International Journal of History and Cultural Studies (IJHCS)
Volume 11, Issue 1, 2025, PP 37-50
ISSN 2454-7646 (Print) & ISSN 2454-7654 (Online)
DOI: https://doi.org/10.20431/2454-7654.1101005
www.arcjournals.org

Technological Hybridization and Economic Resilience in the Horticultural Sector of Santa (Cameroon), 1980-2017

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Abstract: *This paper explores the technics and developmental stages that defined the rise of market gardening in Santa Sub Division, Cameroon, following the decline of the coffee economy in the 1980s. Using oral testimonies, archival material, and field observations, the study examines how local farmers transitioned from export-dependent coffee cultivation to a diversified horticultural system rooted in indigenous agency and adaptive innovation. Key findings reveal that the success of market gardening hinged on structured stages—land preparation, seed selection, irrigation, pest control, harvesting, and decentralized market distribution. The study further establishes that these techniques were shaped by both inherited farming knowledge and the selective adoption of modern inputs such as chemical fertilizers and mechanized tools. In addition, market gardening enhanced economic inclusion, especially for women and youth, and allowed farmers greater control over pricing and production cycles. Ultimately, the paper argues that the technics and stages of market gardening in Santa reflect a broader postcolonial shift toward local autonomy, resilience, and self-directed rural development.*

1. INTRODUCTION

The agricultural economy of Santa Sub Division underwent significant transformation in the late twentieth century, particularly following the decline of coffee cultivation which had dominated the region since its introduction in the 1930s. For decades, Arabica coffee served as Santa's primary cash crop closely tied to colonial agricultural policies, cooperative marketing structures, and international commodity markets. However, by the 1980s, global price shocks, state withdrawal, and the failure of cooperative institutions triggered a severe collapse of the coffee economy. This collapse left thousands of smallholder farmers economically vulnerable and searching for alternative means of livelihood. Amid this crisis, market gardening began to take root as a viable economic substitute. While subsistence gardening had long been practiced on a small scale, its evolution into a commercial activity was new.

The decline of the coffee economy in Santa Sub Division during the 1980s marked a critical turning point in the region's agrarian history. In the wake of this collapse, farmers were compelled to explore alternative farming systems that could offer both economic viability and local autonomy. Market gardening emerged as a leading response to this crisis, driven by the need for short-cycle crops, flexible income opportunities, and food security. This paper explores the technics and developmental stages that underpinned the rise of market gardening in Santa. It examines how local farmers adopted new cultivation methods—ranging from land preparation, seed selection, and irrigation to pest control, harvesting, and distribution. These practices, often blending indigenous knowledge with modern inputs, reveal the depth of local innovation and the adaptive capacity of rural communities in postcolonial Cameroon. Understanding these stages is essential to grasping how market gardening evolved from a coping strategy into a dominant economic activity. It further underscores the role of farmer agency and technical transformation in shaping local development and resisting structural dependency.

1.1. Historical Context of Agricultural Change in Santa

The Santa Sub Division, located in the North West Region of Cameroon, was historically anchored in the cultivation of Arabica coffee a crop introduced in the early 1930s through cross-border migration and colonial experimentation.[1] Coffee rapidly became the region's economic backbone, shaping social

[1]George Bongoh, The Socio-Economic Impact of the Introduction of Coffee in Santa, 1930–1987 (MA Thesis, University of Yaounde I, 2000), 17.

structures, cooperative networks, and Santa's integration into global commodity chains. For several decades, the coffee economy thrived, supported by state marketing boards, international demand, and a relatively structured cooperative framework.[2]

However, the 1980s marked a turning point. A combination of global price collapses, Cameroon's economic crisis, and the liberalization of the agricultural sector under structural adjustment programs severely undermined the profitability and sustainability of coffee farming.[3] As government subsidies were withdrawn and cooperative institutions weakened by mismanagement and corruption, coffee farmers in Santa faced a crisis of survival. Many became disillusioned with a system that no longer offered economic security or local control.[4]

It was within this context of economic dislocation and institutional failure that market gardening emerged as an alternative pathway. Initially practiced as a marginal activity, it soon evolved into a central component of Santa's agricultural landscape.[5] Several factors facilitated this transition. The sub region's favorable climate, fertile volcanic soil, and available labor created the physical conditions necessary for diversified horticulture. Additionally, access to demonstration farms during the colonial and postcolonial periods had familiarized some farmers with alternative cultivation methods. Government policies promoting agricultural diversification in the early 2000s, though limited in direct support, created a discursive space that legitimized the shift. Over time, market gardening evolved from a survival strategy into a structured and technically informed economic practice, involving distinct stages of production, risk management, and market engagement. The transition was not abrupt, but rather a gradual process marked by trial and error, adaptation, and community-driven innovation. By the early 2000s, market gardening had outpaced coffee in terms of productivity, household income, and employment generation.[6]

The period from the 1980s to 2017 thus represents a critical era of agrarian transformation in Santa—one in which farmers shifted from dependence on a vulnerable export crop to a diversified, locally grounded system of production. This transformation was not merely economic but carried deep social and political implications, particularly in terms of gender roles, market agency, and the reassertion of indigenous control over agricultural cycles.[7] The practice of Market gardening in Santa was marked by a whole repertoire of methods and strategies selected according to the crops being grown and their cycle. These technics and strategies were linked to Land Preparation and Plot Management, Seed Selection and Crop Variety, Irrigation and Water Management Techniques, Pest and Disease Control Strategies, Harvesting Methods and Storage, Distribution Channels and Market Access and the Integration of Traditional Knowledge and Modern Inputs

1.2. Land Preparation and Plot Management

As far as land preparation was concerned, the inhabitants after falling down most of their coffee farms between 1985-1996, to experiment the gardening crops, they started by preparing the lands or farm plots for the new crops. This preparation process usually involved clearing the farm lands. The clearing was usually done by the men with a majority being the youths[8]. This labor was gotten from family children or solidarity schemes usually referred to as "*Njangie*". For those whose farmlands were large

[2]Kemgo Emmanuel, "The Coffee Economy in North West Province of Cameroon, 1923–1993" (PhD Thesis, University of Nigeria, 2007), 105–112.

[3]J. N. Aryee, "The Impact of the Structural Adjustment Program on the Agricultural Sector in Cameroon," Journal of Agricultural and Applied Economics 33, no. 2 (2001): 381–395.

[4] Emmanuel Kemgo, "Bamenda Coffee Farmers and the Unfulfilled Expectations of Unification, 1961–1971," Asian Journal of Social Sciences and Humanities 4, no. 1 (2015): 13–20.

[5]Marie-Claire Nwenwi Nyamzou, "Market Gardening and Its Socio-Economic Impacts in Santa Sub-Division, 1985–2010" (MA Thesis, University of Yaounde I, 2013), 21–27.

[6]Tabitha Azimbom (Manager of Santa Coffee Cooperative) in discussion with the authors, Santa, July 13, 2024; and Edwin Nchinda,(Market Gardener), in discussion with the authors, Santa, July 13, 2024.

[7]Milton Abawah Ndambi, "Agricultural kShows in Southern/West Cameroon: A Mechanism for Social Cohesion and Economic Development, 1952–1973," International Journal of History and Cultural Studies 8, no. 1 (2022): 35–36.

[8]Lesley Buma, (Market Gardener), in discussion with the authors, Santa, 11 June 2024.

enough, they equally employed labor[9]. In order for a socent analysis, discussing labor and sex distribution becomes imperative to the farming process in the sub division.

Labor before the advent of market gardening in Santa Sub Division was not clearly defined, but at list existed in a traditional pattern. This was because the labor force was based on family size. Agriculture was generally carried out by all the members of a particular family in the area, with some degree of division of labor[10]. This was because the labor force was based on family size. The number of hours put in farming was low. This was because local farmers were also engaged in other activities. Another reason for the low hours put in agriculture was the lack of agricultural tools. The household was seen as the most important economic unit to provide needed labor in the area prior to introduction of market gardening activities in the region.[11]

With the evolution of market gardening demand for labor was high. At this time, additional labor force was mobilized. The additional labor in the area was that of traditional farming groups formed within the villages. Farmers grouped themselves in self – help groups, working successively from one farm to the other[12]. A program was made on a day they work on an individual's farm. On that working day, the individual arranged for food and drinks. That was palm wine precisely for the group. The members of these self-help groups gave assistance only to members. Thus the attitude gave help to the weaker ones to survive as everybody could not put in the same quantity of labor[13]. In Santa Sub Division this system was and is still called *lenyeh* (to invite one to help)[14].

The women secret society known as *tekembeng*, became very instrumental in providing the labor force, regulates the activity and also contributed in the smooth running of the village[15]. They chased and confiscated stray animals during farming season. This labor force was usually readily available in the different communities of the sub division[16].

In order not to stress much on the issue of land preparation, it was revealed that, most of the farm lands were cleared on hired bases. Farmers preferred to contract a group of young males who could range from 2 to any number depending on the farm size and capability of the youths to deliver at short notice. Through the contract system, the farm was priced by any of the youths the farmer met, and when a fixed price was agreed upon, the young boys swung into action[17]. Claud Tamjong recounts how this activity was done when he stated that,

Clearing farm lands in Santa became a lucrative job for most of us the youths especially as it provided us the needed means to meet up with our basic needs. Usually, we bargained a farm and if it was big enough, you then inform your close friends with whom you are sure can work well and fast to. Those of us who were really good at clearing at a short noticed were widely known by farmers such that, even those who were just beginning or expanding into new farm lands got to us via any means possible. Maximum we could spend on a farm that was big enough was 4 to 5 days, while in some cases a day or two.[18]

Closely related to this was the fact that, for farms where the shrubs were not too tall or hard, the farmer preferred to hire a daily pay for his or her farm to be sprayed. The practice of hiring laborers became very famous in the sub region with an increasing number of youths both male and female engaging into such employment opportunities. By the year 2000, according to most of the informants, spots where these laborers were picking developed powerfully. Although a specific period when this phenomenon started could not be conveniently stated, a majority of the farmers interviewed indicated that before the

[9]Lesley Buma, (Market Gardener), in discussion with the authors, Santa, 11 June 2024.

[10]John Achiri, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.

[11]Thomas Ndi, (Market Gardener), in discussion with the authors, Santa , 3 September 2024

[12]Lilian Azimbom, (Market Gardener), in discussion with the authors, Akum, 14 June 2024.

[13]Michael Giti, (Market Gardener), in discussion with the authors, 11 June 2024.

[14]Victory Kemla, (Market Gardener), in discussion with the authors, 11 June 2024.

[15]Boniface Nchinda, (Market Gardener), in discussion with the authors, 11 June 2024.

[16]Boniface Nchinda, (Market Gardener), in discussion with the authors, 11 June 2024.

[17]Thomas Ndi, (Market Gardener), in discussion with the authors, Santa , 3 September 2024

[18]Claud Tamjong, (Trader), in discussion with the authors, Bamenda, 16 June 2024.

era of hiring laborers from a specific sport to work in the farms gained prominence, what had usually transpired was the fact that, farmers went from compound to compound to secure laborers. Individuals who were already involved in the activity were known prior to 2000s, with their payment either in cash or kind[19]. One Mr. Michael affirms this when he indicated that:

If a farmer needed laborers for his far, he usually indicated to a few friends who then inform others that might be interested. On that day, the met at the farmers compound or agreed venue and moved straight to the farm. At the end of the day, they were even paid 1500 CFA FRS or less depending on how the arrangement was made. It was not until the early 2000s that the sector of hiring laborers experienced mutations with some degree of increase in financial rewards to the laborers so much such that, I for the past 15 years of cultivating green vegetables frequently paid 2000-2500 CFA FRS per laborer for a day in my farm. A situation which was not the same at the time i grew up, for I do remember clearing different farm lands as a young boy with some close friends for not up to 5000 CFA FRS in 1988-1990[20].

A good example of such spots where labor was hired was seen in the mile 12 market square in Santa central town. A situation which was equally the same in Awing village square and Pinyin. Once recruited from the different sports where these laborers usually stand, they are taken to the farm by the owner for a daily pay ranging from 2000 CFA FRS to 2500 CFA FRS as per the time of the study. One Elvis Asongwi recounts how he between 2006-2014 as a secondary school boy participated in clearing farms and performing other task in different farms for a daily pay.

Figure 1. *A Spot where laborers gather every morning for farmers to select them*

Source: *Nguimkie C. et. al. Fieldwork (2025), Santa, Field Notebook.*

I was 16 years when I started working for different farmers in Santa, Pinyin and Awing. Most of my free days and holidays was spent hired as a laborer in Santa. We were recruited at mile 12 every morning before 7AM and taken to the farm. After a tedious day of work, we were returned home with a payment of about 2000 CFA when I started and eventually 2500 CFA by 2014[21].

This testimony was corroborated by many of our informants such as Lesley who equally recounted how he before 2010 had worked as a laborer for many farmers one of whom was the famous former Prime Minister Pa Simon Achu. He further expanded to state that majority of the farms he worked on became the reason he gathered experience and money and started his farms[22].

The second stage of the land preparation process was the tilling of the soil. For each market gardening activity, or better put for any successful agricultural adventure that required farming, the land was cleared or the grass sprayed, and upon completion, the farmer had to till the soil(simply put it as

[19]Lambert Nchinda, (Farmer) in discussion with the authors, Santa, 13 June 2024.

[20]Michael Giti, (Farmer) in discussion with the authors, 15 June 2024.

[21]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[22]Lesley Chi, (Market Gardener), in discussion with the authors, Santa, 14 July 2024.

softening the soil) before he or she could advance in carrying out the activity[23]. The tilling of the soil involved using the digging fork or hoes. Ploughing machines were also used by worthy gardeners. Tilling was done evenly or uniformly over the whole field to a depth of about 50 centimetre (cm). During the operation of tilling, tractors were used by some farmers to plough their fields[24].

The soil tilling was an extension part of land preparation. It should be noted here that, for highly mechanized agricultural ventures, the soils was tasted and the soil fertility ascertain as to which crop could better perform in the area. This soil tasting was not very common or did not exist for most part of the communities in the sub division[25]. This was because, for the farmers for the most part did not have the means to finance the process.

Figure 2. *Prepared Farm*

Source: *Nguimkie C. et. al. Fieldwork (2025), Santa, Field Notebook.*

Fortunately for the farmers, research made by the agricultural institutes in in the north west province in collaboration with the Ministry of Agriculture, and formal colonialist, had indicated that the region was very fertile for a variety of market gardening crops alongside serials and coffee[26]. This was due to the natural situation of the Santa sub division along the volcanic line of reaction with the top soils black alluvial and full of nutrients, for a divest agricultural activity.

Diving more into the technics of farming, it was revealed that, by 2005, there was the introduction of modern practices in agriculture even though the traditional agricultural practices like bush fallow remained. The introduction of gardening activity, the cultivation of potato and vegetables by the department of agriculture (MIDENO) gave a new direction in land use change[27]. Next in line was the introduction of animal traction by Adaptive Farming System based on Animal Traction (PAFSAT) whereby cows were trained to till the soil and their dung used as manure for the farms[28]. It was noted during this period that agricultural land use experienced a decrease due to an increase in settlement functions. It was not too long for Market gardening to gain grounds in new areas as a result of its short cycle which enable double cropping.[29]

The most improved type of agricultural techniques in the Sub Division was irrigation. This involved market gardening. This system of agriculture was practiced in Achou, pinyin, Mbeng, Ntarra, Mbei,

[23]Lesley Chi, (Market Gardener), in discussion with the authors, Santa, 14 July 2024.

[24]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[25]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[26]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[27]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[28]Richard Asongwa, (Agro-forester), in discussion with the authors, Ntamadam, 16 August 2024.

[29]Richard Asongwa, (Agro-forester), in discussion with the authors, Ntamadam, 16 August 2024.

Sosei, Njong, Meforbe just to name a few[30]. These areas had the highest population pressure on land. Irrigation was done with the use of watering canes, engine pumping, farmer controlling furrow irrigation and overhead sprinkler. Irrigation using watering can was more preferable to over-head irrigation[31]. The latter has a high potential of disease spread. This system of farming enabled people to produce crops independent of natural conditions like rainfall.[32]

Specifically, zike revealed that when the farm land was prepared either by clearing which was the most commonly used method, not until the late 1990s when herbicides became common for farmers to purchase and use in killing the shorts grass and shrubs[33]. The farm land was either tilled using hoes or spates. Upon completion, the farm was now prepared depending on the type of green vegetable to be grown on the farm land. Generally, for green vegetables like licks, celery, cabbage and carrot, the farm preparation had slight differences. Crops like celery were cultivated in ridges that were prepared at a distance of 15—20 meters length depending on the farm size. Note that the ridges were worked horizontally to avoid run off from rain washing the farm down[34].

Moreover, the process of ridge formation required that, a ridge was made about 1m apart from crest to crest. Holes of 15cm depth were opened on the ridge crest with a circumference of about 10cm and a planting distance of 30cm between plants. The holes were manure with organic manure mostly fowl dropping though other animal manure were used. The manure was mixed properly with soil in preparation to receive tubers in the case of Irish potatoes and other root crops, including celery[35].

It should be noted here that, not all crops required ridges, reason why it was revealed by the farmers that, the practice of tilling and forming ridges was not basically for all crops. They were crops that after spraying, or clearing, the grass or short shrubs were buried with soil for decomposition to take place. While in some cases, after tilling, the farmers went ahead to plant[36]. A good example of such crops that did not require formation of ridges was Beans and maize. For Irish potatoes. Although ridges were formed, they were scattered to cover the Irish seedlings placed in the foro. These ridges only saw the lamp light when the potatoes was mulched and fertilizers and paste control chemicals applied[37].

1.3. Seed Selection, preparation and Crop Variety

Market gardening nurseries were usually constructed by the gardeners. Site selection criteria were quite necessary in order to establish a nursery[38]. A constant water source was needed in maintaining a dry season nursery and a fence if there was possibility of free ranging animals in the area. To solve the problem of water source, some nurseries were constructed around the homes so as to ease watering. Nurseries were also established on farms to farms to avoid the demands and problems of transporting seedlings[39]. During the dry season, the nurseries were located within the same fence if there was room or nearby so as to ensure that when the garden was getting watered the nursery was to be looked after as well.[40]

Usually, several types of nurseries existed. With field studies, it was realized that the growers practically had two types of nurseries as seen on the picture. There were Open root bed or ground nurseries. This was the most practical type of nursery for leguminous plants and other fast growing species. This was preferable by most farmers especially during the dry season. They required less labor to build, cost

[30]Marie-Claire Nwenwi Nyamzou, "Market Gardening and its Socio-economic Impacts in Santa Sub Division 1985-2010," 55-67.

[31]Ibid.

[32] S. N. Asoh, "A Move from Traditional to a Modernized Economy: A case study of Akum North West Province of Cameroon 1969-2006" M. A. Dissertation in History, University Yaounde I. (2007). P. 72

[33]Chi Zike, (Farmer) in discussion with the authors, Santa 11 June 2024.

[34]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024

[35]John Achiri, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.

[36]John Achiri, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.

[37]John Achiri, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.

[38]John Achiri, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.

[39]Victory Kemla, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.

[40]Njeumpa Enock, (Gardener), in discussion with the authors, Santa, 23 August 2024.

much less, easier to out plant and seedlings much easier to transport. The width of the bed was not to exceed one meter so that weeding could be done from either side without having to step on the seedlings. The bed was to be at least 25cm high so that when out planting was done, the roots were not to be rip up from the soil below which may be a dense clay.[41]

Equally, there were Suspended nurseries. This type requires a lot of labor and materials like sticks, bamboos and nails. It was preferable during the rainy season. The idea was that, when a nursery was built off the ground, it was freed from many pests as one on the ground. With suspended nursery, the worries of the growers were reduced because according to Makem, 90% of the gardener's success or failure was from the nursery, then followed by cultivation and marketing. The garden was also freed from problems and pests like goats, sheep, cows, rats, snails and other critters. This would eliminate the need for building a fence but would still need a shade structure. During the dry season the nursery was watered depending on where it was established. In more humid zones, it was watered once or twice a day. If it was in a swamp or raffia bush, it was watered once every two days especially if it had a shade.[42]

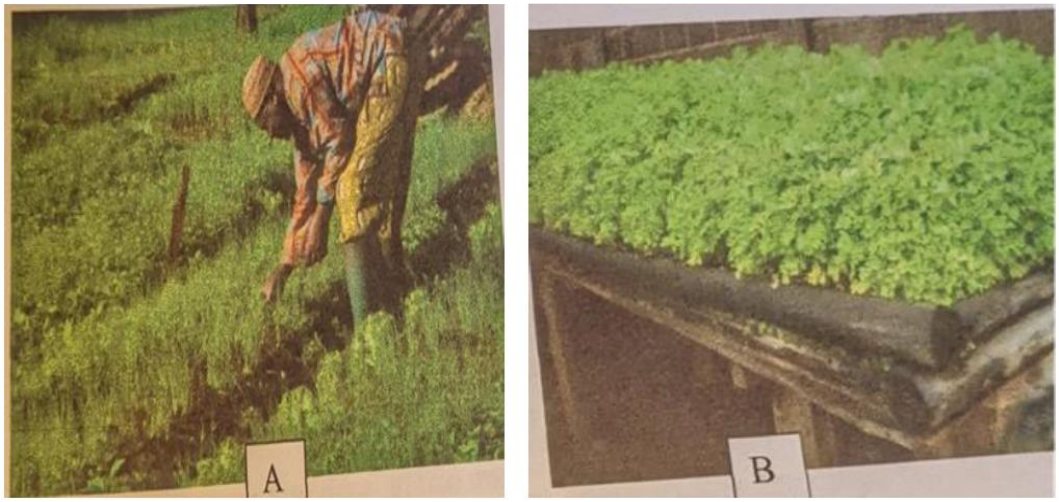

Figure 3. *The Two Types of Nurseries*

Source: *Nguimkie C. et. al. Fieldwork (2025), Santa, Field Notebook.*

Plate 3 (A) illustrates ground nursery which was one of the several nursery types involved at the early stage of market gardening. Here leeks were nursed directly on the ground in preparation for further transplanting. Plate 1 (B) represents a nursery that was suspended using a local wood table. As opposed to ground nursery, the suspended nursery avoided direct contact with the ground. Special soil types were gathered and mounted on the table before the crops were nursed on it.

The seedlings were always taken great care of as seen on plate 1 (A). Weeding was done at least once a week especially once seedlings started getting bigger and competing with each other. Weeding nursery beds was one of the hardest things experienced by gardeners[43]. This was because it was difficult to differentiate between newly germinated seedlings and weeds. In some cases, the seeds were sown on open root beds in lines. Here, it was easier to distinguish weeds from the actual young plants. Some of the farmers came to realized that, it was good to keep a good nursery records so as to know what to look for when things start to germinate[44]. It was necessary to treat the young seedlings against pests and diseases. Wood ash was usually sprayed on the seedlings as it was known to have fungicidal and insecticidal properties. Other chemicals like liquid fertilizers were also used. A dry season nursery was done around marshy areas so that the crops would have constant supply of water. This facilitated the continuous availability of market gardening crops even in the dry season[45].

[41]Njeumpa Enock, (Gardener), in discussion with the authors, Santa, 23 August 2024.

[42]Michel Makem, (Gardener), in discussion with the authors, Santa, 23 august 2024.

[43]Michel Makem, (Gardener), in discussion with the authors, Santa, 23 august 2024.

[44]Michel Makem, (Gardener), in discussion with the authors, Santa, 23 august 2024.

[45]Augustine Chi, (Market Gardener), in discussion with the authors Njong, 14 June 2024.

Figure 4. *Treatment of Spices against Pest and Diseases*

Source: *Collette's fieldwork, September 2024*

Transplanting the seedlings was another important milestone. Transplanting is the process of placing partially grown plants, rather than seed, into the garden. Many vegetable crops benefited from being transplanted rather than direct seeded into the soil. Transplanting makes weed control simpler, enhances the growth and quality of crops that prefer cool weather (such as cauliflower, huckleberries), and shortens the time of harvest of many fruit bearing crops such as peppers and tomatoes. Vegetables varied in their response to transplanting. Some were very difficult; other transplanted well only if proper precautions were followed[46]. Other transplanted very easily, for example cabbage, cauliflower, eggplant and leeks. Root crops like beet root, carrot and Irish potatoes were not transplanted. Potatoes seeds were nursed differently and carrot was nursed directly on the prepared bed. The growers ether purchased or grown transplants at home from seed[47]. The gardeners were provided with some unique advantages when they grow their own transplant such as increasing the availability of unusual varieties, reducing overall cost and controlling growth and the plants were planted at the size when they were ready. The Table below shows the period of nursing, and maturity. Transplanting without good experience was a challenge to some farmers. They find it difficult to take care especially in the nursery causing them to purchase from expects.[48]

Table 1. *Duration for Nursing*

Crop	Weeks to produce a transplant from seed	Maturity
Tomatoes	3 to 4 weeks	3 months
Onion	8 weeks	3 months
Carrot	Nursed directly on the ridges	3 months
Leeks	8 weeks	3 months
Parsley	8 weeks	3 months
Celery	8-10 weeks	3 months
Hot pepper	8-10 weeks	3 months
Sweet pepper	6-8 weeks	3 months
Beetroot	4 weeks	3 months
Cabbage	6 weeks	3 months
Cutmajo	7 weeks	3 months
Huckleberry	4 weeks	3 months
Potato	Nursery directly	3 months
Cauliflower	5-7 weeks	3 months
Garden egg	7 weeks	3 months

Source: *build by the researcher in collaboration with the farmers from the field*

[46]Augustine Chi, (Market Gardener), in discussion with the authors Njong, 14 June 2024.

[47]Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[48]Enock Njeumpa , (Gardener), in discussion with the authors, Santa, 23 August 2024.

The young seedlings were transferred from their nursery beds to their planting site into prepared holds. The soil was tilled and ridges made or mere tiling of ground surrounding foundations of houses was done by the gardeners of Santa sub division. Some manuring was done by spreading or spot manuring methods was applied[49]. The seedlings were watered before transplanting to bind soil to the root. Seedlings were usually removed singly although some gardeners removed many at a time, with a ball of earth and as far as possible damage to the root system was minimized. Transplanting was done after mulching to some depth. It was usually done under cool weather or preferably in the evenings. After transplanting, constant watering of the seedlings was done especially during the dry season. They used watering cans or other means of irrigation to water the plants. Very tender ones were lightly shaded to reduce excessive light intensity.[50]

Weeding was an essential practice after transplanting. The crops do not tolerate competition with weeds. During this period of growth, weeding was carried out on constant bases by laborers for healthy and quick growth. Weeding was also done by spraying with chemicals like herbicide to dry up the weeds. Weeding was done by the gardeners in Santa sub division as need arise. This was so because reduce yield and attract pests and disease.

1.4. Pest and Disease Control Strategies

Market gardening productivity was affected by the adverse effect of pest and diseases attack. The climate favored the prevalence of so many pests and disease. The principal pest and diseases affecting crops and animals in Santa sub division were as follows. Just to take example of few of the crops cultivated; Tomatoes have pests and these included modes, insects, caterpillars, grasshoppers, cutworms, and fruit-swarms. This was controlled by hand picking in the case of caterpillars and digging up crickets and using insecticides and pesticides. Other pests were fowls that may dig the roots or eat fruits. The prevention in Santa Sub Division was by building a fence for the tomatoes[51].

Common diseases included the following:

- Fusarium wilt: This was caused by fusarium orxysporium. This attacked the young seedling and caused it to wilt. Control was mainly by the use of resistant varieties.[52]
- Bacterial wilt: this was a disease which attacked salanaceous crops at almost all stages of their development causing a rapid wilting of leaves followed by the death of the whole plant. The disease was also associated with the presence of cutworms in the soil. These microscopic organisms damaged the roots and thereby provide entrance for the bacteria to attack the plant.[53]

Spraying or clusting has no controlling influence over the disease once the incidence of the disease has taken place. All infected plants were instead removed and burned to reduce spreading the disease. Tomatoes or any crop of the salanaceous group “pepper, garden egg or tomatoes” need not to grown on the infected soil for about five years[54].

In another perspective, Leaf spots and blights equally posed a serious thread and farmers adopted some approaches to fight it. These were wide spread during the rainy season and they were virus diseases. Spots of various sizes and colors occur on leaves, petiole and stem. The infection progresses upwards to younger leaves. To control, it was done through spraying the Dithane M-450 or coprantol or Bordeaux mixtures. Coprantol and Bordeaux mixtures needed to be used only on adult plants to avoid the poisoning effect of copper to the younger plants. The spraying was to be done very well and plants were watered and particularly only the ground was watered and care being taken to avoid water touching the leaves. Remains of the old

[49]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[50]Interview with Clement Wara, (Gardener), in discussion with the authors, Mbei, 9 Oct 2024.

[51]Interview with Clement Wara, (Gardener), in discussion with the authors, Mbei, 9 Oct 2024.

[52]Marie-Claire Nwemwi Nyamzou, “Market Gardening and its Socio-economic Impacts in Santa Sub division 1985-2010,” Masters Dissertation in History, University of Yaounde1, (2013), 58.

[53]J. A. Anaraban, “Agriculture in Ngo village (a comprehensive Geographical approach)” Diploma in Education (DIPCEG) in Geography, Bambili, (1985), p. 46.

[54]Ibid

infected plants were collected and burned and if infection was severe, adequate crop rotation was practiced whereby salanaceous crops appear at reasonable intervals.[55]

In all, after planting, the next step was to follow up closely how they germinate. Where there were congested, the farmer ensured that a reduction approach was adopted and the seedlings observed not to do well taken off. Herbicides were then applied in the farm to control blight or as a convenient way of removing grass. Except for carrot, that this technic was largely made use of, the farmer employed workers for a daily pay system to weed off the grass and mulched the farm. In the process of mulching, manure was equally applied, and fertilizers followed some few weeks afterwards. The purpose for this manure and fertilizer was to boast growth. The farmer remained watchful of his or her farm and applied herbicides and blight control chemicals to ensure good yields and performance of the crops[56]. Note here that a majority of the farmers practiced segmented farming methods where different crops were cultivated in different portions of the farm, except for tomatoes and carrot that for most cases were done on a single farm.

Figure 5. *Garden crops after planting and treating*

Source: *Nguimkie C. et. al. Fieldwork (2025), Santa, Field Notebook.*

It should be recalled that, with respect to Irish potatoes, the cultivation was usually done in a large farm land with just a single Irish potatoes seed cultivated. As the main agricultural activity that brought income to the farmers, it was observed that, almost all the farmers interviewed had a potatoes farm. The majority of these farms were observed to be concentrated in Pinyin with their cooperative in Santa central town around Petrol station in mile 13. The farmers revealed that, their seeds were obtained either from Dschang, while a farmer group known as United Agro Factoral Farming Group was known for the importation of the best quality seeds from Holland. The seed imported was called Palamela. Pa James Ntemfack recounts how he through this group had imported his Irish potatoes seeds through this Common Initiative Group (CIG). He furthered explained why he preferred importing and multiplying his seeds right at Bafang because to him the area was very fertile and virgin land. This permits for a smooth multiplication process. While MR. Edwin Achiri stated how he assisted farmers with seeds and even multiplied it for a good number of farmers. By the year 2013, he was already into seed multiplication alongside Pa Clement Wara[57].

2. HARVESTING METHODS AND STORAGE

Market gardening crops were planted and harvested three times a year depending on duration of crops. The crops were grown using comparative treatment such as manure, chemical fertilizers, insecticides and fungicides. Farmers confirmed that, Irish potatoes and market gardening crops like vegetables and fruits yielded rapid income than the coffee which was harvested once a year... this was easier due to the intense use of chemicals. The type of chemical fertilizer used by the farmers was Nitrogen Phosphorus Potassium (N. P. K) 20:10:10[58]. It was applied to many crops except huckleberry. 20:10:10 promotes

[55]H. P., White and Gleave M. B Economic Geography of West Africa p. 106.

[56]Hans Che, (Market Gardener), in discussion with the authors, Bamendakwe, 13 June 2024.

[57]Edwin Achiri, (Potatoes Farmer), in discussion with the authors, Santa, 13 July 2024.

[58]Edwin Achiri, (Potatoes Farmer), in discussion with the authors, Santa, 13 July 2024.

the formation of plant roots, flows and was resistant to fungal diseases. It gives rise to green leaves. Other fertilizers are UREE, Yara mila, Yara liver Ammonium sulphate, macosam and Potassium.[59]

Harvesting of most market gardening crops was done after three months. It was done by both women and men the latter being the majority. Transportation was done mostly with baskets, buckets, basins, to minimize bruises. Tomatoes fruits were ready for harvesting from three to four months after planting. Harvesting was when they were half ripe and change their color from greenish to reddish or reddish yellow[60]. Harvesting of tuber crops like potatoes, carrot and beetroot was done by digging them out carefully from the soil, while avoiding bruises as depicted in picture 6 below. The seeds and the ware potatoes were differentiated during harvesting and were transported differently. The seeds of Irish potatoes were treated different from those of vegetables. The ware potatoes were stored in dry places, spread and covered with jute bags or wood shave or dry leaves. The seeds were spread on dry floors, kept on counters or in baskets under diffused light[61]. In case where there was a dark room then there was no need of covering the ware potatoes.[62]

Figure 6. *Harvesting of Irish Potatoes*

Source: *Nguimkie C. et. al. Fieldwork (2025), Santa, Field Notebook.*

The producers used lantana and cypress to place them on the tubers during storage to avoid moth, whose larvae was a treat to stored Irish potatoes. The farmers also used some chemicals to spray on the crops before storage. High production was during the rainy season. The highly cultivated variety of Irish potatoes in the sub division was the CIPIRA which was blight resistant and high yield. Another specie of Irish potato that was also cultivated in the area was "*Nkara*". The "*nkara* was to be completely cold during preservation.

In the sub division, vegetable was harvested with the use of a knife or blade. This method which was commonly traditional was tedious and often inefficient. Harvesting was done from the 4-6th weeks after transplanting, when stems were cut to about 15cm from the ground. This was to allow new shoots to develop. Picking at roughly 7-14days intervals allow three to four harvests for each plant.[63]

During the process of preparing the farm, growing and harvesting the crop, the farmers engage laborers most of whom from a cross section of those interviewed, were women[64]. The majority of women laborers as well as farmers were identified dominant in practicing market gardening. It was done using hoes, cutlass, spates, watering cans exceptionally for irrigation technic, herbicides, buckets amongst other tools. The purpose of tilling the soil was to ensure that especially for virgin lands, the soil should

[59]Edwin Achiri, (Potatoes Farmer), in discussion with the authors, Santa, 13 July 2024.

[60]Margaree Lum, (Retired Farmer), Nkwen, 13 August 2024.

[61]Elvis Asongwi Ngunyi, (Teacher and farmer), in discussion with the authors, Pinyin, 11 May 2024.

[62]Augustine Chi, (Farmer), in discussion with the authors, Njong 12 September 2024.

[63]Constance Awah, (Farmer), in discussion with the authors, Matazem, 5 August 2024.

[64]Constance Awah, (Farmer), in discussion with the authors, Matazem, 5 August 2024.

be soft enough to ease forming of ridges. For cases where a farmer carried out mechanized farming, a tractor was utilized in tilling the soils, form ridges and planting done manually. Though the practice of using tractors was not very common as of 2015, it was identified as the most advanced method of machine farming. It remained an important stage in the farming process as this gave way for the farmers to mount their ridges according to the crop to be cultivated, monitored and harvested[65]. When discussing market gardening practices in Santa, there is no specific area or village to be completely glorified for this activity, as all the crops were cultivated in the different villages that constituted the sub division. The only difference was in the quantity dominant crop that prevailed in a particular area. This was due to the difference which existed as a consequence of variety in climatic and soil conditions. Generally, market gardening especially green vegetables, Crops tended to have heavier yields in Pinyin, Mbei, Santa center and Njong.[66] The volcanic soils around mount Lefo and Lake Awing which harbored villages like Awing and Njoung

2.1. Distribution Channels and Marketing Access

The expansion of market gardening in Santa Sub Division from the 1990s onward was closely linked to the development of informal but effective distribution networks and improved access to regional markets. Unlike coffee, which depended on cooperative societies and central buying posts, vegetables required more flexible and frequent transportation due to their perishable nature.[67] This shift brought about fundamental changes in how agricultural goods were marketed and sold. Most farmers relied on a combination of local, regional, and interurban markets to dispose of their produce. The Santa Market, held every Saturday, became a key point for bulk transactions, attracting middlemen (locally known as buyam-sellams), restaurant suppliers, and urban traders from Bamenda, Bafoussam, and even Douala.2[68] From Santa, produce was loaded into pickup trucks or lorries and transported along the Bamenda–Bafoussam–Douala corridor, leveraging Santa's proximity to major roads and urban centers.[69] This strategic location significantly reduced spoilage and increased the frequency of market contact.

In addition to physical markets, some farmers developed direct sales relationships with restaurants, schools, hotels, and private buyers.[70] A few larger producers in villages like Akum and Mbei even entered informal supply contracts, ensuring steady income and reducing reliance on fluctuating market prices. Informal groupings of women traders also emerged, organizing rotational selling days and transport pooling to minimize costs and time.[71] Marketing strategies were adapted based on seasonality and consumer demand. Farmers became adept at staggering their planting schedules to align with high-price periods (e.g., festive seasons or school reopening dates)[72]. Vegetables such as cabbage, carrots, and green spices had relatively high turnover and were cultivated with a keen eye on market trends.

Despite these innovations, challenges persisted. Poor road conditions during the rainy season, price fluctuations, and post-harvest losses due to lack of cold storage remained significant concerns.[73] However, the flexible and decentralized nature of market gardening allowed farmers to respond more quickly to market signals than they could under the rigid coffee marketing board system. In essence, Santa's farmers shifted from a state-controlled marketing structure to a market-driven, farmer-led distribution system. This adaptation reflected both necessity and ingenuity, reinforcing the autonomy and resilience of local agricultural actors in the post-coffee

[65]John Achiri, (Market Gardener), in discussion with the authors, Santa, 10 June 2024.
[66]George Wanki, (Retired Gardener), in discussion with the authors, Santa, 17 August 2024.
[67]Emmanuel Kemgo, The Coffee Economy in North West Province of Cameroon, 1923–1993 (PhD Thesis, University of Nigeria, 2007), 187.
[68]Marie-Claire Nwenwi Nyamzou, Market Gardening and Its Socio-Economic Impacts in Santa Sub-Division, 1985–2010 (MA Thesis, University of Yaounde I, 2013), 34–36.
[69]Santa Sub-Divisional Council, Santa Council Monographic Study (2005).
[70]Tabitha Azimbom (Manager of Santa Coffee Cooperative) in discussion with the authors, Santa, July 13, 2024.
[71] Lum Caroline, (Trader and Market Gardener), in discussion with the authors, Santa Market, September 26, 2024.
[72]Edwin Nchinda,(Market Gardener), in discussion with the authors, Santa, July 13, 2024.
[73]J. N. Aryee, "The Impact of the Structural Adjustment Program on the Agricultural Sector in Cameroon," Journal of Agricultural and Applied Economics 33, no. 2 (2001): 389.

2.2. Integration of Traditional Knowledge and Modern Inputs

One of the defining features of market gardening in Santa Sub Division is its hybrid character—a dynamic integration of indigenous farming knowledge with selectively adopted modern agricultural inputs. This integration was not merely a technical shift but a deeply historical process rooted in trial, adaptation, and generational memory. Traditionally, Santa farmers relied on organic compost, animal manure, intercropping techniques, and indigenous pest repellents such as ash and herbs to sustain soil fertility and protect crops.[74] These methods were passed down through community experience and oral tradition, reflecting a nuanced understanding of the local ecosystem. For example, farmers knew which crop combinations best repelled pests, which native plants deterred fungal attacks, and how to use planting calendars aligned with seasonal cycles.[75] As market gardening intensified in the 1990s and 2000s, many of these practices were retained but also modified or supplemented with modern inputs. Farmers increasingly adopted chemical fertilizers (such as NPK), hybrid seeds, and synthetic pesticides, particularly for cabbage, tomatoes, and carrots, which require disease control and high yields for market competitiveness.[76] Rather than replacing traditional techniques, modern tools were often layered onto existing knowledge systems, creating a locally tailored form of agricultural innovation.

This process was largely informal and community-led. In the absence of consistent extension services, farmers observed one another's practices, shared success stories, and experimented with varying combinations of inputs and techniques.[77] Demonstration effects—where one farmer's success with a technique prompted others to adopt it—played a key role in disseminating innovations. Younger farmers, often more literate and mobile, acted as intermediaries between agro-dealer advice and older farmers' experiential wisdom.[78] Additionally, access to markets influenced technical decisions. Because market gardening involved perishable crops, farmers had to adapt planting and harvesting cycles to align with weekly market days in Santa, Bamenda, and Bafoussam.[79] This required careful calculation of input quantities, harvest timing, and post-harvest handling—all of which evolved into forms of indigenous planning and record-keeping.

Crucially, this integration was not driven by external imposition, but by necessity and local initiative. In blending tradition with modernity, Santa's farmers crafted a resilient agricultural model that responded not only to ecological conditions but also to market pressures and socio-economic change. This adaptive hybridity challenges linear models of agricultural modernization and underscores the importance of context-specific, historically informed farming systems.

3. CONCLUSION

The development of market gardening in Santa Sub Division following the decline of the coffee economy reflects a significant historical shift in local agricultural practice. What began as a coping mechanism evolved into a technically sophisticated and economically viable farming system. The various stages involved—ranging from land preparation and seed selection to irrigation, pest management, harvesting, and marketing—demonstrate the ingenuity of local farmers and their ability to integrate traditional knowledge with modern techniques.

This transformation did more than diversify production; it restructured rural livelihoods, empowered marginalized groups—particularly women—and expanded the local economy's autonomy from volatile international markets. The systematic adoption of market gardening technics reveals a form of rural resilience that challenges common narratives of dependency and underdevelopment in postcolonial Africa. Ultimately, the Santa experience underscores the importance of recognizing and supporting

[74]Marie-Claire Nwenwi Nyamzou, Market Gardening and Its Socio-Economic Impacts in Santa Sub-Division, 1985–2010 (MA Thesis, University of Yaounde I, 2013), 27.

[75]Elizabeth Nforchu, (Retired Farmer), in discussion with the authors, Santa, July 13, 2024.

[76]George Bongoh, The Socio-Economic Impact of the Introduction of Coffee in Santa, 1930–1987 (MA Thesis, University of Yaounde I, 2000), 34.

[77]Edwin Nchinda,(Market Gardener), in discussion with the authors, Santa, July 13, 2024.

[78]Field notes from community agricultural meeting, Upper Mbei Village, September 2023.

[79]Tem, Protus Mbeum, "Native Authorities and Agricultural Diversification in Bamenda Province: British Southern Cameroon after World War II," World Wide Journal of Multidisciplinary Research and Development (2019): 5

grassroots innovation in agricultural policy and historical analysis. The technics and stages of market gardening serve not only as a model of adaptation but also as a testament to the capacity of local actors to drive economic and social change from below.

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Citation: *Collette Nguimkie Ngweka et al. "Technological Hybridization and Economic Resilience in the Horticultural Sector of Santa (Cameroon),1980-2017". International Journal of History and Cultural Studies (IJHCS). vol 11, no. 1, 2025, pp. 37-50. DOI: https://doi.org/10.20431/2454-7654.1101005.*