Pioneering Urban Agroecological Research with Citizen Science

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The Henry Doubleday Research Association (HDRA), now known as Garden Organic, was established as a UK charity in 1958 by Lawrence Hills. From the outset the aim was to conduct scientific research that could 'improve and encourage horticulture and agriculture generally' (stated as object 1 of Henry Doubleday Research Association). With very limited funds, the idea was that simple experiments would be conducted by the members in their own gardens and the results sent back to be collated and published in the quarterly Newsletter of the association.

The organisation was very much conceived as an association of individuals that would explore, trial and share knowledge about 'alternative' farming or gardening techniques. Lawrence Hills was strongly motivated to challenge what he perceived as 'orthodoxy' or 'authority' by using experimentation to challenge the type of industrialised food production that was being developed after World War II. He was a key pioneer of the organic movement alongside Lady Eve Balfour and Sir Albert Howard.

In the early years, when there were only a few hundred members, there were regular participants working in one or more 'teams' that each tackled a particular issue: *Russian Comfrey* (differences in varieties, productivity and value as a stock feed, as a soil improver or in medicine), *Pest Control Without Poisons* (the benefits of various plants, particularly *Tagetes*, on pests and diseases), *Composting and Green Manures* (techniques of composting , effects of applications and the use of different green manure species), *Freak Plants* (looking for possibly useful abnormal plants that may have resulted from nuclear testing then being carried out). Over the years these themes became less clearly defined as the range of research undertaken increased but in broad terms they have been continued until the present day (Figure 1).

Since the beginning, between three and ten members' experiments have been conducted each year (sometimes repeated in successive years) – more than 500 experiments in all. Some ran in collaboration with other organisations (such as universities or commercial companies) and some have been used as the foundation for more formal scientific studies. Experiments to investigate various aspects of pest control have been the most common, particularly so in the early years. In the last fifteen years there has been an increase in the number of experiments concerned with novel crops, wildlife surveys and socio-economic aspects (e.g. surveys of garden productivity and vegetable buying habits). At present there are usually between 100 and 300 participants in each experiment – mainly private individuals but also schools and community groups. Clearly defined instructions are provided (together with seeds or other specialist materials) and there are either paper or on-line forms to complete to record the results.

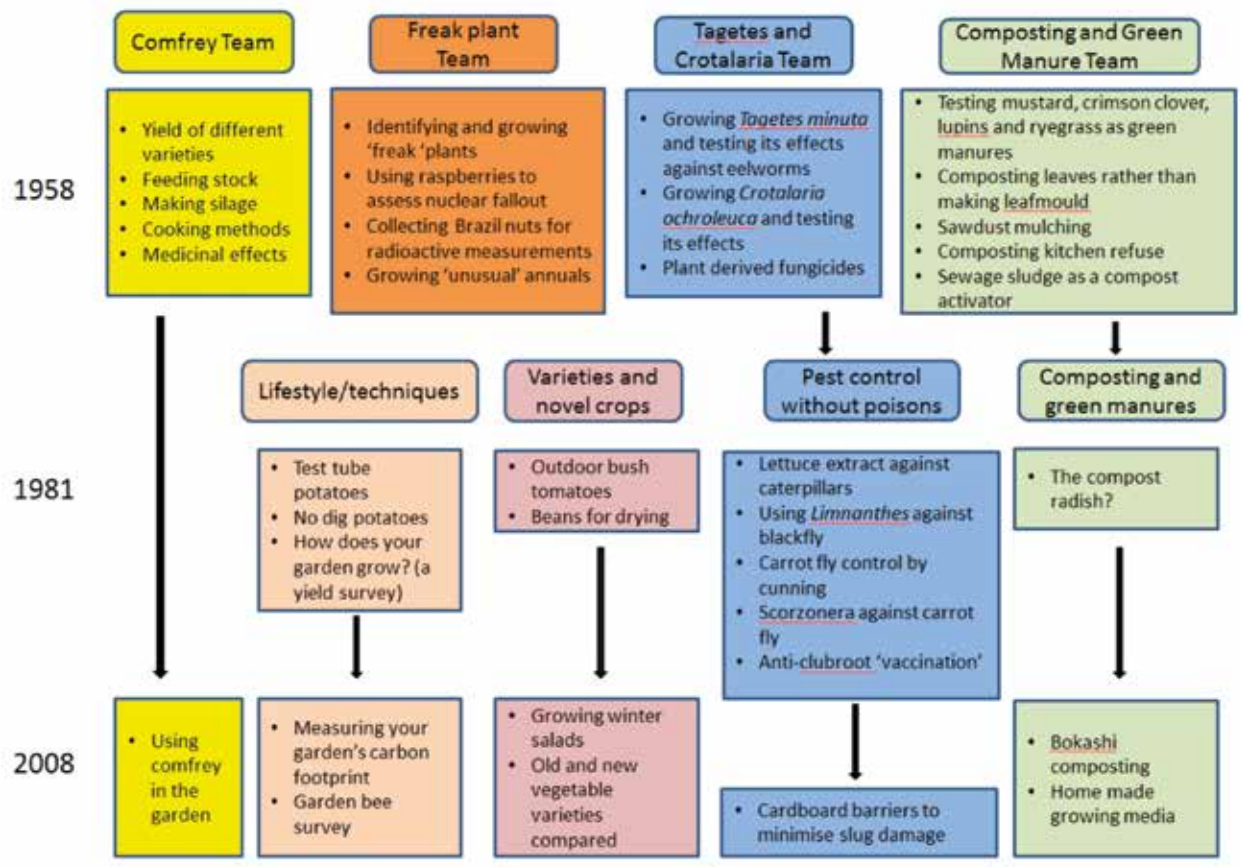
The results have always been published, primarily for the benefit of the members, in the organisation's Newsletters (now known as *The Organic Way* magazine). Initially individual accounts were reported verbatim, with little statistical analysis or objective evaluation. This approach

Garden Organic today

After 60 years, Garden Organic is still supporting individuals and communities today across the UK in developing important horticultural skills based on the principles of organic growing. Garden Organic is home to the Heritage Seed Library, a unique living collection of over 800 endangered vegetable varieties, safeguarded from extinction and shared with growers nationwide. They also work to preserve exotic crops through the Sowing New Seeds project, bringing communities together through sharing and growing crops, which they have brought to the UK from around the world.

The Master Composter and Master Gardener programmes engage expert volunteers to mentor and support novice growers and help them to compost effectively. The Food Growing Schools: London project is a diverse project that engages children practically across the spectrum from food growing to cooking and turning the produce into higher value items. The project start coincided with the changes to the Government school food policy, and it became an important tool to enact the cooking in the curriculum requirements of the new policy. Garden Organic has also developed a number of project within vulnerable and food insecure communities (in Warwickshire and Southwark), where gardening and mentoring schemes have helped to identify food insecurity that goes below the radar, or tackled health and wellbeing through horticultural therapy.

Figure 1. *Examples of Member's Experiments in each of the key themes carried out at different times in the organisation's history.*



was harder to maintain as the numbers of members and participants increased. Later, with the employment of dedicated research staff, the results were better summarised and the conclusions more clearly identified. One of the aims of the work was to establish firm foundations for advice concerning organic gardening techniques and to dispel unfounded 'myths'. Many of the findings were incorporated in popular books written by Lawrence Hills and then subsequently by other authors working for the association (e.g. Stickland and Pears). With Lawrence Hills background in journalism (gardening correspondent of The Observer 1958-66 and of Punch 1966-70), the findings were also very successfully disseminated to audiences outside the organisation, via regular columns in gardening magazines and broadsheet papers and also via Britain's first organic gardening television series *All Muck and Magic* broadcast by Channel 4 in the late 1980s and through practical demonstration in the organisation' gardens open to the public. As a result, the experiments really underpin many organic gardening and growing techniques commonly used today. The information provided an important source of guidance, not only for organic gardeners, but notably also for many of the first commercial growers who started to grow organic vegetables on a field scale.

The participatory approach of the research has clearly benefitted and influenced organic gardening in practice over the years, offering an active approach to knowledge transfer and often a very immediate uptake of research findings. In a recent questionnaire, many of the experimenters participating in the scheme reported that their involvement had often had a direct impact on what they grow and how they manage their gardens. Example quotes from the respondents included:

'Yes, the experiments influence the way I garden- the use of comfrey fertiliser, mulches, composting techniques and pest resistant varieties are some examples'.

'This year my leeks had leek moth. Having done the experiment, I knew to cut the leeks down. They have re-grown'.

'I now look more closely at bees, bumble bees and butterflies'.

'One year there was a slug count. I became more aware of the different kind of slugs and their habits and I now don't feel it is necessary to destroy every single slug in sight'.

'Taking part in the experiments have made me realise to what extent all gardening is in fact a series of in vivo experiments... I am now more likely to compare two things and see what works best'.

From the 1990s onwards, increased external funding for research allowed the organisation to also conduct more 'formal' scientific research, often to develop agroecological ideas and techniques originally explored as Member's Experiments, for example, to examine the effect of winter green manures on soil nutrient dynamics. Whenever

Examples of some recent experiments

Shark's fin melon as a novel crop (2012). *Cucurbita ficifolia gets its name because the flesh of the large fruits can be made into a broth resembling the texture of shark's fin soup. Seeds were obtained as part of the Sowing New Seeds project (which was set up to encourage the growing of exotic crops in the UK). The experiment was run to find out how well the plants grew in different areas of the UK and how worthwhile the melons were as a cooked vegetable. Almost all the experimenters found it to be a very vigorous and productive plant, although many found it to be unpalatable.*

Ecological footprinting of gardening (2007 and 2008). *This experiment took the form of a survey to evaluate how much CO^2 was generated by the members' eating habits and their gardening activities, considering both the resources used and how much food was produced. Growing at home could reduce the carbon footprint associated with fruit and vegetable consumption by 13% although frozen storage could have a significant impact.*

Bumblebee survey (2013). *One of the aims of this project was to raise awareness of the importance of bumblebees in urban areas and to find out which food plants were important to them. Even plants that appear popular with a large number of bumblebee species may be avoided in preference for other plant species when these are available – emphasising the value of diverse planting schemes. This work led to the development of the Blooms for Bees project: www.bloomsforbees.co.uk*

Blight resistant tomatoes (2011 and 2012). *Phytopthora infestans causes 'late blight' in both potatoes and tomatoes. This experiment was run in collaboration with the Savari Research Trust and ProVeg seeds to evaluate the performance of newly bred bush varieties of tomatoes. Participants were also encouraged to send in samples of diseased leaves for genetic analysis to help map the incidence of different blight strains across the UK.*

Biochar as an amendment to enhance soil fertility (2014). *The addition of biochar (charcoal) to soil can have beneficial effects on fertility and has been advocated as a way to mitigate climate change. However, its use is controversial and this experiment, run in collaboration with Oxford Biochar, was designed to evaluate its applicability in a gardening situation. Participants were supplied with biochar and seeds of suitable test crops.*

Compostable packaging (2015). *In recent years there has been an increase in packaging labelled as 'compostable'; the aim of this experiment was to find out how well a range of products decomposed in typical domestic compost heaps. Plates made form bagasse composted well but forks made form plant based materials did not and there were very variable results with caddy bags. The official 'home compostable' label was not found not give an obvious indication of how well materials actually broke down in practice.*

possible the research still employed participatory approaches, but working primarily with commercial organic producers growing fruit and vegetables on a field scale. This resulted in close links with a number of universities and research institutes, particularly with Coventry University which went on to establish the Centre for Agroecology, Water and Resilience in 2014.

As a well-established citizen science programme, the Members Experiments has provided a structure for investigation by individuals and groups, particularly schools. In addition to generating new knowledge, this pioneering research programme has continued to have an important role for Garden Organic in terms of enabling active engagement with members and to promote interactive learning.

The combined results and achievements of the citizen scientists have provided a firm base for organic gardening practice as we see it today, and as a social movement with its values firmly embedded in the wider principles of organic agriculture - the principles of health, ecology, fairness and care- it is likely to continue to be important for urban agroecology practice also in the future.

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