

STUDENT PROJECT

PINEAPPLE GROWING: ITS HISTORICAL DEVELOPMENT AND THE CULTIVATION OF THE VICTORIAN PINEAPPLE PIT AT THE LOST GARDENS OF HELIGAN, CORNWALL

Johanna Lausen-Higgins¹ & Phil Lusby²

ABSTRACT

Pineapples are a tropical food crop, yet from the late 1600s onwards, they were grown extensively in the northerly latitudes of Europe. The race to produce the first fruit in Europe was won by the Dutch in 1685 but the production of the first British fruits between 1714 and 1716 triggered a mania for growing them and the horticultural developments that this stimulated are described. The advent of hot water heating from 1816 revolutionized pineapple growing and in the Victorian era the production of well-grown pineapples became the crucial challenge that every gardener worth his salt had to master so that fruits could be entered in the prestigious horticultural shows. The Victorian pineapple pit at The Lost Gardens of Heligan, which was restored in 1994, recalls 19th century pineapple growing. A description and evaluation of the cultivation of the pit using traditional Victorian methods, but lacking certain crucial facilities such as tanner's bark and supplementary heating, is given.

INTRODUCTION

Reports by Christopher Columbus from 1493 that describe the deliciousness of the tropical South American pineapple (*Ananas comosus*) triggered a competition for the accolade of producing the first pineapple in Europe after the plant's introduction, the date of which is uncertain. There is no doubt that the Netherlands were the pioneers of European pineapple cultivation and it was on the estate of Agnes Block in Vijerhof that the first pineapple was fruited in 1685 (Wright, 1892). Further, it was another Dutch grower, Pieter de la Court, who first grew a successful crop of pineapples.

The first record of the fruit in Britain seems to date from about 1657 from a note made by the diarist John Evelyn for 9 August 1661:

¹Johanna Lausen-Higgins was a student on the BSc in Horticulture with Plantsmanship at the Royal Botanic Garden Edinburgh from 2005–08. She graduated in July 2008.

Address: Hilblestrasse 40, 80636 München, Germany.

Email: j-laussen@hotmail.com

²Phil Lusby is the year tutor on the HND/BSc in Horticulture with Plantsmanship at the RBGE and has a specific interest in garden history. Prior to his appointment in the School of Horticulture he co-ordinated the Scottish Rare Plant Project, a project funded by Scottish Natural Heritage, based at RBGE.

Address: Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh EH3 5LR.

Email: P.Lusby@rbge.org.uk



Fig. 1 Painting by Hendrick Danckerts (1675) depicting Charles II being presented with a pineapple by John Rose the gardener. Reproduced with the permission of The Stapleton Collection/The Bridgeman Art Library.

“I first saw the famous queen pine brought from Barbadoes, and presented to His Majesty (Charles II); but the first that were ever seen in England were those sent to Cromwell four years since” (Wright, 1892).

Although Britain did not lag behind the Netherlands for long, the first pineapple fruit raised on British soil was also produced by a Dutchman, Henry Telende, gardener to Mathew Decker at Richmond, in about 1714–1716 (Beauman, 2005; Loudon, 1822; Speechley, 1779; Wright, 1892).

A painting depicting the presentation of a pineapple to Charles II by John Rose, gardener to the Duchess of Cleveland, has led to the common belief that the illustrated fruit was grown in Britain (Fig. 1). There are, however, no records to prove this.

There is also a record of fruit being ripened from mature imported plants (and therefore not considered British grown) at Hampton Court where plants belonging to Caspar Fagel were purchased and shipped to England in 1692 by William Bentinck, royal gardener to William of Orange, after Fagel’s death (Campbell, 1996).

THE PINEAPPLE FASHION IN BRITAIN

Once Henry Telende had demonstrated that it was possible to cultivate pineapples in Britain a mania for growing them began. The fruit soon became the ultimate horticultural status symbol with a pineapple pit or 'pinery' mandatory for the estate kitchen garden for the following 150 years. Like other fashions, interest waned once the trend became commonplace, and the decline of the long standing craze for British grown pineapples was mainly brought about by saturation of the market by cheaper fruit imported from the Azores. Consequently, the demand for home-grown pines rapidly declined.

The final blow to this horticultural luxury was the First World War. The specialist skills and experience required to reliably grow a good crop of pineapples perished along with a vast number of estate gardeners. The decimation of the garden workforce could not have been felt stronger than at The Lost Gardens of Heligan where every gardener is thought to have been killed (Smit, 1995).

DEVELOPMENTS IN PINEAPPLE CULTIVATION IN EUROPE AND BRITAIN

The race to raise the first pineapple fruit in Europe stimulated horticultural experiment and ingenuity. Early attempts at cultivation were made in orangeries which had been designed to provide frost protection for citrus fruit. These houses were only glazed on the south side, and had wooden roofs and brick sides. Although tolerated by orange and lemon plants when growth ceases during the winter months, this did not provide enough heat and light for the tropical pineapple that grew all year round.

Any heating in glasshouses during the mid-1600s was provided by furnaces and hot air flues but fumes from the flues often damaged or killed the plants. Heat dissipation was uneven which resulted in cold areas in some places and plant scorch in others. A light environment with even, fume-free continuous heat was still only an aspiration. John Evelyn introduced external heating pipes which lessened the effects of toxic fumes and scorching but was unreliable (Hix, 1996).

Pieter de la Court's advance in pineapple cultivation included angled glazing to improve light capture, and heat provided by the combination of hot air flues and fermenting tanner's bark in which the pots were plunged. The last of these was the most important development. Tanner's bark (oak bark) fermented slowly and steadily which produced a constant temperature of 25–30°C for about two to three months and a further two if stirred. Bottom heat is essential for pineapple cultivation and tanner's bark provided the first reliable source (Beuman, 2005; Campbell, 1996). Manure was inferior in that it heated violently at first but cooled more quickly (Mawe & Abercrombie, 1784; Campbell, 1996; Miller, 1759). De la Court also used hessian sacking for further frost protection in winter and also for shading in particularly hot summer weather.

Henry Telende pioneered the use of tanner's bark for pineapple cultivation (in combination with manure) in Britain to produce the first fruit. He advocated plunging potted suckers, crowns, one year old plants, succession plants and fruiting plants in tan

bark pits from March to October and then transferring fruiting plants to the stove house for additional heat. The cycle would then begin again the following March with the addition of newly potted crowns taken from the fruit or suckers from the fruiting plants. The pits were brick-lined with a basal layer of rubble followed by a layer of manure and topped with compacted tanner's bark (Campbell, 1996).

James Justice (1698–1763), an Edinburgh High Court judge, was the first to grow pineapples in Scotland. A plan from 1732 (Minay, 1974; Fig. 2) shows that he did not use a combination of separate pit and stove house but grew newly propagated suckers and crowns together with succession plants and fruiting plants in the same house but separated fruiting and young plants by a low wall in which heating flues were situated. Walkways enabled access to all parts of the house.

Importantly, Justice's stove had a sloping glazed roof which anticipated the lean-to glasshouse later to be seen in almost every kitchen garden (Minay, 1974).

Like Henry Telende, Justice advocated the use of improved thermometers to monitor glasshouse temperature. Unfortunately no further details of Justice's cultivation methods have been found and a solitary beech tree is all that remains to mark the approximate location of his garden on his estate at Crichton, south of Edinburgh.

An architectural celebration of the pineapple as a status symbol is the summerhouse erected by the Earl of Dunmore on his estate in Dunmore, Stirlingshire in 1767. The house, in the form of a massive pineapple, is thought to have been designed by William Chambers who is famous for other architectural follies, notably, the pagoda

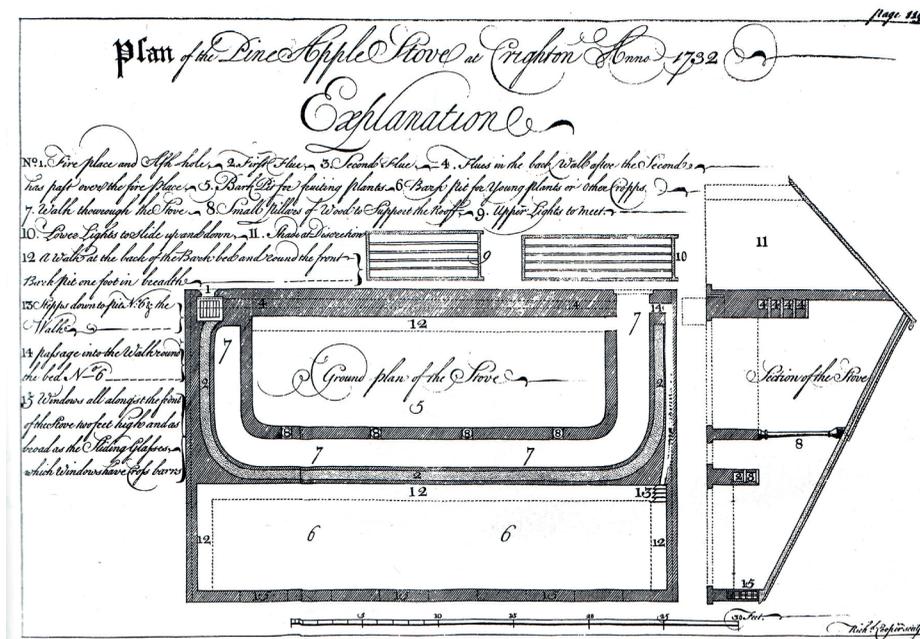


Fig. 2 James Justice's plan for the Pine Apple Stove at Crichton, Scotland, 1732. It was engraved by Richard Cooper and published in Justice's *The Scots Gardiners Director*, Edinburgh, 1754.

in Kew Gardens (Beauman, 2005). Regrettably, the stoves at Dunmore have long been dismantled.

Despite the superiority of tan bark for heating pine stoves, manure was used in combination to a greater or lesser extent, with hot air flues. The earliest record seems to be that of Jenkins of Portman nursery in 1769 documented by Loudon (1827). Loudon (1827) also records and illustrates a pineapple pit heated purely by a combination of manure and tanner's bark, the former providing warmth from the outside and the latter for basal heat.

A similar claim for heating a pit solely with horse manure was made by A. Taylor in his account *On the Ananas and on Melons* (1769) quoted by Loudon in the 1826 edition of his *Encyclopedia of Gardening*. Taylor also remarks "a little more trouble" in the management of manure compared with tanner's bark is offset by its value to the garden once it has passed active fermentation – an important fact for the vegetable garden at Heligan as it was fuelled by the spent horse manure from the pineapple pit. However, the merits of manure compared with tanner's bark were debatable; Philip Miller was not a manure advocate, clearly preferring tanner's bark for plants that required long periods of even warmth "... which cannot be effected by Horse-Dung" (Miller, 1759). Because of their much lower elevation, pits required less heat to warm the air than stove houses so they also won Miller's approval. He recommended a height of three feet at the back and fifteen inches at the front which he thought provided a sufficient angle for the glass lights to keep condensation off the plants and also allowed enough space for larger, fruiting plants at the back and smaller, younger plants at the front.

William Speechly, gardener to the third Duke of Portland, grew pineapples under a similar regime to James Justice. He was the first to suggest that grapes could be successfully grown with pineapples which soon became a common practice. Speechly also collected rainwater for irrigation in an internal cistern and this improved the cultivation of pineapples as the tepid water prevented any cold shocks to the plants.

The development that revolutionized protected cultivation was hot water heating. In comparison with hot air flues it was less dangerous, cleaner, more efficient, and more reliable. It was also safer and more effective than the comparatively short-lived innovation of steam heating which preceded it. Although a hot water heating system designed by the Marquis de Chabannes was first used in a forcing house at Sundridge Park, Kent in 1816, its use did not become widespread until the 1830s. Under this form of heating the Victorians produced enviable pineapple crops. Even allowing for possible slight exaggeration, both crops and individual fruits were often huge. The 1830–60s witnessed the most intense competition at horticultural shows for the best pineapples. Reputations of estates' head gardeners were at stake and, not surprisingly, Joseph Paxton, the gardening hero at Chatsworth, was a leading grower.

Hot water heating was efficient enough to heat the greater volume of air in span roofed glasshouses. These houses with central walkways eased the access to fruiting plants. However, tanner's bark was still commonly used to supply bottom heat in succession pits. Whilst hot water heating had transformed pineapple cultivation the

demands of the house kept pace – fruit was now expected to be available all year round.

It now became important to grow a range of cultivars that naturally extended the fruiting season as much as possible. For summer fruiting (May–October) ‘Queen’ was recommended and for winter (October–May) ‘Smooth-leaved Cayenne’ or, for highest quality, ‘Black Jamaica’ (Wright, 1892).

From the outset pineapples had always been grown in pots but a rare exception where open beds were used by a Mr Lang, kitchen gardener to the King of Bavaria, was recorded by Loudon during his travels through France and Germany. Loudon visited the Royal Gardens at Nymphenburg, Munich in 1828 and encouraged Lang to publish his methods which appeared the following year in an article for the *Gardener’s Magazine* titled “*On the culture of the Pine-apple without pots, in the Royal Kitchen Gardens at Nymphenburg*”.

Ironically, it seems that once the techniques of pineapple cultivation had been perfected, the effects of cheaper, imported fruit really took hold. As the pineapple became available to the wider public it began to lose its position as a signifier of class. Even though the finest pineapples continued to hold currency in horticultural circles, and continued to be proudly exhibited at horticultural shows into the 1900s, they were no longer the coveted status symbol of fashionable society. In 1892 Wright states:

“Home-grown pine apples still hold the foremost place as the finest and best, but their cultivation has been relinquished in many gardens in consequence of imported fruits arriving in much fresher and higher condition than formerly, only first-class British pine apples taking precedence in the markets.”

PINEAPPLE CULTIVATION AT THE LOST GARDENS OF HELIGAN IN THE 21ST CENTURY

The old pineapple pit at The Lost Gardens of Heligan is situated in the one acre walled Melon Yard along with a Melon House or stove house, potting shed, mushroom house, fruit store, four sets of cold frames, potting shed, and gardener’s privy.

The superficial resemblance to a set of cold frames resulted in the pit being misidentified at first, only revealing its more interesting identity on closer inspection during the garden’s restoration by John Nelson and Tim Smit (Smit, 1995). The pit is thought to date from 1840–50 but, unfortunately, records of the original pineapple pit were destroyed by fire which made restoration even more challenging. The design that most closely matched the remains of the pit at Heligan was that described in an article of 1882 by Thomas Knight, President of the Horticultural Society (McMillan Browse, 2005). From Knight’s description, John Chamberlain, an architect specializing in old horticultural structures, produced a working drawing that was used for the restoration of the pit which was completed in 1994 by John Nelson and his team (Fig. 3).

The pineapple pit consisted of a main central frame to house the plants and dung pits to front and rear. Heat was transferred from the dung pits to the main frame through

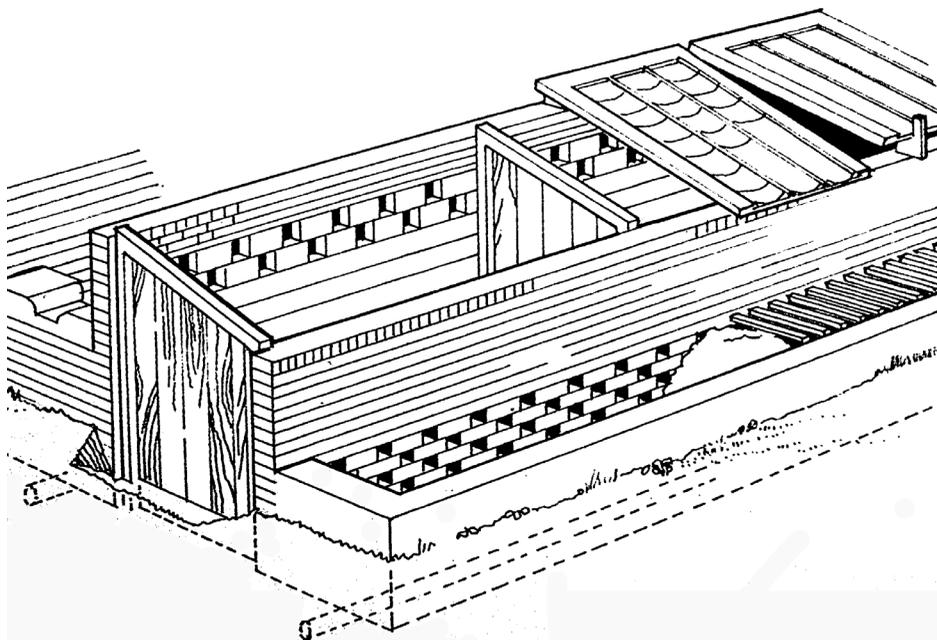


Fig. 3 John Chamberlain's drawing, used for the restoration of the pineapple pit at Heligan. Reproduced with the kind permission of John Chamberlain.

'pigeon holes' in the brick wall that separated them. Basal heat would have been provided by compacted tanner's bark into which the potted plants would have been plunged. It is not known whether a layer of dung beneath the tanner's bark was used. This layout was very similar to that described by Philip Miller in 1759.

Unfortunately, the boiler that provided hot water heating for the Melon House was not restored. The proximity of the boiler to the pineapple pit possibly provided some heat for it.

Acquisition of old pineapple varieties at first proved difficult. However, a fortuitous meeting between Tim Smit and the Director of the Agricultural Research Station in South Africa resulted in the procurement of one hundred each of the two traditional cultivars 'Jamaica Queen' and 'Smooth-leaved Cayenne' (Smit, 1995).

Cultivation

When attempting to use only traditional methods to grow a crop, the practice of which has long since ceased, it soon becomes clear which pieces of vital information are missing. Many practical details, perhaps considered too commonplace or trivial to record, or simply passed on by word of mouth 120 years ago, become essential for cultivation today and can often mean the difference between success and failure.

Besides the lack of a detailed cultivation guide the team at The Lost Gardens of Heligan were deprived of a source of tanner's bark, after the first crop in 1997, to provide crucial bottom heat for the plunged potted plants. The local source, the tannery at St. Austell, had changed to the modern use of the liquid extract rather than the bark for tanning. In addition, there was no hot water heating. Active leaf mould was the alternative to tanner's bark for bottom heat at Heligan but did not provide an even heat for more than a month so, critically, failed to last through the winter months. The gardeners were totally reliant on dung as the source for heating the air in the main frame. It is a notoriously variable substance that requires considerable experience to manage. Ideally, dung should be urine-soaked and strawy; the use of sawdust in stables these days significantly lessens its heating effect, making it useless. Even given suitable manure, if it is not sufficiently aerated it violently heats but cools quickly; it must be turned up to three times to admit enough air for steady fermentation which releases a more uniform heat over a longer period of time. Once the dung pit has been filled (it takes 15 tons to fill one pit) the manure is compacted and watered in. Further, it was found that the front and back dung pits should not be filled at the same time, but alternately, otherwise the temperature in the main pit would fall too low as the manure in both pits cooled (McMillan Browse, 2005).

Given the considerable disadvantages it was virtually impossible to achieve anywhere near optimum conditions for pineapple cultivation at Heligan. Without a reliable heat source to adequately moderate the effects of the highly variable and capricious Cornish climate, controlling wild diurnal and seasonal temperature oscillations was particularly difficult. Thompson (1881) provides optimum minimum and maximum temperature limits for pineapple growing. The graph in Fig. 4 compares Thompson's data with that recorded for Heligan in 2002 when a pineapple crop was produced. The

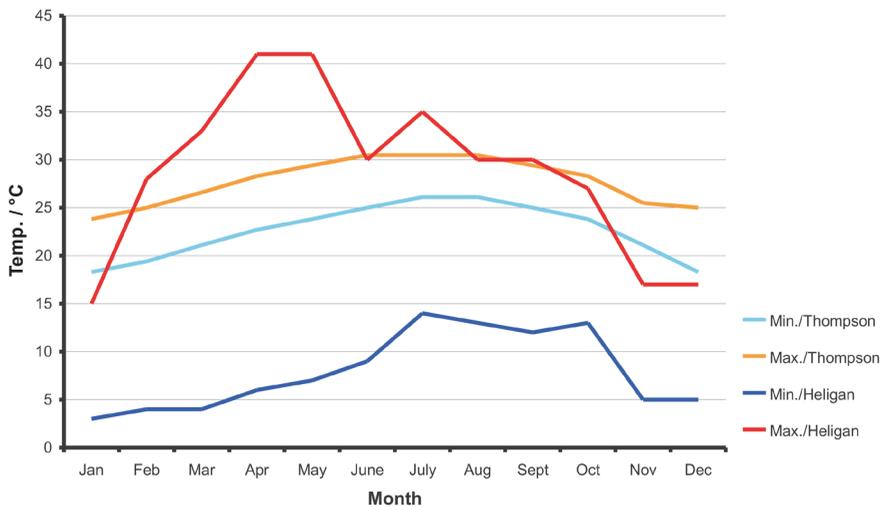


Fig. 4 The graph shows the ideal temperatures given by Thompson in 1881 and the actual temperatures at Heligan during 2002.



Fig. 5 Red leaf discoloration after a cold shock (left) and large crown to plant ratio (right). Photo: J. Lausen-Higgins.

wide diurnal temperature amplitude, way outside Thompson's confines, demonstrated the problems at Heligan.

Nevertheless, growing pines at the limit of their tolerance provided some interesting information. The minimum air temperature tolerance generally cited in the literature is 10°C but at Heligan the pineapple plants are commonly subjected to, and survive, temperatures below 3°C during the winter months. At these cold temperatures the foliage turns bright red, which is shown in Fig. 5. Insufficient bottom heat results in the production of a large crown to plant ratio, also shown in Fig. 5.

Given the difficulties and disadvantages at Heligan it was exciting and highly gratifying when pineapples were first successfully produced in 1997, the first of which was presented to the Queen thus invoking the painting of John Rose presenting a pineapple to Charles II in the 1660s.

Propagation and cultivation cycle at the lost gardens of Heligan

Following tradition, all plants were grown in terracotta pots. Propagation by suckers and potting-on of larger plants was carried out in the warmest months of July and August. Cold shocks to mature plants may result in bolting.

Only stem suckers were used for propagation. Those produced on the peduncle or fruiting stem (known as gills) were found to be inferior. Suckers not required for propagation were removed and discarded to prevent vigour being taken away from the mother plant. To lessen the risk of cold shock to the plants the leaf mould in the main frame was renewed at the same time as potting. The frame was divided into four bays; two were used for 'Jamaica Queen' and two for 'Smooth Cayenne'. The two cultivars are easily distinguished by their spiny and entire leaves respectively.

The growing medium for both suckers and mature plants consisted of 1:1:1 peat-based compost, John Innes No.2, and sand. Charcoal dust was also added. Following Wright (1892) pots were crocked and then a layer of charcoal dust was added before the growing medium, ostensibly to reduce soil borne nematodes and other root pests. A compost trial recorded in the *Gardener's Chronicle* for 1841 showed that pines prefer acid composts whilst a mixture of sand and lime resulted in chlorosis.

Potted suckers, and re-potted succession plants and mature plants were plunged in the main frame with the mature plants at the rear and the young plants at the front. The larger dung pit was adjacent to the rear wall of the frame to provide more heat to promote fruiting.

Plants were generally given one to two good waterings a week during the spring and summer months depending on temperature and ventilation. A liquid feed of horse manure and seaweed was added at each watering. Because of low temperatures, watering ceased in winter through fear of rotting caused by condensation as ventilation was impossible; the plants can also withstand cold temperatures better in the dry state.

An optimum temperature range of between approximately 18–25°C for winter and spring and between 25–30°C for summer was aimed for but the difficulty of achieving this without hot water heating and tanner's bark for basal heat has already been mentioned. Most challenging were cold but sunny winter days when condensation could scorch plants but the temperature was insufficient for ventilation. Controlling the temperature within the pit by manual ventilation is very difficult; the Victorian gardeners lived on site, giving them a far better control over the growing environment of the plants. For protection in severe frost, the frame lights were covered with sail cloth.

Pineapples normally reach fruiting size in two years from propagated suckers. Flower buds, called 'buttons', are usually produced in spring and harvestable fruit are ready by late summer to early autumn.

Since the pineapple pit's restoration in 1994 there have been more non-cropping than cropping years in the fourteen years to date. The best harvests produced were the first crop in 1997 and in 2002 with c. 30 and 25 pineapples produced respectively. The 1997 crop benefited from some extra heat provided by a Parwin heater on exceptionally cold nights.

The results, so far, at Heligan are very encouraging considering the lack of a heating system and tan bark. The authors believe that the common practice of transferring the fruiting plants and the largest succession plants from the pit to the heated stove for the winter to provide a more even temperature would also have been carried out at Heligan. Without tan bark and a supplementary heating system, both of which were available to the Victorians, it is remarkable what has been achieved at Heligan. It is not surprising that crops are only produced erratically as there is little power to moderate the environment. The gardeners are at the mercy of the vagaries of the climate; without a warm spring there is little chance of a pineapple crop at Heligan. To provide a closer and more realistic comparison between the achievements of the Victorians and today's team at Heligan, a reliable alternative to tanner's bark and some form of supplementary heating needs to be supplied. Possible substitutes for tanner's bark are decomposing

bark chips or leaf mould but are still unlikely to be as efficient. For public interest traditional methods are being adhered to at Heligan but at present the gardeners are not only restrained by tradition but are also missing some vital traditional elements. This handicap may well be preventing the restored pineapple pit, and the gardeners, from realizing their potential.

REFERENCES

- BEAUMAN, F. (2005). *The Pineapple, King of Fruits*. Chatto & Windus, London.
- CAMPBELL, S. (1996). *Charleston Kidding: A History of Kitchen Gardening*. Ebury Press, London.
- Gardener's Chronicle* (September, 1841). London. 625.
- HIX, J. (1996). *The Glasshouse*. Phaidon Press Ltd., Regent's Wharf, London.
- LANG, J. (1829). *On the culture of the Pine-apple without pots, in the Royal Kitchen Gardens at Nymphenburg* in Loudon, J.C. [ed.] *Gardener's Magazine*.
- LOUDON, J.C. (1822). *Encyclopedia of Gardening*. Longman, Rees, Orme, Brown and Green, London.
- LOUDON, J.C. (1826). *Encyclopedia of Gardening*. Longman, Rees, Orme, Brown and Green, London.
- LOUDON, J.C. (1827). *Encyclopedia of Gardening*. Longman, Rees, Orme, Brown and Green, London.
- MAWE, T. & ABERCROMBIE, J.F. (1784). *Everyman his own Gardener*. London.
- MCMILLAN BROWSE, P. (2005). *Heligan Fruit, Flowers and Herbs*. Alison Hodge Publication, Penzance, Cornwall.
- MILLER, P. (1759). *Gardener's Dictionary*. Seventh edition. J. Rivington, London.
- MINAY, P. (1974). JAMES JUSTICE (1698–1763): Eighteenth Century Scots Horticulturist and Botanist-II. *Garden History Journal*, Vol. II (2), 51–75.
- SMIT, T. (1995). *The Lost Gardens of Heligan*. Victor Gollancz, London.
- SPEECHLY, W. (1779). *A Treatise on the Pineapple*. A. Ward, Burlington House, London; and at Welbeck in Nottinghamshire.
- THOMPSON, R. (1881). *The Gardener's Assistant*. The Gresham Publishing Company, London. (I).
- WRIGHT, J. (1892). *Fruit Grower's Guide*. J. S. Virtue & Co Ltd., London.

