

Vegetable landrace inventory of England and Wales: information bulletin

July 2009

Recent studies (primarily focusing on cereal and forage crops) have shown that there is a significant wealth of landrace diversity in the UK but that it is often highly geographically localized and threatened with extinction. Current knowledge of vegetable landrace maintenance throughout the UK is however limited; therefore, the project, 'Vegetable landrace inventory of England and Wales' was conceived to initiate an inventory of English and Welsh vegetable landrace diversity as a step towards understanding what needs to be done to secure this agrobiodiversity resource for the benefit of future generations. This bulletin summarizes the objectives and key findings of this project.



Paul Watkin

Why a vegetable landrace inventory?

Over the last century, UK agriculture has undergone a sea change. In the early 1900s, agriculture was mainly based on traditional cultivation systems, where most of the inputs and products (including seed) came from the farm itself; now, the many genetically diverse crop varieties (or landraces) that were once grown have been largely replaced by fewer uniform commercially bred cultivars, which now dominate agricultural production. The extent of loss of crop genetic diversity associated with the loss of landraces is difficult to quantify accurately, but we do know that both worldwide and in Europe there has been a massive loss of named landrace varieties that is thought to equate to a significant loss of crop genetic diversity. This erosion of our agrobiodiversity resources, which may be critical for future food security, has been recognized in a number of international legal instruments, including the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). As a signatory to these treaties, the UK has an obligation to take steps to secure the full range of its plant genetic resources for food and agriculture (PGRFA), including the diversity of landraces. However, until we know what is being grown, by who and where, we cannot begin to

put in place strategies to ensure the continued maintenance and availability of UK PGRFA. We need a national landrace inventory to provide the baseline data to identify conservation needs, enact systematic conservation, monitor change and enhance landrace use in meeting changing market demands and promoting UK food security.

Collating landrace information

Gathering information about landraces presents a number of challenges; including people's differing definitions of 'landrace' (see Box 1), uncertainties over crop origin, commercial sensitivity, and maintainer resource and/or time-limiting factors. Despite these challenges, much useful information was collated from a wide range of sources, including existing data sets from four UK seedbanks that are central to the maintenance of landrace diversity *ex situ*, and traditional vegetable varieties included in the UK National Lists of Vegetable Varieties, 'B' List. Novel data were collated following media releases and advertisements, and by using a questionnaire, internet searches, email correspondence, telephone calls and face to face meetings, capturing a broad range of interest groups, companies and individuals.

Box 1. What are landraces?

The precise definition of a landrace has been debated, researched and written about for many years. Recently, Camacho Villa *et al.* (2006) proposed that a landrace should have some (but not necessarily all) of the following characteristics: historical origin; high genetic diversity; local genetic adaptation; recognizable identity; lack of formal genetic improvement; and an association with traditional farming systems. A further characteristic proposed by Negri (2007) is that a landrace is "associated with the traditional uses, knowledge, habits, dialects, and celebrations of the people who developed and continue to grow it". In the current project, we used a broad definition of a landrace to be as inclusive as possible and recognizing that there is not always a clear defining line between a 'landrace' *sensu stricto* and a 'traditional variety' or 'old variety', nor between crops grown on a subsistence basis or on a small scale for local commerce or seed production.

Because landraces are genetically heterogeneous, they are an important agrobiodiversity resource (both as crops in their own right and as sources of useful traits for crop improvement) and will be particularly important for adapting to climate change and new environmental conditions.

Pictured above: 'Throws' winter field bean (*Vicia faba* var. *equina*), which has been self-saved by F. Watkin & Son for forty years or more on their farm in Suffolk.

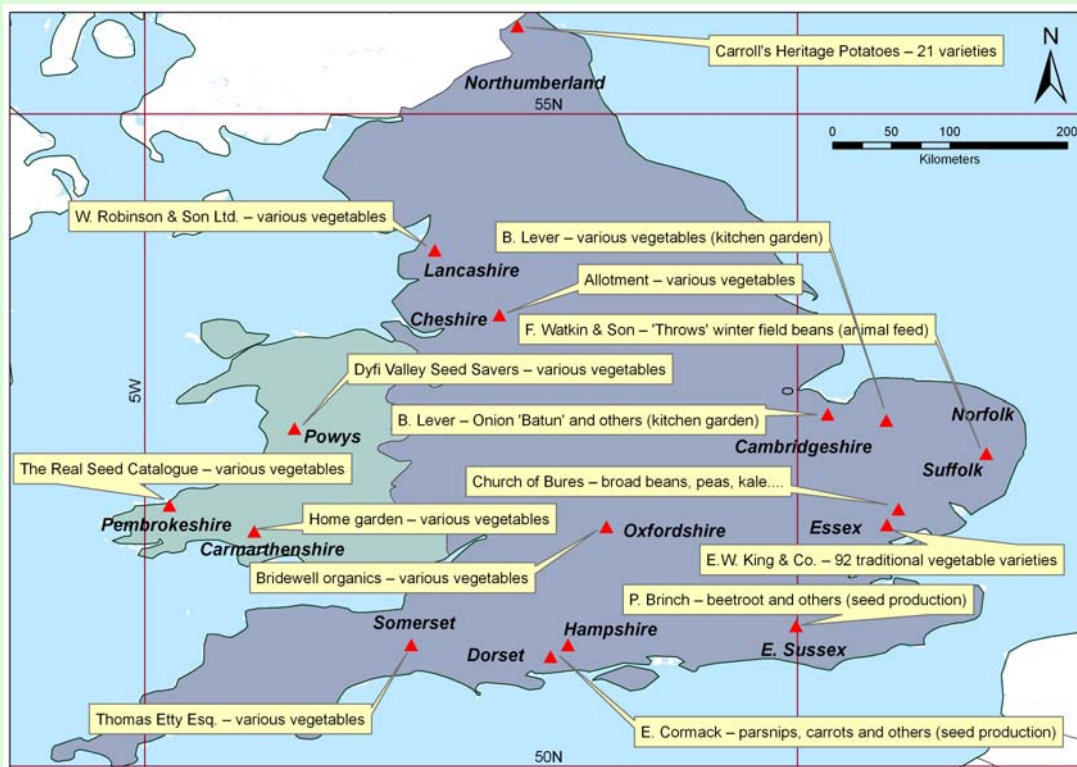


Figure 1: Commercial companies, NGOs and individuals maintaining vegetable landrace diversity in various locations of England and Wales. Note that the location indicated for Church of Bures is not the actual location where the crops are maintained—the company maintains vegetable varieties in four counties: Suffolk, Essex, Norfolk and Cambridgeshire.

Who is maintaining vegetable landraces?

A range of *in situ* maintainers of English and Welsh vegetable landrace diversity were identified, including commercial seed and vegetable companies, non-governmental organizations (NGOs), individual farmers, allotment-holders and home gardeners (see Figure 1 for examples).

Commercial seed companies notable for the maintenance of vegetable landrace diversity in England and Wales include E.W. King & Co., Church of Bures and W. Robinson & Son (who have each been trading for over 100 years), Thomas Etty Esq., Seeds by Size, The Real Seed Catalogue, Roguelands Vegetable Seeds Company and Carroll's Heritage Potatoes. While some companies contract seed production to overseas companies, stock plants are maintained in the UK and mother seed is selected from this stock. W. Robinson & Son is notable for maintaining all the traditional varieties they sell (including seed regeneration) at the business location in Lancashire.

Examples of NGOs important for the maintenance of landrace diversity in England and Wales include:

- Garden Organic's Heritage Seed Library www.gardenorganic.org.uk/hsl – conserves and makes available vegetable varieties that are not widely available.
- The Biodynamic Agricultural Association www.biodynamic.org.uk – biodynamic agriculture and gardening relies on the use of traditionally developed vegetable varieties.
- Dyfi Valley Seed Savers www.dyfivalleyseedsavers.co.uk – (see Box 2).
- Seedy Sunday www.seedysunday.org – the UK's biggest annual community seed swap, which includes talks, demonstrations and films on saving and growing seed, as well as on wider issues such as local food and biodiversity.
- The National Society of Allotment and Leisure Gardeners www.nsalg.org.uk – many allotments have been established for several decades and there is a long-standing tradition of swapping and sharing seed amongst growers. Allotments are also important from the point of view of the diversity of ethnic origins and cultures of the people that tend them because this diversity is likely to lead to a greater diversity of crops and varieties that are maintained and developed by growers in the UK.
- Garden Organic www.gardenorganic.org.uk – dedicated to researching and promoting organic gardening, farming and food.

Box 2. Dyfi Valley Seed Savers

Based in Powys, Wales, Dyfi Valley Seed Savers are searching for and maintaining vegetable varieties that are special to Wales. Their aim is to bring together a collection of Welsh varieties, record their characteristics and history and make the seed available to gardeners across the country. Varieties include those that have grown well in Wales for generations, the products of back-yard plant breeding and traditional varieties with stories in their name. They encourage growers to carry out seed trials to increase the number of seeds available and to test varieties for their growing and eating qualities. Seedy Sunday and Seedling Saturday events are organized as a means of distributing the seed more widely.

A recent variety they have been trialling and multiplying is climbing French bean 'Melbourne Mini' (Figure 2).

Dyfi Valley Seed Savers is run by volunteers. For more information, visit: www.dyfi-valley-seed-savers.co.uk

A number of individual farmers maintaining vegetable landraces have also been identified, indicating that there is still significant vegetable landrace diversity maintained by farmers throughout England and Wales. Two of these farm to produce Demeter certified seed, which requires full compliance to organic standards and is recognized by Defra as an organic certification body (see www.biodynamic.org.uk/demeter/certification). F. Watkin & Son are notable for the maintenance of a winter field bean variety, which they have self-saved for forty years or more on their farm in Suffolk (Figure 3). While the crop is grown for fodder, and is therefore classed as an agricultural crop, it is closely related to broad bean (*V. faba* var. *faba*) and is therefore important as a vegetable landrace resource because it has potential for use in crop breeding programmes. It is thought that the variety originated from Throws Farm in Essex—the original variety may have been 'Throws M.S.', which was the first synthetic (blended) commercially available winter faba



Nigel Maxted

Figure 3: Paul and Tobias Watkin on their farm in Suffolk where they grow 'Throws' winter field bean (*Vicia faba* var. *equina*) (pictured). They are also notable for maintaining traditional cereal varieties, including wheat 'Squarehead Master', used for thatching.

bean cultivar, which was constituted from four parent stocks from farms in Essex and Scotland. However, the original source of this crop is academic as not only was it a blended cultivar at the start, it has further crossed within itself and with other varieties in adjoining fields for many crop generations.



Sophie Halastock

Figure 2: Climbing French bean 'Melbourne Mini' trial carried out by Dyfi Valley Seed Savers.

Vegetable landraces in UK seedbanks

Four UK seedbanks are primarily responsible for the maintenance of English and Welsh vegetable landrace diversity—the Heritage Seed Library (HSL), the John Innes Centre (JIC – notable for pea and bean collections), Science and Advice for Scottish Agriculture (SASA) and Warwick HRI's Vegetable Genebank (WHRI). Collectively, they are responsible for the maintenance of seed samples of at least 327 vegetable landraces; however, we know that the actual number is higher because at present not all landrace samples are distinguished as landraces in their data management systems. Work is currently in progress to ensure that all landrace material is identified.

Seedbanks not only play an important role in the conservation of plant diversity, but also in providing access to material for research and crop improvement (although not all material stored is available for use, depending on its source). Activities that have proved very successful include open days for growers and breeders at JIC where they can view crop varieties in trial plots and learn about their characteristics and potential use, and the initiation of the Scottish Landrace Protection Scheme (SLPS) by SASA, which provides back-up seed samples that can be made available to the grower should they need it (e.g., in case of crop failure or seed loss). The scheme is currently in place for populations of Shetland Cabbage, Bere barley, small oat and Hebridean rye (see www.scottishlandraces.org.uk), but could gradually be extended to include other landraces and taken forward by other seedbanks.

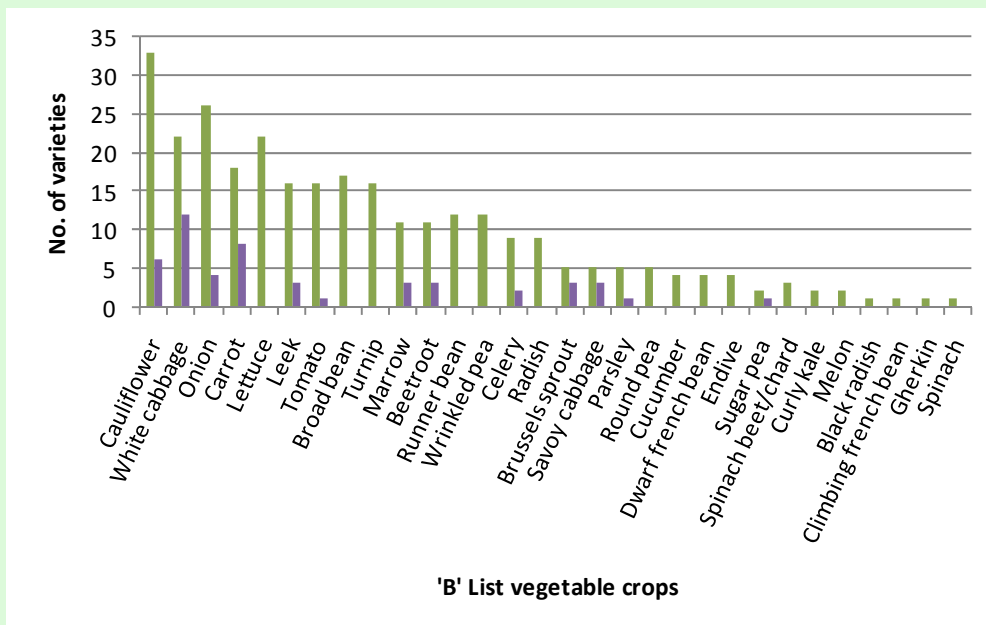


Figure 4: The number of ‘B’ List varieties per vegetable crop, showing listed varietal names in green and approved maintenances in purple. Crops are shown with the highest number of varieties overall on the left to the lowest number on the right.

How many English and Welsh vegetable landraces are there?

The answer to this question is we currently don’t know and may never be able to give a precise estimate, partly because some varieties are marketed or grown under different common names, but also because gaining access to information about who is growing landraces is hampered by a number of challenges, as highlighted earlier. However, if we are to retain this national resource, we need to continue to build the inventory and gradually increase our knowledge of the diversity that exists before it is lost forever.

We do know that there are currently 345 landraces included in the UK National Lists of Varieties of Vegetable Plant Species ‘B’ List (see Box 3 and next section). However, small seed packets of a number of other landraces are also available in the UK. However, of these, we do not know how many are unique rather than simply synonyms of the same varieties.

The Vegetable ‘B’ List

Of the 345 landraces included in the ‘B’ List, the highest numbers of varieties are listed for cauliflower, white cabbage, onion, carrot and lettuce (each with more than 20 varieties, accounting for 44% of the total). Nine crops (leek, tomato, broad bean, turnip, marrow, beetroot, runner bean, wrinkled pea and celery) each have 11–19 varieties listed, accounting for 38% of the total, and the remaining 16 crops account for 18% of the varieties, each with 1–9 varieties listed (Figure 4). The crop species with the highest diversity represented in terms of the number of varieties is *Brassica oleracea* with a total of 91 varieties of cauliflower, white cabbage, Brussels

sprout, Savoy cabbage and curly kale, collectively—a significantly higher number than any other crop species.

Forty companies are listed as maintainers of ‘B’ List vegetable varieties; however, only 20 of these are based in the UK (18 in England and two in Scotland—one of

Box 3. The UK Vegetable ‘B’ List explained

The Vegetable ‘B’ List is the section of the UK National Lists of Varieties of Vegetable Plant Species (a register of varieties of the main vegetable species which are eligible for certification and marketing in the UK) that deals with the marketing of older varieties—it mainly comprises varieties that were in commerce before the inception of the National Lists of Vegetable Varieties in 1973, although some varieties were added at later dates. While the ‘B’ List includes some hybrid varieties, the majority of varieties are of landrace origin or can be classed as traditional varieties. The list includes varieties listed as ‘approved maintenances’, which are different landraces within a broad type represented by the listed varietal name.

The European Commission compiles Common Catalogues of varieties on the National Lists of EU Member States which are eligible for certification and marketing throughout the EU.

To be added to the National Lists of Varieties of Vegetable Plant Species, a variety must be distinct, uniform and stable (DUS); however, ‘B’ List varieties known prior to the creation of the National Lists were not subject to formal DUS testing. Tests for adding varieties to the UK National Lists are undertaken at three centres. SASA, based in Edinburgh, is the UK test centre for vegetables and maintains variety collections for this purpose.

The National List Regulations require that a listed variety is maintained by at least one person or company who can maintain the variety according to accepted practices.

For further information visit:

www.fera.defra.gov.uk/plants/plantVarieties/nationalListing

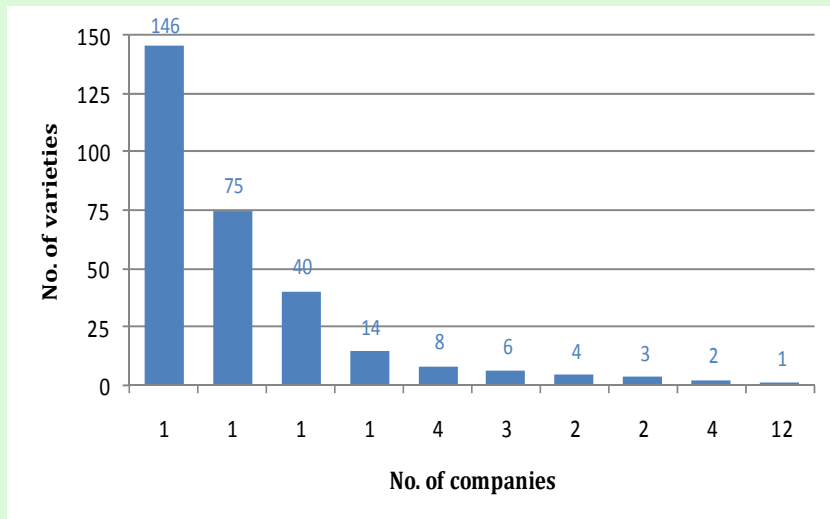


Figure 5: Company share of the maintenance of 'B' List non-hybrid varieties, showing SASA as the maintainer of 42% of varieties at one end of the scale, and 12 companies each officially maintaining only one variety at the other.

Pictured over page: Peter Brinch on-farm in East Sussex, where he grows crops to produce Demeter Certified seed. The crop pictured is beetroot 'Cheltenham Green Top', which has a good taste, is high yielding, and stores well both in the ground and post-harvest.

which is SASA). A recent major review of the 'B' List revealed that some former maintainers had either gone out of business or no longer wanted to maintain the varieties and this has resulted in a major change in responsibilities regarding the official maintenance of the remaining varieties, with SASA taking on the maintenance of a significant proportion (the organization currently maintains 42% of the varieties of non-hybrid origin).

Of the commercial companies that maintain 'B' List varieties, E.W. King and Co. Ltd. maintains the highest number (75), while A.L. Tozer Ltd. and W. Robinson & Sons are notable for maintaining a large proportion (40 and 14 varieties, respectively). Eighty-four varieties are maintained by 27 companies, each responsible for maintaining between one and eight varieties (Figure 5).

While some companies are only listed as official maintainers of one or a few 'B' List varieties, they may also maintain other 'B' List varieties for which they are not listed as official maintainers. For example, Church of Bures is only listed as an official maintainer of two 'B' List varieties; however, the company also maintains (through commercial production) other varieties in the 'B' List for which it is not an official maintainer. Conversely, E.W. King & Co. Ltd. is an official maintainer of 75 'B' List varieties, not all of which are now commercially viable. However, recognizing the conservation value of these varieties, the company continues to maintain some of them in trial plots. It is notable that since 2006, E.W. King and Co. Ltd. has discontinued 14 'B' List varieties and this is reported to be largely due to competition from overseas companies producing and selling seed for the UK market at a more competitive price. Although these varieties are maintained in seedbank collections, the reduction in the number of traditional varieties offered by seed companies such as E.W. King & Co. equates to a loss of local diversity when the company decides to cease maintenance of the varieties altogether.

Growers' reasons for maintaining landraces

Knowledge of the socio-economic reasons underlying landrace maintenance (as well as related information such as the origin of the crop material, the length of time grown and whether seed is exchanged with other growers) is critical to develop strategies for their conservation. As part of this study, we looked at the qualities assigned to landraces and found that of the specific use categories, the highest number of varieties was recorded for good taste (26%), followed by historical interest/tradition (15%), high yield (13%), strong market demand (3%), good storage (2.5%), disease resistance (2.5%) and pest resistance (1%). The remaining 37% were assigned other qualities, which included good texture, winter hardiness, early cropping, good for exhibition, attractive/interesting colour, long roots and long pods.



Chloe Ward

Pictured above: Vegetable plot at the Centre for Alternative Technology in Wales, showing French bean 'Melbourne Mini' and runner bean 'Tad Cu's' growing in the background.

Conclusions

We are already armed with the knowledge that many old landrace vegetable varieties have been lost—mainly due to replacement with modern, high-yielding varieties—although it is not known exactly how many because there is no consolidated historical list. While the loss of a named variety does not necessarily imply an associated loss of genetic diversity (due to potential synonymy), in the absence of solid evidence (i.e., results of genetic diversity analyses to compare genetic diversity between varieties), we have to assume that to some degree, loss of named varieties will equate to some loss of genetic



Pupak Haghighi-Brinch

diversity. This is essentially the catalyst for the landrace inventory because unless we create an inventory of the diversity present in England and Wales and across the whole of the UK now, we will not be able to monitor their continued maintenance to ensure that no further diversity is lost.

The known loss of landrace diversity in the past and knowl-

edge that varieties continue to be added to the obsolete list at the present time are stark reminders that action is required now to secure as much remaining diversity as possible. Critically, this research has highlighted the fact that while the genetic diversity of our vegetable crops may have been impoverished through the loss of many traditional varieties in the past—diversity that is irreplaceable—new variation is now being created through grower-based breeding. This may be as a result of deliberate or passive variety improvement through repeated cycles of selection and seed-saving or occasionally through accidental or deliberate cross-pollination leading to the production of a new variety. Therefore, while the loss of old varieties and the irreplaceable diversity that has gone with them is of concern, we may now be in a new period of expansion of locally-based vegetable crop diversity as a result of a strong resurgence in interest in growing traditional varieties and in grower-based breeding amongst both amateur and professional growers—the formal sector needs to work with the maintainers to put in place strategies to capture this diversity, as well as nurturing the culture that is responsible for creating and maintaining it.

Recommendations

As a result of this research, a number of recommended actions have been put forward that will be necessary to secure the diversity of UK vegetable landraces as an agrobiodiversity resource for future food security, as well as a vital component of our biodiversity and cultural heritage. In summary these are:

- Establish and maintain a comprehensive inventory of UK vegetable (and fruit) landraces;
- Improve and standardize the management of landrace data;
- Establish and maintain a list of landrace maintainers and key contacts;
- Open and maintain dialogue with key groups and individuals;
- Initiate a landrace protection scheme in England and Wales based on the Scottish model;
- Enhance *ex situ* landrace collections;
- Stimulate landrace use by plant breeders;
- Carry out research into landrace diversity in the context of climate change;
- Educate and raise public awareness of local landrace diversity;
- Review opportunities for supporting landrace cultivation through policy and legislative instruments.

Acknowledgements

This information bulletin is based on a report by Kell *et al.* (2009). We would like to acknowledge Defra for funding this project. The authors are also indebted to the many people who supported this project with ideas, advice, data, contacts and practical assistance. A full list of acknowledgements and further details about this research can be found in the project report, which can be downloaded from the UK's Information Portal on Genetic Resources for Food and Agriculture at: www.grfa.org.uk/publications/plants



References

- Camacho Villa, T.C., Maxted, N., Scholten, M. and Ford-Lloyd, B. (2006) Defining and identifying crop landraces. *Plant Genetic Resources* 3(3): 373–384. DOI: 10.1079/PGR200591
- Kell, S.P., Maxted, N., Allender, C., Astley, D., Ford-Lloyd, B.V. and contributors (2009) Vegetable Landrace Inventory of England and Wales. The University of Birmingham, UK. 117 pp.
- Negri, V. (2007) Towards a more comprehensive definition of 'landrace' than currently published. In: Del Greco, A., Negri, V. and Maxted, N. (compilers) *Report of a Task Force on On-farm Conservation and Management, Second Meeting, 19-20 June 2006, Stegelitz, Germany*. Bioversity International, Rome, Italy. Pp. 20.