

**‘Cultivated with great carefulness’: Chinese market gardening, urban food supplies and public health in Australasia, 1860s-1950s**

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**Abstract**

Our article examines Chinese market gardening in Australasia and changes in their agricultural practices, notably the gradual adoption of artificial fertilisers over the twentieth century, consequent with declining supplies of human and animal manure in cities. We highlight the centrality of Chinese market gardens to urban food supplies in Australasia. In light of the public health revolution, we also demonstrate the contentious issue of Chinese use of human waste or nightsoil as fertiliser. We show that urbanisation and the public health revolution transformed manure from a valued agricultural resource into a problematic waste product. Our article reveals a range of attitudes and beliefs towards Chinese market gardening that complicate simplistic narratives of uniform colonial racism.

**Keywords:** Chinese market gardening, Australia, New Zealand, urban environmental history, public health, urbanisation

The Chinese are most successful gardeners, or rather farmers, for in their gardens in this colony we really get a specimen of Chinese agriculture. Although we make a distinction between farming and gardening, and conduct them diligently, there is no such distinction made in China, every foot of which is cultivated with as great carefulness as we find displayed here on the land on which they grow vegetables. The Chinese are universally acknowledged to be the best agriculturists in the world.

*The Sydney Morning Herald*, 2 March 1865, p. 2.

## Introduction

Most mid-nineteenth-century Chinese immigrants to Australasia came from Guangdong's Pearl River delta region. The majority were peasant farmers, from counties around modern-day Guangzhou (formerly Canton). The largest numbers came from Poon Yue (today Panyu, a district of Guangzhou<sup>1</sup>) and Toi Shan (today Taishan county, southwestern Guangdong).<sup>2</sup> The Cantonese and Fujianese, in particular, have a long history of overseas migration, initially to south-east Asia and, from the mid-nineteenth century, to countries bordering the Pacific Ocean.<sup>3</sup> Like their kith and kin in south-east Asia, Cantonese migrants in the Pacific established networks of finance, trade, and migration connecting China with their new, often temporary homes. They relied on supplies of food, as well as letters and other information, from their homeland, and established kin and native-place associations in both China and their place of residence.<sup>4</sup>

Our article examines one particularly significant activity among Chinese in Australasia: market gardening. We highlight its prominence among Chinese once goldmining declined, and show that by the late-nineteenth century this activity was provisioning most Australasian towns with the majority of fresh vegetables. We first overview Chinese market gardening's extent and characteristics in Australasia. Next, we focus on Chinese horticultural practices, especially manuring techniques and their reception, to provide a window into how gardening — and exchanges of garden produce — could serve as a fractious and fruitful cultural contact zone among residents in Australia and New Zealand, one that at times transcended linguistic and other cultural barriers and at other times reinforced them.<sup>5</sup>

Manuring in Chinese market gardens represented a widely commented-upon practice by colonists, and a key way in which Europeans evaluated Chinese, more especially since linguistic

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<sup>1</sup> We use Cantonese transliteration of county names, as this was the language spoken by early Chinese immigrants to New Zealand, but use Guangdong and Guangzhou as the current names for the province and capital city, to avoid any ambiguity, as both earlier transliterations rendered the city and province, 'Canton'.

<sup>2</sup> James Ng, *Windows on a Chinese Past...*, Vol. 1, Dunedin, Otago Heritage Books, 1993.

<sup>3</sup> For a useful overview, see Ian Rae and Morgen Witzel, *The Overseas Chinese of South East Asia: History, culture, business*, Basingstoke, Palgrave Macmillan, 2008.

<sup>4</sup> Henry Yu, 'The Rhythm of Cantonese trans-Pacific migration', in Donna Gabaccia and Dirk Hoeder, eds., *Connecting Seas and Connected Ocean Rims: Indian, Atlantic and Pacific Oceans and China Seas Migrations from the 1830s to the 1930s*, Leiden, Boston, Brill, 2011, pp. 393-414.

<sup>5</sup> On the application to gardens of Mary Louise Scott's zone of cultural contact, see: James Beattie, ed., *Gardens at the Frontier: New Methodological Perspectives on Garden History and Designed Landscapes*, London, Routledge, 2018.

differences often precluded other forms of social interaction. Our focus on this topic responds to a recent call by environmental historian Donald Worster for historians to ‘uncover the past of muck production and consumption’, a topic to which historians have not given adequate attention.<sup>6</sup> To our knowledge, our study is the first to focus only on manuring practices among overseas Cantonese, a topic which enriches several aspects of scholarship.<sup>7</sup> First, it expands existing writing on Australasian agriculture and soil management, which in both countries has largely focused on European practices (and, in New Zealand, to a much lesser extent, Māori systems).<sup>8</sup> Second, examination of urban Chinese gardening addresses a silence in New Zealand urban historiography.<sup>9</sup> Both Chinese market gardeners and Chinese fruit shops dominated fruit and vegetable production and supply in colonial New Zealand.<sup>10</sup> Yet the only work on New Zealand urban environmental history has overlooked entirely the contribution of Chinese market gardening (and fruit shops) to both urban food production and distribution.<sup>11</sup> Finally, our study highlights the role of Chinese in the so-called sanitary revolution in which Australasian municipal authorities came to introduce safe drinking water and sewerage systems.<sup>12</sup>

### Home soils

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<sup>6</sup> Donald Worster, *The Good Muck: Toward an Excremental History of China*, Munich, RCC Perspectives: Transformations in Environment and Society, 2017, p.4.

<sup>7</sup> The major study on this topic is: Joanna Boileau, *Chinese Market Gardening in Australia and New Zealand: Gardens of Prosperity*, London, Palgrave Macmillan, 2017.

<sup>8</sup> On which, note: Cameron Muir, *The Broken Promise of Agricultural Progress: An environmental history*, New York: Earthscan/Routledge, 2014; Joe Powell, *Cambridge Studies in Historical Geography: An Historical Geography of Modern Australia: The Restive Fringe*, Cambridge, CUP, 2004. On New Zealand, note R. Vaughan Wood, ‘Soil fertility management in nineteenth century New Zealand agriculture’, University of Otago, PhD diss., 2003; R. Vaughan Wood, ‘Appraising Soil Fertility in Early Colonial New Zealand: The “Biometric Fallacy” and Beyond’, *Environment and History*, 9, 4 (2003), pp.393-405; James Beattie, ‘Scientific Agriculture, Health and Gardening: Japan, New Zealand and Bella and Frederic Truby King’, *New Zealand Journal of Asian Studies*, 16, 2 (2014), pp.47-76.

<sup>9</sup> For example, Ben Schrader’s 2017 study on urban New Zealand largely ignores gardens and Chinese, devoting only a handful of pages to gardening, and even less to Chinese. Schrader, *The Big Smoke: New Zealand Cities 1840-1920*, Wellington, Bridget Williams Books, 2016, pp. 270, 273, 347-9. Nor do Chinese appear at all in older scholarship, such as by David Hamer, *New Towns in the New World*, Columbia University Press, 1990. An exception is Erik Olssen’s *Building the New World: Work, Politics and Society in Caversham, 1880s–1920*, Auckland, Auckland University Press, 1995, pp.44-45, 158-166, 187-9, 249-254.

<sup>10</sup> James Beattie, “‘The Empire of the Rhododendron’: Reorienting New Zealand Garden history”, in Tom Brooking and Eric Pawson, eds., *Making a New Land: Environmental Histories of New Zealand*, Dunedin: Otago University Press, 2013, pp.241-257, 365-367. On garden history, see Matt Morris, *Common Ground Garden Histories Of Aotearoa*, Dunedin, University of Otago Press, 2020.

<sup>11</sup> James Beattie, ‘Colonial geographies of settlement: vegetation, towns, disease and well-being in Aotearoa/New Zealand, 1830s-1930s’, *Environment and History*, 14, 4 (2008), pp.583-610.

<sup>12</sup> For an overview of this change in the colonies and dependencies of the British Empire, see James Beattie and Ruth Morgan, ‘Engineering Edens on This ‘Rivered Earth’? A Review Article on Water Management and Hydro-Resilience in the British Empire, 1860s–1940s’, *Environment and History*, 23, 1 (2017), pp.39-63.

Over a 1,500 year period, from the Qin to Yuan dynasties (221 BC to 1368 AD), intensive agricultural systems developed in China in response to continuous population growth and land pressure.<sup>13</sup> By the early-nineteenth century, integrated farming systems were operating in the densely populated southern provinces of China, such as Guangdong. There, farmers grew rice and vegetables, raised chickens and pigs, and planted fruit trees, including mulberry to raise silkworms. They also farmed fish, and engaged in extensive reclamation projects to increase the area of cultivable land. In this agro-ecological system, nothing was wasted. Mulberry trees fed silkworms. Silkworm waste nourished fish. And manure from humans, pigs and chickens fertilised fields. Irrigated rice fields were thus highly productive, if also highly simplified, artificial systems. Rice fields produced two crops a year—sometimes even three. Between harvests, on the raised divisions along fields, farmers grew a wide variety of other crops, such as green vegetables, tobacco, peas, rape, sweet potatoes, sugarcane, peanuts and ginger. Some of the species had originally been introduced from the Americas from the 1600s.<sup>14</sup>

In intensive agricultural systems without fallowing, manuring is essential to maintain soil fertility over centuries of continuous cropping. In China, livestock played a much lesser role in producing manure than in Europe. Chinese farmers kept only a few pigs, chickens or oxen, and instead relied heavily on human manure and urine to supplement animal manure.<sup>15</sup> Such was manure's value in China that some companies specialized in collecting waste from cities and selling it to agriculturists, a response to rapid urbanization from the sixteenth and seventeenth centuries. In Jiangnan (the area south of the Yangtze river), as in southern Chinese cities such as Guangzhou, business groups commercialized and controlled nightsoil collection, distribution and sales.<sup>16</sup> This very efficient pre-modern system of waste utilization served, as Yong Xue notes, to integrate and shape 'relations between the urban and rural worlds, both economically and environmentally.'<sup>17</sup>

Visiting Asia in 1909, American agriculturalist Franklin Hiram King declared that the first lesson the West can learn from the East is how the farmers of China, Japan and Korea were able to solve the problem of conserving natural resources and maintaining soil fertility. He decried the short sightedness of European farmers for letting valuable fertiliser run to waste into rivers and oceans.<sup>18</sup> In Guangdong, King described boatloads of human manure being shipped by canal from Canton (faeces and urine was collected separately). In the fields, he saw armies of barefoot men wading in water, working the furrows between beds and applying diluted manure to crops of leeks using long-handled dippers holding a gallon (4.5 litres).<sup>19</sup>

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13 Guoha Xu and L. J. Peel (eds), *The Agriculture of China*, Oxford, Oxford University Press, 1991, p.66.

14 Xu and Peel, *Agriculture of China*, pp. 69-70; Francesca Bray and Joseph Needham, *Science and Civilisation*, Vol. 6: Part I, Agriculture, Cambridge, Cambridge University Press, pp.111-2; Franklin Hiram King, *Farmers of Forty Centuries*, London, Butler and Tanner, 1949 (1927), p.87.

15 Bray and Needham, *Science and Civilisation*, Vol. 6: part II, pp.289-90; King, *Farmers of Forty Centuries*, p.171; Bray, *Rice Economies: Technology & Development in Asian Societies*, University of California Press, 1986; E.N. Anderson, *The Food of China*, New Haven, Yale University Press, 1988; Eugene Anderson, *Food and Environment in Early and Medieval China*, Philadelphia, University of Pennsylvania Press, 2014.

16 Yong Xue, "Treasure Nightsoil as if it were gold:" Economic and ecological links between urban and rural areas in late imperial Jiangnan', *Late Imperial China*, 26, 1 (2005), p.55.

17 Xue, 63.

18 King, *Farmers of Forty Centuries*, pp.15, 171.

19 King, *Farmers of Forty Centuries*, p.74.

Collecting, preparing and applying fertilisers was labour-intensive. Traditionally, human waste was stored in large terracotta urns near houses, or sometimes privies were combined with pig-pens so that human and animal manure could be efficiently collected from one location.<sup>20</sup> Manure was left to ferment aerobically in large pits, for a duration of several days to a few weeks before use. Recent research has shown that the heat generated during the composting process, which reaches 55-60°C, is high enough to kill many of the harmful micro-organisms present in manure. This means that the application of human and animal manure to the fields is in fact less of a health hazard than has often been supposed. Modern chemical analyses show that manure is rich in essential plant nutrients, such as nitrogen, potassium and phosphorous.<sup>21</sup> Farmers recognised the harmful effects of direct application of manure to plants, so they diluted the fermented manure with water. Liquid manure was carefully applied using a long-handled dipper or added to irrigation water. Additional organic materials, when added to manure, made compost. Such supplementary material could be everything from chaff, straw and husks, to sediments dredged from ponds and canals, as well as wood-ash and green manures, like legumes, weeds and aquatic plants.<sup>22</sup>

Interpretations of the environmental impacts of this form of agriculture have varied. In his detailed study of the environmental history of southern China, *Tigers, Rice Silk and Silt: Environment and Economy in Late Imperial South China*, Robert B. Marks argued that this region's integrated, intensive agricultural system was ultimately unsustainable. Guangdong Province, he notes, reached the limits of its cultivable land around the middle of the nineteenth century. At this critical point, people were eking out an existence on ever-smaller plots of land, agricultural techniques were as developed as they could be, and yields were stagnating. This ecological crisis fomented disputes over access to land, water, and trees for fuel and timber, and contributed to feuds and social uprisings, such as the Taiping rebellion (1850–1864).<sup>23</sup> Donald Worster supports Marks' interpretation, but Worster argues that the so-called metabolic rift—which describes how capitalism broke the efficient exchange of nutrients between city and countryside—oversimplifies and romanticizes the situation of non-Western agriculture in countries like China. Instead, Worster argues that a 'stark metabolic rift' had emerged in southern China centuries before the west, through its agricultural practices. According to this viewpoint, China's artificial system was ultimately unsustainable.<sup>24</sup> In contrast, environmental and food anthropologist Eugene N. Anderson argues that by late imperial times, although China's environment was severely depleted in places, and its food-production system stretched, comparatively, it nevertheless still had 'a vast expanse of productive, well-managed land, and hardly any extinctions.'<sup>25</sup>

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20 Bray and Needham, *Science and Civilisation*, 6: II, p.292; King, *Farmers of Forty Centuries*, p.175.

21 Thomas McCalla and Donald Plucknett, 'Collecting, transporting and processing organic fertilisers', in Donald Plucknett and Halsey Beemer, eds., *Vegetable Farming Systems in China*, Boulder, Colorado, Westview Press, 1981, pp.23-4.

22 King, *Farmers of Forty Centuries*, pp.67, 175; McCalla and Plucknett, 'Collecting, transporting and processing', pp.19, 24; Bray and Needham, *Science and Civilisation*, 6:II, p.290.

23 Robert B. Marks, *Tigers, Rice, Silt, and Silk: Environment and Economy in Late Imperial China*, Cambridge, Cambridge University Press, 1998, p.308.

<sup>24</sup> Worster, *The Good Muck*, pp.30-33 (Quote, 33).

25 E.N. Anderson, 'Agriculture, Population and Environment in late imperial China', in James Beattie, Edward Melillo and Emily O'Gorman, eds., *Eco-Cultural Networks and the British Empire: New Views on Environmental History*, (New York; London: Bloomsbury, 2015), p.31.



## New Soils

Market gardening in Australasia arrived with the first Chinese goldminers. The Pacific gold rushes began with California's (1848), followed by ones in Victoria (1851), Otago and Westland (mid-1860s), and others thereafter.<sup>26</sup> Gold rushes delivered short-lived boomtowns, explosions of economic growth and population that left lasting environmental and sometimes demographic legacies.<sup>27</sup> Cities such as Melbourne and Dunedin experienced more sustained growth than many other short-lived goldfields settlements. In a decade from the first rush, Melbourne's population increased sevenfold, from about 20,000 in 1851 to over 140,000 by 1861 (Table 1).<sup>28</sup> Victorian censuses record a sharp increase in numbers of Chinese in 1854, a population which climbed rapidly from 2,341 in 1854 (almost 1 per cent of the total population) to 25,424 in 1857 (6.2 per cent of the population). The great majority worked on the goldfields (23,733 out of 24,732 in 1861).<sup>29</sup>

[TABLE 1 HERE]

For New Zealand, almost all nineteenth-century Chinese first arrived in Otago, even if they later moved to other parts of the country. Otago's Chinese population peaked at 3,715 in 1871,<sup>30</sup> reaching an official high point of 5,004 in 1881. The latter figure was only surpassed after World War II, although historian James Ng believes that possibly as many as 8,000 Chinese may have passed through New Zealand (Table 2), something that went unrecorded in official statistics.<sup>31</sup> While only comprising a minority of Otago's overall population, as on the Victorian goldfields,<sup>32</sup> Chinese were overrepresented in certain professions, such as mining and, later, market gardening (Table 3).

[TABLES 2 & 3 HERE]

Early Chinese arrivals in New Zealand took up market gardening to supplement their earnings from mining. Later, others moved into the occupation full-time, once it was clear there was a sufficient market in the wider community. The high prices of goldfields goods and services, as well as the high demand for fresh food, combined with Chinese horticultural skills,

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<sup>26</sup> Philip Ross May, 'Gold Rushes of the Pacific Borderlands: A comparative study', in Len Richardson and W. David McIntyre, eds., *Provincial Perspectives: Essays in Honour of W.J. Gardner*, Christchurch, University of Canterbury Press, 1980, pp.91-105.

<sup>27</sup> Andrew C. Isenberg, *Mining California: An Ecological History* (New York: Hill and Wang, 2005).

<sup>28</sup> Warwick Anderson, *The Cultivation of Whiteness: Science, Health and Racial Destiny in Australia*, Carlton South, Victoria: Melbourne University Press, 2002, pp.20 (figures), 35-8.

<sup>29</sup> Parliament of Victoria, Census of Victoria, 1861, Table V p. 7, Table VII p. 9. <https://www.parliament.vic.gov.au/vufind/Record/90203>, accessed 11 January 2019.

<sup>30</sup> Select Committee, 1871, *Appendices to the Journal of the House of Representatives (AJHR)*, p.23.

<sup>31</sup> James Ng, 'The Sojourner Experience', in Manying Ip, ed., *Unfolding History, Evolving Identity*, Auckland, Auckland University Press, 2003, p.14.

<sup>32</sup> At one point in the late 1850s, for example, Keir Reeves estimates that the Chinese accounted for one in ten Victorians. Keir Reeves, 'The Chinese in Central Victoria, A Nation's Heritage', *Electronic Encyclopedia of Gold in Australia*, <http://www.egold.net.au/biogs/EG00193b.htm>, accessed 10 January 2019.

made market gardening an attractive option. Declining gold yields after the heady early days of the gold rushes (later 1870s) provided further incentive for Chinese miners to diversify into other activities.<sup>33</sup>

Descriptions and photographs abound of the carefully tended vegetable plots adjacent to Chinese miners' huts (Figure 1).<sup>34</sup> Writing in 1911, missionary Alexander Don (1857–1934) recorded '[a]n old man of 70' at Waipori, Otago, whose very modest hut, before fire engulfed it, had beside it a 'little cabbage patch and potato plot'.<sup>35</sup> Don's tour diaries – extending from the 1880s to the 1920s – mention many Chinese introductions into New Zealand: bok choy, Chinese cabbage, and other popular edible plants (white radish, Chinese chives, spring onions, Chinese sugar peas and kohlrabi, and less commonly, chrysanthemum greens, coriander and boxthorn).<sup>36</sup>

[FIGURE 1 here]

Figure 1: Tse Tsum's House, Gabriel's Gully, Lawrence, 22 January 1903, from Foreign Missions Committee NZ Chinese (A. Don), 1902/03, 496/31 A-512-49 CB7/2, item A-S12-49-10. Reproduced with permission from Presbyterian Archives Research Centre New Zealand.

The Chinese camp at Cromwell, Central Otago, illustrates the nature of early Chinese gardens in Australasia. Located in the gold fields, the camp had around thirty huts. Along with pig pens, hen coops and fruit trees, a number of small garden plots surrounded the camp. A small stone-lined spring provided gardeners with a year-round water supply. In this way, the miners recreated in the far south of New Zealand a form of subsistence similar in many ways to that which they had left behind in southern China. As noted, theirs was a home of small self-sufficient farmlets, with pig and chicken raising providing both food and valuable manure for vegetable growing. From the 1880s, large commercial market gardens, operating on clan lines, opened in many Otago towns (Figure 2—Gore garden).<sup>37</sup>

[FIGURE 2]

Figure 2: Chan Kwong Yim, Chan Shek, William Mawson, Chan Yip Kwong, Chan Tak Ship, Tse Yeung and Chan Yuk Lam (Chin Lim), Bury Street, Gore, 20 January 1903, from Foreign Missions Committee NZ Chinese (A. Don), 1902/03, 496/31 A-512-49 CB7/2, item A-S12-49-9. Reproduced with permission from Presbyterian Archives Research Centre New Zealand.

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<sup>33</sup> Boileau, *Chinese Market Gardening*, pp. 101-102. The timing of this differed by goldfields, as we explore below.

<sup>34</sup> Neville Ritchie, 'Archaeology and history of the Chinese in southern New Zealand during the nineteenth century: a study of acculturation, adaptation, and change', PhD Thesis, University of Otago, 1986, p.640.

<sup>35</sup> A. Don, *New Zealand Presbyterian Chinese Mission: Inland Tours XXIII and XXIV, 1909-1911, and Westland Tour, 1911*, Dunedin, Otago Daily Times, 1911, p. 39.

<sup>36</sup> A. Piper, 'Chinese Diet and Cultural Conservatism in Nineteenth-century southern New Zealand', *Australian Journal of Historical Archaeology*, vol. 6, 1988, pp.34-42; A. Don, *Nineteenth Inland Otago Tour, 1905-1906*, Dunedin, Otago Daily Times, 1906, p. 26; On garden plants, see also: Ng, *Windows on a Chinese Past*, vol. 3, p. 55, note 35b.

<sup>37</sup> Ritchie, 'Traces of the past', p.35; Ritchie, 'Archaeology and history of the Chinese', pp.640-1.

In Australia Chinese market gardening also had its origins in the gold rushes and developed from small plots serving the Chinese community to commercial gardens serving the wider community. For example, Keir Reeves' study of McLaren's Flat on the Mount Alexander diggings in Victoria traces the transition of Chinese activity from mining to other occupations, predominantly market gardening. He shows that many Chinese miners stayed on after the gold rushes, either by choice or circumstance, developing strong networks with the Chinese community in Melbourne and other regional centres and becoming integrated into the European community.<sup>38</sup> In her archaeological survey of a Chinese market garden on the Loddon River near Vaughan on the Victorian goldfields, Zvonkica Stanin traces its development over more than half a century, from 1851 to 1912. She contrasts the simple one-room dwellings of Chinese gardeners, used for communal sleeping and cooking, with those of European settlers where the presence of families and the accumulation of possessions led to expansion and division of spaces.<sup>39</sup> The first archaeological survey in Australia of a Chinese market garden site was the study of Ah Toy's garden on the Palmer River goldfields, undertaken by Ian Jack and Katie Holmes in 1984. The original leaseholders, An Gee and Ah Ung, were among the thousands of Chinese who flocked to the Palmer River in North Queensland after gold was discovered there in 1871. They combined mining with market gardening. Later leaseholder Ah Toy took over the garden in 1900. For over 30 years he supplied vegetables to local miners, the householders of Maytown and a Chinese storekeeper in Cooktown.<sup>40</sup>

In another study of gardening on the Victorian goldfields, Suzanne Hunt describes how colonial nurserymen were at the forefront of experimentation in the growing of plants suitable to the different climatic zones in Australia and New Zealand. They also saw the opportunity for marketing their products to Chinese gardeners. One was the entrepreneurial nurseryman Thomas Lang of Ballarat, who imported a million plants into Victoria between 1858 and 1870. Quick to capitalise on the commercial possibilities of the expanding goldfields towns, Lang imported seeds from as far afield as the Himalayas and Shanghai. He prominently displayed the seeds he imported from China in the window of his Ballarat store with Chinese labels, and in this way supplied Chinese market gardeners with familiar plants and herbs to cater for the large Chinese population in the Ballarat region.<sup>41</sup>

Chinese commercial gardens concentrated in areas of high European population.<sup>42</sup> Urbanization made market gardening economically viable, as did the proximity of many larger settlements to ports. Between 1871 and 1911 New Zealand's four major cities grew steadily; by 1911 45.82 percent of the population lived in cities, compared to 37.66 percent in 1881.<sup>43</sup>

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38 Keir Reeves, 'Historical neglect of an enduring Chinese community', *Traffic*, Issue 3, July 2003, pp. 53–77.

39 Zvonkica Stanin, 'From Li Chun to Yong Kit: A Market Garden on the Loddon, 1851--1912', *Journal of Australian Colonial History*, Vol. 6, 2004, pp. 27--8.

40 Ian Jack and Katie Holmes, 'Ah Toy's garden: a Chinese market garden on the Palmer River goldfield, North Queensland', *Australian Journal of Historical Archaeology*, Vol. 2, 1984, pp. 51–52.

41 Suzanne Hunt, 'Vegetable plots and pleasure gardens of the Victorian goldfields', in Ian McCalman, Alexander Cook and Andrew Reeves (ed.s), *Gold: Forgotten Histories and Lost Objects of Australia*, Cambridge, Cambridge University Press, 2001, pp. 267–284.

42 C. Y. Choi, *Chinese Migration and Settlement in Australia*, Sydney, Sydney University Press, p.33.

43 New Zealand Census and Statistics Department, Results of a Census of the Dominion of New Zealand taken for the night of the 17th April 1921, Wellington, Government Printer, p.55.



From 1911, Auckland's growth began to outstrip that of Wellington, Christchurch and Dunedin. Reflective of this shift in population, in the latter part of the nineteenth century, Chinese market gardens began shifting northwards and to the main centres. This trend continued into the next century, part of a broader population drift in which Wellington became the largest Chinese centre after World War I. Smaller Chinese populations also established in rural areas, regional centres and on the fringes of country towns.<sup>44</sup>

In 1889, of Dunedin's 110 Chinese market gardeners, 80 worked in South Dunedin, a lowland area of peri-urban settlement. In addition to producing for a local market, Dunedin's Chinese market gardeners likely supplied visiting ships, especially from those gardens located near Dunedin's Port Chalmers (as at Sawyers Bay). Cantonese gardeners had a near-monopoly on Dunedin's vegetable trade from the early 1880s—a similar situation to the colony's other main centres. It led parliamentarian J. Duthie to observe in 1896 that Wellington's citizens 'are almost solely dependent upon them for vegetables...but [for] these industrious Chinamen the people would generally go short.'<sup>45</sup> Others expressed the same message but with a different sentiment. In 1912, the *Wanganui Chronicle* wailed that in New Zealand, 'The Chinese have been left in indisputed [sic] possession of the industry' of market gardening.<sup>46</sup>

One of Auckland's most prominent gardeners, Chan Dah Chee (Chan Ah Chee, 1851-1930), established a succession of market gardens in and around Auckland between the 1880s and 1920, at one point employing over 300 Chinese workers.<sup>47</sup> Like many other Chinese, Chan Dah Chee later opened fruit shops, a natural progression from vegetable hawking, and a reflection of the greater opportunities available to naturalised Chinese who remained in New

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44 Paul Jones, *Chinese-Australian Journeys: Records on Travel, Migration and Settlement, 1860-1975*, Canberra, National Archives of Australia, 2005, p.16; Charles Sedgwick, 'The politics of survival: a social history of the Chinese in New Zealand', PhD Thesis, University of Canterbury, Christchurch, 1982, pp.73-4, 154. Wellington Province's Chinese population increased from 474 in 1896 to 868 by 1916 and 1544 by 1921. In 1936, 39 per cent of Chinese in New Zealand lived in Wellington Province. See, L. Lee and R. Lam, *Sons of the Soil: Chinese Market Gardeners in New Zealand*, Pukekohe, Dominion Federation of N.Z. Chinese Commercial Growers, 2012, pp.119-120, 160.

45 For an excellent overview see, Lee and Lam, *Sons of the Soil*; and N. Murphy, *Success Through Adversity: A History of the Dominion Federation of New Zealand Chinese Commercial Growers*, Pukekohe, Dominion Federation of N.Z. Chinese Commercial Growers, 2012. On Otago: Ng, *Windows on a Chinese Past*, vol. 1, pp.301, 320-26, 337-44. Also, J. B. J. Lee, 'Eating Porkbones and Puha with Chopsticks: Maori-Chinese Constructions', in *Unfolding History*, pp.94-112; D. McGill, *Lower Hutt: The First Garden City*, Petone, Lower Hutt City Council, 1991, pp.110-111; Lee and Lam, '陈达枝 Chan Dah Chee (1851 -1930): Pioneer Chinese Market Gardener and Auckland Businessman', *ENNZ: Environment and Nature in New Zealand*, vol. 6, no. 1, June 2011, p.48; Julie Bradshaw, *Golden Prospects: Chinese on the West Coast of New Zealand*, Greymouth, West Coast Historical & Mechanical Society, 2009, pp.69-79; *Records of the Gore and Surrounding Districts' Early Settlers' Association*, vol. 4, Gore, Gore and Surrounding Districts' Early Settlers' Association, 1953, pp.25-26.

46 *Wanganui Chronicle*, 3 June 1912, p.3.

47 Ng, *Windows*, vol. 1, op. cit., pp. 320-325, 338-341, 148, 341. By 1926 the Chinese population of 3374 was concentrated in Wellington (1163) and Auckland (1086). J. Heine, 'Colonial Anxieties and the Construction of Identities: The Employment of Maori Women in Chinese Market Gardens, Auckland, 1929', M.A., University of Waikato, Hamilton, 2006, p. 26. *Evening Post*, 19 October 1891, p.3. 'Interim Report (No II) of the Chinese Immigration Committees', *AJHR*, H-5a, 1871, p. 8. Lee and Lam, 'Chan', op. cit., pp. 24-54.

Zealand, notwithstanding the poll tax acts, levied from 1881 to restrict Chinese immigration.<sup>48</sup> In Wellington, a succession of market gardens dotted its peri-urban area: notably, in the Hutt Valley, and along the Kapiti Coast. Here, the advent of railways, and later (motorised) trucks, enabled market gardens to move further out of town, where land prices were increasing with the advent of more intensive settlement and tramway development.<sup>49</sup>

Australia presented a similar pattern. The majority of cities were coastal ports, and the general population became increasingly urbanised in the late nineteenth century. This process was almost as rapid among the Chinese community, as they sought employment opportunities in the cities.<sup>50</sup> Market gardening was an economically and socially viable occupation for urban Chinese, as the demand for fresh food increased dramatically with the growth of urban populations. The urbanisation of the Chinese community continued after Federation in 1901, although there remained sizeable Chinese populations dispersed across rural areas, in small groups on the fringes of country towns, or in larger groups of one hundred or more in some regional centres.<sup>51</sup> In addition to market gardening, Chinese in rural areas ran stores and worked on pastoral stations.

Australia's climatic range challenged Chinese market gardeners to successfully cultivate crops in regions from tropical Northern Australia and Queensland to semi-arid western New South Wales and temperate Tasmania. In his research on Chinese market gardens in southern and western New South Wales, including sites in Cobar, Booligal and Hillston in the arid far west and Braidwood, Araluen and Jembaicumbene in the south, Barry McGowan notes the close links between market gardening and mining. The dams and water races constructed for sluicing alluvial gravels and separating the precious grains of gold were also used by market gardeners to channel irrigation water to their gardens. McGowan highlights the inventiveness and adaptability of Chinese market gardeners in harnessing scarce water resources, making use of storm water flows and soakages to harness irregular rainfall and modifying and adapting the technology and implements they had available to them. At Nimagee Station, for example, a wing dam (a barrier only extending part way into a water course) and water race were constructed to divert water to a market garden from a water soakage and overflow.<sup>52</sup>

Notwithstanding their wide geographical spread, most Chinese gardens concentrated in the continent's relatively well-watered and temperate south-east, an area stretching over 2,000 kilometres from Brisbane to Melbourne and Adelaide. This area, with the largest and densest European population, provided Chinese gardeners with a ready market.<sup>53</sup> In Melbourne in 1863, the *Farmer's Journal and Gardener's Chronicle*, acknowledging the 'indefatigable industry' of the Chinese market gardener, noted that Europeans were 'indebted [to them] for [providing] succulent vegetables to accompany his not always very palatable staff of life', while '[o]n the gold-fields the Chinese gardener has become an institution.' The writer

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<sup>48</sup> Ruth Lam, Beverly Lowe, Helen Wong, Michael Wong, Carolyn King, *The Fruits of our Labours: Chinese Fruitshops in New Zealand*, 2 Vols., Wellington: Chinese Poll Tax Heritage Trust, Department of Internal Affairs, 2018.

<sup>49</sup> Lee and Lam, *Sons of the Soil*.

<sup>50</sup> C.Y. Choi, *Chinese Migration and Settlement in Australia*, Sydney, 1975, pp. 28, 52.

<sup>51</sup> Paul Jones, *Chinese-Australian Journeys: Records on Travel, Migration and Settlement, 1860--1975*, Canberra, 2005, p. 16.

<sup>52</sup> Barry McGowan, 'Chinese market gardens in southern and western New South Wales', *Australian Humanities Review*, Issue 36, July 2005, n.p.; Barry McGowan, 'Adaptation and organization: the history and heritage of the Chinese in the Riverina and Western New South Wales, Australia', *Chinese America: History and Perspectives*, Annual, 2007, p. 238

<sup>53</sup> Boileau, *Chinese Market Gardening*, pp.58-9, 108-9.

recorded six market gardens in and around Melbourne.<sup>54</sup> Such indebtedness to Chinese for a supply of vegetables to urban areas was a story writ large across Australasia.

In these Australasian cities and towns, in gardens, and on streets and in fruitshops, Chinese, British and indigenous horticultural traditions met and interacted.<sup>55</sup> Although they developed under very different circumstances and with their own distinctive histories, the first two traditions actually shared many commonalities. Chinese and Māori forged successful partnerships in North Island market gardens in the twentieth century, as did some Indigenous Australians, Torres Strait Islanders and Chinese in parts of northern Australia.<sup>56</sup> The commonalities between Chinese and European horticulture included attention to individual plants, deep cultivation of the soil, the raising of seedlings in hotbeds, as well as transplantation, multi-cropping and crop rotation, in addition to extensive manure use.<sup>57</sup> Many of the methods employed by Chinese market gardeners were therefore familiar to Europeans, a familiarity promoting recognition and sometimes acceptance and respect of Chinese horticultural skills. Moreover, British and Chinese cultures held a special place for horticulture and gardens as symbols of civilisation and status, likewise regarding land left idle or waste with abhorrence.<sup>58</sup>

The particular nature of Chinese manuring methods aroused both approval and opprobrium among Europeans and Māori (we cannot find evidence of Aboriginal Australian views).<sup>59</sup> An observant journalist described the storage of liquid manure in an array of Chinese jars, in Victoria, 1862. The Chinese gardener

... is great in the use of liquid manure, and round his garden gate at all times long rows of peculiar round long-necked pipkins are to be seen--miniatures of those oil jars in which the forty thieves who tormented Ali Baba were so summarily disposed of by quick-witted Morgiana. These pipkins the Chinese gardener circulates throughout his neighbourhood when empty, and recovers when full, and, with the help of the river water, to thoroughly disseminate this manure about the roots of his plants, he performs marvels in the art of kitchen gardening.<sup>60</sup>

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<sup>54</sup> *Farmer's Journal and Gardener's Chronicle*, 20 June 1863, p.9.

<sup>55</sup> Note, for example, the provision of horticultural knowledge as a point of contact between Europeans and Chinese. Fa-ti Fan, *British Naturalists in Qing China: Science, Empire, and Cultural Encounter*, Harvard, Harvard University Press, 2004; Beattie, 'Thomas McDonnell's Opium: Circulating, Plants, Patronage, and Power in Britain, China and New Zealand, 1830s-1850s', in Sarah Burke Cahalan and Yota Basaki, eds., *The Botany of Empire in the Long Eighteenth Century*, Washington, D.C., Dumbarton Oaks/Harvard University Press, 2017, pp.163-188.

<sup>56</sup> On New Zealand: Jenny Bol Lee, *Jade Taniwha: Māori-Chinese identity and schooling in Aotearoa* (Auckland: Ruatoki, 2007); Lee and Lam, *Sons of the Soil*. On northern Australia: Boileau, *Chinese Market Gardening*, pp.251-252.

<sup>57</sup> For a discussion, see: Georges Métaillé, *Science and Civilisation in China, Volume 6: Biology and Biological Technology, Part 4, Traditional Botany: An Ethnobotanical Approach*, Cambridge, CUP, 2015; Boileau, *Chinese Market Gardening*, pp. 39-40.

<sup>58</sup> On which attitudes, see: Joseph Lawson, 'The Chinese State and Agriculture in an age of global empires', in *Eco-cultural Networks*, pp.44-67. See also Boileau, *Chinese Market Gardening*, p.236.

<sup>59</sup> J. Heine, 'Colonial Anxieties and the Construction of Identities'; B. Brookes, 'Gender, work and fears of a "hybrid race" in 1920s New Zealand', *Gender & History*, 19, 3 (2007), pp.501-518.

<sup>60</sup> *The Argus*, 27 August 1862, p. 5.

Other accounts corroborate the widespread usage of jars by Chinese.<sup>61</sup> A particularly detailed account of Chinese market-gardening methods in Australia in 1870 describes the practices on a 4.5 acre garden bordering the Barwon River in Geelong, Victoria. It illustrates the continuity of traditional Chinese horticultural practices, including growing crops on raised beds, and raising water from the river to irrigate gardens through a system of channels. Manuring featured prominently in the garden.

The Chinese gardener bought, or procured all the manure, urine, or human excrement which could be got easily from nightmen, and filled the tank; sent his men to the gas works and tanneries for refuse, and mixed all together, and sunk some barrels perforated in the sides beside the tank. ... The two years after he began were seasons of drought. While you could not see a cabbage, or scarcely a blade of grass, for miles, this garden was one map of verdure. ... The crops were wonderful—cabbages, lettuces, radishes, red beet, and Chinese peas and cabbages growing as close as they could stand, and not a yellow or unhealthy plant to be seen.<sup>62</sup>

Most Chinese leased market gardens, due to expense (in New Zealand's case) or for both this reason and anti-Chinese legislation (in Australia's case). In New Zealand, other than for a three-year period during World War II, under the law Chinese could purchase land.<sup>63</sup> In Australia, by contrast, Chinese were unable to own land unless they were naturalised Australian citizens. Only some 5,000 Chinese became naturalised under the laws of the Australian colonies prior to 1901. After Federation, legislative restrictions varied from state to state.<sup>64</sup> In light of these factors, for most Chinese, then, their major outlays were rent, as well as purchases of seeds, gardening implements, and fertiliser, and transporting produce to market. To make most efficient use of their carts, market gardeners in cities such as Sydney and Melbourne carried back loads of manure and straw to their gardens after their early morning trip to deliver produce to the central markets.<sup>65</sup>

There are many examples of practical 'making do' in the methods Chinese market gardeners deployed to collect and store water and liquid manure on their gardens. Water, of course, challenged gardeners in dry parts of Australasia. Regular watering by Chinese market gardeners in Deniliquin, New South Wales, attracted praise from pastoralist Gideon S. Lang in a public lecture in August 1865. Admiring local Chinese market gardeners' ability to raise vegetables 'even in the hottest weather', Lang highlighted their activities during the drought of 1864, when 'their garden was a perfect oasis in the desert. The fresh green patch...formed a wonderful contrast to the surrounding brazen [sic] herbage'.<sup>66</sup> In Central Otago, New Zealand, Lye Bow of Alexandra combated dry conditions by making extensive use of former irrigation channels to water over one hundred apple trees in 1894, a number that increased dramatically

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61 John Gelding, 'John Chinaman and his garden', *Horticultural Magazine and Gardener's Calendar of New South Wales*, Vol. 4, No. 44, August 1867, p.192.

62 *Bruce Herald*, 24 August 1870, p.7.

63 Nigel Murphy, *A Guide to the Laws and Policies relating to the Chinese in New Zealand*, Wellington: New Zealand Chinese Association Inc., 1997, pp. 94-98.

64 Boileau, *Chinese market Gardening in Australia and New Zealand*, p. 136

65 Weston Bate, *A History of Brighton*, Melbourne, Melbourne, Melbourne University Press, 1983, p.166; Randwick Municipal Council, *Randwick: A Social History*, Kensington, University of New South Wales Press, 1985, p.159.

66 *Rockhampton Bulletin and Central Queensland Advertiser*, 31 August 1865, p.2.



over time.<sup>67</sup> In the Sydney suburb of Manly in the early-twentieth century, Chinese market gardeners used baths to store liquid fertiliser, a smelly mix of pig manure and nightsoil.<sup>68</sup> And, in Pine Creek, in the Northern Territory, Nellie Fong recalled how, earlier in the twentieth century, her husband would water the plants in their garden using a kerosene tin and 44 gallon drums of stored liquid manure, in place of the traditional ceramic jars used in China. She vividly recalls the stench of the fertiliser, fortified with oxblood:

...when they kill, the ox blood, we always take the tin out there for them to drain the ox blood into the tin. And that's our fertiliser, the liquid one--and can they smell! The whole garden smell... We put them in a drum first, a big 44 gallon drum. And when we needed to fertilise them we just put them in the bucket and then dip it in water and then water it. For the seedlings it would be a very fine one, very thin one, and for the mature one it would be a stronger one.<sup>69</sup>

While providing the cornerstone of Chinese market gardening, the use of manure aroused near-constant complaints from neighbouring Europeans, amidst concerns that it bred disease, a reflection of prevailing miasmatic theories of illness.<sup>70</sup> In 1863, Bendigo residents complained 'loudly of the unwholesome stench from the liquid manure which the Chinese horticulturists are in the habit of using for their gardens.' The *Bendigo Advertiser* went on: 'Although it would be inadvisable, no doubt, to restrict industry, whether of Chinese or any other class, it becomes a question whether the maintenance of the public health must not take precedence of any industry, however novel, if nasty.'<sup>71</sup> Clearly, authorities prioritized industry, as the complaints continued.<sup>72</sup> In 1878, Brisbane's Local Board of Health addressed concerns of residents neighbouring the two Chinese gardens in Fortitude Valley, who were accused of 'keeping faeces and other filth lying about in the open air, causing pollution to the atmosphere.'<sup>73</sup>

Some Europeans believed that such practices generated particular diseases. In 1868, South Australia's *Tarregower Times* identified Chinese-grown vegetables as the cause of leprosy. In response, Dr. Bryn criticised 'the most gratuitous injustice [promulgated] to the poor Chinese gardener', by which the *Tarregower Times* 'wickedly accuses their wholesome vegetables with producing leprosy.' The *Walleroo Times*' editor supported Bryn, calling the whole episode a 'silly but vicious hoax.'<sup>74</sup> Almost two decades later, a Sydney lecturer levelled similar accusations against the Chinese. In 1887, Angus Mackay accused local Chinese of introducing 'the fearful demon of typhoid' into Sydney, 'in consequence of the filthy mode of conducting their operations'. Other newspapers, such as the *Sydney Telegraph*, however, recognised the sentiment for what it was: part and parcel of the 'strongly anti-Chinese platform' of the *Bulletin*. Dr. Ashburton Thomson dismissed the accusations, stating that consumers had to, of course, boil vegetables before consumption. New Zealand's *Auckland Star* picked up the

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67 On which, see: Beattie, 'Eco-cultural networks in southern China', in *Eco-Cultural Networks*, p.159.

68 Terry Metherill, 'Faster: Manly in the 1920s', unpublished ms, 2006, City of Ryde Library Service, p.3.

69 Nellie Fong interviewed by Diana Giese, 28 December 1996, National Library of Australia, Post-war Chinese Australians oral history project, ORAL TRC 3543, transcript pp.47-8.

70 On which, see Beattie, *Empire and Environmental Anxiety*, chapters 1-3.

71 *Bendigo Advertiser*, 29 March 1865, p.2.

72 *Bendigo Advertiser*, 1 March 1867, p.2.

73 *The Brisbane Courier*, 19 December 1878, p.3.

74 *Walleroo Times and Mining Journal*, 17 October 1868, p. 5.



issue, eliciting assurances from several scientific and medical men in Auckland in support of Thomson's findings of the harmlessness of Chinese-grown vegetables.<sup>75</sup>

Complaints of a stench emanating from gardens led to prosecutions of Chinese market gardeners on grounds of public health. By the twentieth century, municipal authorities enacted bylaws to restrict or prohibit market-gardening operations in certain parts of a city. In some instances, however, compromises were worked out. In 1923, Wellington City Council's proposal for 'a bylaw banishing market gardens from the precincts of the city' drew strong protests from Chinese gardeners. Council eventually agreed on a compromise: to rid Russell Street of flies associated with the market gardens, Chinese agreed to use stable manure in winter, and artificial fertilisers in summer.<sup>76</sup> This situation is somewhat ironic. The advent of modern sanitary reform claimed to banish disease, yet it created the problem of waste disposal and downstream pollution because it broke the intimate connection between urban and rural nature established through the efficient spread of waste onto fields. Instead of a boon, in the modern, sanitised city, nightsoil became a problem. Without nightsoil collection, waste generally went directly into waterways, with resulting impacts on disease-rates.<sup>77</sup> Urban sanitation systems struggled to cope with waste, a problem magnified during that period's rapid urbanization.<sup>78</sup> Indeed, nineteenth-century researchers were unearthing startling findings just as the sanitary revolution was kicking in. Research was indicating that pre-modern systems of waste disposal and water-supply produced much better water quality than modern industrialized cities of the time. In the 1870s, R.W. Atkinson, a British engineer, expressed astonishment at Tokyo's water supply, which was much purer than London's, a factor historian Susan B. Hanley puts down to the simple fact of Tokyo's efficient nightsoil system, which meant that sewage was regarded as a resource rather than a waste, which needed to be disposed of.<sup>79</sup>

In this respect, Chinese market gardens provided a vital source, not only of food production, but also of waste disposal in urban Australasia. Urban market gardens generally favoured sites close to water sources, which placed them in proximity to other industries requiring water, such as slaughterhouses, tanneries, dairies, poultry farms, piggeries and stables. In Auckland from the 1870s, Chinese had gardens in Parnell's Waipapa Stream, as well as around the lagoon (now the duck pond) in Auckland Domain, and near Western Springs.<sup>80</sup> The Sydney suburb of Botany, known as Struggletown in the late 1880s and 1890s, had an unsavoury reputation due to the sights, sounds and smells of the glue works, tanneries and fellmongers interspersed between Chinese market gardens and the houses of factory workers and fishermen.<sup>81</sup> In Perth, Chinese market gardens clustered around the edge of Smith's Lake, alongside piggeries and dairies, and dumps for nightsoil.<sup>82</sup>

The country was never far from the town. In towns across Australasia, crowing cocks marked dawn's breaking, dairy cows lowed and stamped their feet, horses hauled delivery carts or conveyed passengers, dogs barked, and pigs snuffled. Nineteenth- and early twentieth-

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75 As summarised in: *Auckland Star*, 23 April 1887, p. 4.

76 *Evening Post*, 20 February 1923, p.8 (initial protest); *Evening Post*, 3 March 1923, p.11 (solution).

<sup>77</sup> See, I. Douglas, *Cities: an environmental history*, New York, I. B. Tauris, 2013.

78 Beattie, *Empire and Environmental Anxiety*, chapters 1-3.

<sup>79</sup> This is discussed in Xue, 62.

<sup>80</sup> Lee and Lam, *Sons of the Soil*, pp.319-20, 237-28. See also *The Auckland Star*, 25 March 1887 p.2.

<sup>81</sup> Graeme Dawson et al., *Australians, A Historical Library, Australians 1888*, Broadway NSW, Fairfax Syme and Weldon p.204.

<sup>82</sup> Gaynor, *Harvest of the Suburbs*, pp.25-6.

century Australasian cities simply teemed with animal life, providing gardeners with a ready supply of animal manure, sourced from horses, cows, pigs, sheep and chickens.<sup>83</sup> Residents of Sydney, Melbourne, Brisbane and Perth could make fertiliser from horse manure and straw, obtained from racing, livery and tramway stables, or get hold of sheep manure from city sale-yards.<sup>84</sup> Indeed, historian Andrea Gaynor estimates that Melbourne City's 2,632 horses in 1891 would alone have produced 13,160 tons of manure.<sup>85</sup> 'In so many ways,' as urban historian David Hamer summarised, "'nature" made its presence felt' in New Zealand's settlements, as townfolk put sections to use 'raising stock and growing vegetables, fruit, and wheat.'<sup>86</sup>

In country towns, surrounding farms provided plentiful manure from sheep, cattle, horses, poultry and pigs. In Otaki, along the south-western coast of New Zealand's North Island, Chinese gardeners obtained manure from local sheep, dairy and poultry farms, hand loading it onto carts and spreading it directly onto the soil for later ploughing.<sup>87</sup> They also collected waste from local slaughter yards for use as fertiliser, in this way performing a useful recycling service. This same practice occurred, for example, among Chinese market gardeners in Daylesford, Victoria, in the 1860s and Perth in the early 1900s, both of which demonstrate the long-standing nature of this practise.<sup>88</sup>

'[I]n scores of country towns' in Victoria, as elsewhere in Australia, Chinese market gardeners collected their own urine and nightsoil to produce liquid manure, supplemented by nightsoil from local residents.<sup>89</sup> (Gardeners collected human waste under cover of darkness, hence the euphemism nightsoil.) Nightsoil's use sparked debate and sometimes controversy among the public and public health officials, as noted, especially by the late-nineteenth century, with growing awareness of public health and sanitation. In Western Australia in the early 1900s, Fremantle municipality sold nightsoil to gardeners, but after the Engineer for Roads and Bridges submitted a report complaining about the state of gardens along the Jandakot Road in 1908, the city banned all sales of nightsoil. Fremantle Board of Health's health inspector was removed from office soon after.<sup>90</sup>

In New Zealand, there is no evidence of Chinese market gardeners using nightsoil to fertilise vegetables **on commercial gardens**, although they certainly used it on their own gardens.<sup>91</sup> There are only a few reports in contemporary New Zealand newspapers of Chinese

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<sup>83</sup> Andrea Gaynor, *Harvest of the Suburbs: An Environmental History of Growing Food in Australian Cities*, Perth, University of Western Australia Press, 2006, p.19.

<sup>84</sup> *The Brisbane Courier*, 16 January 1889, p.3; Gaynor, *Harvest of the Suburbs*, p.23; R. Nixon, 'The Chinese community of Camden', unpublished ms., Camden Historical Society pp.3-4.

<sup>85</sup> Gaynor, *Harvest of the Suburbs*, p.23. See also Andrea Gaynor, 'Fowls and the contested public spaces in Australian suburbia 1890-1990', in Peter Atkins, ed, *Animal Cities: Beastly Urban Histories*, Abingdon, Routledge, 2012, pp.205-20.

<sup>86</sup> David Hamer, 'Towns in nineteenth-century New Zealand', *New Zealand Journal of History*, 13, 1 (1979), p.10.

<sup>87</sup> *The Sydney Morning Herald*, 13 January 1865, p.8; Thorpe *et al.*, 'Otaki's market gardens', pp. 26-7.

<sup>88</sup> Gaynor, *Harvest of the Suburbs*, p.23; *Daylesford Mercury*, 13 July 1866, reprinted in *The Argus*, Melbourne, 14 July 1866, p.6.

<sup>89</sup> David Horsfall, *March to Big Gold Mountain*, Melbourne, Red Rooster Press 1985, p.121.

<sup>90</sup> Anne Atkinson, 'Chinese market gardening in the Perth metropolitan region 1900-1920', *Western Geographer*, Vol. 8, 1984, p.47.

<sup>91</sup> Discussions with elderly Chinese market gardeners, as well as earlier interviews, reveal use of human manure for their own garden, but not for commercial market gardens.

gardeners collecting and applying nightsoil to their gardens. In 1897 a Wellington resident complained to the City Council that Chinese frequently carted manure (both nightsoil and stable manure) through the streets.<sup>92</sup> Another unsubstantiated report comes from an avowedly anti-Chinese correspondent, alleging that Chinese gardeners did not grow all the vegetables they sold but acted as middlemen and, moreover, used nightsoil.<sup>93</sup> Chinese in New Zealand may not have used nightsoil on commercial gardens, at least openly. The risks of using nightsoil were high, especially during a period of heightened anti-Chinese sentiment such as the 1880s to 1890s. Before the advent of fruitshops in the late-nineteenth century, European customers often bought vegetables directly from Chinese gardeners, so they would have known very quickly about any use of nightsoil.<sup>94</sup>

Yet in Australia, Andrea Gaynor argues, there was a long history of the use of nightsoil as a fertiliser in peri-urban market gardens, orchards and vineyards prior to the development of water-borne sewerage systems and readily available artificial fertilisers. This was not only associated with Chinese market gardeners, but was commonly practiced by a wide range of producers.<sup>95</sup> But by the late-nineteenth-century in Australia and New Zealand disposal of nightsoil represented a growing problem, due to population increase and denser urbanisation. One solution, in locations where the earlier system of pan toilets and manual nightsoil removal still operated, involved converting nightsoil into artificial manure, for example, by treating it with lime (calcium carbonate), kiln drying and adding pulverised clay, sawdust and scoria, or mixing it with gypsum (calcium sulphate) and charcoal. Between the 1880s and the early 1900s in New Zealand, several patent applications were made for this process.<sup>96</sup> Another solution in cities with water-borne sewage treatment systems utilized sewerage farms. Here, sewage irrigated land destined for food production, including vegetables, orchards, stock-feed and pasture.<sup>97</sup> A case in point is Dunedin's municipal authorities. They organised transportation of nightsoil to the Taieri Plain, where initially they tried spreading it directly onto fields; then, by the 1870s, they were drying and making it into artificial manure. After abandoning attempts to dump nightsoil in Otago Harbour for removal by the tide, by the 1900s council workers were spreading nightsoil over sandhills located on the city's outskirts, based on the belief that it would dry and deodorise.<sup>98</sup> Dunedin's represented a common practice at the time in the colony, whereby municipal authorities would dispatch nightsoil and rubbish into neighbouring territories.<sup>99</sup>

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Lynette Shum, pers. comm., 13 February 2019; Liz Ngan, pers. comm., 6 March 2019. Suie Jung Thompson, whose family had a market garden in the Wairarapa, recalled the use of nightsoil on the garden, but it isn't clear whether this was on the commercial or the private garden. Suie Jung Thompson, *Memories* (no place: no date, c.2008), p.1. I thank Lynette Shum for this reference.

<sup>92</sup> *New Zealand Mail*, 18 February 1897, p.35.

<sup>93</sup> *Lyttelton Times*, 17 August 1912, p.12.

<sup>94</sup> We are indebted to Dr James Ng for this observation. Not only a noted historian of Chinese, he also grew up and worked for a time on a Chinese market garden.

<sup>95</sup> Andrea Gaynor, pers. comm.

<sup>96</sup> *Otago Witness*, 8 October 1886, p. 17; 12 October 1888, p. 10; 23 September 1903, p. 7.

<sup>97</sup> On which, see: Gaynor, 'Pernicious or Prudent? Australian urban sewage farms', draft manuscript. We thank the author for allowing us to read and cite this.

<sup>98</sup> Pamela Wood, *Dirt: Filth and Decay in a New World Arcadia*, Auckland, Auckland University Press, 2005, p.100.

<sup>99</sup> F.S. McLean, *Challenge for Health: A History of Public Health in New Zealand*, Wellington, Government Printer, 1964, p.61.

### **From nightsoil to superphosphate**

Use of manure to fertilise market gardens continued into the twentieth century, but gradually began to decline, depending on when mechanisation replaced animal urban transportation and the timing of the introduction of urban sanitation. Chinese market gardeners adapted their traditional gardening practices to the changing world around them by adopting more scientific approaches to horticulture and purchasing commercial fertilisers, such as blood and bone and superphosphate.<sup>100</sup>

This transition took place earlier in some places than in others. In 1910, Mr H. Anderson, Undersecretary for Agriculture in New South Wales, observed that:

Chinese vegetable gardeners are the best customers for our highest quality of blood and bone manure, and I need hardly remind you that the Chinese and Japanese were intense cultivators thousands of years before New South Wales was discovered. These nations have nothing to learn from us with regard to petite culture and the utilisation of every possible source of fertility for the soil.<sup>101</sup>

Yet dairies, stables, market gardens and poultry farms remained scattered through Australasian suburbs well into the 1930s. Oral histories in Ryde, Sydney, depict a semi-rural landscape, dotted with Chinese market gardens, poultry farms, orchards, stables and dairies,<sup>102</sup> a description echoed in oral histories of this period describing Chinese market gardens in South Dunedin and Dunedin's Kaikorai Valley.<sup>103</sup> In 1905, Christchurch still had 3000 nightsoil pans, despite the city having over 60 miles of sewers.<sup>104</sup> Over the twentieth century, Chinese market gardeners began to utilise the newly introduced public services, such as water, power, sewerage and waste disposal. As well, like other urban producers, they became subject to a growing list of local regulations regarding sanitation and building standards.<sup>105</sup> Sanitary inspectors regularly surveilled market gardens and conducted campaigns against practices such as washing vegetables in polluted water or carting vegetables in the same vehicles used to transport manure without cleaning them.<sup>106</sup>

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<sup>100</sup> Evans, *History of Agriculture*, pp.5-7; Hawke and Lattimore, *Visionaries, Farmers and Markets*, pp.1, 17; *The Sydney Morning Herald*, 17 June 1912, p.11. A developing export trade in blood and bone, as well as superphosphate, from Australia to New Zealand emerged by the early 1900s.

<sup>101</sup> *Advocate and the Emu Bay Times*, 5 November 1910, p. 7.

<sup>102</sup> Owen Bennett interviewed by Lesley Goldberg, 3 November 1998, City of Ryde Library Services, transcript pp.17, 20.

<sup>103</sup> See the files in: <https://caversham.otago.ac.nz/resource/place/index.html>; Margaret Foote interviewed by James Beattie, 7 June 1997, personal collection.

<sup>104</sup> McClean, p.81.

<sup>105</sup> Gaynor, *Harvest of the Suburbs*, pp.194-5.

<sup>106</sup> On such developments, see: Derek A. Dow, *Safeguarding the Public Health: A History of the New Zealand Department of Health*, Wellington, Victoria University Press/Historical Branch, 1995; Geoffrey W. Rice, 'Public Health in Christchurch, 1875-1910: Mortality and Sanitation', in Linda Bryder, ed., *A Healthy Country: Essays on the Social History of Medicine in New Zealand*, Wellington, Bridget Williams Books, 1991, pp.85-108; Milton James Lewis, *The People's Health: Public Health in Australia, 1788-1950*, Westport, Praeger, 2003), pp.41-116. On primary sources, note: *The Brisbane Courier*, 16 January 1889, p.3, 30 September 1889, p.7; *The Mercury*, Hobart, 15 September 1910, p. 3; *The West Australian*, Perth, 28 February 1906, p. 9; *The Star*, Ballarat, 9 July 1891 p. 3; *The Argus*,



Although evidence is patchy, it appears that interwar market gardeners increasingly turned to commercial fertilisers as supplies of manure in cities declined. This occurred with the demise of horse-drawn transportation, as housing and industry displaced suburban dairies, stables and poultry farms, and as sewerage-system construction advanced.<sup>107</sup> Articles published in the Australian Chinese-language newspaper, *Tung Wah Times*, between 1902 and 1930 indicate interest among Chinese market gardeners in the latest agricultural innovations, both in China and Australia. For example, a report described a Sydney company winning an award for high-quality fertilisers in 1902; in 1908, the newspaper reported on a new chemical fertiliser being manufactured in Foshan, Guangdong.<sup>108</sup> The newspaper also provided advice on the fertilisers best suited for specific crops, suggesting a readership for such innovation. For example, a 1926 article made recommendations for growing onions and potatoes, using a combination of animal and artificial fertilisers. For both crops, it advised thoroughly digging chicken manure into the soil, then applying 448 pounds of phosphate and 168 pounds of potassium sulphate per acre before planting. Once the seedlings had grown taller (5 to 6 inches high for potatoes), it advised applying 112 pounds of sodium nitrate per acre. The article assured readers that chemical fertilisers were not poisonous.<sup>109</sup> It is impossible to determine how many Chinese market gardeners used commercial fertilisers and to what extent they continued to use animal manures. Relative cost was obviously a factor, as were the size and financial success of the market gardening enterprise: as the *Tung Wah Times* reported in 1930, high customs duties increased imported fertiliser costs.<sup>110</sup>

One Chinese market gardener in Australia who adopted a more scientific approach to horticulture was James Chung Gon, who ran market gardens in Launceston, Tasmania, for over fifty years, until 1953. Throughout his life, Chung Gon used traditional Chinese agricultural methods, including crop rotation, planting by the moon, thorough soil preparation before planting, and soil enrichment. He applied hundreds of cart loads of stable manure a month.<sup>111</sup> By the 1940s, he was experimenting with artificial fertilisers and adopting scientific methods of soil analysis, including adding trace elements. He read constantly to keep abreast of innovations in horticulture; and reportedly pioneered commercial irrigation in Northern Tasmania.<sup>112</sup> In 1953, Hobart's *Mercury* newspaper reported on Chung Gon's experiments with various types of artificial manures, including mixtures of blood and bone, ammonia, potash and other trace elements.<sup>113</sup>

The Te Aro Seed Company, which operated from 1899/1900 until 1956, illustrates

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Melbourne, 14 February 1911, p.9; 8 October 1907, p. 6; *Bendigo Advertiser*, 14 October 1903, p.2.

107 Gaynor, *Harvest of the Suburbs*, pp.88-9; McClean, *Challaenge for Health*, pp.59-121. James recalls his grandmother, who lived in semi-rural Kapiti, on the North Island's west coast, describing the 'night cart' and its use well into the 1920s.

108 *Tung Wah Times*, 19 April 1902 p.3, e; 24 October 1908, p.3, b-d.

109 *Tung Wah Times*, 27 February 1926, p.6, b-c.

110 *Tung Wah Times*, 6 December 1930, pp.6--7, a-d.

111 *The Mercury*, Hobart, 28 August 1942, p.3; 28 July 1953, p.12.

112 Jill Cassidy, 'Chung Gon, James (1854—1952)', *Australian Dictionary of Biography*, National Centre of Biography, Australian National University, <http://adb.anu.edu.au/biography/chung-gon-james-9745/text17213>, accessed 3 November 2013.

113 By the 1950s Chung Gon found that market gardening was no longer economically viable, due to increased costs of labour and artificial fertilisers, and declining supplies of stable manure. Land values in Launceston were rising, and in 1953 he sold his 18 acres of land for residential development. *The Mercury*, 28 July 1953, p.12.



changing twentieth-century Chinese gardening practices in New Zealand. Based in Wellington, James Chin/Moon Ting (1859-1956) took over the business in the early 1900s, turning it into a thriving mail-order seed company, centred on a trial garden, fruitshop, nursery and glasshouse. The Company itself sold a range of fertiliser products, including, by 1931, both organic and artificial manures. The former included specialised manures for sweet peas, roses and chrysanthemums, as well as blood manure, dissolved Peruvian guano and bone dust. Of the ‘artificial’ fertilisers on offer, there was only superphosphate.<sup>114</sup> The variety of manures on sale did not markedly change over the next twenty years.<sup>115</sup> We do not know how typical such endeavours were, but as the Te Aro Seed Company supplied market gardeners throughout the country, including many Chinese ones, its catalogues indicate uptake of artificial fertilisers among New Zealand gardeners and horticulturists. This mirrored the uptake of superphosphate in agriculture from the mid-twentieth century.<sup>116</sup>

### **Bridging races and cultures**

Chinese experiences on market gardens in Australasia suggest a less clear-cut reading of the question of race and what historians Marilyn Lake and Henry Reynolds have termed the ‘global colour line’. In their pioneering transnational study, the authors present a global history of racial politics between the late-nineteenth and early-twentieth centuries, demonstrating how Australia and New Zealand were part of an international exchange of ideas, people and publications between ‘white men’s countries’ dedicated to maintaining white racial dominance, and developing defensive racial policies.<sup>117</sup> This sweeping study focuses mainly on institutional racism and the erection of legislative barriers at the broader political level. However, a closer examination of daily interactions between Chinese market gardeners and the wider community at the local level reveals a variety of kinds of interactions. Nineteenth- and early twentieth-century settler attitudes towards Chinese immigrants in Australia and New Zealand were complex and often ambivalent, including belief in the superiority of the European race and European technology, fear of economic competition and a strong fear of miscegenation. At the same time, local residents regularly purchased vegetables and fruit from Chinese growers, hawkers or retailers, who were closely associated with providing food to Europeans. Some, as noted, also defended the Chinese from accusations of pollution. Food and food production were therefore a key bridge between European and Chinese cultures, breaking down barriers of language and culture.

Chinese market gardeners had a significant influence on the diets of Australians and New Zealanders, stimulating cultural change. In his gastronomic history of Australia, Michael Symons lists the staples of the colonial diet as salt meat, sugar, flour and tea, describing them as the ‘rations of an ocean-going empire’.<sup>118</sup> This culinary heritage was remarkably enduring. From the mid-nineteenth century, Chinese market gardeners all over Australia showed that it was possible to grow vegetables in a variety of climates, stimulating demand for fresh

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114 *Te Aro Seed Co. Garden Annual 1931: Seeds, Bulbs & Plants*, no place, Te Aro Seed Company, 1931, p.64.

115 *Te Aro Seed Co. Garden Annual 1948-9*, no place: Te Aro Seed Company, 1948, p.94.

116 Tom Brooking and Eric Pawson. *Seeds of Empire: The Environmental Transformation of New Zealand*, New York, I.B. Taurus, 2010; Wood, “Soil”.

117 Marilyn Lake and Henry Reynolds, *Drawing the Global Colour Line: White Men's Countries and the International Challenge of Racial Equality*, Cambridge, Cambridge University Press, 2008.

118 Michael Symons, *One Continuous Picnic: A Gastronomic History of Australia*, Melbourne, 2007, p. 14.

vegetables. By the 1890s dietary attitudes were changing. Commentary in newspapers from the 1870s and 1880s shows there was already public awareness of the health benefits of vegetables and of the role of Chinese gardeners in promoting the health of the community.<sup>119</sup> In 1874, for example, a New Zealand newspaper reported on around twenty Chinese market gardeners in Charleville, Queensland, who also kept boarding houses. Their establishments were well patronised by stockmen coming in from the bush, for they were served ample quantities of fresh vegetables and could 'drink and gamble to their hearts content without the interference of the police'.<sup>120</sup>

The relationships forged across community boundaries broke down barriers of language, culture and ethnicity. Anti-Chinese attitudes at the broader societal level could be moderated in several ways at the local level, such as through exchanges related to food and changing dietary patterns; shared desire to develop land and make it productive; and, the contribution which Chinese market gardeners made to the economy. At the local level, the diverse relationships that market gardeners formed in their daily interactions with the wider community fostered understanding between cultures, promoted business opportunities and helped to counter broader anti-Chinese attitudes. They ranged from business partnerships, donations to local hospitals and participation in community celebrations, to marriage and *de facto* relationships between Chinese men and women of other ethnic backgrounds: these were the background to building successful market gardening enterprises.<sup>121</sup>

## Conclusion

This article has examined both the changing geographical distribution of Chinese market gardens in Australasia and shifts in their agricultural practices, notably the gradual adoption of artificial fertilisers over the twentieth century, as supplies of human and animal manure began to decline in cities. Our research highlights that Chinese market gardeners in Australasia successfully grew crops in a variety of environments, from tropical and semi-arid regions to much cooler climates. One of the keys to Chinese success was manuring, a central feature of their imported horticultural practices. In examining manuring, which traditionally included the use of human waste, our article has exposed a range of attitudes and beliefs towards health, environment and agriculture, attitudes and beliefs that sometimes reflected strong anti-Chinese sentiments, particularly in the late-nineteenth and early twentieth centuries. The contentious issue of the use of human waste or nightsoil as fertiliser for food crops has also highlighted the problems associated with urbanisation, as sanitation systems in Australasia's growing cities struggled to cope with ever-increasing volumes of human waste. Lastly, our article highlights that Chinese market gardeners made a significant contribution to the economies of Australia and New Zealand, by developing flexible strategies to cope with complex and changing business, regulatory and social environments, and, not least, the vagaries of climate. While there was considerable continuity in their horticultural practices, Chinese adapted their traditional horticultural techniques to the demands of new environments and markets, as well as adopting European technological developments appropriate to the scale and work organisation of their enterprises.

A testament to the central role which Chinese market gardens played in local communities is the King Brothers market garden in Ashburton, New Zealand. The largest market garden in the South Island, it was established by the Ng brothers from Taishan county, Guangdong. King Brothers played a prominent role in the daily life of the town and in its heyday it served people across the Ashburton district, operating from 1921 until 1964. Over that time

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119 See for example *Brisbane Courier*, 7 January 1887, p. 5.

120 *Grey River Argus*, 19 November 1874, p. 3.

121 Boileau, *Chinese Market Gardening*, pp.255-256.

anti-Chinese sentiments softened. Between 1939 and 1941, the New Zealand government allowed the wives and children of Chinese men living in New Zealand to settle here after the advancing Japanese forces, who had invaded China in 1931, threatened their home villages in Guangdong by 1938. During World War II, New Zealand Chinese fought with New Zealand military overseas, while at home Chinese market gardeners played a vital role in the war effort, increasing production to supply United States troops in the Pacific. Today King Brothers is the only known market garden settlement in the country with its original buildings intact. Since 2013, it has been administered as a reserve under the stewardship of Ashburton District Council. In 2019 it was declared archaeologically significant by Heritage New Zealand, one of only seven other post-1900 sites in New Zealand.<sup>122</sup> It has considerable research potential and is particularly important to the descendants of the extended Ng clan who lived there, as well as to the wider community in the Ashburton district. It is also appropriate that one of the pioneers of New Zealand Chinese history, Dr James Ng, hails from that family and that the records of that company are now held at the Ng Collection, New Zealand Chinese Heritage Research Centre, Presbyterian Research Centre, Presbyterian Church of Aotearoa New Zealand.

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<sup>122</sup> Clara Watson, The Ng King Brothers Chinese Market Garden Settlement, 3 May 2019. <https://blog.underoverarch.co.nz/2019/05/the-ng-king-brothers-chinese-market-garden-settlement/>