Does the cultural heritage of pome fruit need support from heritage practitioners?

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Abstract

Pome fruits (especially apples and pears) are among the world’s most popular fruits: they are highly nutritious and have great cultural heritage significance. Querying the identity of an old pear tree in the southwest of Western Australia led me to visit horticultural and botanical libraries in England and Australia, and fruit collections, many of which have evolved since the 1980s when the public noticed the loss of many heritage varieties of fruit, especially apples. The collections have allowed the public to experience heritage varieties, while conserving the germplasm.

The world’s population is expected to reach 10 billion by 2050, and the World Health Organisation highlights the need for a diet rich in fruit and vegetables to maintain health. Cities have often been settled on rivers and estuaries, surrounded by hills and valleys which in temperate climates have served as horticultural zones to supply local markets. During the 20th Century, urban expansion into this hinterland has reduced the amount of land available for horticulture in proximity to cities, in Australia and elsewhere. This paper raises the question: as heritage practitioners aligned with the United Nations Sustainable Development Goals, how can we help to conserve fruit heritage, in this case pome fruit?

Introduction

Fruit growing has its own cultural heritage which gives an identity to a place, perhaps exemplified by apple orchards. The aesthetic value of orchards includes the beautiful sight and scent of blossom in spring. The promise of fresh fruit for local people, and festive harvest traditions add to the appeal. As cities grow, peri-urban areas used for horticulture are often developed for other purposes, especially housing, roads and industry.

‘Pome’ (from Old French pome meaning ‘apple’, from Latin *pomum*) refers to plants with a fleshy fruit consisting of an outer thickened fleshy layer in a central core, belonging to the botanical family Rosaceae. They include apples (belonging to the genus *Malus*), pears (*Pyrus*), medlars (*Mespilus*) and quinces (*Cydonia*), often grown in the same orchard. Due to their soil and climate requirements, and proximity to markets, pome orchards (mainly apples and pears) are often grown on...
hillsides close to cities. The trees take years to mature and suitable sites are not always available for relocation.

This paper has been adapted from a presentation at the ICOMOS 19th General Assembly and Scientific Symposium ‘Heritage and Democracy’ in Delhi, India in December 2017, during the session Constructing Resilience: Advancing sustainable agriculture at the nexus of culture and nature, part of the ‘Culture-Nature Journey’. Presenters were asked to consider an aspect of stewardship of the landscape that helps to contribute to its resilience, and how the case study and relevant lessons learned offer potential to link with global processes such as World Heritage and the United Nations Sustainable Development Goals (UN SDGs).

The aspect of stewardship I investigated was the role of fruit collections in England in successfully conserving pome fruit varieties, which occurred partly through raising public awareness and conserving the germplasm (living genetic resources – in this case, trees maintained for plant breeding and research). The paper linked to World Heritage via the World Rural Landscapes initiative, which has as one of its goals: ‘Act to prevent the loss of traditional knowledge and local values, and reinforce their importance by recognising and disseminating them’: in this case pome fruit production (ISCCL 2017). It linked to the UN SDGs by drawing attention to the forecast increased demand for fruit and vegetables in the next few decades. The audience responded with interest to the Food and Agriculture Organisation’s statistics concerning global fruit production. Pome fruit is an example of a popular category of fruit affected by urban expansion into peri-urban horticultural zones. For example, researchers have expressed concern at the expansion of Melbourne into its foodbowl (Sheridan, Larsen & Carey 2015).

**Origins of the pome fruit collection study**

Querying the identity of an old pear tree growing in the southwest of Western Australia led me to various botanical and horticultural libraries, including the Lindley Library in London, which belongs to the Royal Horticultural Society (RHS), where staff directed me to the collection of Pomona (books containing detailed paintings of fruit – see Figure 1 for an example), to Joan Morgan’s excellent work on apples and pears, and other useful material including nursery catalogues.

The fruit collections I visited were English, mainly due to their proximity to London, and were predominantly made up of pomes. Often located in walled kitchen gardens, the collections

![Figure 2: West Dean Gardens showing pome orchard (photo by the author)](image)
included the organically cultivated pome collection at Audley End in Essex (managed by English Heritage) and the privately-owned gardens at West Dean in Sussex which were redeveloped after the great storm of 1987 (see Figure 2). The largest visited was the National Fruit Collection at Brogdale in Kent, which has over 3,500 named cultivars. It is owned by the United Kingdom’s Department for Environment, Food and Rural Affairs (DEFRA).

This paper aims to provide a broad brush history of pome fruit, highlight its cultural heritage significance globally (without delving into its representation in art), and hopefully encourage more writing on the topic, which may provide support for the World Rural Landscapes initiative. The conclusion contains suggestions concerning the conservation of pome fruit and fruit producing areas more broadly.

A global view of fruit production

Global fruit production and health

Fruit is an important part of the world’s diet. It is nutritious, and for many people it is a treat. In poorer countries, fruit can be expensive, and may only be available seasonally, if at all.

The United Nations Food and Agriculture Organisation (FAO) estimates that the world needs 50% more food by 2050 (FAO 2017). The United Nations World Health Organisation (WHO) stresses the importance of a diet rich in fruit and vegetables to maintain health (WHO 2015). The projected rapid urbanisation and expansion of cities poses considerable challenges when planning for food.

According to data supplied by the United Nations Food and Agriculture Organisation (FAO), in 2016 the world’s most popular fruits (by volume of production) were tomatoes, watermelons, bananas, apples, grapes and oranges, in that order, as shown in Figure 3. If pear production were added to apples, pome fruit production would equal watermelons (FAO 2016a).

2016 Global Production – World’s most popular fruits (millions of tonnes)

Biologists emphasise the importance of biodiversity, the variety of plant and animal life in a particular habitat, a high level of which is considered to be important (Myers et al. 2000). Biodiversity is also important when considering agricultural diversity, referred to as agrobiodiversity. Researchers are concerned about the loss of varieties (types of plants within a species) in agriculture, which is important for supporting the world’s increasing population (Pacicco et al. 2018). The population is expected to reach almost 10 billion by 2050, boosting agricultural demand – in a scenario of modest economic growth – by some 50% compared to 2013 (FAO 2017). Supplies of fruit and vegetables will be crucial in maintaining adequate nutrition, and maintaining fruit varieties will be an essential part of agrobiodiversity.
A snapshot of the world’s most popular fruits

By volume of production, the tomato is the most popular fruit in the world. The tomato plant (Solanum lycopersicum) is a vine or robust herb, a member of the Solanaceae, or nightshade family. The tomato was taken to Europe by the Spanish and its use has spread throughout the world. In 2016 China produced 56 million tonnes of tomatoes, or 32% of the world’s crop, followed by India, USA, Turkey, Egypt and Italy (FAO 2016a).

Watermelon (Citrullus lanatus) was the second most popular fruit, with global production of 117 million tonnes, more than half of which was grown in China. A vine-like flowering plant cultivated for its fruit, watermelons belong to the family Cucurbitaceae. Archaeological remains of watermelons (mostly seeds) dating from 5000 years ago have been found in northeastern Africa. Watermelons were domesticated for water and food there over 4000 years ago (Blancke 2016, p. 63). Sweet dessert watermelons emerged in Mediterranean lands approximately 2000 years ago (Paris 2015, p. 134).

The banana is an edible fruit of the largest herbaceous flowering plant, in the genus Musa. Bananas are widely grown throughout the tropics and cultivated extensively throughout south and southeast Asia. Most producers are small-scale and produce only for home consumption or local markets (FAO 2016a). The exact origins of the banana are unknown but evidence arising from archaeological and paleoenvironmental studies at Kuk Swamp in the Western Highlands Province of Papua New Guinea suggests a history of banana cultivation dating back at least 7000 years and possibly as far back as 10,000 years. They are a major staple food crop for millions of people in developing countries: a good source of carbohydrates, fibre, vitamins B and C, and minerals, particularly potassium, magnesium and manganese (Blancke 2016, p. 157).

Apples are the fourth most popular fruit crop in the world after tomatoes, watermelon and bananas, ahead of grapes and oranges based on FAO statistics for 2016, when the world’s apple crop amounted to 89 million tonnes. Around 44 million tonnes, or half the world’s crop, was grown in China.

The FAO statistics on fruit production have limitations: not everything that is grown in the world is captured by their data collection methods, and not all regions are included (FAO 2016b). Virtually all commercial fruits are bred from plants which have undergone ‘improvement’ or domestication: varieties have been selected over many generations for special characteristics including flavour, colour, size of fruit, reliability of fruiting, pest resistance, time of ripening and suitability for storage.

The United Nations Sustainable Development Goals (UN SDGs)

There are 17 Sustainable Development Goals (SDGs) which are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The cultural heritage of fruit production relates closely to SDG 2: ‘Zero Hunger – End hunger, achieve food security and improved nutrition and promote sustainable agriculture’. SDG 11 ‘Make cities inclusive, safe, resilient and sustainable’ is also implicated, because cities put a strain on the resources needed to provide food and clean water for them.

A number of global trends are influencing food security, poverty and the overall sustainability of food and agricultural systems. The world’s population is expected to grow to almost 10 billion by 2050, boosting agricultural demand – in a scenario of modest economic growth – by some 50% compared to 2013. Income growth in low- and middle-income countries would hasten a dietary transition towards higher consumption of meat, fruits and vegetables, relative to that of cereals, requiring commensurate shifts in output and adding pressure on natural resources.

...Although agricultural investments and technological innovations are boosting productivity, growth of yields has slowed to rates that are too low for comfort. Food losses and waste claim a significant proportion of agricultural output, and reducing them would lessen the need for production increases. However the needed acceleration in productivity growth is hampered by the degradation of natural resources, the loss of
biodiversity, and the spread of transboundary pests and diseases of plants and animals, some of which are becoming resistant to antimicrobials. (FAO 2017, p. x)

Many UN and government policies have been directed at providing sufficient cereals to alleviate hunger, which has reduced greatly since the 1990s (FAO 2017, p. xi). However, there has been an increase in non-communicable diseases (NCDs) with the number one killer in the world being ischaemic heart disease and stroke. Diabetes is an emerging threat: global prevalence doubled from 1980 to 2014, mirroring a rise in overweight and obesity (WHO 2016, p. 31). The WHO recommends a diet rich in fruit and vegetables to combat mortality and illness due to heart disease and diabetes (WHO 2016, p. 36). A longitudinal study has shown that increased availability of fruit and vegetables is associated with a reduction in stunting in childhood (Green et al. 2016).

Cities and their foodbowls

Many people are moving to cities, with limited opportunities to grow their own food, so it must be grown elsewhere. Cities often expand into peri-urban areas where food has traditionally been grown. Researchers believe that population growth and urban sprawl could reduce the capacity of Melbourne’s foodbowl (which covers a radius of more than 100 kilometres) to meet the city’s future food needs from 41% (currently) to 18% by 2050 (Carey et al. 2016).

Two themes mentioned here are echoed elsewhere: the loss of land for horticulture as cities expand, and warnings from health authorities that diets currently lack fruit and vegetables, a situation which is likely to worsen if the availability of fresh fruit and vegetables declines and prices increase. Land for housing and urban infrastructure sometimes commands a higher price than the economic return that growing fruit and vegetables can provide. Some cities, for example, Vancouver, Toronto and Portland, Oregon have addressed planning issues regarding food production (Carey, Sheridan & Larsen 2018).

To a certain extent, vegetable growing can be transferred into spaces made available for horticulture within and adjacent to cities. Vegetables are more flexible than fruit tree crops: most need only shallow soils and are seasonal plants with short lives. Fruit trees require a greater investment: pomes especially take years to propagate and bear fruit, and the amount of land suitable for their cultivation is limited.

A global view of pome fruit

Pomes have great utilitarian value – most can be carried easily and eaten without preparation, cooked, dried or turned into alcoholic drinks (such as cider). Many pomes can be stored for long periods while retaining their high nutritional value. The English word ‘culture’ is derived from cultus, past participle of the Latin verb colere, which means ‘to till the soil to grow crops’. ‘Culture’ is derived from the practice of growing crops, which is central to our existence as humans on this planet. At its simplest, cultural heritage is the knowledge, practices and material goods that we transmit to following generations.

Over thousands of years of cultivation, varieties of pomes have been selected and bred, and propagation techniques developed to retain the special qualities of those varieties. Knowledge of suitable soils and sites, and special horticultural practices such as pruning and training on wires to maximise fruit production have evolved. Knowledge of the appearance, scent, flavour and specific cultivation techniques necessary for prized varieties have also been handed down, as well as picking and storage techniques to lengthen the period over which fruit is available. Recipes for various methods of cooking apples, drying fruit and making cider have also evolved.

The origins of apples

It is believed that wild apples originated in the Tian Shan or Heavenly Mountains in Kyrgyzstan, between Russia and China (see Figure 4). The origins of the domesticated apple (Malus domestica Bokh.) are thought to be in the fruit forests of Kazakhstan and neighbouring regions, including the Pamir mountains in Tajikistan, the Kopet-Dag mountains near Ashqabat on the border of Iran and Turkmenistan, and the Caucasus mountains near Georgia (Morgan & Richards 2002, p. 10).
The main wild apple species in the Kazakhstan forests is *Malus sieversii*, a species which shows immense diversity in the apples it produces, ranging from large to small, red to yellow to green, and sweet to sharp. The apple trees in the forest spread as the fruits were eaten by birds, animals and humans, who probably chose the largest, juiciest fruits (Morgan & Richards 2002, p. 10).

Researchers are working on an apple evolutionary map following the Silk Road, and propose that the orient hybrid species arose from crosses between the Siberian crab apple (*Malus baccata*) and *Malus sieversii*, and travelled eastwards into China. Genome re-sequencing has shown that *Malus sieversii* and *Malus sylvestris* (the European crab apple) are the parents of the domesticated apple which travelled westwards from Central Asia with humans and animals (Duan & Yang 2017).

Domesticated apples (*Malus domestica* or *Malus pumila*) are widely distributed: they are grown in places with hard, cold winters in regions of North America, Russia and China, and in the tropics, for example in Java, Indonesia and in Shan State, Myanmar, but mostly in temperate climates. Apple trees require a period of winter cold to break the tree’s dormancy (Agrifutures 2017).

Apples do not breed true from seed: every pip is potentially a new kind of apple. Apples grown from seed can be unpalatable, but sometimes a delicious apple will grow from a ‘chance seedling’: for example, the Granny Smith apple, grown by Mrs Anne Smith of Ryde, New South Wales. In most instances though, propagation requires joining a bud or a piece of growth containing several buds (scion) from one tree to another (rootstock) to produce identical trees growing the same fruit (Gilbert 2001, p. 102).

**The origins of pears**

The generally accepted view is that the European or western pear arose from the wild species *Pyrus communis*, native across Continental Europe to north-west Iran, and that this species is a hybrid between *Pyrus pyraster*, indigenous to Europe, and *Pyrus caucasica*, or it may be a complex hybrid. Around half of the species of *Pyrus* are native to Europe, the Near East and the Atlas Mountains of North Africa; the others are native to Central Asia and China. Iranian botanists believe that the pear tree’s domestication occurred in the province of Gilan, in the north-west of Iran between the Caspian Sea and the Alborz Mountains (Morgan 2015, p. 12).
From the 17th Century onwards, there was great pear-breeding activity in France and what is now Belgium. Some pears were large, and had to be cooked: for example, the Catillac (Figure 5). Referred to as a ‘pound pear’, it provided much-needed carbohydrates in the diet in East Anglia (Dallas, Barnes & Williamson 2015, p.30).

In drier climates pear trees can live much longer than apple trees. In the 17th Century, the Dutch East India Company established a garden in Cape Town to supply vessels plying the spice trade between Europe and southeast Asia. In September 1660 Commander Jan van Riebeeck recorded the grafting of Dutch apple, pear, quince and medlar trees on young, wild trees in the forest and also in the Company’s gardens. (Pooley 2009). Cuttings have been taken from a pear tree that survives from that time (Philip 2015).

A history of apple cultivation in England

The word ‘orchard’ is derived from the Latin hortus and old English ortgeard, originally meaning a garden for herbs and fruit trees. In England the most commonly cultivated orchard fruits were apples. Now it specifically means an enclosure for the cultivation of fruit trees (The Shorter Oxford English Dictionary 2002).

In Britain, crab apples (Malus sylvestris) existed before the domestic apples that were brought by the Romans. Roman orchards probably did not survive the withdrawal of the legions and the subsequent influx of Jutes, Angles and Saxons from northern Germany into Britain, although some orchards survived in the monasteries (Morgan & Richards 2002, pp. 24-5).

During the Middle Ages the Muslim world encouraged scholarship, fruit growing, fine craftsmanship and the arts. Greek and Roman botanical works were translated, updated and expanded, and new fruit varieties were grown wherever possible. Moorish Spain became a centre of horticultural expertise. Alphonso X of Castile (1252-1284) owned Arabic horticultural works, including The Book of Agriculture written around 1080 by Ibn Bassal, whose works contained information on pruning, grafting, planting, soils and manure. Alfonso’s sister Eleanor married King Edward I in 1254, and imported gardeners from Spain (Morgan & Richards 2002, pp. 28-9). There are records indicating that Eleanor planted an orchard at Kings Langley in Hertfordshire in 1280 (McNeill 2013).

King Henry VIII was interested in fruit and planted an orchard at Hampton Court Palace from 1530 (Woudstra 2016, p. 255-257). In the late 16th Century, many of Queen Elizabeth I’s emissaries returned from Paris with fruit trees bearing sweet-tasting fruits and having smaller roots which enabled them to be trained against walls, forming ‘espaliers’ (Campbell 2005, p. 69).

In Norfolk, orchards also belonged to relatively modest properties, in both rural and urban situations between the 14th and 17th Centuries. Apples were the main fruit tree in Norfolk orchards, especially from the 18th Century (Dallas, Barnes & Williamson 2015, p. 28).

In the late 18th Century, Thomas Andrew Knight, who later became President of the Horticultural Society of London (now the RHS) was concerned that cider production had become depressed in his home county of Herefordshire. Many of the fruit trees were in decline, and he thought the solution was to create many new varieties. Actually, the decline of the orchards was probably due to viral diseases as the orchards aged (Kingsbury 2009, pp. 81-2).

An apple variety sometimes had many names depending on where it was grown and who had bred and/or named it. In 1811, Knight commissioned the artist William Hooker to paint the finest fruit accurately, including blemishes, stalks and leaves, to help identify varieties. The paintings were put into the Pomona Herefordiensis (see Figure 1). Later in the century, the Scottish pomologist Robert Hogg produced a fruit manual containing comprehensive records of every fruit cultivated in British gardens and orchards (Morgan 2012, pp. 6-7).

As the English apple reached its heyday in the 19th Century, competition from imports from the USA, Canada, Australia, New Zealand and South Africa forced English growers to concentrate on a few varieties. During the 20th Century as markets for pome fruit became...
more globalised, the number of apple and pear varieties grown commercially declined further. Varieties which cropped reliably and survived machine sorting, long distance travel and cool storage were favoured.

At first the loss of old varieties seemed purely nostalgic. Older people recounted the joy of picking ripe apples and eating dishes using local apple varieties. Gradually it became clear that losing traditional English orchards containing a mixture of varieties was leading to a loss of genetic material. If certain characteristics were needed to cope with climate change or emerging pests and diseases, drawing on the gene bank of ‘heritage’ varieties might be necessary.

English biologists discovered how important old fruit trees and orchards are as habitats for maintaining the biodiversity of plant and animal life in England (PTES 2018b). The People’s Trust for Endangered Species (PTES, founded in 1977) became involved in mapping and conserving traditional orchards. In 1983 an organisation called Common Ground was formed to engage people with their local environment. Their annual Apple Day event has helped to raise awareness of the importance of orchards with the display, tasting and buying of numerous varieties of apples, and helping with identification (Common Ground 2018). PTES and Natural England (the UK Government’s adviser for the natural environment) have created a database of all known fruit collections (PTES 2018a).

Supermarket chains supply most English people’s food requirements, and require large quantities of fruit for quick distribution. Buyers select unblemished colourful fruit which stores well, is sweet in flavour, standard in size and low in price. Growers select for disease resistance: examples of apples include Braeburn, Fuji, Gala, Jonagold and Pink Lady (Morgan & Richards 2002, p. 133). However, favourite English apples such as Cox’s Orange Pippin (somewhat more disease-prone than contemporary varieties), and Bramley cooking apples (which have an uneven shape but a fluffy texture when cooked) have reappeared in some supermarkets and farmers’ markets. Although they represent a tiny percentage of apples eaten in England, if locally sourced food becomes a high priority, a resurgence of other English apple varieties is feasible.

Apples in Australia

First pome fruits cultivated in Australia

In each new settlement in Australia, establishing fruit and vegetable gardens was essential to survival. The apple tree planted at Bruny Island in Tasmania by Captain William Bligh in 1788 is the first recorded tree, and survived until Bligh visited again in 1792 (Cowles and Walker 2005, p.3). Apples later became an important crop for Tasmania (McConnell & Servant 1999).

The First Fleet which arrived in Sydney Cove in January 1788 brought many plants and seeds to commence the settlement. In The Journal of a First Fleet Surgeon, George B. Worgan wrote that fruit trees, including pears and quince apple were procured at the Cape of Good Hope (Worgan 1788). The Botanic Gardens in Sydney received and distributed fruit trees during the 1830s. A shipment from the Horticultural Society of London which arrived in 1834 included a Downton Pippin apple tree which did not survive: over half of the apple trees were dead on arrival. The Downton Pippin apple is shown in Figure 1.

The transportation of fruit trees was expensive and difficult: they had to be dug up, protected from damage while handling, protected from saltwater spray on board ship, given rationed fresh water, then handled again in the colony. The invention of the Wardian Case in 1835, a glass case with a wooden base, dramatically improved the survival of plants shipped to Australia (Short 2003, p. 329-334).

In remote locations it was important to develop gardens and storage to suit local conditions. Figure 6 shows a well-insulated apple house shaded by old pear trees at Anlaby Station (settled in the 1830s) near Kapunda, some eighty kilometres north of Adelaide.

During Australia’s gold rushes, fruit trees were established wherever possible. At Hill End in New South Wales, Catillac pear trees survive from the 1850s gold rush (Tropman & Burton 1991). They provided much needed nourishment: it was said that a single pear could feed a whole family.
Prior to World War II, Australia’s population was more rurally based than at present. Many people grew some of their own food, including apple varieties suited to home gardens. At the 1933 Census the population of New South Wales was 2.6 million people, of whom half lived in rural and provincial areas. By 2016, the population of New South Wales had roughly tripled to 7.5 million people, of whom 4.8 million people (65%) lived in Sydney (ABS 2016). Many houses have been built where orchards once stood, for example on the Shipley Plateau in the Blue Mountains. Similarly, in Victoria, Melbourne increased from representing half of Victoria’s population of approximately 900,000 in 1933 (ABS 2013), to three quarters of Victoria’s population of 5.9 million in 2016 (ABS 2016). Doncaster is an example of a suburb that stands in place of orchards.

**Western Australia**

In 1933, Western Australia’s population was evenly divided between Perth and the regions, but in 2016, 1.9 million people (80% of the population) were living in Perth. As in Sydney and Melbourne, after timber was cut from the hills surrounding the city, orchards were planted, producing fruit for the Perth metropolitan area.

Early in the 20th Century, orchardists in the Great Southern region near the port of Albany grew apple varieties for European markets: being slightly closer to Europe than the eastern states ports enabled producers to export fresh apples which arrived in the northern hemisphere more quickly. In 1918 the Mount Barker Co-operative was established, funding a packing shed and cool store for exporting apples (Groom & Gates 2009, p. 24). During World War II, the Federal Government introduced a scheme for the compulsory acquisition of apples and pears. The Government requested and underwrote the building of a dehydration plant to supply dried apples to troops and for local sale (Groom & Gates 2009, p. 56).

After World War II, Australian orchardists exporting to the northern hemisphere experienced increasing competition from other countries such as South Africa (Groom & Gates 2009, p. 85). Apple prices fell, compounded by Britain joining the Common Market and importing apples from European countries instead of Australia. By 1968 the West Australian Government was paying people to pull out orchards when it had become uneconomical to grow fruit (Groom & Gates 2009, p. 87). Driving around Mt Barker in 2018 there is barely any evidence that a pome fruit industry existed, except when visiting the Old Police Station and Museum which has a shed full of apple handling and cultivation equipment.
Due to controlled atmosphere storage and refrigerated transport, in most parts of Australia Granny Smith apples can be obtained all year round at affordable prices in supermarkets. One or two generations ago this situation was very different: pome fruit was seasonal, a famine or a feast (or glut). Many varieties grown at that time are barely known today, except among elderly orchardists and apple enthusiasts.

Conclusion

Horticulture is a capricious business: it requires special skills and is not always profitable, for reasons which are often beyond the control of the horticulturalist. It is laborious, and labour-saving machinery can be expensive and financially risky. Crop failures caused by drought, pests, a change in water allocation or consumer tastes can be catastrophic for viability, and can make selling horticulturally productive land to a developer attractive. If the land is then covered in housing and roads, it is unlikely to be reclaimed for horticulture.

According to FAO studies, the world needs to increase food production by 50% by 2050. Fruit is highly nutritious and pome fruits have in the past saved people from famine. WHO and various epidemiological studies have shown that fruit and vegetables are integral to a good diet. In order to avoid or mitigate the effects of non-communicable diseases such as heart disease and diabetes, more fruit and vegetables are needed.

Pome fruit production is a critical part of the world’s agriculture. Apples and pears are important in both western and eastern culture: they have been cultivated for thousands of years over a range of latitudes. The processes of commercialisation during the 20th Century restricted the range of pome fruit varieties cultivated.

Australians benefit from a wide choice of fruit, and an innovative agricultural industry. The requirements of pomes are well known, and research into cultivating them under future scenarios of a warmer and drier climate is ongoing (Murphy-White 2018). Awareness of the health benefits of eating pome fruit is increasing (Sarkar et al. 2015).

In the future, foods which are indigenous to a particular region may be cultivated for their nutritional value and appropriateness to the local soils and climate. In the southwest of Australia fruits such as quandongs (*Santalum acuminatum*) and zamia (*Macrozamia fraseri*) are known to be nutritious, but the technology to cultivate and process these foods is limited, and the market demand does not yet exist.

Pome collections have successfully acted as repositories for rare varieties. Collections are scattered throughout Australia, many of them in private hands and relatively unknown. Australia ICOMOS heritage practitioners could help to conserve pome fruit heritage by raising awareness of the importance of pome fruit, and supporting those who propagate heritage varieties, supply trees and provide education about pome fruit. A database of nurseries and orchards containing heritage varieties could be developed, and heritage planners could become involved with more integrated urban planning concerning fruit producing areas.

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