

Singapore's First Spice Plantation and Botanic Garden 1819–1859

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Abstract

The history of the spice plantation and Botanic Garden conceived by Sir Stamford Raffles (1781–1826) for Government Hill (now Fort Canning Hill) in Singapore is documented from its inception in 1819 using archival sources, contemporary accounts, as well as previously published and unpublished maps. After Raffles's departure from Singapore in 1823 and under pressure for retrenchment, the patronage of economic botany shifted from the government to entrepreneurs who revived Raffles's original nutmeg (*Myristica fragrans* Houtt.) plantation in the 1830's, subsequently leading to frenzied nutmeg cultivation around the settlement. A combination of competitive pressure, inadequate husbandry and an insect pest brought nutmeg cultivation on Government Hill and elsewhere in Singapore to an end in 1859. Not only was the spice plantation envisioned by Raffles in existence longer and at times more extensive than previously thought, it also exerted a significant impact on land development in and around the settlement. A map of Government Hill and the surrounding area is shown to illustrate the extent of the Botanic Garden as originally planned, its approximate location in 1827 and the gradual encroachment of other buildings and facilities over time.

Introduction

The powerful combination of George III (1738–1820) and Sir Joseph Banks (1743–1820) created in late eighteenth-century Britain a spirit of agricultural 'improvement' that extended its reaches well beyond domestic agrarian reform. The West Indies, after 1783 deprived of their connection to the American mainland, saw the revival (e.g. St. Vincent) or founding (e.g. Grenada) of Botanic Gardens to prepare for the acclimatization of new Asian plants as

much needed staple foods or crops. In Asia itself, the East India Company was faced with millions of pounds of debt and needed to seek new measures to finance its China trade. Economic botany, in particular the cultivation of commodities of value in Europe or China, it was hoped, would come to the rescue of the East India Company's trade balance (Drayton, 2000, pp. 85–128).

When in 1786 Lieutenant-Colonel Robert Kyd (1746–1793) first approached the Board of Directors with the suggestion for a Company plantation in Calcutta in order to transfer novel food plants to Bengal as a measure against a future famine, his arguments were of a moral and political nature (Kyd to Board of Dir., 15 April 1786, in Biswas, 1950). Subsequently, he withdrew to more traditional mercantile reasoning and detailed the financial benefits the Company could derive from undermining the profitable Dutch monopoly for spices. He envisioned a Botanic Garden 'not for the purpose of collecting rare plants ... as things of mere curiosity', but rather to provide a depository for plants that would 'tend to the extension of the national Commerce and Riches' (Kyd to Board of Dir., 1 June 1786, in Biswas, 1950; Chatterjee, 1948, p. 362; Shukla, 1994, pp. 28–30). As the cultivation of the 'finer spices', nutmeg (*Myristica fragrans* Houtt.) and its derivative mace, cloves (*Syzygium aromaticum* (L.) Merr. & Perry) and cinnamon (*Cinnamomum verum* Presl), had so far and contrary to French successes, eluded the East India Company, the Court of Directors seized upon this opportunity by endorsing Kyd's plan in July 1787. On a site of 310 acres along the Hooghly river, Kyd then introduced about 300 species of commercially significant plants into the new Calcutta Botanic Garden.

Early Spice Cultivation in Penang and Bencoolen

The British occupation of the Moluccas from 1796 to 1803 for the first time allowed unhindered access to the spice gardens of the Banda islands and Ambon (Wright, 1958, p. 27–47), and Kyd's successor, Dr William Roxburgh (1751–1815), immediately sent the botanist Christopher Smith (d. 1807) to organise the transportation of large amounts of nutmeg and clove plants to areas under the Company's control. In the years 1800–1801 over 30,000 nutmeg seedlings and plants and 31,000 clove seeds and plants were dispatched to Penang. The larger spice plants, some as tall as 14 ft and over 15 years old, typically perished during the journey, but not so the younger plant material (Leith to Government (Gov.), 16 July 1800, in Braddell, 1851; Penang to Calcutta, 21 April 1802, in Braddell, 1851; Hunter to Sec. to Gov., 1 July 1802, in Braddell, 1851; Warburg, 1897a, pp. 244–246). The spice plants were cultivated in an extensive government-run spice plantation at Ayer Hitam, where, however, due to the

excessive inventory and ill-guided care the survival rate was low. When in 1805 the annual expenses for the plantations in Penang reached \$11,909, the Calcutta government ordered that they be disposed of, and Lieutenant-Governor Robert Townsend Farquhar (1776-1830) did so by selling the surviving 7,800 spice plants to European individuals for a total of \$9,656 (Farquhar to incoming Gov., 1805, in Braddell, 1851; Penang to Gov., 12 November 1805, in Braddell, 1852). Spanish dollars (\$) were worth about 5 shillings sterling in the early 19th century. Except for a feeble and ultimately abortive attempt at establishing another Company Garden between 1822 and 1834, the further development of the spice industry of Penang was left entirely to private initiative (Low, 1836, p. 20; Warburg, 1897a, p. 246; Jackson, 1968, table 7, p. 105).

In Bencoolen, the British settlement in West Sumatra, fruitless attempts had been made since the early 1770's to procure spice plants, until in 1798 a first shipment of about 850 nutmeg and 70 clove plants arrived (Warburg, 1897a, pp. 226-228; Bastin, 1965, pp. xxxii-xxxiii). Since the initial progress of the nutmeg plants was encouraging, a much larger shipment from the Moluccas followed in 1803, and, despite the Court of Directors' fiscal concerns, the local authorities at Fort Marlborough in Bencoolen decided to cultivate spices in a significant Company-owned nursery, where by 1809 about 3,200 nutmeg trees and 200 clove trees thrived (Fort Marlborough to Court of Dir., 7 March 1804, in Bastin, 1965). However, the second British occupation of the Moluccas from 1810-1817 and the ensuing excessive imports brought about a glut of spices on the London market, and when Sir Stamford Raffles (1781-1826) was dispatched to his post as Lieutenant-Governor of Fort Marlborough in October 1817, he had clear instructions to dispose of the Company's spice plantation there. Unlike Robert Farquhar, who had been criticized for his fire sale of the government plantation in Penang, Raffles resisted the immediate execution of his order and only gradually sold off the stock in the government plantation to locals planters whose spice cultivation he steadfastly encouraged (Remarks on Farquhar's Report by Governor in Council, 20 February 1806, in Braddell, 1851; Raffles to Court of Dir., 18 April 1818, in Bastin, 1965).

In late 1818, Raffles stayed in Calcutta in order to lobby for his plan of permanently securing the British trade route through the Straits of Malacca and thus had the opportunity to explore the Calcutta Botanic Garden where he became acquainted with the Danish surgeon and botanist Dr Nathaniel Wallich (1786-1854). In 1809, Roxburgh's support had helped Wallich to be employed by the East India Company as a collector 'to travel about in search of the unknown objects of natural history' (Roxburgh to Gov., 24 February 1809, in Bastin, 1981), and in 1817 Wallich was appointed permanent Superintendent of the Calcutta Garden. Wallich introduced Raffles to Dr William Jack (1795-1822), a physician and outstanding systematic botanist, staying at the Garden to pursue his botanical interests. Raffles immediately engaged Jack as his

naturalist. Jack was to replace Raffles's previous naturalist Dr Joseph Arnold (1782-1818) who had died in July 1818, shortly after discovering with Raffles and Lady Raffles the parasitic plant that would be named *Rafflesia arnoldii* R.Br. (Burkill, 1916, p. 149; van Steenis-Kruseman, 1950, pp. 23-24; Bastin, 1990, p. 12).

First Spice Plantation in Singapore, 1819-1822

When in January 1819, Raffles and Major William Farquhar (1770-1839) settled on Singapore island for a new British trading post, they found a Malay fishing village surrounded by lush primary forest with ample fresh water supplies. Even during those first days spent on Singapore island, Raffles took time to study the vegetation and engage in some botanising (Raffles to Marsden, 31 January 1819, in Raffles, 1830). Raffles returned to Singapore a second time in May 1819 for about three weeks to instruct the new Resident Farquhar on numerous administrative issues, and this time he brought along a group of naturalists comprised of Jack and two Frenchmen, Alfred Duvaucel (1793-1863) and Pierre Diard (1795-1863) who later became Director of the Botanic Garden at Buitenzorg (now Bogor) in Java (Treub, 1893, p. 34; van Steenis-Kruseman, 1950, p. 136). After exploring the island, Jack was overwhelmed with the abundance of the vegetation, reporting to Wallich:

'Flora here luxuriates in endless varieties, where she finds soil, climate and everything congenial. I find many, or most of my Penang acquaintances with others surpassing them in magnificence' (Jack to Wallich, 8 June 1819, in Burkill, 1916).

If the luxuriant growth of tropical vegetation was not enough to raise Raffles's hopes for successful plantations on the island, there was also evidence of past and ongoing agriculture around what was known to the local Malays as *Bukit Larangan* (Forbidden Hill). This cone-shaped eminence, located between the Singapore River and a fresh water stream (Bras Basah River), in March 1819 had undergone some clearing (Hill, 1970, p. 146; *ibid.*, p. 168) whereby workers came upon an abandoned orchard on the apparently fertile hillside. A few years later this orchard was still being recognized as a remnant of Singapore's past:

'It is remarkable, that many of the fruit-trees cultivated by the ancient inhabitants of Singapore are still existing, on the eastern side of the hill, after a supposed lapse of near six hundred years. Here we find the durian, the rambutan, the duku, the shaddock, and other fruit-trees of great size' (4 February 1822; Crawford, 1828, p. 47).

Lacking other historical or physical evidence, the actual age and origin of the trees cannot now be ascertained, but the presence of fruit trees was rightly taken as evidence of previous arboriculture on the hillside. Early British

observers also found established plantations in the hills surrounding the mouth of the Singapore River where, in exchange for rent, Temenggong Abdul Rahman (d. 1825) had allowed various Malays and Chinese to establish about 20 gambier (*Uncaria gambier* Roxb.) plantations prior to the arrival of the British (Jack to Wallich, 8 June 1819, in Burkill, 1916; *Singapore Straits Records* (SSR, National Archives, Singapore) L11, pp. 139–141, Farquhar to Sec. to Lieutenant Governor, 23 December 1822; Bartley, 1933, p. 117; Jackson, 1968, pp. 7–8). This was recognized in the treaty of 26 June 1819 between the British and the Temenggong, in which he, as the proprietor of the soil, was given continuing and exclusive control over the disposal of land for gardens and plantations, while the boundaries of the land under British control were restricted to a stretch of sea front of about six miles long and landwards to the range of a cannon shot (SSR, L17, p. 57A, Sec. to Lieutenant Governor to Farquhar, 4 February 1823; Buckley, 1902, pp. 58–59; Wake, 1975, pp. 60–61). Before his departure, Raffles decreed as part of his instructions for the town planning that the whole of the hill, subsequently known as ‘Government Hill’, should be reserved for the ‘exclusive accomodation of the Chief Authority’ and that a bungalow later be added on top as a residence (SSR, L10, pp. 71–75, Raffles to Farquhar, 25 June 1819). No written orders to Farquhar were included for the location of the planned spice plantation, though he would have received at least oral directions from Raffles. Cross-referencing later documents allows us to place the first spice plantation on the more gradual lower eastern slopes of the hill, close to the later Government House, and not too far from the site of previous awricultural activities. This particular location would prove well-suited to the cultivation of nutmegs (Wallich to Raffles, 21 November 1822, in Hanitsch, 1913; Pearson, 1953, pp. 200–204).

After 1818, the nurseries of the private and public spice plantations near Fort Marlborough in Bencoolen contained such a tremendous supply that many plants perished from neglect (Lumsdaine, 1821). Upon returning to Bencoolen in July 1819, Raffles was therefore quickly able to assemble a collection of 1000 nutmeg and 350 clove seeds as well as 100 seedlings and 25 large plant specimens each of both species, and on 18 August this shipment was dispatched to Singapore on the *Indiana* (Captain J. Pearl). Raffles explained to his superiors that the purpose of the endeavour was ‘to extend the cultivation of the nutmeg and clove tree as much as possible’ advising Farquhar ‘to exert [his] utmost endeavours to establish the cultivation under [his] immediate authority’ (SSR, L10, p. 125, Raffles to Farquhar, 18 August 1819; Raffles to Gov., 26 August 1819, in Bastin, 1965). The plant material arrived in Singapore on 27 September 1819 in the care of M.W. Dunn. The latter was apparently not so much a gardener, but a long-time employee of the Company in Batavia (today’s Jakarta) and Bangka sent by Raffles for general assistance to the administration in Singapore where Dunn can be traced till July 1821 as an occupant of land

(SSR, L10, p. 179, Farquhar to Raffles, 27 October 1819; Braddell, 1855, p. 451; Kathirithamby-Wells, 1969, p. 51).

Farquhar himself was known to have a long-standing interest in botany. During his tenure as Resident of Malacca, 1803–1818, he collected plants on Mount Ophir and had Chinese artists prepare a large collection of botanical drawings (Jack to Wallich, 14 January 1819, in Hanitsch, 1916; Goh, 1999). Farquhar soon reported back from Singapore that the larger plants had been established in their permanent location and that seeds and seedlings were in a nursery, all 'in a thriving state' (SSR, L10, pp. 182–183, Farquhar to Raffles, 28 October 1819). Farquhar's initiative to employ Mr Brooks, a European gardener, at \$40 a month as Botanist and Superintendent for the spice plantation on Government Hill, drew an immediate rebuke from Raffles. Raffles cited orders of the Supreme Government to prune expenses in Singapore and abolished the post of Brooks in December 1819 (SSR, L10, pp. 239–243, Raffles to Farquhar, 29 December 1819, enclosing letter from Governor General, 15 October 1819; Kathirithamby-Wells, 1969, p. 51). The spice plantation was thereafter under the direction of Farquhar with no further guidance from Raffles until he eventually returned to Singapore.

Raffles's extreme disdain for the Dutch helped motivate his own zealous pursuit of spices. He resented the return of the 'fertile and important Islands of Java and the Moluccas' to the Dutch, and one of his declared objectives in founding Singapore was to 'eventually destroy the spell of Dutch monopoly' (Raffles to Col. Addenbrooke, 10 June 1819, in Willians, 1878). Fostering the cultivation of spices to this end was, however, at least a ten-year project and reveals Raffles's long-term hopes for the British foothold at a time when the future of Singapore was still caught up in a 'paper war' (Wurtzburg, 1954, pp. 525–542). Besides sending spice plants to Singapore, Raffles continued to entice planters in Bencoolen to increase nutmeg production. In Penang in 1818, 79,000 nutmeg and 104,000 clove trees had been counted, and harvests were beginning to swell during the 1820's (Penang Consultations, 7 October 1818, in Jackson, 1968). Raffles grossly overestimated both the future demand for spices in Great Britain and the price they would command. In 1822, the Company's London warehouses had about 1,000,000 lbs of nutmeg and 200,000 lbs of mace in stock, and further imports of spices from Bencoolen could only be sold, if at all, at great losses (Bastin, 1960, p. xxxvii). Hence, Raffles agricultural endeavours in Bencoolen proved financially disastrous for the Company and did little to inspire official support for Raffles's new agricultural experiments in Singapore.

In 1819, Raffles himself also imported to Singapore cotton (*Gossypium* sp.) seeds of the *pernambuco* variety, probably from Penang, and the plants were successfully raised on Government Hill. While claims of cacao trees (*Theobroma cacao* L.) and cultivated orchids thriving nearby are apocryphal

(Ridley, 1905, p. 296; *ibid.*, p. 303; Knecht, 2000, p. 194), there is evidence that tea (*Camellia sinensis* (L.) Kuntze) was flourishing in the Garden by 1822, though nutmeg and clove trees would remain its dominant features (Wallich to Raffles, 2 November 1822, in Hanitsch, 1913; Jack to Wallich, 15 March 1819, in Burkill, 1916).

By May 1821, access to the spice plantation was improved with small roads over the top and around Government Hill, and an additional \$80 had been spent on a bungalow, presumably a small structure to house a caretaker and tools (Buckley, 1902, pp. 68–69; Bastin, 1960, pp. 146–147). During the same time period, Chinese gambier and pepper (*Piper nigrum* L.) plantations continued to slowly expand inland (Finlayson, 1826, pp. 61–62), but the unclear future of Singapore and uncertain land rights caused most of the 22 Europeans that occupied land in 1821 to abstain from engaging in agricultural ventures (Braddell, 1855, p. 451; Miller, 1941, p. 194). A notable exception and case in point regarding the issue of land tenure was Farquhar himself who started a ‘Garden & Plantation’ at his own expense on a hill north of the settlement. Despite his insistence that he had received sanction from the Temenggong according to the treaty of June 1819, his claim on the land was later denied by Raffles (SSR, L11, pp. 139–141, Farquhar to Sec. to Lieutenant Governor, 23 December 1822).

Plans for a Botanic and Experimental Garden, 1822–1823

Raffles returned from Bencoolen to Singapore on 10 October 1822 and, out of concern about the haphazard growth of the settlement, he mounted a final effort to shape its design and character to match his vision for a ‘civilized’ society. By coincidence, in early September 1822 Wallich had arrived in Singapore from Calcutta on his way to China to recover from malaria. He decided to remain on the island for the rest of his leave, ultimately taking with him ‘a curious and extensive botanical collection’ as the result of his botanising in Singapore (Crawford, 1828, p. 297; Wallich to Secretary to Gov., 19 July 1822, in Hanitsch, 1913).

Wallich’s friendship with Raffles and Lady Sophia Raffles (1786–1858) led to frequent social meetings and shared excursions over the course of six weeks. They agreed to significantly expand the existing ‘Government Garden’ into a larger ‘Botanic and Experimental Garden’. The timing of their plan was not accidental: Under the guidance of Raffles, a ‘Land Allotment Committee’, in which Wallich participated, and a ‘Town Planning Committee’ were formed to advise on developing a detailed masterplan for the settlement. Dr John Lumsdaine, Superintendent of the Company’s Spice Plantation at Fort Marlborough and an expert in the cultivation of spices, had accompanied Raffles to Singapore and joined Wallich on the first committee. The actual map of the

town was to be drawn up by Lieutenant Philip Jackson (1802–1879), the Assistant Settlement Engineer (Report of the Committee to Raffles, 23 October 1822, in Hanitsch, 1913; Pearson, 1953, pp. 200–204; Wurtzburg, 1954, pp. 608–610; Bastin, 1981, p. 49). In the course of this town planning process, and no doubt with much input from Raffles himself, on 2 November 1822 Wallich formally suggested to Raffles to include an extended garden into the redesigned town plan:

‘... I beg leave to recommend that a suitable piece of ground may be appropriated in the neighbourhood of the European town for the purposes of a botanic garden and for the experimental cultivation of the indigenous plants of Singapore and the adjacent Islands, as well as of such others of foreign growth, as it might be desirable to submit to a skilful trial, previous to encouraging their general introduction’.

In Wallich's opinion Singapore's location was ideal for such an institution: ‘... the most favourable for indigenous as well as foreign vegetation and forming part of the richest archipelago in the world - its soil yielding to none in fertility, its climate not exceeded by any in uniformity, mildness and salubrity’ (Wallich to Raffles, 2 November 1822, in Hanitsch, 1913; SSR, L9, pp. 91–100, 1822).

As an indication of the commercial promise of Singapore's agriculture, Wallich pointed to a number of wild nutmeg species found in the surrounding forests, Farquhar's successful experiments with spices and *pernambuco* cotton in the existing garden, as well as the local pepper and gambier production. He closed by expressing his hopes of becoming the Superintendent of this Garden, which he planned to staff with a number of apprentices and experienced gardeners from Calcutta. Raffles's and Wallich's letter was carefully designed to aid their bid for financial support from the East India Company, hence it overstated the bright prospects of economic botany in Singapore. Wallich had, indeed, collected at least six species of wild nutmegs on the island, one of which he named in Farquhar's honour *Myristica farquhariana* (now known as *Gymnacranthera farquhariana* (Wall. ex Hook. f. & Thomson) Warb. var. *farquhariana*; Warburg 1897b: p. 367; de Wilde, 2000, pp. 44–46), but none of those species had the slightest aromatic quality. Over the years, some other of Wallich's supporting arguments also proved to be spurious, for example, the lack of seasonality had a deleterious effect on some crops, like cotton, and made the cultivation of others, like coffee (*Coffea arabica* L.), costly by extending the harvest over a long period (Thomson, 1850, p. 141; Crane, 1851, p. 122).

The planning for the Botanic Garden was cut short when suddenly an opportunity arose for Wallich to catch a return passage to Calcutta (Wurtzburg, 1954, p. 614). On 21 November, one day before his embarkation, Wallich outlined to Raffles a plot for the Garden, which was soon after surveyed by Jackson, the planner. An area of 48 acres on the northeastern side of

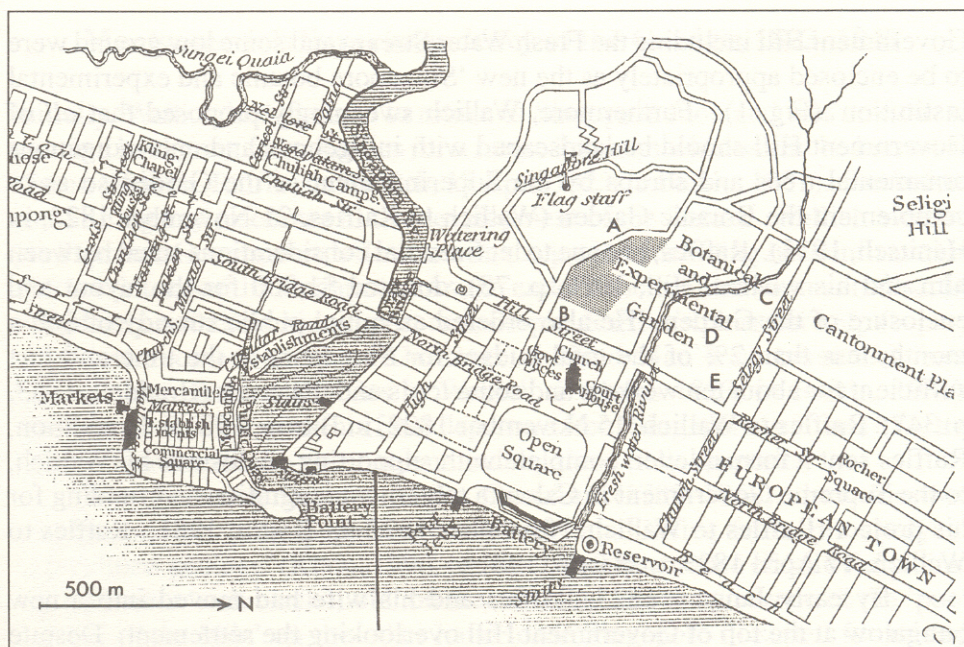


Figure 1. This 'Plan of the Town of Singapore by Lieut. Jackson' represents the proposed lay-out of the town as of December 1822 (Crawford, 1828, opposite p. 529; Pearson, 1953, pp. 200-204) with a revised scale added.

The road along the 'Fresh water Rivulet' (Bras Basah River) corresponds to Hospital Street, now Stamford Road, and Selegie Road was soon renamed Brass Bassa Road (now Bras Basah Road). The area east of Hill Street, originally reserved for church, government offices and court house as shown in this lay-out, accommodated the convict lines after 1825. The total area of the planned 'Botanical and Experimental Garden' within the borders of the roads as shown here is 48 acres. The dotted area of eight acres marks the approximate extent of the Government Garden under Montgomerie's superintendency in 1827 and includes the original plantings by Farquhar. The calculation of the planted area is conservatively based on a distance of thirty feet between trees, equivalent to fifty trees per acre (Low, 1836, pp. 28-30; Ridley, 1912, p. 445).

- (A) The cemetery opened in 1822 and was extended across the road from town in the late 1840's.
- (B) The Armenian Church was erected in 1835 in proximity to the location of the first home of the merchant A. L. Johnston. By 1840 Armenian Street ran parallel to Hill Street on the lower slopes of Government Hill with houses encroaching on the spice plantation.
- (C) After 1830 the area (between the current Bencoolen and Waterloo Streets) was used for different hospitals, hence the early name Hospital Street for Stamford Road.
- (D) A new convict jail was erected by convicts in 1841 and expanded considerably between Hospital and Brass Bassa Road over the next fifteen years.
- (E) The location of the Catholic Church of the Good Shepherd since 1845.

Government Hill including the Fresh Water Stream and some low ground were to be enclosed appropriately as the new 'Singapore botanic and experimental institution' (Fig. 1). Furthermore, Wallich sweepingly proposed that *all* of Government Hill should be landscaped with indigenous and non-indigenous ornamental trees and shrubs by the Superintendent of the Garden so as to complement the Botanic Garden (Wallich to Raffles, 21 November 1822, in Hanitsch, 1913). Raffles, not one to let financial considerations stand between him and his wishes (Hill, 1970, p. 78), donated \$1,000 for the layout and enclosure of the Garden. He also ordered an initial public subsidy of \$60 a month, less than 2% of the total budget for Singapore at the time and just sufficient for about ten workers and some tools and materials (Braddell, 1853, p. 347; Raffles to Wallich, 15 November 1822, in Bastin, 1981). In addition, Raffles sent a formal letter, complete with supporting enclosures by Wallich, to the Supreme Government in Calcutta to garner recognition and funding for his project (Raffles to Wallich, November 1822, in Bastin, 1981; Raffles to Wallich, 17 April 1823, in Bastin, 1981).

By early January 1823, Raffles and his wife had moved into a new bungalow at the top of Government Hill overlooking the settlement. Despite his serious and recurrent health problems, he was now anxious to begin the design of his 'future Superstructure' by expanding the existing Botanic Garden and turning the remainder of the Hill into a 'very pretty Park'. He even planned for an enclosure with 200 Spotted Deer (*Axis axis* Erxleben), though he soon scaled back and abandoned the idea, recognizing that his successor would not look favourably upon it (Raffles to Wallich, 5 January 1823, in Bastin, 1981; Raffles to Marsden, 21 January 1823, in Raffles, 1830). Without official approval from Calcutta for the project, Raffles prepared for the start of construction: He gave orders to evict locals residing within the area of the planned Botanic Garden and to compensate them for their dwellings and surrounding cultivated areas (SSR, L13, p. 14, Farquhar to Asst. to Police Dept. Bernard, 11 January 1823). Engineer Jackson began building a wall made from a combination of brick and wood around the part of the Botanic Garden facing the town, and workers began cutting a number of 'noble' walks through the grounds (SSR, L13, p. 3, Farquhar to Jackson, 6 January 1823; SSR, N1, p. 103, Montgomerie to Prince, 8 February 1827). Raffles's grand vision of Government House overlooking a magnificently landscaped park and Botanic Garden appears modelled after the private estates of the influential and wealthy members of Penang's British community, such as Governor William Edward Phillips's (b. 1769) Suffolk House or David Brown's (d. 1825) Glugor House (Crawfurd, 1828, p. 10; Stevens, 1929, pp. 405-411). For Singapore, Raffles's plan for his Garden was way out of proportion with the simple Government Residence it was to surround, and, more importantly, would have required substantial public financing.

Montgomery's Superintendency of the Garden, 1823–1827

Initially, Wallich had planned to return to Singapore soon and was anxious to secure a land grant from Raffles for a future home on what would be known as Mount Wallich (Raffles to Wallich, 17 April 1823, in Bastin, 1981). But before committing any resources to the development of the Garden, Wallich awaited the Supreme Government's decision on the project including his confirmation as Superintendent in Singapore. As the endorsement failed to materialise, he completely withdrew his support and, despite Raffles's pleas for help ('- pray send down something like a Gardener or Head Man'), no personnel from Calcutta ever arrived (Raffles to Wallich, 8 March 1823, in Bastin, 1981). Thus, when Raffles made his final departure from Singapore in June 1823, the nascent Garden lost its most ardent and, by then, only supporter.

The incoming Resident, John Crawfurd (1783–1868), drew his own conclusions on Singapore's agricultural capabilities from his study of 'agricultural geology' (Khoo, 1996, pp. 61–70). The absence of 'alluvial plains' and sufficient 'rich black mold' on the one hand and the presence of the 'poor red soil of the hills' on the other hand made Singapore ill-suited for raising most tropical crops of commercial importance (Crawfurd, 1828, p. 534; Crawfurd, 1849, pp. 508–509). The relatively poor soil of Singapore island had been noticed as early as the 1330's by the travelling Chinese trader Wang Ta Yuan in his *Tao-i Chih-lioh* who remarked about the settlement surrounding Government Hill: 'The soil is poor and grain scarce' (Wheatley, 1961, p. 83).

Crawfurd's dire predictions for the cultivation of the finer spices were based on his calculations of the inherent value versus the actual price obtained for spices. He became convinced that competitive pressure from the Moluccas would eventually erode profits for the British planters if ever the Dutch restored free culture and the artificially high prices were to disappear (Crawfurd, 1820, vol. III, p. 409). Declining prices did, indeed, become a challenging issues for the spice planters around the middle of the nineteenth century, and Crawfurd's cautious assessment of the island's agricultural potential would turn out to be more accurate than Raffles's and Wallich's glowing endorsements. To make matters worse for the future of the Garden, in February 1823, Crawfurd had bitterly fallen out with Wallich while both were in Calcutta, at the time when Raffles was lobbying the authorities for support of the project (Raffles to Wallich, 8 March 1823, in Bastin, 1981). It was no surprise then that Crawfurd gave no further support to the Garden than the stipulated monthly allowance and polite appreciation for the work of the new Superintendent of the Gardens, Dr William Montgomery (1797–1856; Crawfurd, 1828, p. 534).

Montgomery had been in Singapore since May 1819 as Assistant Surgeon in general medical charge of the troops and from January 1823, after the dismissal of his colleague Dr Thomas Prendergast, was alone in medical charge of the settlement (Makepeace *et al.*, 1921, vol. I, p. 517; Pearson, 1955, pp.

41–46). In the course of his own rushed departure, Wallich had suggested that Montgomerie, known for his interest in natural history, should temporarily oversee the Garden – though without any addition in pay ‘as the thing was upon a small scale’ (Braddell, 1855, p. 62). Montgomerie, initially reluctant, was put to work willy nilly ‘*nolens volens*’ under Raffles’s direct supervision, but after Raffles’s departure, Montgomerie found himself left entirely to his own devices since Wallich never contacted him again nor sent the promised botanical expert (Raffles to Wallich, 5 January 1823, in Bastin, 1981).

This mirrors the experience of the botanist George Porter (d. 1833) who in 1822 on Wallich’s recommendation was put in charge of the new Government Botanic Garden in Penang, but he, too, waited in vain for the expected support from Calcutta (SSR, A19, p. 386, Establishment of a Botanic Garden at Penang, 1823; Bastin, 1981, pp. 43–44). In fact, during the period between Wallich’s departure from Singapore and 1830, not a single botanical collector brought his expertise to the settlement (van Steenis-Kruseman, 1950, p. LXXXIV). Hence Montgomerie lacked the inspiration and means to establish a botanical collection, but instead concentrated on the development of the experimental spice plantation, marking the start of his enthusiastic involvement in plantation agriculture.

Montgomerie completed the enclosure of this plantation with a bamboo fence on the hill side and improved the roads in the area. He also attempted in vain to drain some of the low ground along the Bras Basah River which was prone to flooding and remained unsuitable for the cultivation of spices. As late as 1841, when a permanent convict jail was erected on the northern side of the Bras Basah River, the marsh had to be reclaimed by raising the site by 2–4 ft with soil from Government Hill (McNair, 1899, pp. 147–148). In addition to the nutmeg and clove trees already planted by Farquhar, he continued to procure seeds, raise them in a nursery and set out seedlings on 18 foot-wide terraces on the lower eastern slopes of Government Hill. When in April 1825, the first 200 Indian convicts were transferred from Bencoolen to Singapore and accommodated in sheds built between Hill Street and North Bridge Road, i.e., just south-east of the spice plantation, Montgomerie was able to supplement his small work force with a few extra convict labourers, some even with working experience from the spice plantations of Bencoolen (Jannings et al., 1821; Raffles, 1830, fold-in plate, facing p. 525; McNair, 1899, pp. 38–39).

The new Resident Councillor Prince, in charge of the town from 1826 to 1828, was far more sympathetic towards the cause of botany than Crawford: Prince himself made botanical collections and re-established communications with Wallich by sending him living specimens to Calcutta (van Steenis-Kruseman, 1950, pp. 416–417; Wurtzburg, 1950, p. 141). In February 1827, Montgomerie reported to Prince that a total of about 300 nutmeg and 100 clove trees were growing on the slope of Government Hill. The first small crop of nutmegs had been harvested in 1826 and from selected fruits 200

seedlings were being propagated in a nursery that held a total of 300 nutmeg and 200 clove plantlets (SSR, N1, pp. 101–106, Montgomerie to Prince, Report upon the present State of the Honorable Company's Botanical and Experimental Garden at Singapore, 8 February 1827). An estimated eight acres plus the nursery, i.e. a fraction of the plot originally allocated in 1822, was being cultivated with nutmegs and cloves (Fig. 1, dotted area). Despite Montgomerie's claim that the spices 'appeared to thrive uncommonly well' (SSR, N1, p. 102, Montgomerie to Prince, 8 February 1827), this was only true for the nutmeg trees, since the clove trees, some in their ninth year, still showed no sign of bearing (Ridley, 1912, p. 176; Bastin, 1960, p. 192). Still, Montgomerie suggested that the government would eventually profit if it developed spice plantations with convict labour and leased them out once they approached bearing - a plan that was both ill-timed and unrealistic.

The Anglo-Dutch treaty of London of March 1824 that had ceded Bencoolen and upheld the Dutch trade monopoly in the Moluccas, raised largely unwarranted fears that the Dutch hold on the spice trade would tighten again. While the treaty caused ruin to the British nutmeg farmers in Bencoolen, giving up the costly dependency was a financial blessing for the Company. In parliament, Foreign Secretary George Canning (1770–1827) used the news about successful experiments with spices in Singapore to assure critics of the treaty that Britain's spice supply would not be endangered in the future (Wright, 1958, p. 101; Newbold, 1839, p. 271). This promise, however, had no bearing on any further investment into spice cultivation by the Company whose prime concern for the United Presidency Administration of Penang, Malakka and Singapore was retrenchment (Kathirithamby-Wells, 1969, p. 53). Lacking sufficient funding, Resident Councillor Prince could do little more to encourage private involvement in spice cultivation than to offer the limited supply of nutmeg and clove seedlings available in Singapore. In 1827 he directed Montgomerie to increase production of seedlings in the nursery and also approached the Governor in Penang with a request for the shipment of young plants or even just germinating seeds since 'many of the European Land holders ... [were] now preparing their Lands for the reception of spices' (SSR, N1, p. 107, Resident's diary, 9/10 February 1827; Prince to Sec. Gov. Penang, 15 February 1827, in Cowan, 1950).

During the same year a period of decline began for the Garden as Montgomerie left Singapore with the Bengal troops for India and financial support of the Garden was limited to a staff allowance of 20 rupees (Makepeace *et al.*, 1921, vol. I, p. 490; *ibid.*, vol. I, p. 517). A Sicca rupee was worth about 2 shillings sterling. The supervision was first put into the hands of a professional English gardener turned artilleryman with the newly arrived Madras troops, later taken on by a Mr Caswall in charge of Medical Garrison Staff (SSR, V2, pp. 307–308, Fullerton and Prince to Court of Dir., June 1828). Upon receiving a report that the Garden was 'by no means in good order and very confined'

the Governor-General ordered that the establishment be discontinued. Effective 30 June 1829, all financial support was cut, and the grounds from then on left under the exclusive care of ten convicts (SSR, N6, p. 160, Act. Resident Presgrave to Supt. of Convicts Bonham, 30 June 1829).

Despite its limited scale, the government plantation had in principle demonstrated the possibility of growing nutmegs on the island by bringing the first nutmeg trees to fruiting, and thus inspired other residents to slowly follow suit with nutmeg cultivation. However, soil analyses performed by Major James Low (1791–1852) during his time as Assistant Resident in 1840–1841, revealed that the soil on the slopes of Government Hill was particularly fertile and suited to the cultivation of nutmegs (*Singapore Free Press*, 25 November 1841). Therefore the initial success had exaggerated the commercial opportunities for nutmegs growing in other locations in Singapore on inferior soils.

The government plantation also presented a ready source for young plantlets. As the viability of nutmeg seeds falls rapidly within a week, but they self-seed easily, young plants could be dug up around the existing trees and transplanted from there. In this respect, the plantation fulfilled a continuing role by providing propagation material, at times supplemented from Penang, for most of the other planters in Singapore (Buckley, 1902, p. 198). Even the less successful cloves in the government plantation continued to attract attention until about 1840, when it was eventually recognized that their best use in Singapore was as an ornamental tree (Belcher, 1848, vol. II, p. 381; Thomson, 1850, pp. 102–103).

Montgomerie had started out as an amateur, unfamiliar with agriculture under equatorial conditions and drew on the experience of the British spice planters from Bencoolen and Penang. He had at his disposal Lumsdaine's often reprinted '*Report on the Cultivation of Spices at Bencoolen, 1819–20*' that became the standard manual for British nutmeg planters for years to come (Lumsdaine, 1821; *Singapore Chronicle* 15 May 1834; Low, 1836, pp. 28–30; Lumsdaine, 1851, pp. 78–84; Ferguson, 1889, pp. 102–108). Montgomerie also had the opportunity to receive direct advice from Lumsdaine when the latter visited Singapore with Raffles in 1822–1823. Consequently, Montgomerie adopted in Singapore Lumsdaine's practice of growing nutmeg trees without the permanent shelter of shade trees. While on the Banda Islands trees were grown in alleys beneath tall *kanari* trees (*Canarium vulgare* Leenh.), in the British plantations only newly-planted trees were protected with individual shade structures made of *atap* (fronds of the mangrove palm, *Nypa fruticans* Wurmb.). The slow growth of the shade trees, the terraced hill sides of the plantations and the scarcity of fertile soil prevented protective shade trees from being considered a useful practice in the British plantations. In the long-run this decision had crucial consequences for Singapore's nutmeg cultivation: Not only did the open design of plantations promote excessive

growth of invasive *lalang* grass (*Imperata cylindrica* (L.) Raensch.), thus requiring frequent expensive weeding, it also made the trees more susceptible to the insect pest that later devastated the spice plantations.

Land Development around the Botanic Garden, 1830s to 1840s

Parts of the large area that had originally been designated for the Botanic Garden gradually began to be utilized for other purposes. A new Christian cemetery had been opened in 1822 on the upper slopes of Government Hill to take the place of the very first cemetery that was located inappropriately close to Government House. This new cemetery gradually expanded downhill towards the Spice Garden, but did not approach planted areas until the late 1840s (Fig. 1, A; Stallwood, 1912, plate I). In the direction of town, the spice plantation early on bordered the gardens of the houses along Hill Street on the lower slopes of Government Hill (Pearson, 1955, frontispiece; *ibid.*, p. 67). In April 1833, the Armenian community petitioned the Resident Councillor for a grant of land from the Botanic Garden facing Hill Street to build a church (Fig. 1, B). A subsequent enquiry with the government in Calcutta led to Raffles's original land grant for the Botanic Garden being cancelled in July 1834. The desired parcel was then assigned to the Armenian community which completed the Armenian Church in January 1835 and had it consecrated in March 1836 (SSR, Z8, pp. 175-176, Act. Governor to Resident Councillor, Aug. 1834, with enclosing letter to Sec. Gov. to Act. Governor, 28 July 1834).

Records for the early land grants in the area of the original Botanic Garden failed to turn up in a search at the Singapore Land Authority. Some had apparently been reissued only in recent years. A school operated by the Rev Darrah from August 1834 to December 1837 at the bottom of Government Hill opposite the top of High Street, apparently was close to, but did not encroach on the original Garden (Buckley, 1902, p. 128). On the north side of the Bras Basah River, a simple Pauper Hospital was built between Bencoolen (now Bencoolen) and Church (now Waterloo) Street in 1830 (Fig. 1, C). Three years later a larger brick building was erected nearby as a permanent hospital for convicts, paupers and European seamen. This building was located approximately at the corner of Hospital Street (later Stamford Road) and Bencoolen Street, i.e. across the street from where the Singapore History Museum now is (Makepeace *et al.*, 1921, vol. I, pp. 493-494). Beginning in 1841 a convict jail and other convict facilities began spreading out in the area to the east of the hospital (Fig. 1, D; McNair, 1899, 54; *ibid.*, plate X, facing p. 77), and, yet further towards the sea, the new Roman Catholic Church (Church of the Good Shepherd) was erected between 1843 and 1846 (Fig. 1, E; Buckley, 1902, p. 248).

Through the early 1830's parts of the original Garden survived insufficient maintenance, weeds and depredation by cattle (Bennett, 1834, vol. II, p. 174; Earl, 1837, p. 350). A drive to the top of Government Hill, past what was still known as the Botanic and Experimental Garden, became a popular evening outing:

'The drive up to this spot is exceedingly romantic - A spiral carriage road winds up the hill, and, at each progressive step, fresh beauties attract the eye. Eminences, undulating above each other, display broad patches either cleared for cultivation, or shining in the bright green livery of clove plantations' (Begbie, 1834, p. 353).

The area provided the closest to a park-like 'recreational' space Singapore had to offer and a respite from what was perceived as 'the gloomy mass of forest scenery' (Bennett, 1834, vol. II, p. 139). Within the confines of the former Garden visitors encountered a variety of ornamental and fragrant trees, some indigenous like Kedah Gardenia (*Gardenia carinata* Wall.), others imported such as Yellow Bauhinia (*Bauhinia tomentosa* L.) and Champaca (*Michelia champaca* L.). There were also common medicinal plants, Purging Croton (*Croton tiglium* L.) and the native *gelam* tree (*Melaleuca cajuputi* Powell) that lent its name to Muslim quarter Kampong Glam, as well as the introduced Borneo Camphor tree, *Dryobalanops aromatica* C.F.Gaertn. (Burkill, 1935, vol. I, pp. 862–863). Many of the older nutmeg and clove trees continued to produce fruit, and even some of the cotton plants from Raffles's days survived so that in 1836 their seeds could be collected to conduct a trial for larger scale, private cotton plantations (Bennett, 1834, vol. II, pp. 174–176; Thomson, 1850, p. 142; Crane, 1851, p. 121). This was part of broader surge in agricultural interest that began to accelerate during the 1830s.

Singapore Agricultural and Horticultural Society, 1836 to c. 1845

Despite some initial interest shown by Europeans, development of plantation agriculture had been hampered by a number of issues. During the 1820s access to cultivatable areas further away from town was difficult, as well as dangerous, so that the interior of the island remained almost unknown to Europeans (Earl, 1837, p. 353). The reluctance of the government to sell land in perpetuity combined with the long maturation period of spice trees also made the shorter term leases offered unattractive to planters (Thomson, 1850, pp. 210–219; Makepeace *et al.*, 1921, vol. I, pp. 301–311). Until about 1835 the cultivation of spices was therefore restricted to about a dozen merchants with 'small amateur plantations of spice-trees near their residences', close to town (*Singapore Chronicle*, 15 May 1834; Earl, 1837, p. 410). Gradually some long-term residents of Singapore accumulated enough free capital to explore local investment options besides trade, and the relative success of the existing

nutmeg plantations and other potential crops caught their attention (Little, 1849, p. 678; Cameron, 1865, p. 168). Renewed interest in spices was helped when locally the price of nutmegs spiked after 1835, aided by the rapidly declining output of Bencoolen's neglected plantations and diminished production of the Banda spice gardens that were recovering from the impact of volcanic eruptions in the 1820s (Warburg, 1897a, pp. 155–157; *ibid.*, pp. 262–263; Jackson, 1968, table 11, p. 123).

Montgomerie, who had returned to Singapore in December 1834 as Senior Surgeon, was one of the Europeans who rapidly developed spice plantations. In 1836, he purchased Ryan's Hill, a ten-year-old 16 acre nutmeg plantation and developed it in conjunction with the neighbouring Craig Hill into a large estate (Makepeace *et al.*, 1921, vol. I, p. 517; Gibson-Hill, 1958, pp. 147–148). His medical colleague and later successor as Senior Surgeon, Dr Thomas Oxley (1805–1886), had an equally strong interest in economic plants and botany. He dispatched plant specimens to Calcutta and Kew as well as contributing 'a large number of peculiar plants' to the Buitenzorg Garden (now Kebun Raya, Bogor) in Java (Treub, 1893, p. 48; Burkill, 1927, p. 129). His nutmeg plantation on the slopes of 'Oxley Hill' became renowned for its beauty, and his residence on top of the hill was surrounded by a considerable collection of rare ornamental plants (Jagor, 1866, pp. 18–20; Buckley, 1902, p. 405). Montgomerie's and Oxley's enthusiasm for nutmeg cultivation interfered sufficiently with their medical duties that after 1857 medical officers were forbidden to engage in any agricultural or commercial pursuits (Turnbull, 1972, p. 217).

In May 1836, a number of influential European residents, Montgomerie and Oxley amongst the leadership, organized the Singapore Agricultural and Horticultural Society to represent their interest as planters. Their ultimate goal was that 'this island should all be cleared and cultivated; in fact become a large Garden' (*Singapore Free Press*, 9 June 1836; *Singapore Free Press*, 6 April 1837; Earl, 1837, p. 409; Buckley, 1902, pp. 305–306). The members soon addressed their most pressing issue by petitioning the Governor-General to review the restrictive land rights, although it took until 1845 that, with the approval of the Court of Directors, large areas of land could be sold in perpetuity (*Singapore Chronicle*, 15 October 1836; Makepeace *et al.*, 1921, vol. I, pp. 310–311). As a means of funding its activities, on 19 November 1836 the Agricultural and Horticultural Society received a land grant for seven acres on Government Hill and access to convict labour so that it could resuscitate the neglected nutmeg plantation (Makepeace *et al.*, 1921, vol. II, p. 70). Fortunately a significant number, by one estimate in excess of 200 nutmeg trees, had survived in the original Garden from the early 1820 (*Singapore Free Press*, 25 November 1841) and in 1837 the Society was already able to earn \$270 from the sale of about 325 lb of nutmegs. Among their other activities was the mutual exchange of seeds with similar Societies in Calcutta and Bombay. It also tried

encouraging the Chinese population to cultivate a broader range of crops and vegetables by distributing pamphlets and seeds, though apparently with little success (*Singapore Free Press*, 6 April 1837; *Singapore Free Press*, 6 July 1837; Buckley, 1902, p. 361). The Society continued to formally operate for about ten years but with increasingly less visibility, and, as its members became absorbed with their own agricultural endeavours, the nutmeg plantation on Government Hill reverted back to the government.

‘Nutmeg Mania’

For this was the time when first many European, then Chinese and Malay inhabitants, were swept away in ‘nutmeg mania’, frantically buying up land and expanding their plantations (Belcher, 1848, vol. II, p. 381; Cameron, 1865, p. 168). Consequently the town’s surroundings to a distance of about five miles underwent a dramatic transformation during the 1840’s:

‘A few years ago it was a dense jungle: On every hill may now be seen the residence of some hospitable merchant, surrounded by plantations of nutmeg or other spice trees’ (Keppel, 1853, vol. I, p. 409).

Corresponding developments took place around Government Hill and can be traced with early maps of Singapore. The first map to show land use patterns was prepared in 1835 by George Drumgoole Coleman (1795-1844) based on his surveys of the early 1830’s. At the time only a few scattered spice plantations existed around Singapore and therefore, unlike other crops, nutmeg and cloves were not yet specifically identified on his map. A strip along Stamford Road, across from the Chinese Hospital, appears to have some agricultural use, but it is impossible to clearly identify the remnants of the government spice plantation as such on Coleman’s map (Tassin, 1836; Tassin, 1839; Goh, 1990, pp. 60-64).

In 1841, John Turnbull Thomson (1821-1884) was appointed Government Surveyor of Singapore to help clarify the issue of land rights. His *Plan of Singapore Town and Adjoining Districts*, based on surveys conducted in 1842, represented the first map of Singapore to establish accurate property boundaries. His maps clearly delineated a significant nutmeg plantation in an area labelled ‘Botanical Garden’ on the north-eastern side of Government Hill, indicating the renewed agricultural use after the Agricultural and Horticultural Society had taken over the management of the site (Thomson, 1846; Thomson, 1854). By the end of 1848 this plantation contained 778 nutmeg trees, of which less than 50 were ‘of the old stock, most having been planted since 1836’, and it had expanded well beyond the boundaries of Montgomerie’s previous plantation to over 13 acres (Oxley, 1848, p. 657). A total of 350 trees were bearing in 1848, the rest being too young or unproductive, and yielded the government an income of \$1134, while expenses were kept

low due to the use of free convict labour (Oxley, 1848, p. 659; Thomson, 1850, p. 31). This was about the height of Singapore's nutmeg craze when a total of 1,190 acres around town were planted with over 71,000 nutmeg trees (Thomson, 1850, fold-out tables, facing p. 219).

Demise of Nutmeg Cultivation, 1859

As nutmeg production in the British and Dutch possessions gradually expanded, demand proved to be inelastic, and prices on the saturated world markets continued their long-term downward trend between 1840 and 1860 (Warburg, 1897a, pp. 518–519; Jackson, 1968, table 11, p. 123). Nutmeg planters in Singapore and Penang incurred significantly higher expenses for labour and fertilizer than their competitors in the Moluccas, and hence found it more and more difficult to compete. What promised to be a profitable undertaking when the nutmeg trees were planted, no longer was so when the first harvests were reaped five to ten years later.

British planters were put at a further disadvantage when fungal and insect-born diseases began to spread through their plantations in the late 1840's. The most significant disease was 'nutmeg canker', which caused premature dehiscence and became quite prevalent in Penang, but also took effect in Singapore (Little, 1849, pp. 678–681; *Singapore Free Press*, 12 July 1855; Ridley, 1912, pp. 135–138; Flach & Tjeenk Willink, 1999, p. 147). Over the course of the 1850s the first European planters began abandoning their ventures, but the final demise of nutmeg cultivation in Singapore began in 1859 when a mysterious disease ravaged the plantations (*Singapore Free Press*, 7 June 1860; Cameron, 1865, pp. 168–170; Jagor, 1866, pp. 21–22), sending trees into rapid decay:

'In the night a tree would be attacked, and the morning light would show its topmost branches withered; the leaves fell off; the disease slowly spread downwards, chiefly on one side of the tree; and, in spite of every attempt to check it (the lower portion often being for a long time green and bushy), the tree became an unsightly mass of bare and whitened twigs' (Collingwood, 1867, p. 47).

The pest was later identified as a small bark boring scolytid beetle (*Hyledius cribratus* Blandf., previously *Phloeosinus cribratus* Blandf.), which killed off the trees by attacking the cambium layer (Ridley, 1896, p. 92; Ridley, 1912, pp. 125–130; Flach & Tjeenk Willink, 1999, p. 147). By 1864 all but one nutmeg plantation in Singapore and most in Penang had been destroyed. Nutmeg mania in Singapore ended with large tracts of abandoned land surrounding the town overgrown by secondary vegetation and financial devastation for private planters who had speculated on their crops as much as on real estate values.

In 1851, the Kew-trained botanical collector Berthold Carl Seemann (1825-1871), stopping over in Singapore on a voyage around the world still had cause to admire the slopes of Government Hill as 'clothed with numerous Nutmeg-Trees, and a turf of brilliant green' (Seeman, 1852, p. 82).

Even an updated map of 1857 shows a significant nutmeg plantation between Armenian Street and the by-now expanded cemetery on the Hill, though it is unclear to what degree the trees were actively maintained (Narayanan, 1857). In November 1859 some 'enterprising citizens' formed a second Singapore Agri-Horticultural Society to stimulate the culture of flowers and vegetables with the ultimate goal of creating a pleasure garden (*Straits Times*, 12 November 1859; Burkill, 1918, p. 55). The government was quick to offer the defunct plantation on Government Hill as well as the labour of convicts, but the Society wisely declined the land and settled a few weeks later for a larger plot of 56 acres at Tanglin, which has remained the site of the current Botanic Gardens (*Straits Times*, 24 December 1859; Makepeace *et al.*, 1921, vol. II, p. 73). As no further agricultural or horticultural use could be found for the eastern side of Government Hill, now overlooked by the newly-built Fort Canning, the land was gradually allocated to a handful of ecclesiastical and public buildings that sparsely filled some of the area originally reserved for Singapore's first Botanic Garden.

Although there are now no remnants of the original Garden, Raffles's overall design for Government Hill left an enduring legacy: Initial exclusion of the Garden area from commercial and residential use allowed its partial preservation and enhancement as a green space after the Botanic Garden was discontinued. Despite continued encroachment over the past 180 years, a significant 'green island' on Fort Canning Hill has survived as a consequence of Raffles's original plan.

The Failure of Raffles's Programme of 'Cultivation'

Taking a broader perspective, it becomes apparent that Raffles's agenda as an advocate for a Botanic Garden extended well beyond his passion for natural history or the hope for the ultimately elusive financial rewards of spices. True to the Georgian ideology that the advance of agriculture lay at the heart of creating an 'improved' society, Raffles had previously proclaimed for Bencoolen: 'I am endeavouring to cultivate the soil, and to civilize the people' (Raffles to ?, 14 July 1820, in Raffles, 1830). When he, through Wallich, pleaded with the government to support the Garden in Singapore, he not only promised rewards of a commercial nature but also an ameliorating influence on the public at large (Wallich to Raffles, 2 November 1822, in Bastin, 1981). In the spirit of enlightened imperialism, Raffles considered the Botanic Garden an instrument of development:

'I am laying out a botanic and experimental garden, and it would delight you to see how rapidly the whole country is coming under cultivation' (Raffles to Marsden, 21 January 1823, in Raffles, 1830).

His broader programme of 'cultivation' was to be complemented by another grandiose idea, the Singapore Institution, combining a new Malay College and the Anglo-Chinese College of Malacca to create 'the means of civilizing and bettering the condition of millions' (Raffles to Wallich, 17 April 1823, in Bastin, 1981). The idea of moving the Malacca College to Singapore arose in January 1823 during a visit to Singapore of Rev Dr Robert Morrison (1782–1834), the founder of the Anglo-Chinese College in Malacca. Morrison was a 'devoted friend' to botany (Broomhall, 1924, pp. 105–107; Harrison, 1979, figure 5; *ibid.*, p. 60) and therefore shared another vision with Raffles, namely to establish a botany department and extend the garden attached to his Malacca College:

'A botanical garden was originally projected, but has failed, from mismanagement. The object of it was to collect, under one view, all the tropical plants of the Eastern Archipelago' (Newbold, 1839, p. 183).

Despite his initial enthusiasm, in 1826 Morrison finally had to abandon the plan of moving his Anglo-Chinese College to Singapore and blamed Crawford, 'the infidel doctor-civilian', for it (Harrison, 1979, p. 75). Raffles's Singapore Institution was formally founded in April 1823 and amongst the numerous provisional appointments was Montgomerie as Professor of Natural Philosophy. But upon Raffles's departure this project did not fare much better than the Botanic Garden: By the early 1830s the poorly constructed building of the Institution had turned into a landmark eye-sore (Earl, 1837, p. 351).

Raffles's aspirations for a botanical enterprise collided with a broader shift in British policy triggered by the death of both George III and Banks in 1820. The loss of the great sponsor and defender of the usefulness of science and, in particular, botany, eventually sent many of the Banksian public initiatives into retreat. As early as 1821 the War Office cut funding for the Botanic Garden in St. Vincent (Guilding, 1825, pp. 22–23), while Kew Garden's plant collectors began to be recalled from abroad. This official pressure for retrenchment in the pursuit of natural history increasingly also pervaded the East India Company where the practical value of the existing Botanic Gardens was being questioned (Drayton, 2000, pp. 130–131). Raffles's plans for his Botanic and Experimental Garden with a focus on spice cultivation not only violated basic economic considerations, when London's storehouses were still overflowing with spices, but were also based on an outdated paradigm of public funding for his ventures. In the age of retrenchment, the initiative and burden was shifting to private support by local amateurs interested in botanical pursuits, often with an eye to investment opportunities. This is exemplified by Montgomerie, a member of the East India Company's medical service, whose passion for economic botany eventually eclipsed his dedication to medicine. Not only did he emerge in

Singapore as a key supporter of private spice growers, he was also one of the first two Europeans to attempt large scale sugar cultivation and claimed priority for introducing the uses of Gutta Percha (*Palaquium gutta* (Hook.) Baill.) to Europeans (Oxley, 1847, p. 22; Thomson, 1848, pp. 138–140).

After 1820, both domestically and abroad, Agri-Horticultural Societies organized efforts to substitute government patronage of Botanic Gardens and botanical exploration in general (McCracken, 1997, pp. 7–8; Drayton, 2000, pp. 132–133). In Singapore, the first local Society operated Raffles's Botanic Garden primarily to fund its main objective of supporting the planters' interests. On the botanical front, their efforts fell short, since amateurish enthusiasm could not make up for proper training or systematic experimentation. H.N. Ridley, the first Director of the current Singapore Botanic Gardens, later claimed that the 'apathy of Government' caused the disastrous decline of spice cultivation in Singapore and Penang, because nutmegs were grown 'only empirically and without the aid of any scientific botanist' (Ridley, 1905, p. 297; Ridley, 1910, p. 103), but this criticism would apply to both public and private efforts. Indeed, pursuit of a more rigorous 'Experimental Garden' as originally envisaged by Raffles might have revealed much sooner that nutmeg culture on a larger scale was not viable in Singapore.

Conclusions

Raffles's vision of spice cultivation in Singapore was embedded in the Georgian philosophy of improvement, but was also based on flawed economic and agronomic premises, and as such was doomed to failure from the onset. Nonetheless, Raffles's Botanic and Experimental Garden was far more than a 'false start' for the current Botanic Garden (McCracken, 1997, p. 8; Tinsley, 1989, pp. 14–17). Characteristic for the changing patronage for botany at the time, it spawned a group of 'botanic entrepreneurs' who for a period of time organized an Agricultural and Horticultural Society. In their pursuit of nutmegs and other crops, they brought large areas of forest around Singapore town under cultivation, thus leaving an indelible imprint on the environment. The 'nutmeg mania' that ultimately ensued was not only a speculation on future nutmeg prices but also bore the signs of an 'asset bubble' in real estate that quickly collapsed when nutmeg cultivation finally failed. The nutmeg plantation on Government Hill survived in its original location until the late 1850s, much longer than previously thought, reaching its greatest extent around 1848 during the peak of frantic spice cultivation in Singapore. It exerted a significant influence on land development in the vicinity of the settlement, as well as helped to preserve 'green space' near the centre of town.

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