

Factors, Ecological Preferences, Varieties and Tomato Production Techniques in the Plateau Department of Benin

Cossi Guy Wokou

Department of Geography and Spatial Planning (University of Abomey-Calavi), Pierre Pagney Laboratory "Climate, Water, Ecosystems and Development" (LACEEDE), Abomey-Calavi, Benin
Email: segla1645@gmail.com

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Abstract

This study aims to analyze the factors, ecological preferences, varieties, and techniques of tomato production in the Plateau Department of Benin. The methodology focused on the data used, its collection, processing, and analysis of the results. The methodological approach relies on the use of climatological, pedological, and socioeconomic data, supplemented by direct observations and field surveys conducted with 164 farming households distributed across the five communes of the Plateau Department. Among these households, 128 practicing tomato production constituted the subsample selected for the analysis of ecological preferences, cultivated varieties, and production techniques. The results show that the Plateau Department benefits from a Sudanian-Guinean climate with two rainy seasons and annual rainfall ranging from 800 to 1400 mm, allowing for two tomato growing seasons per year. Ferrallitic, hydromorphic, and ferruginous soils, as well as vertisols, are favorable to tomato production, while waterways and plains facilitate off-season market gardening. Agriculture involves more than 90% of households, thus providing a significant workforce and a potentially crucial market for tomato production. Finally, 92% of respondents use the local Akikon variety, while ridging is considered essential by 89% of producers and clearing land before planting by 87%.

Keywords

Plateau Department, Agricultural Production, Ecological Factors and Preferences

1. Introduction

Economic growth in developed countries is closely linked to the identification of

priority sectors for socio-economic development [1]. Agriculture is inherently risky, and this is true worldwide [2]. In both developing and developed countries, family farming is the main form of agriculture in the food production sector [3]. The agricultural sector, a pillar of the Beninese economy, employs 80% of the active population and contributes 40% to the gross domestic product [4].

Market gardening is a priority for improving nutritional balance and increasing producers' incomes [5]. Tomatoes, like all vegetable crops, require significant amounts of water [6]. Among vegetable products, tomatoes are the most consumed and serve as a condiment in daily diets based on cereals and tubers [7]. Tomato cultivation, like the agricultural sector as a whole, is characterized by its dependence on climatic conditions and limited access to certain inputs, resulting in low yields [8].

In Benin, tomatoes are cultivated in various regions of the country [9] and occupy an important place among vegetable crops, both for food and economic purposes [10]. Despite this importance, their production remains subject to several constraints, including variable rainfall, high temperatures, difficulties in water supply, and pressure from diseases and pests, which can affect yields [11]. Water and soil, essential resources for production, are currently experiencing quantitative and qualitative decline [12].

In the Plateau department, soil types and climate are suitable for tomato production. The main adaptation strategies implemented by producers [13] include water and soil conservation techniques, changes in planting dates, irrigation systems, adoption of improved crop varieties, agroforestry, intensive use of fertilizers and investment in better land management practices.

The Plateau department is located in southeastern Benin, between 6°20' and 7°40' north latitude and between 2°20' and 2°46' east longitude. It comprises five communes (Kétou, Pobè, Adja- Ouèrè, Sakété, and Ifangni). It covers an area of 3264 km², representing approximately 3% of the national territory [14]. It is bordered to the north by the Collines department, to the east by the Federal Republic of Nigeria, to the west by the Zou department, and to the south by the Ouémé department (Figure 1).

2. Methodology

2.1. Data Used

- The climatological (precipitation, temperatures, etc.) and potential evapotranspiration (decadal and monthly) data used in this study cover the period 1992 - 2024 and come from the synoptic station of Pobè . They were collected at the National Meteorological Directorate (DMN) of Météo-Bénin.
- Spatial data relating to land use: map of the plateau at a scale of 1/50,000, techniques for acquiring, processing, analyzing and interpreting images obtained by specialized satellites.
- Qualitative information from socio-anthropological surveys has made it possible to identify the factors, ecological preferences, varieties and production techniques associated with tomato cultivation in the Plateau department.

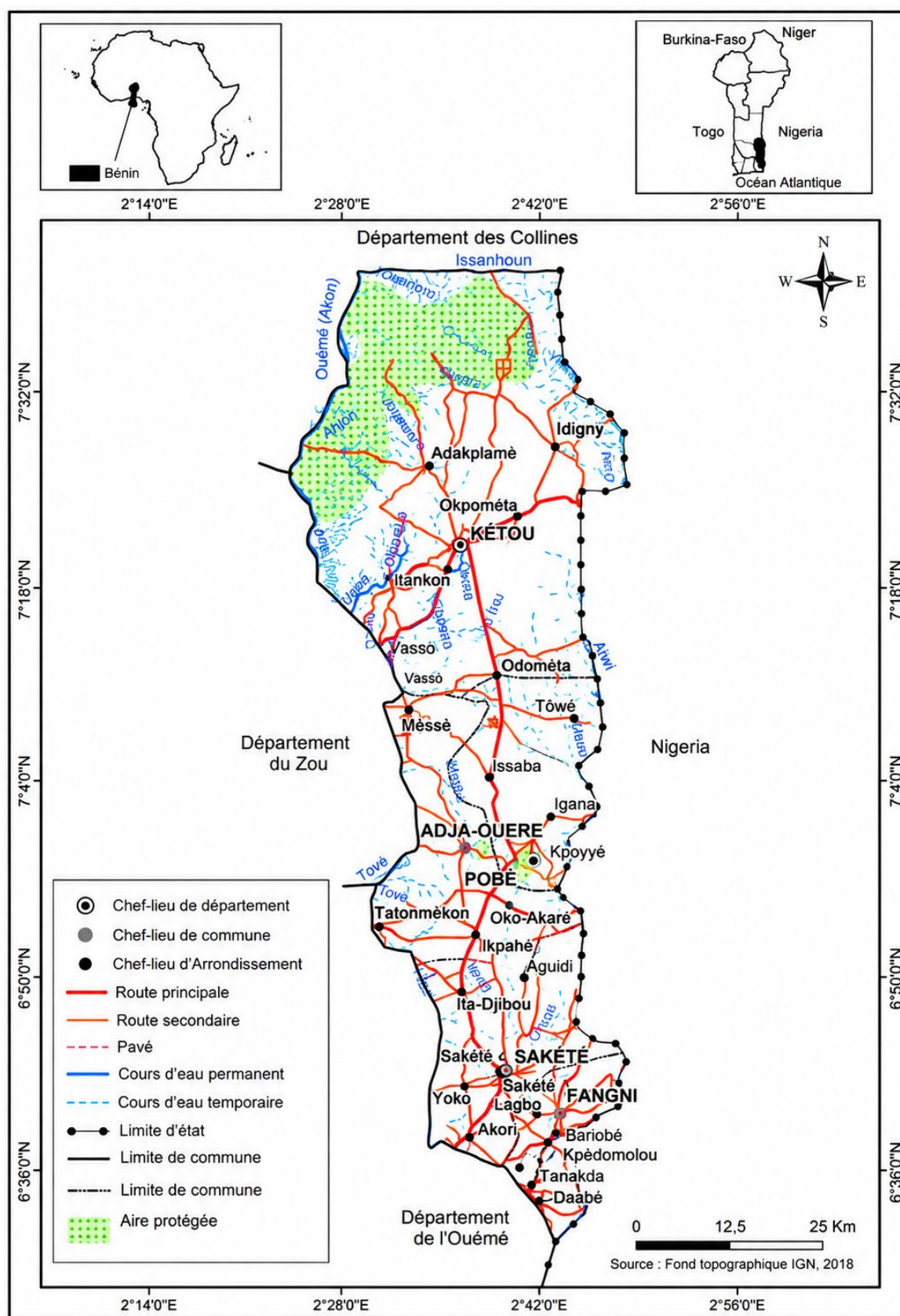


Figure 1. Geographical and administrative situation of the Plateau department.

2.2. Materials, Tools and Data Collection Techniques

➤ Collection equipment

The equipment used included a digital camera, a GPS (global positioning system), and a laptop for internet research. This equipment was used respectively to photograph the different types of plants and to georeference them accurately.

Location, soil and relief, land suitability, and hydrographic maps were obtained from the general base map of the Plateau department and a SPOT image. Mapping instruments such as Rotring pens, tracing letters, and circular templates were used.

➤ Data collection technique

A literature review was conducted in research centers, services, and institutions whose activities are related to the subject of this study. More specifically:

- The Laboratory for the Study of Climates, Water Resources and Ecosystem Dynamics (LECEEDE), the Faculty of Arts and Humanities (FASHS) and the University's Central Library;
- The National Institute of Statistics and Demography (INStAD);
- The Ministry of Agriculture, Livestock and Fisheries (MAEP) and the Territorial Agency for Agricultural Development (ATDA 6).

➤ Data collection tools

Several tools were used to collect data in the field.

- Questionnaires were administered to farming households primarily to assess their knowledge and practices regarding production techniques;
- A guide for group interviews (discussion groups) was used to collect qualitative data to complement observations and individual interviews, and also to identify the most appropriate communication channels in each village or district;
- An observation guide was used to assess field conditions during the different phases of agricultural production.

2.3. Field Surveys

The study was conducted in the Plateau department. The population studied consisted of agricultural producers and households. The villages studied belonged to the Yoruba and Nago ethnic groups.

➤ Sampling

The sample consisted of municipalities in the Plateau department. These municipalities were selected in a targeted manner, taking into account selection criteria, the degree of degradation, the importance given to agricultural production and the existence or absence of conflicts.

The study sample consists of 164 farming households distributed across the five communes of the Plateau department, namely Kétou, Adja- Ouèrè, Sakété, Pobè and Ifangni. Among these households, 128 cultivate tomatoes and constitute the specific sub-sample selected for the analysis of factors associated with this production, ecological preferences, cultivated varieties and farming practices.

The primary unit of analysis is the agricultural household, represented by a respondent with sufficient knowledge of production activities. For analyses specifi-

cally focused on tomatoes, the unit of analysis corresponds to the tomato-producing household.

The proportions relating to cultivated varieties, soil preparation techniques, and production practices are calculated based on the 128 tomato-producing households. The analyses concerning the general characteristics of farming households, however, are based on the overall sample of 164 households.

The farmers interviewed were selected according to the following criteria:

- be at least thirty (30) years old and have practiced agriculture for at least ten years;
- having lived in the locality for at least the last fifteen years.

The sampling covered the five communes in the study area. Within each commune, two villages were selected. The communes were chosen based on their agricultural production capacity. Thus, Kétou, Adja- Ouèrè, and Sakété have high production capacity, while Pobè and Ifangni have low agricultural production. The surveys were conducted from August 11 to 27, 2025. **Table 1** below shows the distribution of respondents by socio-professional category.

Table 1. Distribution of surveyed agricultural households according to the municipalities of the Plateau department.

Municipalities	Number of agricultural households	Households surveyed	Sampling rate (%)
Ketou	204	42	20.59
Adja- Ouèrè	208	43	20.67
Sake	219	44	20.09
Pobè	89	17	19.10
Ifangni	92	18	19.57
Total	812	164	20.20

Source: Survey data, August 2025.

Table 1 presents the distribution of surveyed agricultural households across the five communes of the Plateau department. Out of a target population of 812 agricultural households, 164 were surveyed, representing an overall sampling rate of 20.20%. The municipal distribution shows that sampling rates vary from 19.10% in Pobè to 20.67% in Adja- Ouèrè, reflecting proportionally similar coverage across the communes. In terms of the number of households surveyed, the communes of Sakété (44 households), Adja- Ouèrè (43 households), and Kétou (42 households) have the highest concentrations, compared to 18 in Ifangni and 17 in Pobè. This distribution provides observations from all five studied communes, while also taking into account their respective proportions within the target population.

2.4. Data Processing and Analysis Methods

2.4.1. Computerized Method

The data collected for this study underwent descriptive statistical processing and thematic analysis, depending on their nature and the research objectives. Infor-

mation collected from farming households using the KoboCollect application was verified, coded, and organized into a database before being used.

Climatological data, particularly rainfall and temperature records from the Pobè synoptic station over the period 1992 - 2024, were used to characterize the climatic conditions of the Plateau department. Their analysis allowed for the representation of monthly variations in climatic parameters and the assessment of their seasonal evolution in relation to the ecological requirements of tomato cultivation.

All of these treatments made it possible to link the environmental characteristics of the Plateau department with the farming practices and perceptions expressed by tomato producers.

2.4.2. Method for Identifying and Analyzing Factors Associated with Tomato Production

The identification and analysis of factors associated with tomato production in the Plateau department are based on a descriptive approach combining survey data from producers, direct field observations, and available biophysical information. This approach made it possible to distinguish two main categories of factors likely to influence production conditions: natural factors and human factors.

The natural factors analyzed include climatic characteristics, notably rainfall and temperature, soil properties, water resource availability, topography, and the characteristics of the hydrographic network. Their examination was based on climatological data from the Pobè synoptic station, cartographic documents, and observations made in the various municipalities studied. The analysis consisted of characterizing the environmental conditions of the area and comparing them to the ecological requirements of tomato cultivation, particularly with regard to temperature, water availability, and soil drainage.

Human factors were assessed through the characteristics of farming households, labor availability, tomato varieties cultivated, and techniques for soil preparation, nursery establishment, transplanting, maintenance, and harvesting. The information gathered allowed for a description of dominant farming practices and the identification of those most frequently reported by producers.

The quantitative analysis was primarily based on calculating the absolute and relative frequencies of the responses obtained. For each variable studied, the relative frequency was determined using the following formula:

$$F_i = (n_i / N) \times 100$$

With: F_i : relative frequency of the modality or practice considered, expressed as a percentage; n_i : number of respondents who declared the modality or practice considered and N : total number of respondents who provided a valid answer to the question in question.

The denominator used corresponds to 164 households for analyses covering the entire agricultural sample and to 128 tomato-producing households for analyses specific to this crop, when all responses are usable.

Quantitative data were supplemented by a qualitative analysis of field observations and information gathered during interviews. Combining these different sources made it possible to compare the perceptions and practices reported by producers with the environmental characteristics observed in the Plateau department.

This descriptive approach aims to highlight the main environmental and human factors associated with tomato production in the study area. It also allows for an assessment of the ecological conditions and cultivation practices likely to promote or limit this production, without establishing direct causal relationships between the variables studied.

3. Results

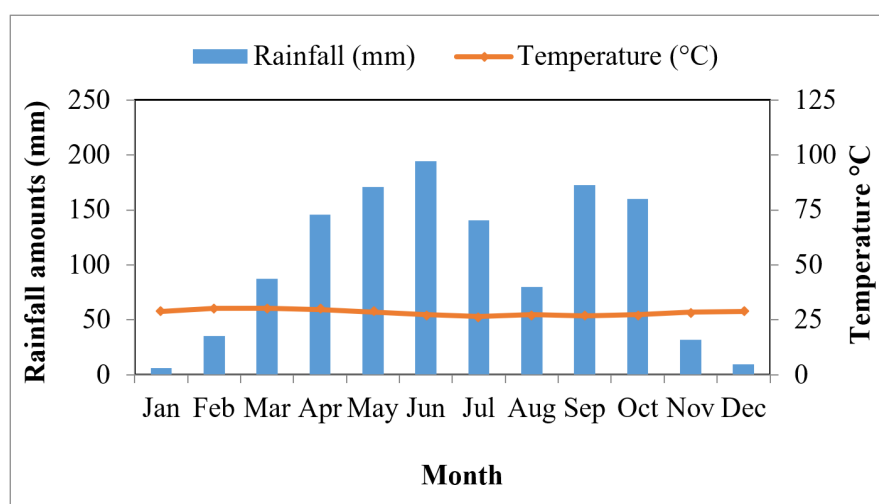
3.1. Natural Factors in the Plateau Department

The biophysical factors favorable to tomato production in the Plateau department are linked to climatic conditions, the hydrographic network and soil characteristics.

3.1.1. Climatic Characteristics

The Plateau department is characterized by a Sudano-Guinean climate with a bimodal rainfall pattern, with annual precipitation ranging from 800 to 1200 mm in its western part and from 1000 to 1400 mm in its eastern part. The vegetative growth period is less than 240 days in the west and reaches approximately 240 days in the east of the department [15]. This climatic regime is distinguished by two rainy seasons, which can offer different periods for tomato cultivation. However, the existence of two rainy seasons does not systematically guarantee two production cycles, as this also depends on the distribution of rainfall, temperatures, water availability, and drainage conditions of the plots.

Figure 2 shows the monthly evolution of rainfall and temperatures recorded at the synoptic station of Pobè over the period 1992 - 2024.



Source: Météo-Bénin/Station Pobè, 2026.

Figure 2. Ombrothermic diagram of the Plateau department.

Analysis of **Figure 2** highlights a main rainy season extending generally from March to July, with peak rainfall in June (190.18 mm). A decrease in rainfall is observed in August, before a resumption of rain in September and October, with values reaching approximately 150 mm. The dry season, which extends mainly from November to February, is characterized by relatively low rainfall.

These seasonal variations are an important factor in determining the tomato growing calendar. This crop requires sufficient and relatively consistent water availability during the vegetative growth, flowering, and fruiting phases. Water deficits can compromise plant development, while excessive rainfall, particularly on poorly drained soils, promotes waterlogging and can increase the risk of disease.

Furthermore, the temperature requirements of tomatoes must be taken into account. The optimal temperatures indicated in Table II are generally between 20 and 24°C for seedling growth and fruit set. The temperatures observed in the Plateau department can therefore be a constraint for certain varieties or developmental stages, particularly when temperature conditions exceed the optimal ranges.

Thus, the bimodal rainfall pattern of the Plateau department offers the possibility of planning two tomato production campaigns per year. However, their success remains contingent upon adapting the cultivation calendar, choosing appropriate varieties, managing water resources, and addressing the specific soil and climate constraints of the cultivated plots.

3.1.2. Agricultural Aptitude

The Plateau department boasts a diversity of soils, including ferrallitic, ferruginous, and hydromorphic soils, which are favorable to certain agricultural activities. However, sparse vegetation cover and soil vulnerability to erosion constitute major natural constraints. The agricultural potential was therefore analyzed in relation to the department's geomorphological, pedological, and hydrological advantages. **Figure 3** presents the pedological characteristics of the study area.

Analysis of **Figure 3** highlights the soil diversity in the Plateau department, characterized in particular by the presence of ferrallitic, ferruginous, hydromorphic, and vertisol soils. This diversity represents potential for the development of agricultural activities, but the suitability of these soils for tomato production varies according to their physical properties, fertility, and drainage conditions.

Ferrallitic and ferruginous soils can be used for tomato cultivation when their structure, usable depth, and fertility allow for satisfactory root system development. However, their cultivation may require appropriate practices for managing organic matter, conserving moisture, and limiting erosion.

Hydromorphic soils, frequently associated with low-lying areas and depressions, offer potential for vegetable production due to their proximity to water resources. However, their suitability for tomato cultivation remains contingent upon controlling excess moisture and preventing prolonged waterlogging. Insufficient drainage can reduce soil aeration, disrupt root development, and promote certain diseases. Similarly, vertisols, characterized by a high clay content, can present challenges related to their permeability and water retention.

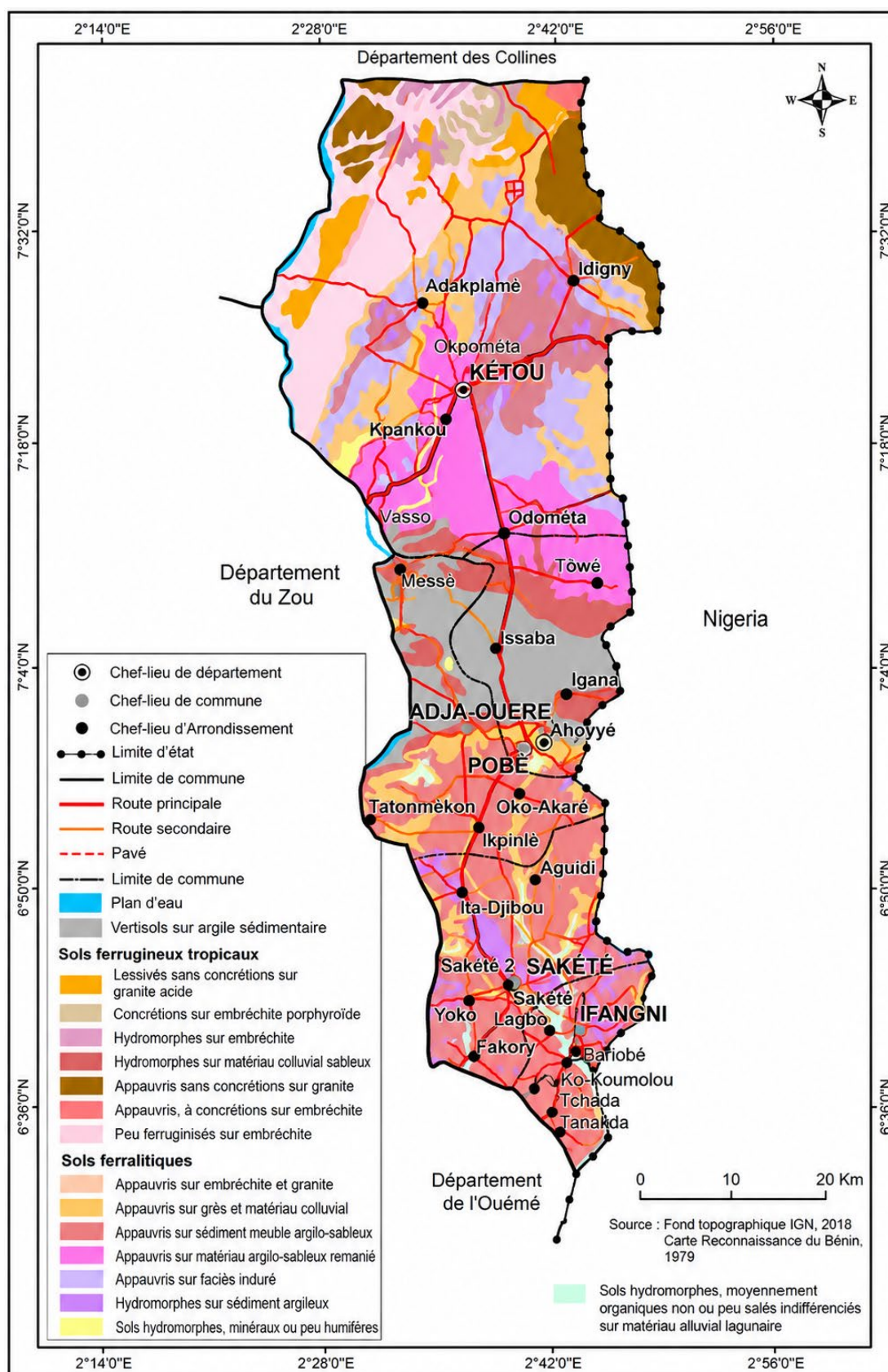


Figure 3. Soil characteristics.

Therefore, the presence of these different soil types does not allow us to conclude that there is uniform agricultural suitability across the entire department. Tomato production potential depends on the specific characteristics of each soil unit and the management practices implemented, particularly ridging, water management, and improved drainage.

3.1.3. Hydrographic Network

The Plateau department's hydrographic network consists of major watercourses that supply water reservoirs for agriculture. Field data (August 2025) show that the study area is crossed by rivers, which explains the presence of ponds and alluvial plains, valuable assets for market gardening, particularly during the off-season. This hydrographic network also transports the organic matter necessary for soil fertility.

Figure 4 shows the hydrographic network of the Plateau department.

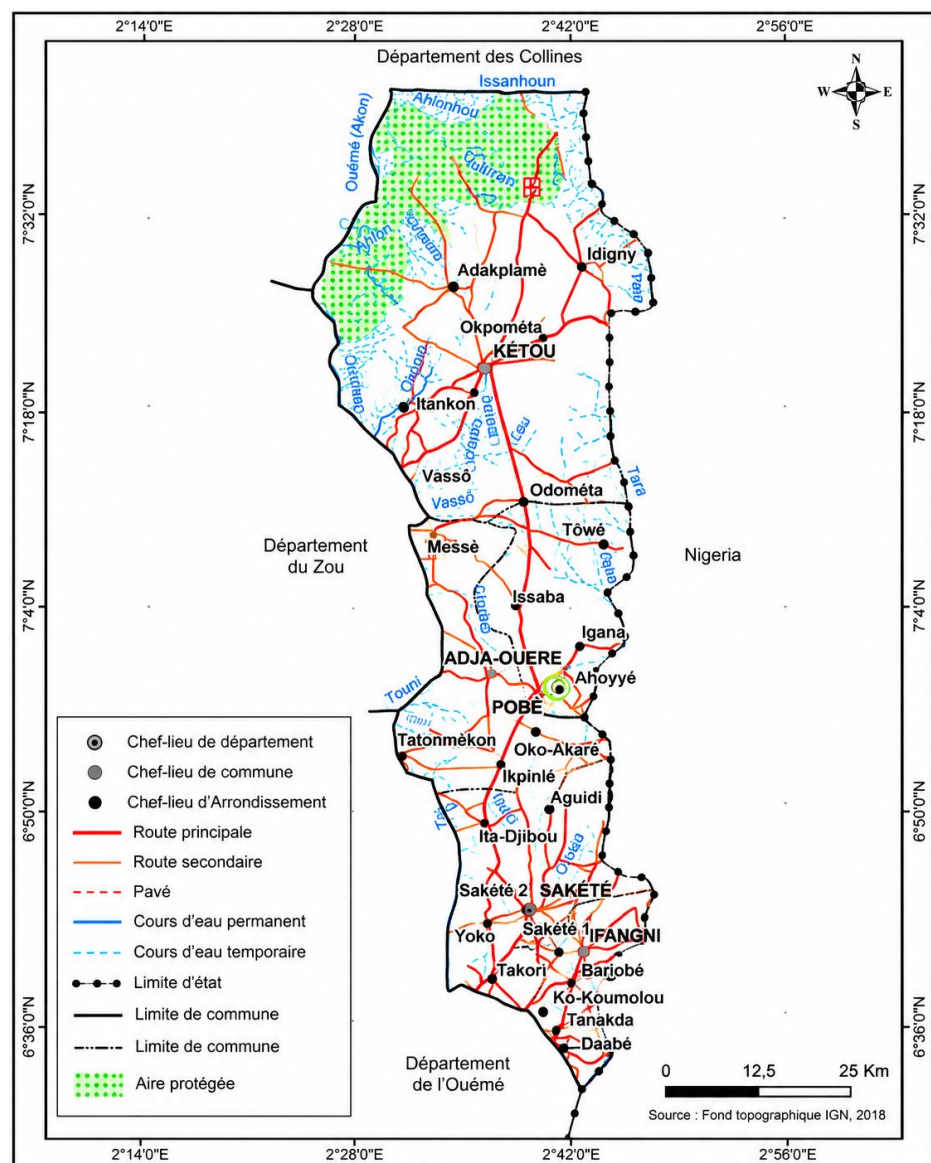


Figure 4. Hydrographic network.

Analysis of **Figure 4** highlights the presence of a hydrographic network consisting of streams and depressions that locally favor the formation of low-lying areas and ponds. These water resources represent potential for the development of market gardening, particularly during periods of low rainfall, when access to water can supplement the crops' water needs.

However, the presence of surface water resources does not guarantee their permanent availability or accessibility for irrigation. Their agricultural use depends in particular on the seasonal variation of flow rates, the possibilities for water mobilization, and the equipment available on farms.

In low-lying areas and hydromorphic zones, proximity to water can be an advantage during the dry season, but also a constraint during periods of heavy rainfall, due to the risks of flooding and soil saturation. Tomato production in these environments therefore requires appropriate moisture management, particularly through the selection of growing periods, plot layout, and improved drainage.

The hydrographic network of the Plateau department thus constitutes a potential resource for the development of market gardening production, subject to technical conditions allowing for a reconciliation of water availability and prevention of excess humidity.

3.1.4. Geomorphological Characteristics

The geomorphological landscape is characterized by the toposequences of the Sakété Plateau and the Lama Depression, also known as the Issaba Depression or the Holli Country Depression. Approximately 25 km wide, it forms a flat area at an altitude of 40 m, sloping gently down towards the Ouémé Valley. The gently rolling terrain of the Pobè-Sakété Plateau, interspersed with depressions and wetlands, offers favorable conditions for agricultural development and cultivation. **Figure 5** presents the geomorphological landscape of the Plateau Department.

The gently rolling terrain of the Pobè-Sakété plateau, dotted with depressions and wetlands, offers favorable conditions for agricultural development and cultivation. This configuration, with available land and suitable soils, promotes tomato production, particularly thanks to the possibility of developing plots specifically adapted to this crop.

3.2. Human Factors in the Plateau Department

In the Plateau department, population growth is one of the factors explaining the region's dynamics, according to 89% of respondents. In 1979, the population was estimated at 208,722 inhabitants, rising to 407,116 in 2002. It reached 624,146 inhabitants in 2013 and is projected to peak at 1,058,206 inhabitants in 2050, representing an annual growth rate of 5.33% between 1992 and 2002 and an increase of 434,060 inhabitants between 2013 and 2050 over a 37-year period. **Figure 6** presents the population trends of the municipalities in the Plateau department based on the 1979, 1992, 2002, and 2013 censuses.

The municipalities of the Plateau department experienced rapid population

growth between 1979 and 2013, according to the last four censuses conducted in Benin. This phenomenon is a significant factor in the development of tomato production, as it increases the availability of labor, an essential resource for expanding cultivated areas and improving productivity. The department thus has a substantial workforce to increase cultivated land. This population also represents a market for tomato production.

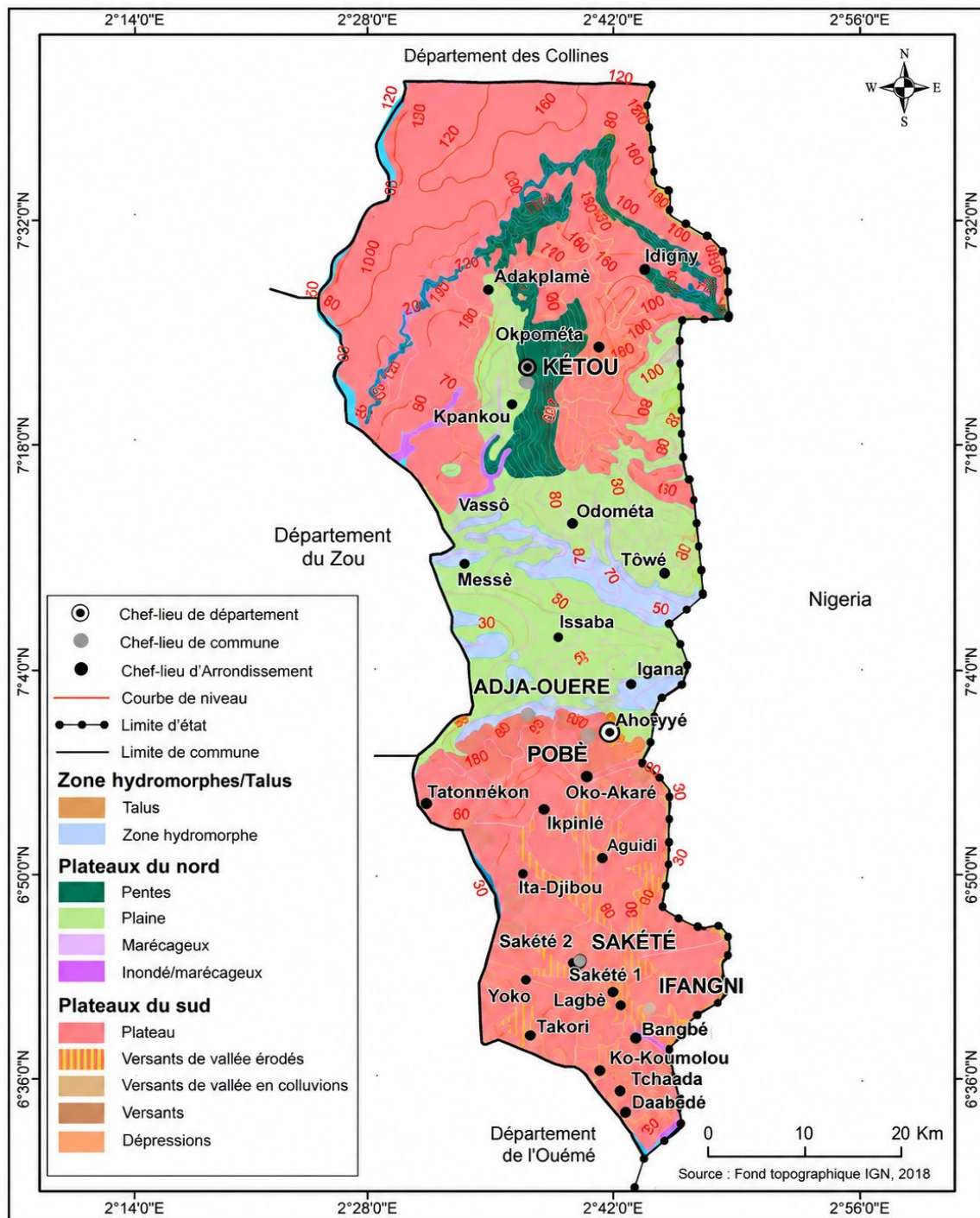
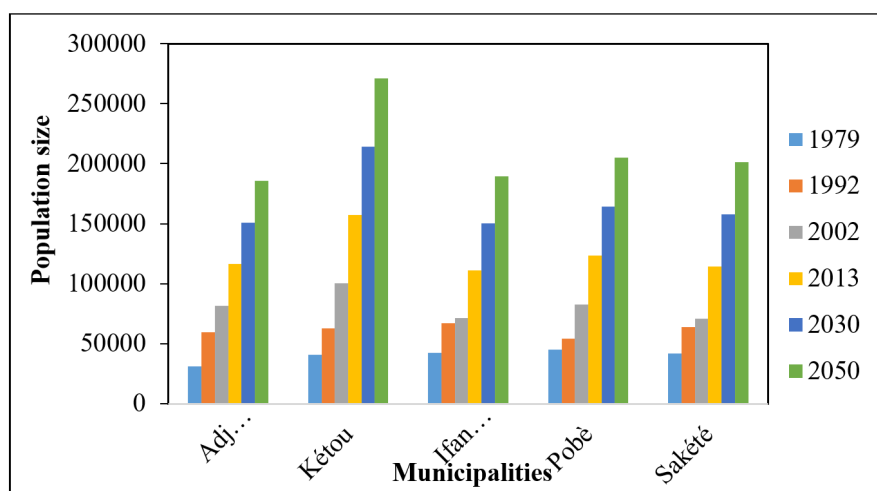


Figure 5. Geomorphological landscape of the Plateau department.



Data source: INStaD, 2013.

Figure 6. Demographic evolution of the municipalities of the Plateau department.

3.3. Agricultural Activities

Agriculture, the cornerstone of the department's economy, remains primarily subsistence farming. It currently involves over 90% of the department's households, who depend on agricultural activities, whether crop farming or livestock breeding. Agricultural production is based mainly on food crops (cereals, roots, tubers, and legumes) and cash crops (oil palm and cotton). It is practiced by both men and women, using rudimentary and traditional techniques.

3.4. Ecological Preference of the Tomato

The ecological preferences of tomatoes refer to the optimal soil and climate conditions for their cultivation, in order to maximize yield and quality. Tomatoes require specific conditions for their growth.

3.4.1. Climate Requirements

Tomatoes require a relatively cool and dry climate to produce a bountiful, high-quality harvest. They are sensitive to temperature variations that occur during their growth cycle. The optimal temperature for most varieties is between 21 and 24 °C.

Table 2 shows the optimal temperatures for tomato cultivation.

Table 2. Optimal temperatures for tomato cultivation.

Steps	Temperature (°C)		
	Min	Optimal range	Max
Seed germination	11	16 - 29	34
Seedling growth	18	21 - 24	32
Fruit assortment	18	20 - 24	30
Development of the color red	10	20 - 24	30

Source: Field survey, August 2025.

Table 2 presents the growth stages of tomato plants and their temperature requirements. The analysis shows that tomato plants can tolerate a certain temperature range, but their tissues are damaged below 10°C and above 38°C.

3.4.2. Water and Humidity Requirements

At least three months of rain are needed. Water stress and prolonged periods of drought cause bud and flower drop and fruit cracking. Conversely, when rainfall is very heavy and humidity is very high, mold growth and fruit rot worsen. Cloudy weather slows down tomato ripening. However, adapted varieties exist. Seed companies offer tomato varieties specifically adapted to hot and humid climates.

3.4.3. Soil Requirements

Tomatoes thrive in most mineral soils with good water retention, aeration, and low salinity. They prefer deep, well-drained loamy soils. The topsoil must be permeable. A soil depth of 15 to 20 cm is optimal for healthy growth. In heavy clay soils, deep tilling promotes better root development. Tomatoes tolerate a wide range of pH levels moderately well, but grow best in soils with a pH between 5.5 and 6.8 and sufficient nutrients. In general, the addition of organic matter promotes good growth. Soils rich in organic matter, such as peaty soils, are less suitable due to their high water retention capacity and nutrient deficiencies.

3.5. Tomato Varieties

The success of tomato production depends on the growing season, water management, variety, and seed quality. In the study area, two local varieties (Tounvi and Akikon) and improved varieties are cultivated.

3.5.1. Local Varieties

Investigations carried out in the Plateau department revealed the use of both local and improved tomato varieties. Among the local varieties, two names were identified: Tounvi and Akikon. These names correspond to those used by producers in the study area.

Tounvi variety is described in the manuscript as having elongated fruits, generally red when ripe. The Akikon variety is distinguished by its round, red fruits. These characteristics allow for a general morphological description of locally cultivated tomatoes, without constituting a formal varietal identification. **Figure 7** shows the local varieties Tounvi and Akikon.



Photographs: Wokou, August 2024.

Figure 7. Local varieties of Tounvi and Akikon.

The local variety Tounvi (1.1) produces medium to large, elongated, red fruit. This tomato variety contains protein and offers a moderate yield. The Akikon tomato is the most widely cultivated local variety in the Plateau department, according to 92% of respondents. It produces medium to large, round, red fruit. This tomato variety contains protein and offers a moderate yield.

3.5.2. Improved Variety

The success of producing an improved tomato variety depends on the growing period, water control, soil type, seed quality, and proper crop management.

It produces very large, round, red or yellow fruits. This tomato variety is protein-rich and has a high yield.

3.6. Production Technique

Tomato production techniques include seed selection and purchase, nursery establishment, soil preparation, transplanting, and crop maintenance.

3.6.1. Seed Selection and Purchase

Tomato growers choose their seeds based on profitability, quality, and the market for different varieties. Seed sources vary from one grower to another. Generally, ATDA and municipal markets supply local and improved seeds to tomato growers. **Figure 8** shows tomato seeds from Djidagba and Towi.



Photographs: Wokou, August 2024.

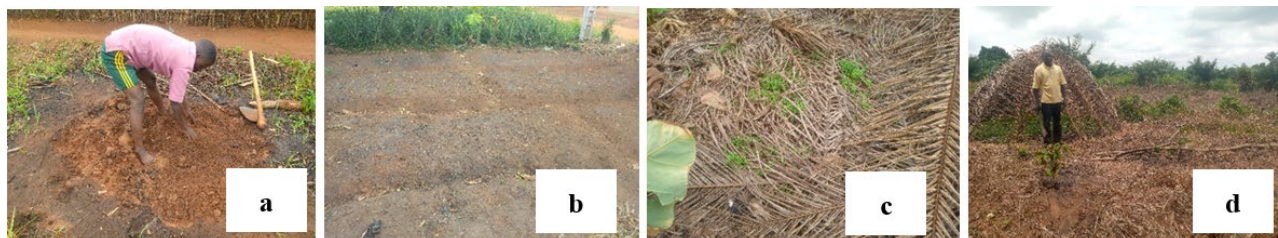
Figure 8. Tomato seeds in Djidagba and Towi.

One batch of seeds is placed in a white bag resting on a brick (a), while another is poured into a basket covered with blue insect netting (b). Analysis and discussions with the producers revealed that the batch of seeds in photo (a) had just been purchased at the market, which explains why it was still in its bag. In contrast, the seeds in the basket covered with netting (photo b) came from tomatoes harvested the previous season. Furthermore, 76% of the farmers explained that local tomato seeds cannot withstand heat or fire (lamps) and are therefore stored in a well-ventilated area.

3.6.2. Nursery

To establish nurseries in the communes of the Plateau department, producers

choose the sunniest and best-ventilated locations in their fields. The nurseries are sheltered from strong winds and planted on flat, well-drained, sandy soils rich in well-decomposed organic matter. **Figure 3** describes the process of establishing the nurseries and preparing the soil for tomato cultivation in Kpoulou.



Photographs: Wokou, August 2025.

Figure 9. Nursery establishment process and soil preparation in Kpoulou.

Observation and examination of the photographs in **Figure 9** show that farmers prepare their nurseries by first creating a loose, sandy seedbed, weeding the soil with a hoe, and manually removing weeds and plastic debris, as shown by the man in photograph (a). After marking out beds of varying sizes according to the producer's needs, as illustrated in photograph (b) (approximately 2.5 m long by 1.5 m wide), the seeds are broadcast. The beds are then covered with oil palm fronds (photographs c and d) to prevent chickens, when the nursery is near the house, and field birds from eating the seeds, and to reduce their direct exposure to sunlight.

3.6.3. Soil Preparation

After creating the nurseries, the producers prepare the soil, starting by mowing or weeding the fields.

➤ Clearing

Clearing involves removing shrubs and brush from cultivated fields. This is generally done with a machete. It eliminates weeds from the soil, after which farmers collect or burn the vegetation. According to 87% of those surveyed, the cleared fields are left fallow until the first rains, at which point mounds are prepared for planting tomato seedlings.

➤ Weeding

Weeding is carried out with a hoe to remove weeds from cultivated fields. It is done when fields are overgrown with vegetation. Weeding techniques vary from one producer to another. Field observations revealed plots where dry corn stalks were weeded and left scattered, while photograph (b) shows a mixture of corn stalks and weeds arranged between the ridges. According to 70% of respondents, the weeding technique illustrated in photograph (b) is practiced by producers with limited land and contributes to soil fertilization.

➤ Ridges

In the municipalities within the study area, tomato cultivation is generally carried out on raised beds. Producers create these beds as soon as the first rains arrive

in May and October. Ridging turns over the soil and incorporates surface vegetation and plant residues. The tomato seedlings are then transplanted onto the beds; this is why 89% of the producers surveyed consider this technique essential to tomato cultivation.

➤ **Transplantation**

The seedlings are transplanted into the garden 3 to 4 weeks after being started in the nursery. A week before transplanting, they are hardened off by reducing watering. Twelve to fourteen hours before lifting them from the seedbed, they are watered thoroughly to prevent root rot during lifting. Seedlings 15 to 25 cm tall, with 3 to 5 true leaves, are best suited for transplanting. This operation is carried out early in the morning or in the afternoon, preferably on a cloudy day, to limit the impact of the sun on the young plants. Immediate watering after planting is necessary. When lifting, it is important to leave a small clump of soil around the roots to avoid damaging them.

➤ **Crop maintenance**

Crop maintenance includes monitoring seedlings after transplanting. It begins with replacing any missing seedlings approximately one week after planting. Light weeding around the seedlings is necessary to remove weeds and break up the surface soil crust. Field observations showed the absence of neighboring weed species in both tomato fields. Analysis and discussions with tomato farmers in Adja-Ouèrè revealed that tomato cultivation requires regular monitoring and careful maintenance; therefore, they carry out at least two hoeings or weedings in their tomato fields. The first weeding is done approximately 20 days after planting, and the second approximately 50 days after. 73% of the farmers stated that tomato plants are vulnerable to weeds and that contact between their roots and weeds can lead to rot.

➤ **Harvest**

Tomatoes are harvested in several stages. The first harvests take place 60 to 80 days after transplanting and can continue for at least a month, depending on the variety. Harvesting is done at specific stages, indicated by the fruit's color. Fruits intended for sale are harvested when they are yellowish and beginning to turn red. Those intended for processing are harvested when they are bright red. The harvest is done by hand and takes place every five days. It generally occurs on the eve of the markets in Ikpilè, Tatonnonkon, and Omowodani.

4. Discussion

The results show that the Plateau department benefits from natural conditions generally favorable to tomato production. The climate, with its two rainy seasons, offers periods conducive to the different production cycles. The diversity of soils is also an asset, with several soil types meeting the requirements of tomato cultivation. The presence of rivers, ponds, and alluvial plains facilitates water supply, particularly during the off-season. The gently rolling terrain and the presence of depressions provide areas suitable for developing agricultural plots. These natural

advantages are complemented by the availability of labor and the agricultural practices developed by producers. Thus, the combination of climatic, soil, hydrological, and human factors creates an environment favorable to the development of tomato production in the Plateau department. According to [16], agriculture is characterized by very high variability in yields, to the point that farmers cannot reliably predict their production volumes.

According to [17], the tomato ranks first among fruit vegetables in terms of cultivated area and production.

The work of [18] shows that in Benin, as in other West African countries, the tomato is an ingredient used in almost every dish. Its nutritional value lies in its richness in vitamins, fiber, essential amino acids and minerals.

5. Conclusions

This study shows that tomato production in the Plateau department relies on a combination of natural and human factors. Rainfall, with annual totals ranging from 800 to 1400 mm, soil diversity, and the availability of water resources are all favorable factors for this production. Furthermore, agriculture involves more than 90% of households, demonstrating the importance of agricultural activities in this department.

Producers cultivate different varieties of tomatoes, with the local Akikon variety being predominant, cited by 92% of respondents. The observed production techniques mainly concern soil preparation, nursery establishment, transplanting, crop maintenance, and harvesting, which generally begins 60 to 80 days after transplanting.

These results show that the development of tomato production in the Plateau department depends on the ecological potential of the environment, varietal choices and agricultural practices of producers.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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