Vegetable landrace inventory of England and Wales: first steps
Defra project code: IF0164

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Defra
Presentation objectives

• Project aims and objectives
• Context in terms of the longer-term aims
• Outline of the methodology:
  – Experts’ meeting
  – Definition of a landrace
  – Database design: descriptors and structure
  – Strategy for accessing landrace information
• Overview of preliminary results
• General conclusions and recommendations
Project aims

• To systematically inventory English and Welsh vegetable landraces to provide the baseline data needed to identify conservation needs

• Where possible, to initiate the *ex situ* safety duplication of landrace accessions
Project objectives

1. Collate vegetable landrace information
2. Create a database to manage landrace information
3. Provide access to landrace information available via the Defra Information Portal on Genetic Resources for Food and Agriculture (http://grfa.org.uk/)
4. Where possible, initiate safety duplication of landrace accessions \textit{ex situ}

Included so far: cereals + forages
Include all main vegetable crop groups:

- **Legumes** (e.g., broad bean, French bean, pea, runner bean)
- **Root crops** (e.g., beet, carrot, parsnip, potato, swede, turnip)
- **Brassica spp.** (e.g., broccoli, Brussels sprout, cabbage, cauliflower, kale, rape)
- **Salad crops** (e.g., celery, lettuce, pepper, radish)
- **Allium spp.** (e.g., onion, leek, chives)
**Long-term aims (beyond this project)**

- Produce a fully comprehensive inventory of UK vegetable and fruit landrace diversity
- Systematically conserve landrace diversity *ex situ* and *in situ* (on farm/home garden)
- Collate local traditional (indigenous) knowledge associated with UK landrace diversity
- Establish self-sustaining regional networks of local food (vegetable and fruit landrace) resources
- Stimulate local landrace production and use by breeders
- Educate and raise public awareness of crop landrace diversity
Methodology: experts’ meeting

- Invitation sent to members of the UK PGR Group
- Attended by 10 participants representing:
  - The University of Birmingham, Warwick HRI, Science and Advice for Scottish Agriculture (SASA), the John Innes Centre, the Institute of Biological, Environmental and Rural Sciences, and the Heritage Seed Library of Garden Organic
- Objectives:
  - Discuss the proposed project strategy
  - Share knowledge (contacts, literature sources, NGOs, commercial companies, genebanks)
  - Review procedures for obtaining germplasm samples for *ex situ* conservation
  - Provide examples of existing landrace conservation projects and the use of landrace diversity in formal crop improvement
- Report circulated to PGR Group
Methodology: landrace definition

Main landrace characteristics (Camacho Villa et al., 2006):

- Historical origin
- High genetic diversity
- Local genetic adaptation
- Recognizable identity
- Lack of formal genetic improvement
- Associated with traditional farming systems

- Associated with the traditional uses, knowledge, habits, dialects, and celebrations of the people who developed and continue to grow it (Negri, 2005)
Methodology: landrace definition cont’d

- Distinction between a ‘landrace’ *sensu stricto* and a ‘traditional variety’ or ‘old variety’ is not always clear-cut
- Keep an open definition to capture as wide a range of vegetable diversity in the inventory as possible
- Most importantly, we need to know:
  - Where landraces are grown
  - Who is maintaining landraces

Regardless of whether the crop is considered a landrace *sensu stricto*
**Methodology: database design**

**Database structure:**

- Crop maintainer *(name, contact details, business or private, interest in conservation etc.)*
- Crop nomenclature *(scientific name, vernacular name, approved maintenance etc.)*
- Socio-economic data *(crop use, type, hectarage, source, country of origin, time grown, qualities etc.)*
- Site geographic data *(coordinates, descriptive location using NUTS and ISO standards)*
**Methodology:** database design cont’d

**Database structure cont’d:**

- Site environmental data (elevation, landform, aspect, soil texture, drainage, pH etc.)
- Crop cultivation (sowing/harvesting dates, irrigation, fertilizers, pesticides, propagation, selection criteria etc.)
- Crop conservation status (ex *situ* and *in situ* conservation status)
Methodology: strategy for accessing landrace information

- Information sources:
  - PGR experts, governmental documents, NGOs, commercial companies, genebanks, websites, literature, and landrace maintainers

- Key sources of existing data:
  - ‘B’ List of the United Kingdom National Lists of Varieties of Vegetable Plant Species (mainly traditional varieties in existence pre-1970s)
  - UK genebanks with major vegetable collections: WHRI, SASA, HSL, JIC
Methodology: strategy for accessing landrace information cont’d

• Novel landrace data:
  – Registered varieties (who is growing them, where, on what scale, under what environmental conditions etc.)
  – Unregistered varieties (may or may not already be maintained *ex situ*)

• Methods used to access novel data:
  – Media releases
  – Advertisements
  – A questionnaire
  – Internet searches
  – Email correspondence and telephone calls
  – Face to face meetings
Methodology: strategy for accessing landrace information cont’d

- **Media coverage:**
  - Media releases from UOB and WHRI
  - Editorial and advertisements in key agricultural and horticultural periodicals (e.g., Farmers’ Weekly, Horticulture Week and The Vegetable Farmer), plus the Grower Bulletin
  - Local newspapers in key vegetable growing regions
  - Radio 4 (Farming Today)
Methodology: strategy for accessing landrace information cont’d

• **Questionnaire:**
  - Simple design to collect the minimum data needed for the landrace inventory
  - Available as hard copy and online
  - Meets requirements of the Data Protection Act 1998
  - Approved by the Defra Survey Control Liaison Unit
  - Advertised in key agricultural and horticultural periodicals
  - Made directly or indirectly available to at least 1000 recipients (including ‘B’ List maintainers, other commercial companies, various grower associations and networks)
Methodology: strategy for accessing landrace information cont’d

- Internet, email, telephone and meetings:
  - Extensive internet searches
  - Contact with a wide range of organizations and individuals by email and telephone
  - Pre-arranged face to face meetings and impromptu interviews (e.g., at seed-swap events)
Results: ‘B’ List vegetable varieties

295 varieties of 30 vegetable crops listed in the ‘B’ List of non-hybrid origin

- 4 crops – 35%
- 9 crops – 44%
- 17 crops – 21%
Results: ‘B’ List variety maintainers

- 40 companies listed as maintainers of B’ List varieties
- 20 based in the UK (including SASA)
- 15 based in other European countries
- 2 in Japan and 3 in the USA
- Some non-UK based companies have agents in the UK
Results: ‘B’ List vegetable variety maintainers cont’d

A recent review of the ‘B’ List revealed that some former maintainers had either gone out of business or no longer wanted to maintain the varieties. SASA took on maintenance of the varieties for which they had samples in the reference collection.

SASA maintains 41% of the 295 vegetable varieties of non-hybrid origin in the ‘B’ List

- E.W. King and Co. Ltd. – 24%
- A.L. Tozer Ltd. – 10%
- W. Robinson & Sons – 4%

Remaining 26% maintained by 27 companies
Results: ‘B’ List variety maintainers cont’d

- Some companies are only listed as official maintainers of one or a few ‘B’ List varieties but also maintain other ‘B’ List varieties for which they are not listed as official maintainers (e.g., Church of Bures)

- Conversely, E.W. King & Co. Ltd. are official maintainers of 70 ‘B’ List varieties, not all of which are now commercially viable—they continue to maintain some varieties that they no longer produce commercially in trial plots (P. Miller, E.W. King & Co. Ltd., pers. comm., 2009)
Results: ‘B’ List variety maintainers cont’d

- Much wholesale seed production is contracted out to overseas companies
- E.W. King & Co. Ltd. contracts out most seed production to overseas companies in other parts of Europe and in Asia and South America; stock seed is maintained in the UK in small plots—selection is carried out in the UK and mother seed is sent to growers overseas for regeneration
- Church of Bures (Suffolk) still produce the majority of their seed within the UK (in Norfolk, Essex, Suffolk and Cambridgeshire)
- Market sectors for wholesale seed:
  - Small packet seed companies
  - Small commercial growers
  - Home gardeners and allotment-holders
  - Agricultural production in low economy countries

Cheaper seed, good taste, disease resistance, tradition, no gluts
Results: UK genebank holdings

244 UK landrace varieties of 28 crop species identified in 3 UK genebanks: WHRI, SASA and HSL
Results: Small-scale commercial companies

• At least 1000 unregistered vegetable varieties are being sold in the UK (J. Edgeley, Defra, pers. comm., 2009)

• Are these of interest? Yes, if they are of UK origin or imported varieties being subjected to grower selection and seed saving in the UK—especially those that have been maintained here for a significant period

• Many small-scale commercial seed companies maintaining landrace diversity (e.g., Thomas Etty Esq., Seeds by Size, The Real Seed Catalogue, Roguelands Vegetable Seeds Company, Carroll’s Heritage Potatoes) (small seed packet market)

• Some seed production contracted out to overseas companies; for example, Thomas Etty Esq. contracts out to companies in other parts of Europe and N. Africa (R. Warner, Thomas Etty Esq., pers. comm., 2009)
Results: NGOs and individual farmers

• Many networks and groups maintaining vegetable landraces; including:
  – Garden Organic and HSL Seed Guardians
  – Biodynamic Agricultural Association
  – Dyfi Valley Seed Savers
  – Seedy Sunday
  – National Association of Allotment Gardeners

• Individual farmers:
  – F. Watkin & Son (Suffolk)
  – B. Lever (Cambridgeshire and Norfolk)
  – P. Brinch (E. Sussex)
  – E. Cormack (Dorset and Hampshire)
  – Elderly potato farmer (Gloucestershire)
Conclusions: challenges in accessing landrace information

- Landrace identification in UK genebanks
- Different people have different definitions of landraces
- Crop variety name is not a reliable indicator of its source
- Country of origin does not necessarily mean a landrace was developed in the UK
- Commercial sensitivity and concerns about legal repercussions over unregistered varieties
- Insufficient time and resources for businesses to respond

These challenges are not insurmountable! Lessons learned from this pilot study can be used to inform future research.
Conclusions: landrace loss and new beginnings

• We know that many old landraces have been lost, mainly due to replacement with modern, high-yielding varieties—it is not known how many

• Commercial varieties are still being discontinued (e.g., E.W. King & Co. Ltd. – c. 20 traditional vegetable varieties discontinued in recent years because of competition from overseas companies as well as a fading market) (P. Miller, E.W. King & Co. Ltd., pers. comm., 2009)

• However, much vegetable landrace diversity is still being maintained in the UK

• Resurgence in interest in growing traditional varieties and in grower-based breeding amongst both amateur and professional growers—new landrace diversity in the making!
Conclusions: looking ahead

- A comprehensive inventory of UK vegetable (and fruit) landraces is critically needed to provide the baseline data needed to initiate appropriate conservation action.
- Inventorying who is maintaining landraces is probably as important as inventorying the crop varieties themselves.
- Most growers of landraces are interested in their long-term conservation and keen to be involved in this research.
- Opening and maintaining dialogue with key groups and individuals will be critical for the effective, long-term conservation of landrace diversity.
Conclusions: looking ahead cont’d

- Further collection of landrace diversity is needed to ensure representative samples are maintained *ex situ*.
- Fresh samples of existing varieties should be collected where possible in order to capture genetic adaptation.
- Some old varieties are being improved through grower-based selection and seed-saving—these should be collected to enhance existing collections.
- The initiation and implementation of a landrace protection scheme in England and Wales, following the model used in Scotland (the Scottish Landrace Protection Scheme), would help to open and maintain dialogue between growers and genebanks, and ultimately in the conservation of landrace diversity.
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Thank you for listening!