comprises the field identification, the site number and a unique population identifier (= collection number).

The associated passport data for CWR (Annex 1) and LR (Annex 2) population samples is extensive and includes:

- Unique population/collection number (CN) - the collector's name followed by a number that is unique for each sample. Collecting numbers are recorded sequentially e.g. J.G. Hawkes 001, J.G. Hawkes 002, J.G. Hawkes 003 etc.
- Taxon and local name (genus, species, and subspecies/variety if available)
- Collection location (site address and specific collection coordinates & elevation)
- Collection date in DD/MM/YYYY format, whether seed / plants / specimens are taken
- Collection site habitat details (dominant flora, grazing levels, human interventions)
- Brief notes about the taxon population (size, distribution, extent of occurrence, actual / perceived threats)
- Any local indigenous knowledge of collection gained from maintainer discussion

Collecting seed samples

For Crop Wild Relatives (CWR):

Collect seeds **randomly from across the whole population** (see the [top](#) image to the right). To do this, apply a numbered grid to the area or assign numbers to each individual plant, then use a random number generator to select them. If the area includes different habitats (like riverside vs hillside), collect from each one.

Avoid collecting all your samples from one small area or in a straight line (like the [bottom](#) image to the left).

Mix all seeds together into one **bulk sample** - you don't need to bag each plant separately.

Try to collect from at least 30 plants for outbreeding species and 50 plants for inbreeding species. Avoid diseased plants and collect from healthy individuals.

For Landraces (LR):

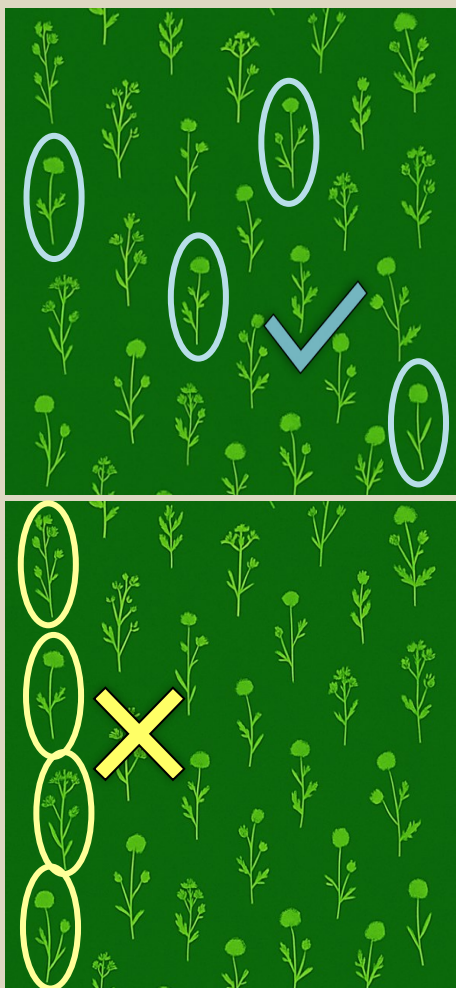
Collect either:

- (a) from multiple plants in the farmer's field, like CWR sampling, or
- (b) from the farmer's seed store if the crop has already been harvested.

How Many Seeds to Collect:

Aim for **5,000 seeds per population**, if possible, although this depends on rarity, population size and threat status. If it's a crop that doesn't produce many seeds (like some vegetables), **500 seeds** is a reasonable target.

To protect the genetic diversity of the population, **collect no more than 30%** of seeds available on the day.



(Image H.R. Lindley)

Processing seed samples

Before you begin, make sure you've read the [Labelling your collections](#) section. Always label your seed envelopes clearly with waterproof ink. Label the outside **and** inside the envelope to avoid mix-ups.

In the Field:

- Remove seeds from the fruit and remove any remaining plant parts (leaves, stems, husks, etc.).
- Check seeds for insects, eggs, larvae, or signs of fungal infection. If you suspect or find that your seed is infected with pests, try to remove them with your fingers or a brush. If they can't be removed or if there is a fungal infection, quarantine them in a separate bag to be dealt with after returning from the field.
- For rare or threatened species, it's okay if the sample isn't perfectly clean - but always remove pests where possible.

After Returning from the Field:

1. Wash your hands and clean any tools used.
2. For seeds infested with pests or fungi, contact the genebank for advice on how to deal with the infestation (see Annex 4 for genebank contact details).
3. If needed, carefully clean seeds again in water and pat them dry with a paper towel.
4. Place the seeds in a **paper** envelope or cloth bag. Label clearly on the outside **and** include a second label inside with: full plant name (taxon), collection date, collection number (CN) and location including GPS.
5. Move to the [Packing and Sending Samples](#) section.



Processing seed sample on a mobile collection table (Photo N, Maxted)

Collecting voucher specimens

When collecting seeds from wild relatives, it's a good idea to also collect a **voucher specimen**. This allows the genebank to confirm the plant's identity.

Voucher specimens are needed for CWR only

How to Collect:

- Choose a **healthy** plant that clearly shows key features like leaves, flowers, fruits, and inflorescence.
- Avoid plants with pests, diseases, or those tangled with other species.
- If the population is large, you can take a whole plant with roots. If the population is small, just cut a stem below the basal leaves so the plant can regrow.
- If the population looks quite variable in morphology, collect **several specimens** that show the different forms.



Throws vetch (*Vicia faba*) Halesworth, Suffolk, UK
(Photo N. Maxted)

Correctly folded stems Cuts are away from the stem and are obvious Clear flower head morphology

Preparing the specimen for pressing

Take time to **arrange the plant carefully** before pressing so its key features are clearly visible once dried.

- Spread flowers to show inner structures. Avoid overlapping parts by twisting stems and folding leaves. Cut roots, bulbs, or corms in half to show cross-sections. Make any cuts obvious (see circle **1** of the example to the right).
- Fold long stems into a V, Z, or N shape so they fit neatly (see circle **2** of the example to the right). The dried specimen should fit on an A3 sheet.
- Make sure no parts stick out of the press.

Inside the press, place the specimen **between absorbent blotting paper** (like newspaper), with a label showing the full plant name, date, and location.

Put this between the cardboard sheets and press boards or metal frame for drying.

A specimen of *Daucus carota* from the Herbarium of the Royal Botanic Garden Edinburgh (RBGE) (E01279455) (with annotations by H.R. Lindley)



Clearly displayed root structure

Where overcrowding is unavoidable, features are still obvious

Detailed label in bottom right



Wild lettuce (*Lactuca serriola*)
Lincolnshire, UK (Photo N. Maxted)



Shetland kale (*Brassica oleracea*)
Whalsay, Shetland (Photo M. Scholten)

Field pressing of voucher specimens (Photo N. Maxted)



Pressing and drying a voucher specimen

Once the specimen is secured in the plant press, leave it to dry in a warm, dry area - **not too hot**, or the plant may become brittle.

Change the absorbent blotting paper **regularly** if it becomes damp to prevent mould.

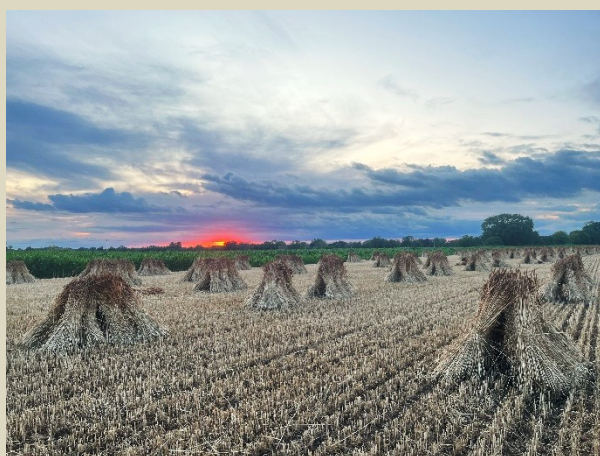
TIP: While drying, you can rearrange the specimen, trim off excess material, and collect any loose seeds into an envelope to keep with the sample.

Once fully dried:

Label the specimen clearly in the **bottom right** of the blotting paper with the same information as the seed passport data (Annex 1).

Move on to the **Packing and Sending Samples** section.

At the genebank, the specimen will be mounted on acid-free paper using acid-free PVA glue or tape, and a label with passport data will be placed in the bottom-right corner, like this one below:

Squareheads master wheat (*Triticum aestivum* subsp. *aestivum*) landrace, Suffolk (Photo J. Wheeler)

Flora of Turkey

University of Southampton

Vicia eristalioides Maxted

Province - Antalya Nearest Settlement: Cavus Collection date: 25/04/87
Directions: 67 kms from Antalya on road to Kumluca (road D400).

Flora Turkey Grid. Sq. C/3 Altitude: 550 Latitude: 36° 21' N Longitude: 30°25' E
Rock type: Limestone Soil: Red Mediterranean Aspect: North west
Habitat: Young coniferous plantation (*Pinus brutei*) and hillside scrub (*Rubus*, *Quercus* and *Ficus* sp.).

Collectors: N. Maxted, R. Allkin and A. Kitiki 4256 Identification: Nigel Maxted

Packing and Sending Samples

Once you've collected and processed your seeds and/or voucher specimens, they are then ready to be packed up.

Place the following into a stiff-backed envelope:

- Envelope or bag containing the dried and cleaned seeds.
- Dried voucher specimen in absorbent blotting paper and supported by stiff cardboard sheets.
- Completed:
 - ☒ Passport Data form (Annex 1 for CWR or Annex 2 for LR)
 - ☒ Material Transfer Agreement form (Annex 3 for both CWR and LR)
- For CWR only: Key to coded environmental information for collection locality.

Then seal the stiff-backed envelope and address to the relevant genebank (Annex 4).

Before you send your packages:

Read Annex 4 carefully. Once you've decided which genebank is suitable for storing your specific donations, contact the provided email address to make sure you're sending the right material and to ensure they are aware that they need to sign their part of the Material Transfer Agreement (Annex 3). In Annex 4, we've also suggested some further questions to ask the genebank before you send your donations.

Once this is all completed, you can send your material. Thank you for supporting the UK's agrobiodiversity.

ANNEX 1. Passport data collection form for CWR in Great Britain

Please print and complete the following form and key for each crop wild relative population sample donation to a UK genebank. Either cross the relevant checkbox or write on the dotted lines. The key for the coded environmental information for collection locality can be found on the next page.

Please fill in a separate form for each CWR you are donating.

Collector data

Collector name(s):

Unique collection number (CN):

Email: Phone number:

Site data

Country: Scotland [] Wales [] England [] Other:

Vice county code: Vice county name:

Nearest settlement and location description:

.....

Latitude (decimal degrees): Longitude (decimal degrees):

Elevation (m above mean sea level):

Coded environmental information for collection locality: *See overleaf for key*

PR	pH	TS	AS	SL	%C	DS	WR	LP	GP	%R	RT	%T	TT	ST

CWR Accession data

Genus:

Species:

Subspecies / var.:

Population characteristics:

.....

Habitat:

Is the land under conservation management? Y [] N []

How many plants have been sampled?:

What type of material is included in the sample?:

Seed [] Specimen [] Both []

Seed coll. date (DD/MM/YYYY) / /

Specimen coll. date (DD/MM/YYYY) / /

Number of duplicate specimens:

Consent

I hereby confirm that I have been granted the correct permits by the landowner to collect and donate this sample to a national genebank and stored for long term conservation purposes, as stipulated in the International Treaty on Plant Genetic Resources. *For more information, please visit <https://www.fao.org/plant-treaty/areas-of-work/benefit-sharing-fund/bsf-overview/en/>*

Yes [] No [] Date / /

Name

Signature

Further, I have received permission for the plant material mentioned above to be distributed to bona fide third party users.

Yes [] No [] Date / /

Name

Signature

Landowner email:

Key to coded environmental information for collection locality:

Please fill in the table in the passport data form with the relevant letter or number that corresponds to the below code.

PR (Parent Rock)		pH	TS (Type of Soil)		AS (Aspect)	SL (Slope)		%C (ground Cover)	DS (Depth of Soil)	
A	Peat and coal	Estimate of soil acidity	A	Calcic brown	Compass points	L	Level	Percentage of the site with ground cover	A	0 – 10cm
B	Conglomerate		B	Terra rossa			0 – 3%		B	10 – 20cm
C	Sandstone		C	Heavy black		U	Undulating		C	20 – 40cm
D	Shales - mudstone		D	Wood brown			3 – 8%		D	> 40cm
E	Siliceous		E	Alluvial		R	Rolling			
F	Limestone		F	Sandy loam			8 – 16%			
G	Laterites		G	Clay		M	Moderate			
H	Granites						16 – 30%			
I	Dolerites					S	Steep			
J	Phyolites						> 30%			
K	Basalts									
L	Hornfels									
M	Slate									
N	Schist									
O	Quartzites									
P	Alluvium									
Q	Dunes									

Please print out this key and include it with the sample donation(s).

Please put clear crosses (X) in fields where you do not have the information.
We understand that this form is very detailed, and most donors will not be able to fill in every field. Please just do your best but do not worry if you have missing information for this section.

WR (Water Relations)		LP (Land Practice)		GP (Grazing Pressure)		%R (Rocky outcrops)	RT (Rock Type)		%T (Trees and shrubs)	TT (Type of Tree or shrub)		ST (Soil Texture)	
F	Free draining	AC	Agriculture crop	A	Nil	Percentage of the site covered by rocky outcrops	A	Flat slabs	Percentage of the site covered by trees and/or shrubs	1	Shrubs	G	Gravel
R	Run-off	AF	Agriculture fallow	B	Light		B	Large boulders		2	Small trees	S	Sand
WM	Wet meadow	AP	Agriculture pasture	C	Moderate		C	Boulders		3	Medium trees	L	Loam
S	Swamp	D	Disturbed	D	Severe		D	Rocks		4	Large trees	SL	Sandy loam
		G	Grassland									CL	Clay loam
		P	Protected enclosure										
		R	Roadside										
		W	Woodland										

ANNEX 2. Passport data collection form for LR in Great Britain

Please print and complete the following form for each crop landrace population sample donation to a UK genebank. Either cross the relevant checkbox or write on the dotted lines.

Please fill in a separate form for each LR you are donating.

Collector data

Collector name(s):

Unique collection number (CN):

Email: Phone number:

Profession / association: Collector ☐ Plant Breeder ☐ Farmer / Grower ☐

Landowner / Manager ☐ Seed firm ☐ Genebank ☐ Institution ☐ Other ☐

Landrace Accession data

Genus:

Species:

Subspecies:

Crop common name:

Landrace variety name:

Collection date (DD/MM/YYYY) / /

Year of harvest (DD/MM/YYYY) / /

Landrace sample type:

Single line ☐ Population ☐ Mixture ☐

Where did you obtain this material?

1 Farm field ☐ 6 Pasture ☐

2 Orchard ☐ 7 Market or store ☐

3 Garden ☐ 8 Institute Org. ☐

4 Allotment ☐ 9 Seed firm ☐

5 Fallow ☐ 99 Other ☐

If other, please specify:

.....

How many plants have been sampled?:

What type of material is included in the sample?:

Seed ☐ Specimen ☐ Both ☐

What life cycle does the crop have?:

Annual ☐ Biannual ☐ Perennial ☐

Site data

Address and postcode:

.....

Scotland ☐ Wales ☐ England ☐

Other:

Latitude (decimal degrees):

Longitude (decimal degrees):

Elevation (m above mean sea level):

Consent

Please ensure that the signatures below belong to the primary maintainer/ manager of the LR or that the correct permits have been granted to permit this sample donation, as stipulated in the International Treaty on Plant Genetic Resources. For more information, please visit <https://www.fao.org/plant-treaty/areas-of-work/benefit-sharing-fund/bsf-overview/en/>

I give permission for the plant material mentioned above to be deposited in a national genebank and stored for long term conservation purposes.

Yes ☐ No ☐ Date / /

Name

Signature

Further, I give permission for the plant material mentioned above to be distributed to bona fide third party users.

Yes ☐ No ☐ Date / /

Name

Signature

ANNEX 3. Material transfer agreement for CWR / LR samples to genebank in Great Britain

Please print the following form. You only need to complete the **Provider** section. Please ensure the genebank you're sending material to is aware that they need to sign the **Recipient** section upon receiving your donation. Email addresses for each genebank can be found in Annex 4.

Include a separate copy in each donation of material you send.

By agreeing to the statement below, you confirm that you give consent for the plant material you have donated to be made available for distribution to third party users in line with UK and international legislation.

More information can be found here: <https://www.fao.org/plant-treaty/en/>.

The Standard Material Transfer Agreement (SMTA) ensures compliance with the International Treaty on Plant Genetic Resources and ensures that the rights and obligations of both the donor and recipient are appropriately met. For example, it states that the recipient (the genebank in this case) must not claim any intellectual property or the material and that it must be made available through the Multilateral System. The Multilateral System provides access to this material to third party users such as researchers and breeders. Furthermore, if the LR/CWR material you donated is used to develop a commercial product, the SMTA states that an agreed percentage of income must be transferred into the Benefit Sharing Fund (BSF) which facilitates capacity building and projects promoting sustainable agriculture and use of plant genetic resources globally.

If you wish to see a copy of the full SMTA, follow this link:

<https://openknowledge.fao.org/server/api/core/bitstreams/e0521161-1b06-4107-8f0f-70b838da908a/content>.

I, (Full Name of Authorised Official)....., represent and warrant that I have the authority to execute **this Agreement** on behalf of the **Provider** and acknowledge my institution's responsibility and obligation to abide by the provisions of **this Agreement**, both by letter and in principle, in order to promote the conservation and sustainable use of **Plant Genetic Resources for Food and Agriculture**.

Signature..... Date / /

Printed name of **Provider**

I, (Full Name of Authorised Official)....., represent and warrant that I have the authority to execute **this Agreement** on behalf of the **Recipient** and acknowledge my institution's responsibility and obligation to abide by the provisions of **this Agreement**, both by letter and in principle, in order to promote the conservation and sustainable use of **Plant Genetic Resources for Food and Agriculture**.

Signature..... Date / /

Printed name of **Recipient**

ANNEX 4. Where to send seed samples and herbarium specimens

There are three genebanks in Britain that specialise in landraces and crop wild relatives for food and agriculture. These genebanks store the seeds, specimens and corresponding passport data, and can make the material and information accessible for breeders or growers. Each of the three genebanks focusses on particular types of plant genetic resources.

These three genebanks are listed in the table below with information on which type of plant genetic resource corresponds to which genebank, and the contact emails and addresses. The genebank websites are also listed so you can explore each genebank's mission and work.

Before sending your sample(s), it's preferable to establish contact with the genebank. As a first step, we would advise you send an email to let them know:

- **What seed and/or specimens you are planning on donating.**
- **That they need to sign the Recipient section of the SMTA form.**
- **Double check the address and ask if there are any specific donation details you need to know about.**

Please make sure you send your sample(s) to the correct genebank that corresponds to the type of material you are donating.

If you are unsure about where to send your material or have any questions, please feel free to email the below genebanks for advice.

Institute of Biological, Environmental and Rural Sciences (IBERS), Aberystwyth University	John Innes Centre	UK Vegetable Genebank, University of Warwick
Forage and Welsh samples Website: https://www.aber.ac.uk/en/ibers/ Email: iberstaff@aber.ac.uk Genetic Resources and Seed Biobank, Institute of Biological, Environmental & Rural Sciences (IBERS), Aberystwyth University, Plas Gogerddan, Aberystwyth, United Kingdom SY23 3EE	Cereal and legume samples Website: https://www.jic.ac.uk/ Email: JIC.geneticresources@jic.ac.uk Genetic Resource Centre Norwich Research Park, Colney Ln, Norwich, United Kingdom NR4 7UH	Vegetable samples Website: https://warwick.ac.uk/fac/sci/lifesci/wcc/genebank/ Email: sls.genebank@warwick.ac.uk UK Vegetable Genebank The University of Warwick Innovation Campus Stratford-upon-Avon, United Kingdom CV35 9EF