

# THE FARM AREA AND CULTIVATED PLANTS ON SANTA CRUZ, 1932–1965, WITH REMARKS ON OTHER PARTS OF GALAPAGOS

By: J.P. Lundh

Lofsrudhøgda 35 B, N-1281 Oslo, Norway. <jacop.lundh@c2i.net>

## SUMMARY

The development of the agricultural area in the Santa Cruz highlands, including Bellavista and the farmlands above it, is described. During the 1930s and 1940s, there was on Santa Cruz an unusually high number of residents interested in experimenting with new plant species, and consequently the greatest variety of cultivated plants in the islands was found there. I present observations of 148 species or varieties of cultivated plants, made largely on Santa Cruz in the period 1946–54, along with other observations made mostly on San Cristóbal in 1952–3 and during my residence on the latter island in 1960–5, when I also made monthly trips around the islands. Of the taxa mentioned, 73 are probably pre-1930 introductions and another 17 possibly so. In the 1930s and 1940s, I found 55 new taxa, almost all of them on the farms in the highlands, and most on the properties of the Norwegians and Captain Castro. Three introductions of the 1950s or 1960s are also listed. Many of the taxa listed are first published records, either for the periods under consideration or earlier, since early botanical works left out nearly all the cultivated plants. Given that many former farmers have since gone over to raising cattle, some of the cultivated species registered during this early experimental period may since have disappeared from Galapagos.

## RESUMEN

**La zona de agricultura y las plantas cultivadas en Santa Cruz, 1932-1965, con algunas observaciones sobre otros sitios de Galápagos.** Se describe el desarrollo del área de agricultura en la parte alta de Santa Cruz, incluyendo Bellavista y el área de cultivo inmediatamente arriba de ella. Durante los años 1930 y 1940, Santa Cruz conoció un número inusual de residentes interesados en experimentar con nuevas especies de plantas, y en consecuencia la mayor variedad de plantas cultivadas en las islas se encontró allí. Presento observaciones sobre 148 especies o variedades de plantas cultivadas en su mayor parte en Santa Cruz en el período 1946–54, juntamente con otras observaciones hechas en gran parte en San Cristóbal durante 1952–3 y durante mi residencia en esta última isla en 1960–5, cuando también realicé viajes mensuales alrededor del archipiélago. De los taxones mencionados, 73 son probablemente introducciones previas a 1930 y otros 17 posiblemente también. En los años 30 y 40, encontré 55 nuevos taxones, casi todos ellos en las granjas en la parte alta, y la mayoría en las propiedades de los noruegos y del capitán Castro. Tres introducciones de los años 50 o 60 también son mencionados. Muchos de los taxones enumerados son registros publicados por primera vez, ya sea de los períodos considerados o anteriormente, ya que los primeros trabajos sobre botánica omitieron casi todas las plantas cultivadas. Dado que muchos antiguos agricultores se han, desde entonces, cambiado a la cría de ganado, algunas de las especies cultivadas registradas durante este período experimental temprano podrían haber desaparecido de Galápagos desde entonces.

Our knowledge about the introduction of cultivated plants in the Galapagos is incomplete (Tye 2006). I attempt here to compile personal observations and information obtained at the time from older settlers, about the earliest farms on Santa Cruz Island and the plants cultivated there. I also include observations on San Cristóbal Island during several months in 1952–3 and during 1960–5, and on other islands where appropriate.

## HISTORY OF THE FARM AREA ON SANTA CRUZ, 1932–1965

I have earlier (Lundh 1995, 1996) described the first farmers and settlers to arrive in the Bellavista and Puerto Ayora areas, between 1910 and 1938. A map made by Lt

Gonzalo Villacís in 1937 (Fig. 1) shows nearly all the older farms on Santa Cruz. Lt Villacís was at the time the head of the first military garrison on the island as well as the local civilian authority and a good friend of my parents.

My visits and stays in the Galápagos have been as follows, and I describe the farm developments I noted during each period.

### 1932

We arrived to Santa Cruz for the first time, finding there a permanent population of about one dozen souls, most of them Europeans. We spent three months on Santa Cruz that year, while working on my father's sloop-rigged ship. Later, we sailed among the islands, fishing, then left for Guayaquil that same year. Farms that existed at the

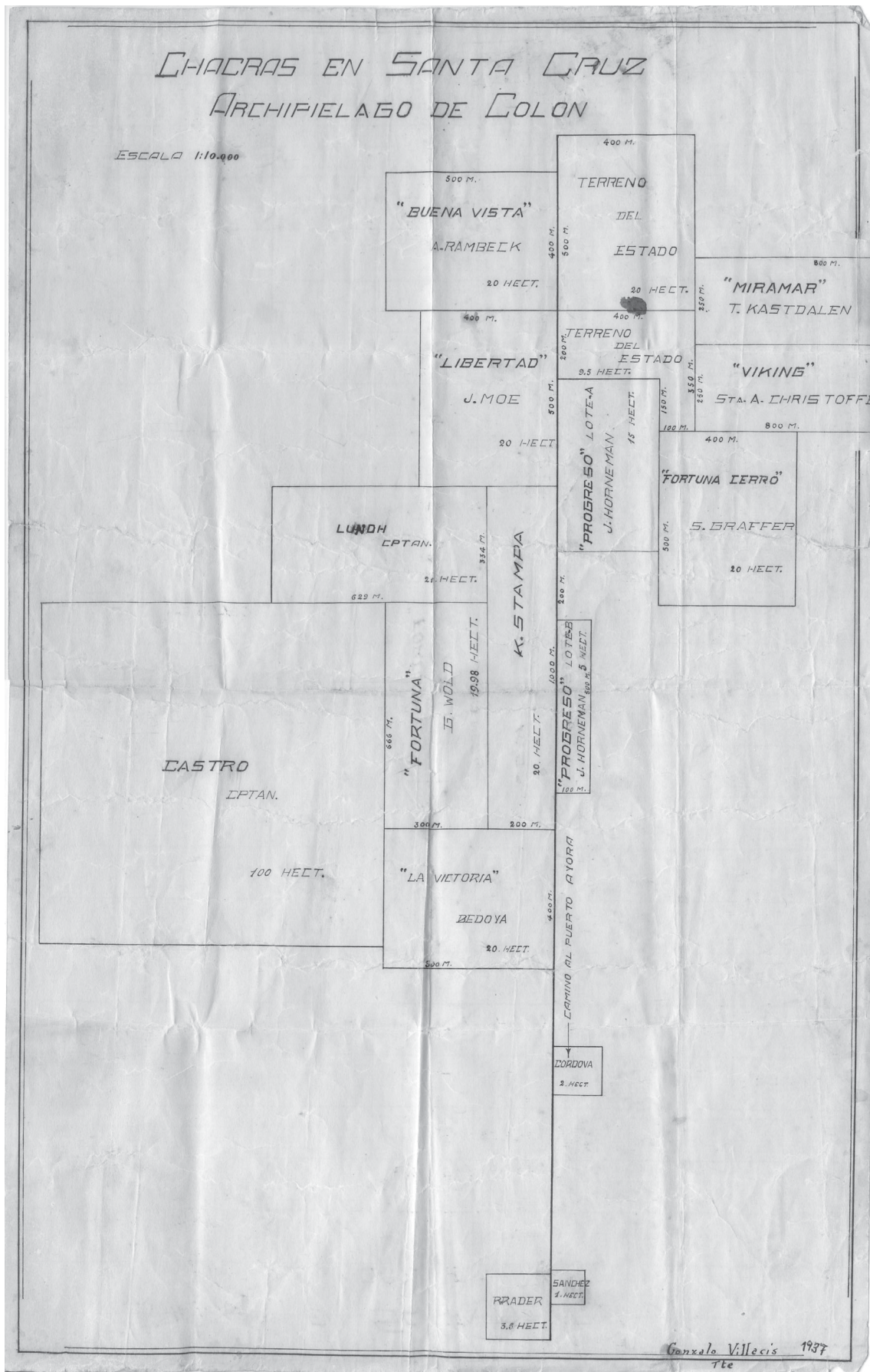


Figure 1. Map of the farm area on Santa Cruz in 1937, drawn by Lt. Gonzalo Villacis.



time (see Fig. 1) were Raeders' "El Rancho" (started 1931), Elías Sánchez's (1917), Gordon Wold's (1926, though there were earlier remains of cultivation left by people who had lived there a year or so before), Kristian Stampa's (1926, with plants such as cassava, bananas and taro left by earlier Ecuadorian settlers) and Jacob H. Horneman's Lote A (1927) and Lote B (probably 1931). These farms, except for Sánchez and Raeder, remained abandoned for several periods, such hardy plants as taro, cassava, bananas, papaya and citrus trees surviving on their own. In 1934, my father, Captain Herman von Hoff Lundh, returned to the islands. My mother Helga B. Lundh (who at the time was pregnant with my brother Eric) and I remained in Guayaquil.

### 1936–7

My mother, baby brother and I returned, remaining on Santa Cruz eight months, until August 1937. We spent some time on San Cristóbal before the old "Calderón" finished its cruise of the islands and returned to the mainland. At the time, it had a scientific expedition on board, which included Professor Acosta-Solís (the botanist) and Dr. Yehuda Sammandaroff (the geologist) among others. My father decided then to become a farmer in the highlands, while we three went back to the mainland. Aside from the farms mentioned above, there were those of Córdova and Bedoya (date unknown), Jens Moe (1934), Sigurd Graffer (1935), Amanda Christoffersen (1935), Thorvald Kastdalen (1935), Anders Rambech (a Norwegian horticulturist, who first came to the island for 18 months from 7 August 1926 as a member of the Academy Bay cannery group, established a new farm in 1935; his former land had been taken over by Wold and Stampa), Captain Rafael Castro (1937) and Captain Lundh (1937). Moe had first come to the island in 1926, and started his farm in 1934 after returning from several years in Colombia. The two "Terrenos del Estado" on Fig. 1 were originally the farm of the Swede Nilsson, who lived on the island in 1934 or 1935 and died later in Guayaquil. To the WNW of the farms on the map was the property of John Lundberg, a Swede who had arrived in 1934 with his wife and a daughter. In that area was the farm that was started by the Angermeyer brothers, who arrived in 1937.

### 1946–9

My brother and I returned in 1946, being joined by our mother the following year. We remained until 1949, when we went to the mainland and spent ten months there. It is during this period and the 1950's that I had closest contact with farming in the highlands. When we arrived in 1946, the population on Santa Cruz had increased to almost 120 inhabitants. A number of these new people were former Ecuadorian army men who had come out as settlers after leaving the service. By then, what was later called Bellavista had begun to take form a little below the older farms, and some distance inland from the Raeder, Sánchez and Córdova claims, which were by then abandoned, as Sánchez and Córdova had left the island

in 1937 or 1938 and the Icelander Walter Finsen, who had taken over the Raeder farm, had died in 1945.

Most of the new settlers had established themselves in what became the village centre and a little below it. "El Pueblo", as we called it then, consisted of a series of houses with small gardens spread on both sides of the trail to Academy Bay, with a relatively short distance between them, on the flat lands below the older farm area. Most of the farming was done in small gardens behind the houses. The school was a little to the east of the upper end of this populated area. The new settlers had arrived in the 1940s, with the exception of the Andrades (Mrs Rosa Castro de Andrade and her two children Hortensia and Lautaro) who had arrived with Captain Rafael Castro (Rosa's brother) in 1937, and lived with him until Hortensia married former army nurse Carlos Játiva, who had settled in Bellavista. Also in *el Pueblo* and its vicinity lived Corporal Cando and Bolívar Cedeño and their families. Another former army man, Luis Aguirre, had his farm at the lower end of this area, where he lived with a number of children and his wife, Marina Fuentes. In 1949, Marina's brother, Enrique, started a farm a short distance above *el Pueblo*, settling there with his wife Teodora and their children. By the 1960s, this last family had moved to Puerto Ayora.

There was also a new farming nucleus that had formed in the area near Lundberg's claim, which in 1946 belonged to the daughter, Gloria Lundberg. Mrs Solveig Graffer, on leaving her family, had built a house and started farming on the edge of the grasslands, above the Angermeyer claim. Farther down, about level with Lundberg's place and more to the west were Augustina Buenaño and César Moncayo (two old settlers from San Cristóbal), Carlos Malo, who was married to the daughter of Augustina and César, and Håvard Henriksen, who had married Seimy, Lundberg's widow. This was an open area with chest-high herbaceous vegetation which was easy to clear and had a deep, dark soil. Somewhat to the SE of these lived a man by the name of Ramos, with his wife and a brother-in-law, César Campuzano. All these farms had been started in the 1940s and were already well established when we arrived in 1946. It was also in this area that Segundo Herrera and his family later became established, probably in the early 1950s.

There was a great diversity of vegetables produced on these farms in the 1940s, especially on the lands of the Norwegians and Captain Castro, who were those most interested in trying new products. The former imported seeds from Norway and Guayaquil, mainly in the 1930s, while the latter did so from Guayaquil from the end of that decade. Another important source was the Norwegian-American Captain Østrem, who brought plants and seeds from Panama, while he was master of the U.S. Army transport that supplied the base at Baltra (?1944–5).

The old farms at Santa Rosa and Salasaca, in the western part of the moist region, were, according to San Cristóbal tradition, established by order of Manuel Julián Cobos so that his archil (orchilla) collectors and tortoise

hunters in the area would have a supply of fresh food (see Lundh 1995). By 1946, these plantings were about to disappear, except for the orange and lime trees, as pigs and cattle, introduced to the south of the island in the 1920s, had by then spread to that part of the highlands.

#### 1950–4

In March 1950 we returned from the mainland. During the earlier part of the decade I still kept in constant contact with people in the highlands, and went often up to work on the farm that my brother bought from Jorge Herrería a couple of years later. However, both my mother and I spent most of our time at what now is the site of the Charles Darwin Research Station, where we had built a house above the little beach where the director's residence would be built, in the next decade. I was absent a few months in 1952 and 1953, while I was employed in the office of Sociedad Nacional de Galápagos in Wreck Bay. Most weekends there I would go to the highlands, where I spent time with the Cobos family, who were old friends. I left for Colombia in 1954.

On the same ship on which we returned to the islands in 1950, came a small group of young city men from Guayaquil, who intended to set up a cooperative to fish and farm on Santa Cruz. Faced with reality and lack of capital, the group broke up shortly after arrival, only one of its members, Arturo Ramírez de Luca, remaining. He started a farm in the area east of the Bellavista school house, where the Herrería Malta brothers (Julio and Jorge) and their families had started farms towards the end of 1949. We found the Herrería brothers and their families already established, alongside Jorge's father-in-law, the Spaniard Isaac González. They had arrived towards the end of 1949, while we were away. Both the Herrería families had left after a couple of years, as did Ramírez, while González remained until his death, a few years later. As stated, my brother bought Jorge's log cabin and his farm, while Marina Fuentes left her husband Luís Aguirre and took off with Víctor Hugo Castro (no relation of Captain Castro), taking over the property left by Julio Herrería.

I assume that these homesteads were of 20 ha each, which was the usual size on Santa Cruz at that time. As an example, 20 ha was the area purchased by my brother from Jorge Herrería. The area NE of *el Pueblo* had been mostly *Scalesia* forest and the trees that were cut down to clear the land were used to build log cabins by these settlers. The area where most of the older farms were had originally been covered by mixed woodland, and as late as the 1960s there still were trees of *Psidium galapageium* and *Zanthoxylum fagara* on the farms belonging to Captain Lundh, Captain Castro, Wold, Stampa and Horneman. Moe was mostly interested in growing coffee and had left some of the original trees, mostly *Pisonia floribunda*, as shade for his crop.

#### 1959

I made two visits to the islands, but had no time to visit the highlands, though I spent several days on Santa Cruz

each time I went by. Most of my time was spent at Iguana Cove (Isabela) and James Bay (Santiago), where I camped two weeks while making a survey of the salt mine. Both these visits were made on behalf of Folke Anderson, the chairman of the Astral Group, who already had a ship running between the islands and the mainland.

#### 1960–5

In 1960 I was appointed agent for Fruit Trading Corporation and Compañía Ecuatoriana de Turismo, both belonging to the Astral Group, and settled in Wreck Bay with my mother and my wife. During those years I visited the highlands on San Cristóbal very often, and made monthly cruises among the islands. A few times I stayed at Academy Bay for a week or two, working on our new house in Pelican Bay (on the site that became Hotel Galapagos). I once visited the Kastdalens, noticing some changes in the highlands, where the interest in cattle was beginning to take shape. There was also a farming community growing rather rapidly in the Santa Rosa area, where I obtained 200 ha, which I never had the opportunity to visit, as I moved to the mainland and later let Miguel Seminario and the Schiess family take it over.

### CULTIVATED PLANTS

The plants marked with a <sup>1</sup> in the list below belong to species that were well established some places in the Galápagos before the 1930s, most of them at an early date. It may be safely assumed that most were introduced in the earliest years of colonization. Most of them are plants that are traditionally cultivated in subsistence farms along the Pacific coast of Colombia and in the coastal lowlands of Ecuador. Plants marked <sup>2</sup> in the list were probably first introduced in the 1930s and 1940s. Plants marked <sup>3</sup> are later introductions (1950s and 1960s).

Scientific names have in some cases been supplied by comparison of a common name or description with species identified (mostly by Charles Darwin Research Station botanists) as present in Galapagos since the period of my observations (*e.g.* the two species of *Chrysophyllum*). The local names (mostly Spanish, sometimes Quechua) given in parentheses after the English names are, as far as possible, the names used in Galapagos at the time.

#### Agavaceae

<sup>1</sup>*Furcraea hexapetala* (Jacq.) Urb. Undoubtedly an early introduction, Cabuya was reported from Floreana, Isabela, Santa Cruz and San Cristóbal by Stewart (1911). Its first appearance on Santa Cruz was in the Santa Rosa–Salasaca area, where Stewart (1911) found it already forming thickets. In 1946, it was found scattered elsewhere in the highlands, where it was introduced in the 1930s. It was also found wild in the Transition and upper Dry Zones of San Cristóbal in the 1960s, having been used for hedges in the highlands. In the 1960s I made arrangements with Cordelería Nacional of Guayaquil to provide machinery

to some of the settlers on San Cristóbal for the extraction of fibre from this plant. When I left the island in 1965, there were five machines working in the Transition Zone, with five or six people attending each, harvesting, cutting the thorny edges and feeding the machines.

### Alliaceae

<sup>2</sup>*Allium ascalonicum* L. Shallots (Chalote) were grown at least in the highlands of Santa Cruz in the 1940s (I grew them myself).

<sup>2</sup>*A. cepa* L. A variety of Red Onion (Cebolla colorada) was tried repeatedly on Santa Cruz before 1946, but eventually given up as it did not form bulbs.

<sup>2</sup>*A. porrum* L. Leeks (Puerro) were grown, mainly on Santa Cruz, in the 1940s and 1960s.

<sup>2</sup>*A. sativum* L. On Santa Cruz there was limited production of excellent Garlic (Ajo) in 1946, but it was discontinued for some reason.

<sup>2</sup>*A. schoenoprasum* L. Chives (Cebollino) were widely grown in the highlands of all the inhabited islands from the 1940s onwards.

### Anacardiaceae

<sup>2</sup>*Anacardium occidentale* L. The only Cashew (Marañón) I have observed in Galapagos was a tree that grew on the Horneman property. It was supposed to have been planted in the 1930s and still existed in the 1960s.

<sup>2</sup>*Mangifera indica* L. The Mango tree was introduced on several of the farms on Santa Cruz in the 1930s, but produced fruit only in years with an exceptional wet warm season, followed by a mild and relatively dry *garúa* season. I know of no earlier introduction. There was a small variety of mango grown at Puerto Baquerizo (San Cristóbal) with the help of irrigation, which produced fruit every year.

<sup>1</sup>*Spondias purpurea* L. The Red Mombin (Ciruela) was common in the highlands of Santa Cruz and San Cristóbal, as well as on Isabela and Floreana. It was often used to reinforce barbed wire fences, especially at the corners. Certainly a very early introduction. The trees at the spring above Black Beach, Floreana, were reputed to have been planted at the time of Gen. José Villamil, who settled there in 1832.

### Annonaceae

<sup>1</sup>*Annona cherimola* Mill. The Cherimoya (Chirimoya) was found in the highlands of Santa Cruz from the 1930s and Captain Thomas Levick (who died in 1925) had some trees growing on his property in Wreck Bay, San Cristóbal.

<sup>1</sup>*A. glabra* L. I saw Pond Apple (Anona de lagarto) in a swampy brackish area near Puerto Villamil on Isabela, which may be the same area where Stewart (1911, 1915) found it. As far as I know, it is not found elsewhere in the islands. It may be native or a very early accidental introduction, as its flavourless flesh is seldom eaten.

<sup>2</sup>*A. muricata* L. The Soursop (Guanábana) was grown to a limited extent in the Santa Cruz highlands in the 1940s and later, and was popular for making drinks.

### Apiaceae

<sup>1</sup>*Apium graveolens* L. Celery (Apio) was grown in the Santa Cruz highlands in the 1940s to 1960s, and is possibly an early introduction.

<sup>1</sup>*Coriandrum sativum* L. Coriander (Cilantro) is a much used herb in Ecuador, and therefore likely to be a very early introduction on all the inhabited islands. It was grown in the Santa Cruz highlands in the 1940s and later.

<sup>1</sup>*Cuminum cyminum* L. Cumin (Comino) is also very popular in Ecuadorian cooking and therefore likely to be an early introduction. It was present on Santa Cruz in the 1940s and said to be present on all the inhabited islands.

<sup>1</sup>*Daucus carota* L. Carrot (Zanahoria) was found on all the inhabited islands in the 1940s and much later. Very popular both in Colombia and Ecuador, for this reason expected to be an early introduction.

<sup>2</sup>*Pastinaca sativa* L. Parsnip (Pastinaca) was cultivated by some of the Norwegian settlers in the Santa Cruz highlands. It was not popular and may have been introduced in the 1940s.

<sup>1</sup>*Petroselinum crispum* (Mill.) A.W. Hill. Parsley (Perejil) was reported from Floreana by Andersson (1858) and by the 1940s was grown on all the inhabited islands. It is an important herb in Ecuadorian cooking so likely to be an early introduction.

### Apocynaceae

<sup>1</sup>*Catharanthus roseus* (L.) G. Don. The Madagascar Periwinkle (Chabela) was common in gardens on San Cristóbal in the 1950s, both by the shore and in the highlands, and was probably one of the first pot and garden plants introduced. Two varieties were grown: a white and a purple-rosy. I grew it there in the 1960s.

<sup>1</sup>*Nerium oleander* L. Oleander (Laurel rosa) was often found in gardens of the San Cristóbal and Santa Cruz highlands, and occasionally by the seashore. A favourite in the Ecuadorian lowlands, it may be an early introduction.

<sup>1</sup>*Plumeria rubra* L. The Frangipani (Suche) was occasionally found in gardens on Santa Cruz and San Cristóbal. The time of its introduction is unknown, but its frequency in lowland gardens on the mainland makes it likely that it was brought to Galapagos at an early date.

### Araceae

<sup>1</sup>*Colocasia esculenta* (L.) Schott. Taro (Papa china) has been grown in Galapagos since the earliest colonization. It was still found on all the inhabited islands in the 1960s. It was found in Santa Rosa and Salasaca in the western part of the Santa Cruz highlands, and it was also grown above Bellavista from very early on. It is little used in Ecuador, which leads me to believe that this plant was introduced by General José Villamil to the first colony on Floreana. Villamil had lived a number of years in Venezuela, and this plant is much used in the Caribbean region, so he may have thought it more useful than it actually was in Galapagos. The considerable shade produced by this plant makes it survive well on its own, once it has become established.



<sup>1</sup>*Xanthosoma sagittifolium* (L.) Schott. Tannia (Otoy) is probably another early introduction, similar in survival capacity to the preceding species. It was still found on all the inhabited islands in the 1960s.

### Areaceae

<sup>1</sup>*Cocos nucifera* L. What are believed to have been the oldest Coconut palms in Galapagos were a pair located next to the plantation house in Progreso, San Cristóbal. They were already large by the 1940s. Coconuts seem to have been introduced early in the Puerto Villamil area, on Isabela. There were a few palms a little to the west of the village, and a large group some distance inland, where there was a large pool of salt water. They are likely to be dead by now, as is the case with the palms planted by Dr Ritter in 1929, inland from Black Beach, Floreana. The species was a late introduction to Santa Cruz, where the first ones were planted by the Ræders, a Danish couple, in 1931 at what later became the site of the naval compound. Carlos Kübler planted a number of coconut palms in the "older" part of Puerto Ayora (the area near Laguna de las Ninfas), the first in 1934. Adolfo Haeni had a number of palms on his property in Pelican Bay, planted at the beginning of the 1950s.

<sup>2</sup>*Phoenix dactylifera* L. The earliest Date Palms (Datileros) known in the Galapagos were those planted in 1929 by Dr Ritter, inland from Black Beach, Floreana. In the early 1930s, Carlos Kübler planted his first Date Palms in Puerto Ayora, while Adolfo Haeni planted a few in Pelican Bay some 20 years later. While I lived above the little beach (now called "Director's Beach") east of Puerto Ayora, in the early 1950s, I planted a few Date Palms a short distance to the east of where the Research Station's buildings are now, inside a group of Manchineel *Hippomane mancinella* L. trees. It was a surprise to find them growing and well developed in the 1960s. The Date Palms in front of the navy's administration building in Puerto Baquerizo are of unknown date and would have been planted in the 1940s or perhaps later, as there was none when we spent two weeks there as guests of Col. Carlos Puente, in 1937

### Asparagaceae

<sup>2</sup>*Asparagus officinalis* L. Asparagus (Espárrago) was produced in the Santa Cruz highlands by several Norwegians in the 1940s. Production was discontinued before the end of the decade, probably because of lack of demand.

### Asphodelaceae

<sup>1</sup>*Aloe vera* (L.) Burm. f. Barbados Aloe (Sábila) was grown at least since the 1930s as an ornamental in the highlands of Santa Cruz and San Cristóbal, sometimes also by the seashore.

### Asteraceae

<sup>2</sup>*Artemisia dracunculul* L. Tarragon (Estragón) was introduced on Santa Cruz in the 1940s. It was not much used and, as far as I know, cultivated only by the Norwegians.

<sup>2</sup>*Aster* spp. Two or three different forms or species of *Aster* were grown in the highland gardens of Santa Cruz, where they may have been introduced as early as the 1930s. Also found in gardens on San Cristóbal.

<sup>2</sup>*Cichorium endivia* L. Endive (Escarola) was grown in limited quantities in the Santa Cruz highlands. Introduced in the 1940s.

<sup>2</sup>*C. intybus* L. The European vegetable Chicory (Achicoria) was grown by some of the Santa Cruz Norwegians, and was probably introduced in the 1940s. Like the Endive above, never became very popular.

<sup>1</sup>*Lactuca sativa* L. Lettuce (Lechuga) has been grown since the earliest times, an open, leafy variety being the commonest on all the islands. The Kastdalens and Rambechs also had the Iceberg variety, which was introduced in the 1940s.

<sup>1</sup>*Matricaria* probably *recutita* L. A species of this genus, probably Sweet False Chamomile (Manzanilla) was grown on some of the farms on Santa Cruz and San Cristóbal as a medicinal herb, and may have been an early introduction.

<sup>1</sup>*Tagetes erecta* L. Aztec Marigold (Flor de muerto) is very popular in lowland Ecuador, and was grown as a garden and pot plant on all the inhabited islands at least from the 1940s.

<sup>1</sup>*Zinnia* sp. A common garden plant in the highlands of Santa Cruz and San Cristóbal, and in the lowlands of the latter. Probably an early introduction.

### Bignoniaceae

<sup>1</sup>*Crescentia cujete* L. The Calabash Tree (Mate) was represented in the 1950s and 1960s by several small specimens at the Progreso cemetery, San Cristóbal. I did not see it elsewhere in the islands.

### Bixaceae

<sup>1</sup>*Bixa orellana* L. Annatto (Achiote) was introduced early to Galapagos, as the colouring matter of its seeds is much used in Ecuadorian cooking. It was found on all the inhabited islands in the 1940s. It may also have escaped from cultivation in some parts, as there was a tree on the trail to Progreso, in the Transition Zone, in the 1950s and 1960s, in an area where no farming had ever been attempted.

### Bombacaceae

<sup>1</sup>*Ceiba pentandra* (L.) Gaertn. The Silk-cotton Tree (Ceibo) was found scattered, in small numbers on both San Cristóbal and Santa Cruz. The trees observed in the 1940s were already quite large and must have been old by then. Most of them were still standing in the 1960s. A large group of these trees at the coconut grove, inland from Puerto Villamil, Isabela, seems to have been planted in the early days of colonization of that island. The species grows equally well in the highlands and the lowlands.

<sup>2</sup>*Ochroma pyramidale* (Cav. ex Lam.) Urban. The first Balsa was introduced on Santa Cruz in the 1940s. Lautaro Andrade found some seeds in a sack, identified them and

gave some to Captain Castro and Wold, who planted them. Wold had a slender tree, about 2.5 m high, growing in 1946. It has since spread in the highlands.

### Brassicaceae

<sup>2</sup>*B. napus* L. A limited amount of Turnip (Nabo) was produced in the Santa Cruz highlands by the Norwegian settlers. They were cultivated as late as the 1960s.

<sup>2</sup>*B. oleracea* L. var. *botrytis* L. Cauliflower (Coliflor) was planted a number of times in the Santa Cruz highlands in the 1940s, without success. No flower heads were formed, though the plants otherwise developed well.

<sup>1</sup>*B. oleracea* L. var. *capitata* L. Excellent Cabbage (Col) was produced in the Santa Cruz highlands, and was cultivated on all the inhabited islands. Probably an early introduction. Anders Rambech produced his first harvest of Cabbage in December 1926.

<sup>2</sup>*B. oleracea* L. var. *gemmifera* (DC.) Zenker. Brussels Sprouts (Col de Bruselas) were produced in the Santa Cruz highlands, and were probably introduced in the 1940s.

<sup>2</sup>*B. oleracea* L. var. *gongylodes* L. Kohlrabi (Colinabo) was cultivated in the Santa Cruz highlands and probably introduced in the 1940s. I have never seen it on the other islands.

<sup>2</sup>*Brassica rapa* L. var. *chinensis* (L.) Kitam. Pak-choi (Col china) was one of the two Chinese cabbages that was produced in the Santa Cruz highlands, mainly by the Norwegian farmers. Introduced in the 1940s and still grown in the 1950s.

<sup>2</sup>*B. rapa* L. var. *glabra* Regel. Pe-tsai (Col china) was the other Chinese cabbage that was produced in the Santa Cruz highlands. Introduced in the 1940s and still produced in the 1950s.

<sup>1</sup>*B. rapa* L. var. *rapa*. The Field Mustard was reported by Stewart (1911) from the San Cristóbal highlands and, was frequently found in the 1940s in open areas near houses in the highlands of the inhabited islands. It was probably introduced accidentally at an early date.

<sup>1</sup>*Raphanus sativus* L. Radish (Rábano) is one of the earliest introductions in Galapagos, and was grown from the first colonization on Floreana, in the 1830s (Andersson 1858). Stewart (1911) reported it from the San Cristóbal highlands and it was still found on all the inhabited islands in the 1960s. I grew them successfully, with irrigation, in Wreck Bay in the 1960s.

### Bromeliaceae

<sup>1</sup>*Ananas comosus* (L.) Merr. Pineapples (Piña) were found in the highlands of all the inhabited islands as far back as I can remember (1937) and were probably an early introduction. Grown on the Santa Cruz farms at least as early as the 1930s.

### Caesalpiniaceae

<sup>1</sup>*Caesalpinia bonduc* (L.) Roxb. This plant was probably introduced in the 19th century by tortoise hunters, to form hedges to keep their donkeys (also introduced by them) from eating their vegetables. The fact that it is introduced is obvious. The species reproduces by its seeds

floating on currents, but I have never met with it along the coasts of Galapagos. Further, the two areas where it has been found, the coconut grove inland from Puerto Villamil (Isabela), far from the shore, and the western part of the Santa Cruz highlands, close to Santa Rosa, are far from places where it could be expected to be found naturally.

<sup>1</sup>*C. pulcherrima* (L.) Sw. Dwarf Poinciana was a popular garden plant on all the inhabited islands by 1946, sometimes grown even on the coast. Most likely one of the earliest gardening introductions.

<sup>1</sup>*Delonix regia* (Boger ex Hook.) Raf. There was a large Flamboyant tree in Pelican Bay, at the beginning of the road to the Research Station, in the 1960s. Nobody seemed to know how it came to be in that place.

### Cannaceae

<sup>1</sup>*Canna x generalis* Bailey. Common Canna (Platanillo) was frequent in the San Cristóbal and Santa Cruz highlands.

### Caricaceae

<sup>1</sup>*Carica papaya* L. An early introduction, reported by Andersson (1858) on Floreana and by Stewart (1911) on Isabela and San Cristóbal. Grown in the highlands on all the inhabited islands, occasional in gardens near the coast, usually near houses, where it reproduces spontaneously from fallen fruits. It was found at Santa Rosa and Salasaca. A red variety was introduced in the 1940s which was seen on Santa Cruz to cross-pollinate readily with the usual yellow variety.

### Casuarinaceae

<sup>2</sup>*Casuarina equisetifolia* L. She-oak was introduced to Santa Cruz in the 1940s. A number of these trees were found on the Kastdalen property, in the highlands, and at the Haeni property in Pelican Bay. There were a few scattered specimens elsewhere in the highlands in the 1960s.

### Combretaceae

<sup>1</sup>*Terminalia catappa* L. Indian Almond (Almendro) is popular as a shade tree in the Ecuadorian lowlands and therefore likely to be an early introduction in Galapagos. It was occasional in gardens on Santa Cruz and San Cristóbal.

### Commelinaceae

<sup>2</sup>*Tradescantia spathaceae* Sw. A plant that seems to be this species was grown as an ornamental on San Cristóbal in the 1960s.

<sup>1</sup>Commelinaceae sp. There was also another ornamental species of this family grown in the area of the Norwegian farms on Santa Cruz in the 1940s.

### Convolvulaceae

<sup>1</sup>*Ipomoea batatas* (L.) Lam. The Sweet Potato (Camote) is a very early introduction on the Galapagos, found on Floreana by Darwin (1839). It was found in Santa Rosa and Salasaca, and in the 1940s on practically all the farms

in the highlands of the inhabited islands. It survives well once it has become established, forming dense mats that cover the ground, shading out other plants.

### Cucurbitaceae

<sup>1</sup>*Citrullus lanatus* (Thunb.) Matsun. & Nakai. Watermelon (Sandía) was grown in the highlands of all the inhabited islands, sometimes also by the sea. Undoubtedly a very early introduction (Andersson 1858, Stewart 1911).

<sup>1</sup>*Cucumis melo* L. The Musk Melon was by far the most popular melon in the islands, being grown on practically all the farms. It was also frequently grown in the lowlands. It was grown as far back as I can remember (1930s), and was undoubtedly an early introduction.

<sup>1</sup>*C. sativus* L. Cucumber (Pepino) is possibly one of the most popular vegetables, a very early introduction, grown on all the inhabited islands in the 1930s onwards, sometimes even in the lowlands.

<sup>1</sup>*Cucurbita moschata* (Duchesne ex Lam.) Duchesne ex Poir. or *C. pepo* L. Pumpkin (Zapallo) was probably a very early introduction, although the plants reported by Stewart (1911) on Isabela, proved to be *C. ficifolia* Bouché (Jørgensen & León-Yáñez 1999). Pumpkins were grown in the highlands of all the inhabited islands in the 1940s, and sometimes even by the sea.

<sup>1</sup>*Luffa cylindrica* (L.) M. Roem. Smooth Loofah (Esponja) was very common near the houses in Puerto Baquerizo after the first warm season rains. It was also found in Puerto Ayora. It is an early introduction, used much for scrubbing. It was especially abundant in the warm season of 1964–5.

<sup>1</sup>*L. sepium* (G. Mey.) C. Jeffrey. I have not seen this species on Santa Cruz, but it was very common in Puerto Baquerizo. In 1959, I saw some plants in Iguana Cove (SW Isabela) that looked like this species. It is a very common warm season plant around Bahía de Caráquez and Manta, on the mainland coast. It may be an early introduction on Floreana. Its dry fruit is very handy for scrubbing pots and pans.

<sup>1</sup>*Momordica charantia* L. The Balsam Pear was, according to Stewart (1911), reported by Baur from Puerto Villamil, Isabela. I cannot recall seeing it there or at Puerto Baquerizo, but it was very common around Puerto Ayora in the 1930s, and in the 1940s I found it a little less common around Fortuna, a little above Bellavista. The Norwegian settlers called it “Mrs Ræder’s weed”, claiming that the plant had originated in her garden, which was in the site of the present naval compound in Puerto Ayora. The Ræders may have introduced it in 1931, when they built their house at this place.

<sup>2</sup>*Sechium edule* (Jacq.) Sw. The Chayote was grown by a few of the Santa Cruz farmers in limited quantities. It was introduced in the 1940s and I cannot remember seeing it on any of the other islands.

### Dioscoreaceae

<sup>1</sup>*Dioscorea bulbifera* L. Potato Yam (Ñame) or a species much like it was grown in small quantity in the Santa Cruz highlands in the 1940s.

### Dracaenaceae

<sup>1</sup>*Sansevieria trisfasciata* Prain. Bowstring Hemp (Lengua de suegra) was a common ornamental on all the inhabited islands, both in the highlands and on the coast. It was observed in and before the 1960s and may have been one of the first introduced ornamentals as it is popular on the mainland coast.

### Euphorbiaceae

<sup>2</sup>*Aleurites fordii* Hemsl. Tung was introduced by Manuel Augusto Cobos on San Cristóbal towards the end of the 1940s. As far as I know this was the only introduction, and by the end of the 1950s there were none left, as they had been destroyed by Cobos’s wife to plant something else, to the great disappointment of don Manuel, who happened to be on the mainland at the time.

<sup>1</sup>*Codiaeum variegatum* (L.) A. Juss. “Croton” was found in the 1940s and 1960s in gardens in the highlands of Santa Cruz and San Cristóbal. It is very popular on the mainland.

<sup>1</sup>*Euphorbia milii* Des Moul. Crown of Thorns was found in the 1950s and 1960s in the Santa Cruz and San Cristóbal highlands, as well as near the shore, often as a pot plant.

<sup>1</sup>*E. pulcherrima* Willd. ex Klotzsch. Poinsettia was probably found on all the inhabited islands. It was on Santa Cruz at least from the 1940s onwards.

<sup>1</sup>*Jatropha curcas* L. Physic Nut (Piñon) was common in the highlands of all the inhabited islands, and well established in the 1940s. It was used in Galapagos to establish dense, high hedges for cattle and other domestic animals.

<sup>1</sup>*Manihot esculenta* Crantz. Cassava (Yuca) was common in the highlands of all the inhabited islands, and is a very early introduction. It was also found at Santa Rosa and Salasaca.

### Fabaceae

<sup>2</sup>*Arachis hypogaea* L. Peanuts (Maní) were introduced on Santa Cruz in the 1940s and grown for a short period in the highlands. Their size was large and the quality was good, but cultivation was discontinued. The reason may be that they were grown experimentally by one or two of the Norwegians and they thought they were not worth the extra work, peanuts not being a part of their food tradition. They would undoubtedly have had a market among the Ecuadorian settlers.

<sup>2</sup>*Glycine max* (L.) Merr. Some of the Norwegians and Captain Castro produced a limited amount of Soya beans in the Santa Cruz highlands. It seems to have been introduced in the 1940s, when it was receiving considerable publicity. It never became popular on the island.

<sup>2</sup>*Lablab purpureus* (L.) Sweet. Hyacinth Bean (Zarandaja) was introduced in the 1940s by Captain Castro as a tropical alternative to the Kudzu vine *Pueraria lobata* (Willd.) Ohwi, which was receiving considerable publicity at the time. It was often planted on Santa Cruz around vegetable gardens to keep down the weeds. It also made land clearing easier, as it formed dense carpets that could be rolled away, leaving fine clean soil for further cultivation. I have not seen it on the other islands.



<sup>1</sup>*Phaseolus vulgaris* L. Beans (Frejol) were grown to a limited extent on all the inhabited islands. It is however surprising that they were not produced in larger quantities considering the good quality and the ease with which they were grown.

<sup>2</sup>*Pisum sativum* L. A limited amount of Garden Peas (Arveja) was produced on Santa Cruz. They may have been grown from the 1930s.

### Juglandaceae

<sup>2</sup>*Juglans neotropica* Diels. Andean Walnut (Tocte) was introduced to San Cristóbal by the Franciscan friars towards the end of the 1940s, and there was one tree growing in their garden in Progreso in the 1960s, which I believe was at that time the only one in Galapagos. More recently it has come to be called "Nogal" in the islands.

### Lamiaceae

<sup>2</sup>*Lavandula* sp. Lavender (Lavanda) was grown in the garden of the Horneman family, it was probably introduced in the 1940s.

<sup>1</sup>*Mentha x piperita* L. Peppermint (Menta), a European herb, was common in the highlands of all the inhabited islands. Likely to be a very early introduction, as it is popular among Ecuadorians for making infusions. The Spearmint-flavoured "Hierbabuena" was another commonly cultivated mint, which could have been a variety of *M. x piperita* or perhaps *M. spicata*. While less popular than "Menta", it was also grown in the highlands of all the inhabited islands and much used for infusions by the Ecuadorian settlers.

<sup>1</sup>*Ocimum* cf. *campechianum* Mill. Basil (Albahaca) was found in the highlands of all the inhabited islands. It was probably this species rather than *O. basilicum* L. Likely to be an early introduction, as it is much used as a kitchen herb in the Ecuadorian lowlands.

<sup>2</sup>*Origanum majorana* L. The European herb Sweet Marjoram was grown by a few of the farmers in the Santa Cruz highlands. Possibly introduced in the 1940s.

<sup>1</sup>*Origanum* sp. probably *O. vulgare*. Oregano (Orégano) was much used by the Ecuadorian settlers. Probably an early introduction, found in the highlands of all the inhabited islands in the 1940s and 1960s.

<sup>2</sup>*Rosmarinus officinalis* L. Rosemary (Romero) was probably introduced in the 1940s and was found to a limited extent in the Santa Cruz highlands.

<sup>2</sup>*Salvia officinalis* L. Sage (Salvia) was introduced in the 1940s, and was found to a limited extent in the Santa Cruz highlands.

<sup>2</sup>*Thymus vulgaris* L. The European herb Common Thyme (Tomillo) was grown in the Santa Cruz highlands by a few of the farmers. Probably introduced in the 1940s.

### Lauraceae

<sup>2</sup>*Laurus nobilis* L. My father and his partner Wold had a bush of Sweet Bay (Laurel) in their vegetable garden. It is the only one I have seen in the islands. However, some of the other Norwegians may have grown this species, as it is used in Norwegian cooking. Introduced in the 1940s.

<sup>1</sup>*Persea americana* Mill. Avocado (Aguacate) was found on all the inhabited islands. Particularly abundant on Santa Cruz, where the Norwegian settlers planted it along the borders of their farms, thus causing it to spread far beyond what was the case on the other islands. There was a stand of this tree in the highlands of Santiago, which originated when a group of men went inland, probably to hunt for tortoises, in the 1920s. One of them, the Colombian César Moncayo, told me that they had eaten avocados, and that he planted the seeds. The wood is excellent for cabinet making, but I have never heard of it being used in the Galapagos.

### Malvaceae

<sup>2</sup>*Abelmoschus esculentus* (L.) Moench. Okra (Quingombó) was grown by a few of the Norwegians in the Santa Cruz highlands. It was introduced in the 1940s, but never became popular.

<sup>1</sup>*Hibiscus rosa-sinensis* L. Hibiscus (Peregrina) was grown in the highlands of Santa Cruz and San Cristóbal and was seen occasionally in lowland gardens, especially in Puerto Baquerizo, where plenty of fresh water was available all year. This hardy species may have escaped cultivation in some places, as it would grow tall and bend over, its upper branches touching the soil and rooting there.

<sup>1</sup>*H. rosa-sinensis* var. *schizopetalus* Dyer. The same that is stated for the previous variety may be said for this one. There was a very large plant which produced abundant flowers every day, under my parents' bedroom window while we lived in the Ræder house in Puerto Ayora in 1936–7. This later became the port captain's residence. The specimen had been planted in 1931.

<sup>1</sup>*H. tiliaceus* L. The Cuban Bast (Majagua), grows wild along the coast in some parts of Galapagos. It was found in Pelican Bay (Santa Cruz), there was a small group of trees beyond the naval compound of Puerto Baquerizo, and I found a dense group above a steep beach at Point Essex (SW Isabela) in 1959. Below the trees, in the sandy soil, a couple of inches below the surface, there was excellent water, only very slightly brackish. The only instance I know of this tree being cultivated in the Galapagos was a small stand on the Graffer farm, in the Santa Cruz highlands. They had been planted in the 1930s to make use of the bark fibre.

### Meliaceae

<sup>2</sup>*Cedrela odorata* L. The Cuban Cedar was introduced during the second half of the 1940s. During a visit to Santa Cruz, one of the sons of the Danish consul in Guayaquil, Emilio Holst, promised to send out seedlings and seeds of this species. His father, Dr Pedro Holst, and Mr von Buchwald, a long time German resident of Ecuador, had been promoting this tree during the previous years. There was another introduction in the same decade, made by Captain Castro.

<sup>2</sup>*Melia azederach* L. Chinaberry was introduced in 1938 with seeds brought from the Far East by my uncle, John Jacob Lundh, known among the Santa Cruz Norwegians

as “China-Lundh” because of his many years in the Far East. He brought a number of seeds of other species, but I am not certain which, or if they were successful.

<sup>2</sup>*Swietenia macrophylla* King. Mahogany (Caoba) was introduced in the 1940s.

### Mimosaceae

<sup>1</sup>*Inga edulis* Mart. It was called “Huaba de mico” because of its terete pods that are reminiscent of a monkey’s tail. This early introduction was never abundant on Santa Cruz and is used as shade for coffee on San Cristóbal.

<sup>1</sup>*I. spectabilis* (Vahl) Willd. Called “Huaba de machete” because of its flat pods. It is an early introduction found in the highlands of all the inhabited islands. It was common on Santa Cruz and even more so on San Cristóbal, where it is much used as shade for coffee.

### Moraceae

<sup>1</sup>*Artocarpus altilis* (Parkinson) Fosberg. Breadfruit (Arbol de pan) was found occasionally on farms in the highlands of Santa Cruz and San Cristóbal. It was introduced to Santa Cruz in the late 1930s by Captain Castro, but seems to have existed much earlier on San Cristóbal.

<sup>1</sup>*Ficus carica* L. Fig (Higuera) was probably a very early introduction. It was found in the 1930s on all the inhabited islands, and occasionally in the lowlands of Santa Cruz and San Cristóbal. There was, in 1937, a very large tree on the Ræder property in Puerto Ayora, which may have been planted when they arrived in 1931.

### Musaceae

<sup>1</sup>*Heliconia* sp. In the 1960s there was a dense thicket of Balisier (Platanillo) near the trail in the SE corner of Moe’s property. When I first saw it in 1946, it looked as if it had been there for many years. Nobody could tell how it got there.

<sup>1</sup>*Musa* spp. The section *Eumusa*, which includes most of the cultivated bananas, is a taxonomically difficult group that no longer can be fitted into the former *M. paradisiaca* and *M. sapientum*. According to Champion (1968) and Pursglove (1972), most cultivars are descended from *M. acuminata* Colla and *M. balbisiana* Colla. The most common Banana (Guineo) variety grown in the Galapagos highlands was the excellent “Gros Michel” which no longer dominates the world market because it has been displaced by varieties that are more resistant to diseases. On Santa Cruz we also had two other varieties, the “Red” and a mutation derived from it called “Green Red”. Neither was grown in quantity. Plantains were an important food on all the inhabited islands. Several varieties were grown, the most common being one called “Dominico”. The Lady’s Finger Banana (Orito), a diploid hybrid of *M. acuminata* and *M. balbisiana*, was well established on Santa Cruz by the 1940s and grown in limited amounts San Cristóbal.

### Myrtaceae

<sup>2</sup>*Eucalyptus globulus* Labill. My father and his partner Wold planted several seeds of Tasmanian Blue Gum (Eucalipto),

which I had sent them from Quito in 1939. The results were poor, and only one seedling prospered, turning into a scrawny tree that never amounted to anything much. The earliest *Eucalyptus* introduction in Ecuador was this species, in the second half of the 19th century.

<sup>2</sup>*Eucalyptus* sp. There were a few tall, beautiful eucalypts at the Lundberg property, obviously of a different species, which Gloria Lundberg told me her parents had planted from seeds received from friends in California in the 1930s. <sup>1</sup>*Psidium guajava* L. Guava (Guayaba) has been introduced into most parts of the tropics, and with different results. It has been declared a noxious weed in Fiji. After the French took possession of Tahiti in 1844, they initiated a long and costly campaign to rid the island of this introduced plant, which had taken over much of the low land, where nearly all agriculture was carried out. The tree was introduced on San Cristóbal in the late 1800s, when Manuel J. Cobos brought out three small plants for his garden in Progreso. By the 1920s it was considered a serious problem by his heirs to the sugar plantation. Its spread to Floreana may have been caused by the animals brought over by the Norwegians in the 1920s and by Baroness von Wagner in the early 1930s. The Santa Cruz settlers, both Norwegians and Ecuadorians, were afraid to have the plant on their island, and killed any that looked remotely like it. However, the increase of colonization in the 1950s and later brought out people who were unaware of the danger, and now Guava is found on both Santa Cruz and Isabela. The wood makes very good firewood and may be a suitable source of charcoal, but is not much exploited in Galapagos.

<sup>1</sup>*Syzygium jambos* (L.) Alston. Rose-apples (Pomarosa) grew in the Santa Cruz highlands in the 1940s, but were not abundant. Very common in the San Cristóbal highlands, where it was found forming small groups in the guava forests in the 1950s and 1960s. Stakes from this tree were used for fencing, much in the same way as with *Jatropha curcas*, as they root easily in the moist soil.

<sup>1</sup>*S. malaccense* (L.) Merr. & L.M. Perry. Pomerac (Pera noruega) was common in the San Cristóbal highlands, but less so in the 1960s than *S. jambos*. It was also widely used for fence posts. The current local name which means “Norwegian Pear” seems to have been a later development.

### Passifloraceae

<sup>1</sup>*Passiflora ligularis* Juss. Sweet Granadilla (Granadilla) has been grown on San Cristóbal and Santa Cruz since early times, but never in large quantities.

<sup>2</sup>*P. quadrangularis* L. Giant Granadilla (Badea) was introduced in the Santa Cruz highlands in the 1930s.

### Poaceae

<sup>1</sup>*Coix lacryma-jobi* L. In the 1960s Job’s Tears (Lágrimas de Moisés) was found occasionally along brooks in the highlands of San Cristóbal. Possibly an early introduction.

<sup>1</sup>*Cymbopogon citratus* (DC.) Stapf. Lemon Grass (Yerba Luisa) was grown in the highlands of all the inhabited islands,

and was much used for infusions. I have seen it growing near the coast only in Pelican Bay, Santa Cruz, where a clump grew in moist soil under some Manchineel trees.  
<sup>2</sup>*Cynodon dactylon* (L.) Pers. Bermuda Grass (Bermuda) was found growing at the entrance to the Horneman farm, in the Santa Cruz highlands, in the 1940s. It had been introduced earlier in that decade.

<sup>3</sup>*Digitaria eriantha* Steud. Pangola was introduced in the 1960s, and first planted in the Santa Rosa area by Robert Schiess, from some cuttings I got him from Guayaquil.

<sup>2</sup>*Guadua angustifolia* Kunth. Giant Bamboo (Caña guadua) was imported as split bamboo from Guayaquil since the earliest colony. As late as the 1950s there was still a large two-storied bamboo building in Puerto Baquerizo (San Cristóbal) that had been built at the time of Manuel J. Cobos. The first floor was used to store coffee and sugar for shipment to Guayaquil. The upper floor served as living quarters. No bamboo was grown on the islands until its introduction on Santa Cruz in the 1940s. Several species were tried, one of them being eliminated early because it spread rapidly and had large spines. The only species that still survived in the 1960s was *G. angustifolia* as it was considered the most useful. In the 1960s I found a stand of this species in the San Cristóbal highlands, on the south side of the mountains, near a brook on the farm of León Buenaño. He may have got plants from Augustina Buenaño, his sister, who lived on Santa Cruz.

<sup>1</sup>*Panicum maximum* Jacq. Guinea Grass (Saboya) was common in the Santa Cruz highlands well into the 1950s. It was not as popular as Pará Grass because the animals liked it only when it was tender.

<sup>3</sup>*Pennisetum purpureum* Schumach. Elephant Grass (Hierba Elefante) was introduced at the end of the 1950s or beginning of the 1960s. Much of its popularity is due to the ease with which it spreads, a characteristic that should have warned the farmers that it might go out of control.

<sup>1</sup>*Saccharum officinarum* L. Sugar Cane (Caña de azúcar) is among the earliest introductions and was found at Santa Rosa and Salasaca in the western highlands of Santa Cruz. It was grown on all the inhabited islands, being often used to make moonshine rum and, occasionally, syrup.

<sup>1</sup>*Urochloa mutica* (Forssk.) T.Q. Nguyen. Pará Grass (locally known as Janeiro) was supposedly introduced from the coastal lowlands around Guayaquil. In the 1940s it was the preferred pasture on Santa Cruz, remaining so until the end of the 1950s, when Elephant Grass was introduced.

<sup>1</sup>*Zea mays* L. Indian Corn (Maíz) was the only cereal grown in Galapagos and was cultivated in the highlands since the days of the first colony, in 1832. All the farmers on the inhabited islands grew this crop, which was used from the moment the young cobs were full enough to be eaten as sweet corn, until they were dry and mature. The latter were used mostly to feed poultry.

### Punicaceae

<sup>2</sup>*Punica granatum* L. Pomegranate (Granada) was produced in limited quantities in the Santa Cruz highlands. Probably

introduced in the 1930s. The fruits are much smaller in Galapagos than those found in the Mediterranean countries.

### Rosaceae

<sup>1</sup>*Eriobotrya japonica* (Thunb.) Lindl. Loquat (Nispero) is often found in gardens around Guayaquil, but was not very common in the Galapagos. In the 1940s it was found in the highlands of both Santa Cruz and San Cristóbal, sometimes wild on the latter. There were a few trees by the road, across from the Progreso cemetery, which still existed in the 1960s. Possibly an early introduction.

### Rubiaceae

<sup>2</sup>*Cinchona pubescens* Vahl. Introduced by Captain Castro in the 1940s as a possible income for the farmers on Santa Cruz, though it is rather difficult to extract the quinine from this species, which has a low content of the drug. A second introduction was made during the same decade, attributed to Karl Angermeyer, who got some seeds he distributed to several farmers. The species had not spread much in the 1950s and was not thought of as a potential problem. The wood is said to be excellent for cabinet making.

<sup>1</sup>*Coffea arabica* L. Seems to be a very early introduction on Floreana and San Cristóbal. There was Coffee (Café) already growing in the Santa Cruz highlands when Horneman cleared considerable areas, planting a large number of seedlings in 1932. The other Norwegians made jokes about there being a Horniman's tea (a popular brand in Ecuador at that time) and that there soon would be a Horneman's coffee. It has been grown as a cash crop on all the inhabited islands since early colonization. During the severe drought in the warm season of 1933–4, nearly all the coffee on Floreana died, and new plants were brought over from Santa Cruz by the Norwegian Arthur Worm-Müller for his friend Dr Friedrich Ritter.

### Rutaceae

<sup>1</sup>*Citrus aurantiifolia* (Christm.) Swingle. The Lime (Limón) is very popular in Ecuador, and is certainly an early introduction. It was found at Santa Rosa and Salasaca and has been grown from the earliest times on all the inhabited islands. The species is found wild on San Cristóbal, and even in greater quantities in the highlands of Floreana.

<sup>1</sup>*C. x aurantium* L. Seville Orange (Naranja agria) was found wild on Floreana, growing scattered in semi-arid areas of the interior, where I saw it in the 1960s. It was probably introduced by the first settlers. I have never seen it on the other islands.

<sup>1</sup>*C. x limon* (L.) Osbeck. Lemon (Limón) was grown in the highlands of all the inhabited islands from the earliest times, though never in the same quantities as the much more popular *C. x aurantiifolia*.

<sup>2</sup>*C. medica* L. The Hornemans and Rambechs had a very few trees of Citron (Cidra) in the Santa Cruz highlands, grown from seeds brought out in the 1930s.



<sup>2</sup>*C. x paradisi* Macfad. Grapefruit (Toronja) was grown in the highlands of Santa Cruz, San Cristóbal and Isabela in small quantities. It seems to be of later introduction than the other fruits of this group.

<sup>1</sup>*C. reticulata* Blanco. Mandarin (Mandarina) was introduced to the islands early and was, in the 1940s, found in the highlands of all the inhabited islands.

<sup>1</sup>*C. x sinensis* (L.) Osbeck. Sweet Orange (Naranja) was found at Santa Rosa and Salasaca, and has been grown in the highlands of all the inhabited islands since early colonization. It was found on all the Santa Cruz farms, but had already in 1946 been attacked by a scale insect, reputedly introduced from Panama via Baltra during the war. This is likely, for this insect was not found on the other islands at the time. The oranges were finally wiped out on Santa Cruz, giving origin to their importation from San Cristóbal from the end of the 1950s. Oranges have been growing wild on Floreana since the days of the first colony, and are also found wild in the San Cristóbal highlands. They were also abundant on Isabela.

<sup>3</sup>*Fortunella japonica* (Thunb.) Swingle. Carlos Kübler had a small bush of what seems to have been the round-fruited Marumi Kumquat (Naranja china) on his property in Puerto Ayora, planted from seeds imported in the 1950s. It was fruiting in the 1960s.

### Sapotaceae

<sup>2</sup>*Chrysophyllum argenteum* Jacq. *panamense* (Pittier) T.D. Penn. In 1946 I found Smooth Star Apple (Caimito), with purple fruits, on the Horneman property, in the Santa Cruz highlands. As far as I know, this was the only tree of the species in Galapagos. It had been planted with seeds brought out from Guayaquil in the 1930s.

<sup>2</sup>*C. cainito* L. One tree of Star Apple (Caimito), with yellowish green fruits, was also present on the Horneman property in 1946, apparently also the only tree of the species in Galapagos, and planted at the same time as *C. argenteum*, with seed brought from Guayaquil in the 1930s.

### Solanaceae

<sup>1</sup>*Brugmansia x candida* Pers. Angel's Trumpet (Floripondio) was found occasionally in gardens on all the inhabited islands, and sometimes even grown in the lowlands, as in Puerto Baquerizo.

<sup>1</sup>*Capsicum annuum* L. Sweet Peppers (Pimentón), var. "grossum" Sendt, have been cultivated since early times in the Galapagos highlands, on all the inhabited islands.

<sup>1</sup>*C. frutescens* L. Chili Peppers (Ají) in several varieties were grown in the highlands of all the inhabited islands. There was a small variety that was often found wild along trails and in open locations in the moist region. It was found on Santa Cruz, San Cristóbal and Floreana. Undoubtedly planted by the first colonists, as it is a traditional ingredient from pre-Columbian times.

<sup>1</sup>*Nicotiana tabacum* L. Tobacco was planted very early in the islands, and is likely to have been first introduced on Floreana with the first colony, in the 1830s. It was planted

mainly for domestic consumption. Some settlers claimed it had escaped from cultivation, though the only wild tobacco I have seen were a few scattered plants of *N. glutinosa* L. in a semiarid area inland on Floreana, in the 1960s.

<sup>2</sup>*Petunia hybrida* Vilm. Occasional in highland gardens on Santa Cruz. Possibly introduced in the 1940s or earlier.

<sup>2</sup>*Solanum betaceum* Cav. Tree Tomato (Tomate serrano) was imported to Santa Cruz in the 1930s by some of the Norwegians, who used it as a substitute for apricots in preserves and pies. I have only seen it on Santa Cruz.

<sup>1</sup>*S. lycopersicum* L. Tomato (Tomate) was grown occasionally in the 1940s and 1950s on all the inhabited islands. The fruit rots very often in the highlands, as a drop of water remains permanently in the lower part of the fruit during the *garúa* season, on account of the constant drizzle. In the 1960s, I produced excellent tomatoes in Puerto Baquerizo with irrigation.

<sup>2</sup>*S. melongena* L. Aubergine (Berenjena) was probably introduced in the 1940s. The only plants I have seen in the islands were on the farms of the Norwegians in the Santa Cruz highlands.

<sup>1</sup>*S. quitoense* Lam. Since the 1940s, Naranjilla was grown in the highlands of all the inhabited islands. Probably a very early introduction. The presence of a few plants at the rim of the main crater on Santiago is not necessarily evidence for colonization there. Farming at that location would not be advisable, there being much better areas lower down, and it is likely that seeds were brought in the intestines of some tortoise hunter or other visitor.

<sup>1</sup>*S. tuberosum* L. Potatoes (Papa) were grown in the highlands of all the inhabited islands, especially on Santa Cruz, where they were produced in large quantities by the Kastdalen family in the 1950s. It has been claimed (e.g. Hoff 1985) that the Kastdalens produced "Norwegian" potatoes, but this is an error. Potatoes brought from Norway were planted by Anders Rambech at Fortuna (above Bellavista) in 1926, but the farming area was abandoned in 1927 and remained so for some time. Later plantings were made using mainly the Ecuadorian Papa chola, which is excellent. During the war, the Idaho Potato was introduced and displaced all prior varieties. I purchased a ton of Potatoes from Kastdalen in 1954, and they were all big, pale Idaho Potatoes.

### Tropaeolaceae

<sup>1</sup>*Tropaeolum majus* L. A small thicket of Nasturtiums (Capuchina) existed for many years in the open area at the entrance to the Rambech farm in the Santa Cruz highlands. Nobody could give a satisfactory explanation for their presence there, and as the farm began in 1935 it may have been an early introduction. This species was otherwise occasional in gardens. I can recall seeing it only in the Santa Cruz highlands.

### Vitaceae

<sup>1</sup>*Vitis vinifera* L. Grapes (Uva) were grown on Santa Cruz and San Cristóbal in the 1960s, with varying degrees of

success. They did not do well in the highlands, but near the seashore, with irrigation, the vines grew well and fruited. The greatest production was obtained by Adolfo Haeni, in Pelican Bay. Carlos Kübler had a few vines in his property near the old landing in the Laguna de las Ninfas. I managed to produce some Muscatel Grapes in Puerto Baquerizo. Unfortunately, we left when they were bearing their first fruit, in 1965. This plant was introduced in the 19th century to Floreana (Robinson 1902), but there was no evidence for its presence there when I was in the islands.

## DISCUSSION

The development of Galapagos agriculture may be divided into the following three phases.

### Early colonization

This period started with the first colony, established in 1832, on Floreana. During this period, the commoner basic crop species still used today were introduced. This period extends to the 1930s, when the introduction of new cultivated species began. The only significant change in agriculture before the 1930s took place with the creation by Manuel J. Cobos of a sugar plantation on San Cristóbal in the 1860s, which was in production into the early 1930s.

There were, during this early period, several attempts at colonization, such as that made by José Valdizán on Floreana (1870–8), ending in failure, and that of Antonio Gil on Isabela (1897) which has survived until our days. Both these gentlemen were mainly concerned with the exploitation of tortoise oil, cattle and archil, rather than agriculture.

On 10 August 1925, a Norwegian settlement was established at Post Office Bay, Floreana. These men found an abandoned farm in the highlands with some useful plants. This had been a subsistence farm set up by cattle hunters left on the island by a Chilean sea captain the previous year. There are no records as to what, if anything, was planted by the Norwegians, and they soon left.

The following year, another Norwegian group set up the cannery in Academy Bay, Santa Cruz (Lundh 1996). When they arrived, there were a few Ecuadorians and the Mexican, Felipe Lastre, living in the highlands. Lastre had arrived about 1910, and one of the Ecuadorians, Elías Sánchez, had been there since 1917, while the others had lived there only since 1926, to look after some cattle that had been landed on the island for a Guayaquil businessman, Amador-Baquerizo. These people had been growing the products that then were usual in the islands, and their plantings were later used by the Norwegians, one of them the horticulturist Rambech. He started growing some European vegetables at Fortuna, above what is now called Bellavista (see under *Brassica oleracea capitata* above). This colony also broke up and only two of its members, Wold and Stampa, remained on the island. Since they were engaged mainly in fishing, their farms in the highlands remained more or less abandoned.

Later in 1926, another group of Norwegians arrived to San Cristóbal, most settling in the highlands. Of these, only two families remained on the island, after being successful at growing the plants that were used by the local people. Several others moved to Santa Cruz, devoting themselves to fishing the short time they were there.

These early Norwegian colonization projects thus had no lasting effect on Galapagos agriculture, and the assortment of plants grown on the islands remained mainly the same as in the first colony. The 73 species that we may count as early, and a further 17 that were possibly early introductions, not only made up the greater part of what would be grown by later settlers, but formed a very important part of their diet.

### The 1930s and 1940s

During this period, when the next group of Norwegians arrived, the variety of vegetables and fruits increased considerably, as most of these people settled in the highlands, becoming full time farmers. However, this increase took place on Santa Cruz, with little if any effect on the other inhabited islands. Individuals such as Captain Castro and the Norwegian settlers were willing to try anything new, even if circumstances were then such that these plants had no commercial possibilities in the islands.

During the 1930s there was an increase in the population of Santa Cruz with the return of two of the earliest settlers and of Horneman, who had first arrived in 1927. These were followed by a number of new Norwegian settlers and a few other Europeans. In 1937 a military garrison was established on the island, Captain Castro and his numerous family arrived, and Captain Lundh decided to become a permanent settler.

The Norwegians actively introduced new cultivated plants, an activity which Captain Castro also took up with enthusiasm. This activity greatly increased in the 1940s, with the help of Captain Østrem. He had been captain on a California tuna clipper in the 1930s and not only knew the islands well, but had befriended Captain Lundh and Wold in 1932, when they had met at Marchena.

In the 1930s and 1940s, I found 55 new plants growing, almost all of them on the farms in the Santa Cruz highlands, and most on the properties of the Norwegians and Captain Castro, who were the only people with great interest in growing these new products. There could have been more that have been missed in this article, either because they had been discontinued by the time I became familiar with the farming on the island, or because I have forgotten them because they were not prominent in our diet.

A similar development was absent on the other inhabited islands, if we except the limited introduction of Tung and Andean Walnut on San Cristóbal.

### Cattle raising

Later, fewer introductions were made, the main ones being Elephant Grass, introduced in the late 1950s, and Pangola Grass, introduced in the 1960s.

Towards the second half of the 1950s an experimental agricultural station was established by the government on San Cristóbal. All the products they tried, as far as I know, had already been tried during earlier years in the Santa Cruz highlands. There seemed to be no interest among the settlers on San Cristóbal to make changes in their agriculture, and this seems to have been the case with most other settlers in Galápagos, including most of those on Santa Cruz. We can therefore observe a decline in the variety of vegetables grown on this last island after the disappearance of the Norwegian farmers and Captain Castro. The increased interest in raising cattle may also have had something to do with it.

Raising cattle had been an important activity on both San Cristóbal and Isabela since the early years of settlement. However, on Santa Cruz agriculture was the main activity. In the 1950s, the Kastdalens imported a male Holstein-Friesian calf from Panama. When it became old enough, it was crossed with local wild cattle, with excellent results. But it was not until the following decade that a general interest in raising cattle took hold on the Santa Cruz farmers. They had seen how cattle shipments from Isabela and San Cristóbal had increased with improved communications with Guayaquil, where there has always been a good market for beef. The raising of cattle for export to the mainland developed steadily from the middle of the 1960s, and my brother, Captain Eric Lundh, who visited Santa Cruz after many years in the 1980s, told me how great areas in the highlands had been deforested to plant pasture for the animals, and that some of his favourite former pig- and cattle-hunting areas were under grass.

## LITERATURE CITED

- Andersson, N.J. 1858. Om Galapagos-öarnes vegetation. Kongliga Svenska fregatten Eugénies resa omkring jorden, 1851–1853. *Kongliga Svenska Vetenskaps-Akademien Handlingen Botanik* 1: 1–256.
- Champion, J. 1968. *El Plátano*. Blume, Barcelona.
- Darwin, C.R. 1839. *The Voyage of the Beagle*. J.M. Dent & Sons, London.
- Jørgensen, P.M. and León-Yáñez, S. (eds) 1999. Catalogue of the Vascular Plants of Ecuador. *Monographs in Systematic Botany from the Missouri Botanical Garden*. 75.
- Lundh, J.P. 1995. A brief account of some early inhabitants of Santa Cruz Island. *Noticias de Galápagos* 55: 2–3.
- Lundh, J.P. 1996. The Colonia de Santa Cruz of 1926. *Noticias de Galápagos* 57: 21.
- Purseglove, J.W. 1972. *Tropical Crops. Monocotyledons*. Longman, London.
- Robinson, B.L. (1902) Flora of the Galapagos Islands. *Proceedings of the American Academy of Arts and Sciences* 38: 79–270.
- Stewart, A. 1911. Expedition of the California Academy of Sciences to the Galápagos Islands, 1905–1906. II. A botanical survey of the Galápagos Islands. *Proceedings of the California Academy of Sciences* 1: 7–288.
- Stewart, A. 1915. Some observations concerning the botanical conditions on the Galapagos islands. *Transactions of the Wisconsin Academy of Sciences, Arts and Letters* 18: 272–340.
- Tye, A. 2006. Can we infer island introduction and naturalization rates from inventory data? Evidence from introduced plants in Galapagos. *Biological Invasions* 8: 201–215.