



## The Highbury Pergola Project

**Stanley Smith Horticultural Trust -  
Let's Grow Together CIC  
October 2019**

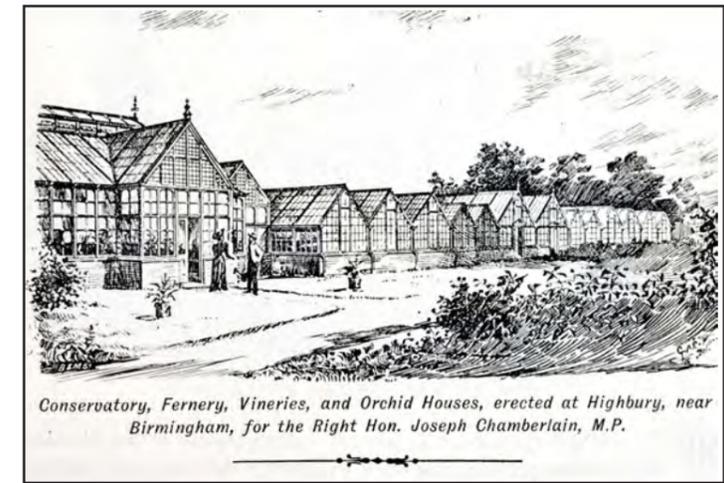
The Highbury Pergola Project aims to ensure the conservation of a historically significant kitchen garden structure, whilst promoting awareness of heritage, conservation and horticultural issues to new audiences.

Highbury Hall was the Birmingham residence of the Chamberlain family and the Chamberlain Highbury Trust is in the process of applying for a large Heritage Lottery Fund bid to restore the house and surrounding grounds. The fruit tree pergola is the last remaining original structure in what was formerly Highbury's kitchen garden.

The Trust has commissioned a conservation survey to assess the condition of the pergola structure and has worked with a local artist, a horticulturalist, architects and other professionals to bring artists and scientists together in engaging the public with the site. A display structure has been produced to house mini laboratories for citizen science work on plant propagation and display interpretation material about the project.

"Mr. Chamberlain's Orchids" is an art project run by Matt Westbrook and this pergola project sits within and contributes to that overall work.

The work funded by SSHT has been aimed at recreating the fruit tree heritage still existent on the site through propagation.



## Context

Highbury Hall, the former residence of the Chamberlains, is situated between the Birmingham suburbs Moseley and Kings Heath. The grounds of the Hall now largely make up Highbury Park although portions of land have had other uses over the years and are now managed separately.

The Highbury Pergola is situated within the curtilage of Four Seasons day care centre, managed by Birmingham City Council Social Services. Given the significance of the pergola as a historical link to the former, apparently magnificent, grounds of the Chamberlains, it is much-valued, despite its poor current state.

The pergola is thought to have been constructed and planted circa 1896. At this time major changes occurred in the gardens of the Chamberlains; a photograph of the era, dated 1900, appears to show the pergola with young trees establishing within it. If this estimate is correct then the fruit trees within the pergola are almost 125 years old. This is close to the maximum life-span for apple trees, although pears can live slightly longer.

Chamberlain Highbury Trust see the care and ongoing survival of this structure as important in the overall plans they have for restoration of the Hall and grounds in coming years. It is planned that all of the specimens linked back to The Chamberlain family now on-site will, eventually, have a replacement propagated and that these will be used to recreate the pergola.



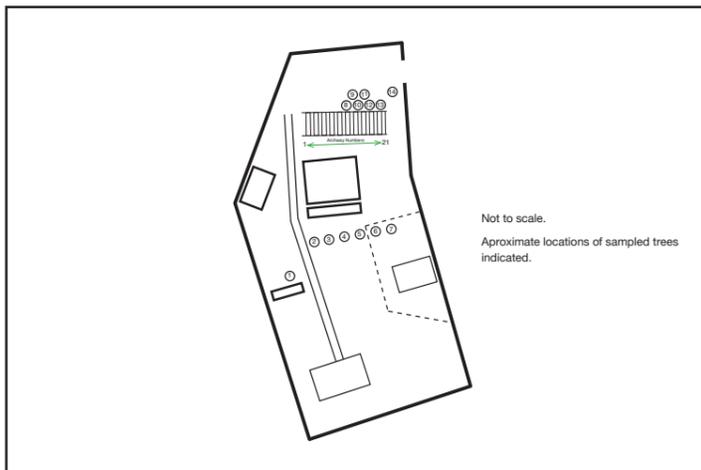
## Delivery of Work

### Scion collection and care:

All heritage trees on site were tagged with an aluminium label prior to collection of scion wood to avoid any confusion at a later date. Thirty trees within the pergola and a further eleven were identified and tagged.

One-year-old wood was taken from each tree using secateurs to ensure a clean cut was made.

Material with as little disease as possible was selected, aiming for “pencil-thick” scions where possible. Scion was cut to approximately 12 cm and bagged immediately in labelled polythene bags. Bagged scion wood was kept chilled in a fridge until the morning of each grafting workshop.





## Delivery of Work

### Rootstock selection:

Rootstock MM111 was selected for apple grafting work. MM111 produces large numbers of very fine roots which is useful if soil fertility is low or there is a tendency to experience droughts.

Despite the roots being long and slender, they are strong and difficult to break. MM111 trees tend to have slender stems with lots of “twiggy” side branches which are ideal for tall, cordoned, fruit trees.

Rootstock Communis was selected for pear grafting work. Communis is a seedling pear rootstock, and produces a traditional free-standing tree. The rootstock is vigorous, allowing trees to reach the full height of a pergola structure.

### Propagation beds:

Three timber-edge beds were built on site at Four Seasons using volunteer labour.

The beds measure approximately four metres by one metre.

These beds were constructed upon grassland after clearing and rotavating. All three beds were filled with imported compost, derived from reclaimed commercially-processed garden waste.



## Delivery of Work

### Grafting workshops:

Two grafting workshops were arranged for the 21st and 24th March 2019. These events were well-attended after promotion mainly through Twitter and word-of-mouth.

Volunteers were typically completely unskilled in grafting and many had come to learn this skill from scratch. This was managed by giving very clear demonstrations of techniques, encouraging mentoring where possible, providing clear written instructions and pre-scheduling all trees to be grafted. Each tree had to be "signed off" by volunteers before planting out in one of the propagation beds.

Grafting techniques used were generally whip-and-tongue or by grafting tool. Other grafting techniques were used in some instances. Graft unions were sealed with either florists tape or a cellophane-type tape. These were then sealed with anti-bacterial sealant.

### Tree care:

Once grafted and planted into beds, the young trees were visited approximately every ten days and inspected.

Care work for the young trees involved repeated weeding of beds, the removal of buds growing below graft unions, removal of any fallen leaf litter or fruits from nearby trees and the removal of leaves, and in some cases whole trees, succumbing to disease.

Trees which failed to successfully graft were removed from the site in late July 2019.



# Potential challenges

**Weather:**

The preceding summer of 2018 had been extremely dry for long periods and had also experienced mass deluge events. The summer of 2019 posed far less of a challenge in this respect.

Rainfall was far more evenly spread over the summer in 2019 with no long periods without rain. There was a heavy rainfall event in June and some tree deaths have been linked to subsequent water-logging after this.

High winds could also offer a potential risk to newly-grafted fruit trees, however, this site is very sheltered and no problem seems to have occurred due to this.

**Digging animals:**

On site at Four Seasons there are numerous species of nocturnal mammalian visitors and residents. In particular, there are several badger setts close by. It was feared that animals from these setts might disturb newly-planted trees. In the event, despite some signs of digging through the season, no uprootings took place.

Two trees were lost later in the season though, after snapping at the graft union. These may have been caused by badgers or other mammals.

**Weeds:**

Although fresh compost was used to fill the new propagation beds, they were built upon grassed land and this cannot easily be completely cleared. Weed seeds blow onto site and many fallen hawthorn berries germinated upon the compost surface. Regular inspection and weeding of beds kept the potential weed problem under control throughout the season.

**Watering:**

It was considered a risk that poorly-managed service users at the Four Seasons Day Care Centre might have been over-zealous when caring for the fruit trees when watering them in dry weather. This does not seem to have occurred.

**Disease:**

Scion wood was collected from trees of approximately 125 year of age. The trees have not been well cared for in recent years and they show signs of several common apple and pear tree diseases. Despite this, it was possible to obtain from the trees some scion wood which looked, on visual inspection, to be disease-free.

However, in some cases the scion wood did appear to be of poor quality. From this material it was not expected that success rates would be high with graft formation. Disease was managed throughout the grafting process by removal of infected leaves and fallen plant materials and many of the trees have grafted successfully.

**Species identification:**

In some cases, working with inexperienced volunteers, it may have been possible to mismatch pear and apple rootstock.

This is unlikely since clear instructions were given and rootstock was clearly labelled, with close supervision when selection was being made.

**Quality of work:**

Volunteer grafters cannot be expected to carry out perfect work in all cases. Three or four clones of each standing tree were planned, and it was arranged that no single individual would graft more than one of each tree to avoid any systematic problems.

Records have been made of which tree was grafted by which individual to allow the investigation of any problem in this respect.

# Outcomes and Analysis

## Success rate:

In late July 2019, 66 of the 126 were deemed to have failed and removed from the propagation beds to reduce the risk of disease. This left 48% of the original grafted trees remaining, but it is anticipated that some may still succumb to problems. This failure rate was expected, hence the attempt to make multiple copies of each tree. At this time it was identified that 11 of the 41 standing trees on site do not yet have a successful clone growing in the collection.

## Variations in success:

Rudimentary analysis has been carried out to demonstrate the success rate of the different grafted trees. Comparisons have been made between growing bed, volunteer worker, grafting technique, grafting date and species. These data are presented below.

## Analysis

An overriding factor in success at this point appears to have been to be grown in Bed 2. This may be linked to the fact that many pear grafts were grown in this bed. It is not possible to say whether the species itself or the position (or content, watering, etc) of Bed 2 has led to this success. Similarly, more pears were grafted on the 21/3/19 leading to it having a lower failure rate over the 24/3/19.

Too few data exist to be certain of whether the Stanley knife gives better results when grafting in this setting, but on first inspection it does appear to be superior to grafting tools and knives.

The greatest, and perhaps most reliable comparison of graft success is that comparing different workers. Some individuals were able to manage 100% success rates whilst others had 100% failure rates. The individuals reaching the higher success rates tend to be those who would have been expected to have a better chance at success. There is still a lack of quality in this data analysis, but it does appear that some individuals, in this case, were producing a higher quality of work.

Bed	n	Failed	Survived	% Failure
1	37	25	12	68
2	45	13	32	29
3	44	28	16	64
	126	66	60	

Worker	n	Failed	Survived	% Failure
?	1	0	1	0
1	10	2	8	20
2	9	3	6	33
3	15	8	7	53
4	5	4	1	80
5	6	4	2	67
6	10	5	5	50
7	1	1	0	100
7/6	1	1	0	100
8	14	13	1	93
9	6	0	6	0
10	10	4	6	40
11	4	2	2	50
12	12	5	7	42
13	1	1	0	100
14	9	4	5	44
15	9	6	3	67
16	3	3	0	100
	126	66	60	

Technique	n	Failed	Survived	% Failure
?	1	0	1	0
Grafting Knife	5	4	1	80
Grafting Tool	8	6	2	75
Stanley	112	56	56	50
	126	66	60	

Date	n	Failed	Survived	% Failure
21/3/19	70	30	40	43
24/3/19	56	36	20	64
	126	66	60	

Species	n	Failed	Survived	% Failure
Apple	96	63	33	66
Pear	30	3	27	10
	126	66	60	



## Engagement

The Highbury Pergola Project set out to draw upon different community groups and to bring different people together through workshops and later guided visits to the site.

Strong links exist between this project and the most significant local stakeholders; Chamberlain Highbury Trust manage the development of the entire Highbury estate; Four Seasons currently occupy the land upon which the pergola stands; Highbury Orchard Community (CIC) are a very local orchard project, also located within the Highbury estate.

All three of these groups were highly cooperative with the grafting work and supportive of it. Highbury Orchard Community also brought several volunteers to one of the grafting workshops.

Chamberlain Highbury Trust facilitated the formal display of some of the success of the project by promoting two guided walks to the pergola during Heritage Open Day at Highbury Hall on 15th September 2019.

Links through the local Fruit & Nut Village Stirchley project were particularly useful in bringing volunteers to grafting workshops. These volunteers, in most cases, also worked on grafting workshops with that project.



*Mr Chamberlain's Orchids display at the Highbury Heritage Open Day, September 2019.*

## Engagement

Mr. Chamberlain's Orchids is, of course, engaged with this work. Matt Westbrook supported work building the propagation beds as well as carrying out grafting work. Matt's structure was used as a display piece at which the work of Highbury Pergola Project was discussed with Highbury Hall visitors on the 15th September 2019 Open Day.

Feeney Trust money was also offered in-kind, through Chamberlain Highbury Trust. This funding contributed to some of the infrastructure of the project which will be a legacy for future work of this kind on-site.

Several University of Birmingham students were engaged in the work of grafting and also in bed construction. These students were connected to the project through links

with Fruit & Nut Village Stirchley and in some cases through their volunteering activity with Birmingham University Conservation Volunteers. Alongside these students our work was promoted to local RHS Level 3 students, some of whom attended workshops to learn an additional skill, above that taught on the course.

Engagement with other local people, unaffiliated with a group or organisation was also significant. The involvement of all of the people mentioned here is greatly appreciated.

The two grafting workshops were run as half-day sessions, with 8, 9, 5 and then 7 people present at each half-day.



*The pergola requires consistent maintenance and upkeep.*

## Future work

Several strands have developed from the work so far carried out and these are all due separate attention:

### Completion of the collection:

Since not all of the existent trees are yet reproduced as grafted specimens, it is proposed that this work continues over the next three winters, to gradually build up a complete collection. It is also proposed that summer, bud, grafting is carried out to increase the chances of success with these trees and overcome any problems with poor scion generation. Several of the trees do appear to have died, but they will be inspected in future in case this is not the correct. Scion wood is being generated on several trees by winter pruning to encourage new growth.

### Use of grafted trees:

Different options exist for the newly-grafted trees. Potentially, the pergola could be removed and reconstructed with these trees in their original position. Alternatively these could be relocated to a new pergola built to mimic the original. A third option might be to simply keep the legacy of this garden growing elsewhere on the site with new plantings in other areas of the Highbury Estate.

Finally, surplus stock may be very popular as specimen trees for private collectors, and could be sold on to support further work. Several of these options could be carried out alongside each other.

### Identification of varieties:

We believe Ribston Pippin, Emperor Alexander and Gascoyne's Scarlet are present within the pergola. These are all apples, leaving all pear trees, as yet, unidentified. We would like to identify all trees at some point and it seems that the most reliable way to carry this out will be through DNA analysis.

There does not appear to be any link between the three known apple varieties on site at present, coming from different countries and being of quite different ages at their time of selection and planting. Some are even partial tip-bearers and they are a mix of eating and cooking apples.

### Engagement:

The pergola has already been used as a visitor attraction during Heritage Open Day 2019. Enthusiasm and interest was high, with 56 people viewing the pergola and newly-grafted trees on that day. It is planned that this interest and enthusiasm will be capitalised upon within the community in coming years.



# Future work

## Related work:

The pergola itself is currently in a poor state, but some pruning work has been carried out upon it in the past two years. It is proposed and planned that pruning workshops run over the next three winters will bring the existent pergola trees back into shape, encourage productivity and generate greater amounts of new scion wood.

Rhododendron propagation has now been inspired on the site. Chamberlain collected these, as was popular in the era, and unusual specimens linked to the original planting designs are present within the estate. We hope that the propagation of rhododendron can also take place at Four Seasons.

Following on from the heritage propagation work outlined here we may be able to create a larger project looking at the plant heritage on-site as a whole. To date the details on the foods grown on site are limited. Identifying varieties used within the vegetable and fruit growing areas will allow these to be grown on site again. There is much research to be carried out to obtain this information. Chamberlain's documents contain much more detailed information on his exotic flower collections than on his culinary plants.

Selected structural details of the pergola.



## Thank You

The funding received from Stanley Smith Horticultural Trust to support this work has been hugely appreciated. The work has impacted positively upon many people and initiated new ways of viewing the site. Historical and artistic side benefits have come about alongside the clear gains from a horticultural perspective.

The ongoing support of Chamberlain Highbury Trust in a number of respects is much appreciated and gratefully received.

Matt Westbrook's "Mr Chamberlain's Orchids" project has to take much credit for bringing the idea of the Highbury Pergola Project to life.

All participants, especially volunteers are highly valued and thanked for taking part in this work.

*Sue Griffith (Chamberlain Highbury Trust), Matt Westbrook, Philip Seaton (Mr Chamberlain's Orchids) and Alison Millward (Chamberlain Highbury Trust) pictured in front of the display structure at The Three Counties Show, Malvern. An event visited by over 90,000 people over the course of 3 days.*