Ministry of Agriculture, Lands and Forestry

2023 Grenada Census of Agriculture

January, 2026

National Report

Contents

0.1 Foreword

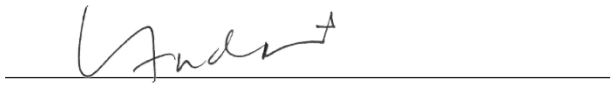
It gives me great pleasure to present the results of the **Grenada Census of Agriculture 2023**. This census provides the most comprehensive and up-to-date assessment of Grenada's agricultural sector since 2012. It was conducted by the **Ministry of Agriculture, Lands, and Forestry** (Ministry of Agriculture), in close collaboration with the **Central Statistics Office (CSO)**, to strengthen the agricultural information base and support evidence-based planning and policy for the transformation of the sector.

The 2023 Census of Agriculture was primarily financed by the **World Bank** through the **Data for Decision Making (DDM) in the OECS – National Component for Grenada**. This investment underscores the Government's commitment to improving statistical systems and using high-quality data to inform agricultural and rural development policies. The **Food and Agriculture Organization of the United Nations (FAO)** provided technical assistance through a **Technical Cooperation Programme (TCP)** project, which supported data processing and analysis and contributed substantially to the preparation of this report.

The census adopted modern data collection tools, including tablet-based **Computer-Assisted Personal Interviewing (CAPI)** and georeferenced data capture, to improve data quality and timeliness. Field operations were significantly affected by **Hurricane Beryl**, which disrupted enumeration activities. Despite these challenges, the census team successfully implemented a robust **capture–recapture estimation methodology** to combine partially enumerated 2023 field data with the farm registration list, ensuring that reliable and representative national estimates could be produced.

The results show that Grenada's agricultural sector continues to evolve, reflecting both persistent challenges and new opportunities. Between 2012 and 2023, the estimated number of eligible farms declined to about **6,268**, and the total agricultural area to approximately **18,457** acres—a reduction of **33 percent** and **21.7 percent, respectively**. The sector remains dominated by small holdings, an aging and largely part-time farming population, and a changing production mix that includes growth in **commercial poultry** and **selected fruit crops such as soursop**. These findings have important implications for policies on land use, youth engagement, climate resilience, and agricultural diversification.

This publication represents the collective effort of many institutions and individuals. The Ministry of Agriculture expresses its deep appreciation to the **World Bank** for its financial support, to the **FAO** for its technical guidance, and to the **CSO**, enumerators, and all stakeholders who made this census possible. The information contained herein will serve as a critical evidence base for strengthening agricultural planning, investment, and resilience in Grenada.



Hon. Lennox J. Andrews
Minister of Economic Development, Planning, Tourism and ICT, Creative Economy, Agriculture and Lands, Forestry, Blue Economy, Marine Resources, and Cooperatives *Grenada, 21 January 2026*

0.2 Acknowledgements

The successful completion of the **Grenada Census of Agriculture 2023** was made possible through the collaboration and dedication of many institutions and individuals. The **Ministry of Agriculture, Lands, and Forestry** extends its sincere appreciation to all who contributed to this important national exercise.

The Census was primarily financed by the **World Bank** through the **Data for Decision Making (DDM) in the OECS - National Component for Grenada**, which provided the resources necessary to modernize agricultural data collection and strengthen the country's statistical systems. The Ministry of Agriculture expresses its gratitude to the **Food and Agriculture Organization of the United Nations (FAO)** for its extensive technical assistance provided through a **Technical Cooperation Programme (TCP)**. The **FAO** supported the census team in the areas of data processing, validation, analysis, and preparation of this report, ensuring that the results meet international quality standards.

Special thanks are also extended to the **Central Statistics Office (CSO)** for its partnership in all phases of the operation, including questionnaire design, sample frame development, data collection oversight, and statistical review. The Ministry acknowledges with appreciation the commitment and professionalism of the **Census Coordination Team, field supervisors, and enumerators**, who carried out data collection under challenging conditions, including the disruptions caused by **Hurricane Beryl**.

The Government of Grenada also recognizes the contributions of **many farmers, households, and community representatives** who participated in the census interviews and provided the valuable information on which this report is based. Their cooperation has made it possible to produce the most comprehensive picture of the state of agriculture in Grenada in over a decade.

Finally, the Ministry of Agriculture thanks all stakeholders—public and private sector entities, farmer organizations, and development partners—whose engagement, advice, and encouragement helped shape and guide the Grenada Census of Agriculture 2023. Their continued collaboration will be essential as the findings of this report are used to inform agricultural policy, investment, and planning in the years ahead.

Mr. Isaac Bhagwan
Permanent Secretary
Ministry of Agriculture, Lands, and Forestry
Grenada, 21 January 2026

Executive Summary

- The Grenada Census of Agriculture 2023 (GCA 2023) provides an essential, comprehensive assessment of the nation's agricultural landscape, bridging the data gap since the previous census in 2012. Conducted by the Ministry of Agriculture, Lands, and Forestry (MoA) in collaboration with the Central Statistics Office (CSO), this census captures the structure and dynamics of a sector undergoing profound transformation amidst evolving economic and environmental pressures.
- The census employed a modern Computer-Assisted Personal Interviewing (CAPI) methodology for efficient and accurate data collection. The enumeration process faced significant challenges, most notably the interruption caused by Hurricane Beryl, which left approximately one-third of the country unenumerated. To address this, a robust Capture-Recapture statistical estimation strategy was implemented, leveraging the existing farm registration database to weight the collected data and produce reliable national estimates.
- The findings of the GCA 2023 paint a picture of a sector that is contracting in scale but adapting in its production focus. The most significant trends include:
  - **Substantial Sector Contraction:** The census confirms a significant and accelerating decline in agricultural activity. The number of eligible farms dropped by 33% since 2012, falling to 6,268. Concurrently, the total area dedicated to farming decreased by 21.7%, now totaling 18,457 acres.
  - **Dominance of Smallholders:** The structure of agriculture remains characterized by very small holdings, with over 40% of all farms being less than 0.5 acres, predominantly under individual or family ownership.
  - **An Aging and Part-Time Workforce:** The demographic data reveals an aging farming population. Critically, farming is not the primary livelihood for the majority; 69% of farm holders report a main occupation outside of agriculture. However, a positive trend shows rising levels of educational attainment among farmers.
  - **Shifts in Crop Production:** There is a notable pivot in permanent crop cultivation. Acreage for Nutmeg, the traditional mainstay, declined by 20%. In contrast, Cocoa acreage remained stable, and Soursop cultivation surged by 58%, indicating a diversification towards high-demand crops.
  - **Transformation in Livestock:** The livestock sector has seen a dramatic shift towards intensification. Commercial poultry production has expanded massively, while the populations of traditional grazing animals (cattle and sheep) have significantly declined.
  - **Operational Changes:** Farmers are increasingly adopting small-scale mechanization (e.g., brush cutters) but not heavy machinery. There is also a marked decrease in the use of chemical fertilizers, although the adoption of formal record-keeping remains low (11%).

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Figure 1: Parish Map of Grenada, Carriacou & Petit Martinique

1 Introduction and Background

Agriculture has historically been a cornerstone of Grenada's economy and a vital part of its social and cultural fabric. Understanding the dynamics and structure of this essential sector is paramount for national planning and development. Recognizing this, Grenada has periodically undertaken comprehensive agricultural censuses to capture a snapshot of its farming landscape. The first such census was conducted in 1961, followed by several others over the subsequent decades, with the most recent prior to this 2023 census, being carried out in 2012 (Grenada MoA 2015).

The twelve years that have passed since the 2012 census have been marked by significant shifts and challenges impacting Grenada's agricultural sector. While the direct, widespread devastation caused by hurricanes like Ivan (2004) and Emily (2005) may lie further in the past, the more insidious and ongoing effects of climate change – manifesting as increased droughts and unpredictable rainfall patterns – continue to impact crop production and water availability across the island.

Beyond environmental factors, broader economic and structural changes have also reshaped the agricultural landscape. An observed decline in the total land dedicated to agricultural use since the mid-1990s indicates a potential shift away from farming. Furthermore, the sector has navigated the lingering effects of the slow global economic recovery that followed the 2008 financial crisis. Simultaneously, Grenada's national economy has undergone a significant transformation, with tourism emerging as the predominant source of foreign exchange, increasingly complemented by revenue from the Citizenship-by-Investment program. While vital agricultural exports such as nutmeg and cocoa continue to contribute valuable foreign currency, their overall economic scale is now considerably smaller when compared to the earnings generated by tourism.

It is within this context of profound environmental, economic, and structural evolution that the Government of Grenada mandated the Census of Agriculture 2023. This crucial undertaking was designed to bridge the data gap since 2012, providing a current and accurate assessment of the structure of agriculture throughout the nation. The comprehensive data collected through this census is indispensable for gaining a deeper understanding of the changes that have occurred, enabling policymakers to make informed decisions, refine sector policies, improve project planning, and enhance implementation strategies that will ultimately contribute to the resilience and positive economic impact of Grenada's agricultural sector.

This report presents the findings of the Census of Agriculture 2023, offering valuable insights into the status of farming in Grenada and providing a foundational dataset for the sustainable development of the sector. It is organized as follows: this Section 1 describes the administrative structure, scope, and objectives of the project. In section 2, the methodological steps involved are described, from the sampling frame to data collection and processing techniques. Section 3 presents the main results derived from the census data. Section 4 offers a summary of the findings and the conclusions. Finally, the Appendices provide supplementary results and an agricultural glossary for reference.

1.1 Objectives and Organizational Structure

1.1.1 Objectives

This section outlines why the GCA 2023 was conducted and how its operations were structured. It details the specific goals that guided the census and describes the hierarchical organization put in place to ensure its successful execution.

The GCA 2023 was executed under the authority of the Statistical Act of December 1960, which governs the operations of the National Statistical System in Grenada. For this census, the Grenada Cabinet of Ministers granted approval through a cabinet conclusion on a censual decree. The Planning Unit of the Ministry of Agriculture was designated as the responsible body for conducting the census, working in close collaboration with the Central Statistics Office (CSO). The Director of the CSO formally empowered an officer of the Planning Unit to carry out the census.

This Statistical Act also mandates the complete confidentiality of all information collected. The data gathered can only be used for statistical purposes, and no individual information can be disclosed to anyone outside the census organization.

According to the World Programme for the Census of Agriculture (WCA 2020) (FAO 2015), ***an agricultural census is a statistical operation to collect, process, and disseminate data on the structure of agriculture for an entire country or a significant part of it, providing detailed data on factors like holding size, land use, livestock, and labor for agricultural planning and policy***. The primary objectives of the agricultural census are to **provide detailed data on the structure of agriculture**, serve as **benchmarks for current agricultural statistics**, and supply **frames for agricultural sample surveys**.

In Grenada, the GCA 2023 was carried out with the following specific objectives:

- To measure the current structure of the agricultural sector by collecting information on key structural variables that typically do not change rapidly year to year.
- To provide an adequate frame for the establishment of Grenada's Ongoing Agricultural Information System, which will facilitate the regular and continuous monitoring and evaluation of changes in the sector, serve as a basis for periodic sample surveys, and function as a key element of the National Statistical System.
- To strengthen the capabilities of the Planning Unit within the Ministry of Agriculture (MoA), and other related institutions, in the planning, design, collection, processing, analysis, and dissemination of information pertinent to the agricultural sector.
- To facilitate comparison of the present state of the agricultural sector with findings from previous periods, specifically 1995 and 2012 (FAO (2019)).
- To provide decision-makers (including the Government of Grenada, Development Partners, and NGOs) and other data users with detailed, reliable, and up-to-date structural data on the agriculture sector to inform their interventions and planning.

1.1.2 Organizational Structure

To effectively achieve these objectives and ensure the successful execution of the Grenada Census of Agriculture 2023 (GCA 2023), a clearly defined hierarchical organization was established. The undertaking received formal approval from the Grenada Cabinet of Ministers, and the authority to proceed was granted by the acting Director of Statistics. Responsibility for conducting the GCA 2023 was primarily assigned to the Planning Unit of the Ministry of Agriculture (MoA), working in close collaboration with the Central Statistics Office.

General oversight and coordination of the GCA 2023 were managed by an inter-institutional Agricultural Census Committee. This committee served as the central coordinating body, chaired by the Permanent Secretary of the MoA, and comprised representatives from relevant producer and user institutions across both the public and private sectors.

Furthermore, a dedicated Technical Co-group was established to supervise and coordinate the technical, administrative, and financial activities essential for the census's operation. The organizational structure for the GCA 2023 is illustrated in the chart below.

Organizational Structure

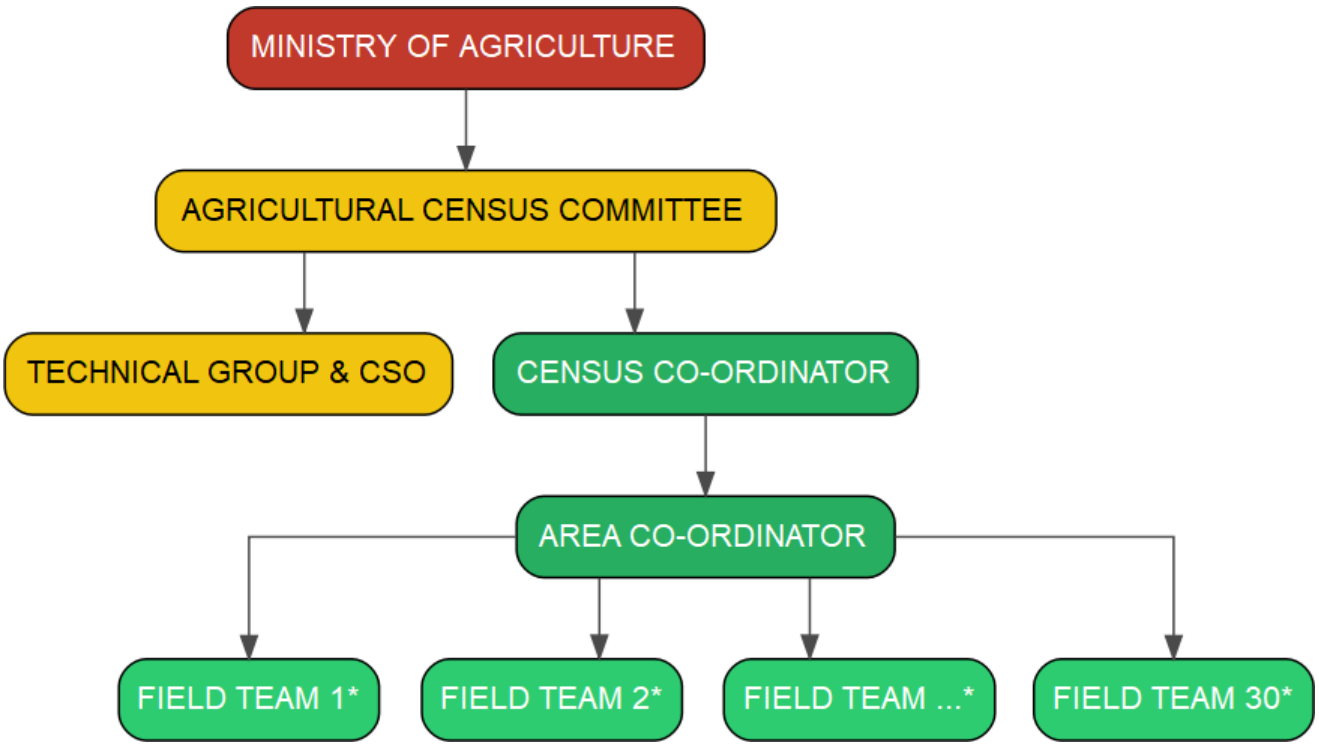


Figure 2: Organizational Structure

Guided by these objectives and supported by the organizational framework described, the implementation of the census followed a specific statistical methodology, which is presented in Section 2.

1.2 Historical Background

! A brief history of previous agricultural censuses in Grenada

Grenada has a long and consistent history of conducting censuses of agriculture, reflecting the Government's enduring commitment to monitoring structural changes in the agricultural sector and supporting evidence-based policy development. Over the past seventy years, **seven censuses of agriculture** have been undertaken in the country, making Grenada one of the most regular and reliable implementers of this statistical exercise in the Caribbean region.

The first and the second censuses were conducted as part of the West Indies Agricultural Censuses, in **1946** and **1961**, respectively. These regional initiatives provided the foundation for developing national agricultural statistics systems across the Caribbean. Following independence, Grenada continued this important work through five nationally implemented GCAs, carried out in **1975, 1981, 1995, 2012,** and **2023.**

This consistent effort underscores the Government's recognition of the vital role that agricultural data play in understanding sectoral trends, identifying challenges and opportunities, and formulating policies that promote sustainable agricultural development, food security, and rural livelihoods.

2 Methodology

This section details the statistical and operational methodology that underpinned the successful execution of the GCA 2023. It describes the systematic approach taken to ensure the comprehensive coverage and accuracy of the data collected across Grenada. The methodology encompasses several critical stages, beginning with the development of the census frame to define the target population, followed by the process of data collection in the field, and concluding with the procedures for data processing to prepare the information for analysis. The subsequent subsections elaborate on each of these key steps, providing insight into how the census was planned and carried out to meet its stated objectives.

2.1 The Census Frame and Coverage

To ensure comprehensive and accurate data collection for the GCA 2023, a robust methodology was essential, particularly concerning the census frame and coverage. Agricultural authorities typically employ various sampling frames, such as list frames (pre-existing records of holdings) and area frames (geographic sampling of land parcels). Given that a complete, readily available list of farms for Grenada was not feasible, and the census aimed for a complete enumeration of all eligible farms across the main island of Grenada and the Grenadine islands of Carriacou and Petite Martinique, an area frame approach was adopted.

Under this approach, the entire country was systematically divided into small, mutually exclusive geographical units known as Enumeration Districts (EDs). An ED serves as the smallest defined area for census and survey purposes, efficiently organizing data collection by assigning enumerators to specific zones.

For the GCA 2023, enumerators meticulously visited every household within their assigned EDs to identify the existence of farms. Each household was screened using a household questionnaire containing specific questions about agricultural involvement among its members. These visits were precisely guided by online ED maps, which enabled the collection of geographically precise census data, down to the smallest local level, utilizing the Global Positioning System (GPS) technology.

In total, the islands were subdivided into 264 EDs across 8 parishes. Five EDs were excluded from the census: four in St. George's parish, which primarily encompasses the capital's commercial and financial hub, and one in St. Andrew's parish. Each included ED typically comprised between 100 and 150 buildings. The ED maps utilized for the GCA 2023 were the same as those employed for the 2021/2022 Population and Housing Census, provided by the CSO. To enhance precision and navigation in the field, each enumerator was equipped with a tablet featuring a digital map of their respective ED, allowing for accurate boundary identification and real-time GPS tracking of their location within the ED.

To ensure comprehensive coverage, particularly for larger and specialized operations, a complementary list frame was compiled prior to the census. This list included large farmers (those with 25 acres or more of land), specialized farmers (engaging in singular agricultural enterprises like goat rearing only), and institutions involved in agricultural activities. This targeted list was used to supplement the household-based enumeration, ensuring that these significant agricultural entities were fully captured by the census.

2.2 Eligible Farms

With the census frame and coverage strategy established, the next crucial step involved defining what constitutes an "eligible farm" for the purpose of the GCA 2023. This section outlines the specific criteria used to identify and include agricultural units in the enumeration, ensuring that the collected data accurately reflects Grenada's unique agricultural landscape.

To produce agricultural statistics, a clear definition of the statistical unit of interest is essential. While there isn't a universally accepted definition, various countries and organizations like the FAO broadly define ***a farm as an agricultural holding, an economic unit of agricultural production under single management, encompassing all land and livestock used for agriculture, regardless of size, legal form, or title*** (FAO 2015). Single management can be by an individual, household, group, or juridical person, and the land may consist of multiple parcels sharing the same production means.

Grenada has adopted a practical definition tailored to its specific needs. Consequently, in Grenada, for the purpose of the Census of Agriculture, an eligible ***farm*** was defined as a holding with

- ***1 or more cattle or***
- ***5 or more small ruminants or a combination that add up to 5 or more (goat, sheep and or pigs) or***
- ***Any small ruminant used for breeding or***
- ***25 or more poultry or***

- *25 or more permanent trees or*
- *0.25 acres or more of temporary crops or*
- *Income from farming of t 2,500 or more*

The definition used in Grenada offers a more practical approach, using specific criteria like acreage and livestock numbers to identify agricultural units. This method helps exclude very small farms, which typically represent a minor portion of agricultural activities.

2.3 The Census Questionnaire

Having established the definition of an eligible farm, the next vital step in the census methodology was the design and implementation of the census questionnaire. This instrument served as the primary tool for collecting all necessary data directly from agricultural holdings. This section details the questionnaire's development, its digital adaptation, and the comprehensive list of variables for which data was captured, encompassing both structural and dynamic aspects of Grenada's agricultural sector.

The questionnaire used for the GCA 2023 was fundamentally based on the version from the Grenada Census of Agriculture 2012. A key difference, however, was the transition from a paper-based format in 2012 to a Computer-Assisted Personal Interview (CAPI) application for 2023. This continuity in questionnaire design was a deliberate decision, vetted by the steering committee, to facilitate more reliable and straightforward comparisons with the data from the 2012 census. The CSO played a crucial role in converting the questionnaire into a digital format using Survey Solutions software.

The scope of this census extended beyond just structural data—variables that typically do not change quickly over time, such as farm size, land use, and land tenure (as recognized by FAO) (FAO 2018). It also captured data on variables that are more dynamic, including short-term crops planted and harvested, and current livestock numbers on the farm.

The following is a comprehensive list of the topics for which data was captured in the GCA 2023:

1. *Location of farm and farmer*
2. *Legal status of farm*
3. *Farmer and household member demographics*
4. *Farm employment - Paid and unpaid labor*
5. *Number and area of farm parcels*
6. *Tenure of farm parcels*
7. *Area under land use*
8. *Number of permanent trees planted*
9. *Number of farms growing temporary crops by area*
10. *Use of irrigation on the farm by type*
11. *Number and type of livestock*

12. ***Disposal of livestock by type***
13. ***Use of fertilizers and Agro- chemicals:***
    - *Chemical fertilizers*
    - *Organic manure*
    - *Fungicides*
    - *Herbicides*
    - *Insecticides*
    - *Other pesticides*
14. ***Ownership and use of agricultural machinery and equipment***
15. ***Miscellaneous Information:***
    - *Markets for production*
    - *Farmer belonging to farm organizations*
    - *Receipt of technical assistance and information*
    - *Access to credit*
    - *Proportion of farmer's income from farm production*
    - *Keeping of farm records*
16. ***Issues of production***

2.4 Data Collection

With the census questionnaire finalized and the CAPI application ready, the operational phase of the GCA 2023 commenced with a comprehensive set of data collection procedures. This section details the timeline of the enumeration, the extensive training programs implemented, the deployment of field staff, and the logistical challenges encountered during this critical phase.

As previously noted, the census primarily utilized a CAPI application, implemented on tablets through the Survey Solutions platform. Developed by the World Bank, Survey Solutions is a free survey software known for its robust features, including offline and online data collection, customizable questionnaires, and real-time monitoring capabilities (The World Bank 2025). It supports various interviewing modes, making it a versatile tool for large-scale surveys like the GCA.

The actual census data collection took place over an extended period, running from November 5, 2023, to June 30, 2024.

A rigorous training program was integral to the successful execution of the census. The initial 'Training of the Trainers' session was held from August 28 to September 1, 2023, at the Grenada National Stadium, involving sixteen (16) individuals from the Ministry of Agriculture and other sectors. From this group, seven (7) Area Coordinators and seven (7) Supervisors were subsequently selected. Training for the larger pool of potential enumerators and super-

visors then began from September 13 to September 26, conducted in-person across five different centers throughout Grenada, primarily in the evenings (1:00 PM to 6:00 PM). Training specifically for Carriacou personnel was held from October 16 to October 27, 2023. Throughout the entire census period (November 2023 to June 2024), continuous virtual training sessions were also conducted to onboard new personnel as needed.

Recruitment for enumerators and supervisors began in August 2023, attracting 301 applicants, with 279 available for in-person training. Although the census aimed to provide employment opportunities, particularly for the unemployed, attrition was noted even during the training phase. Consequently, 228 individuals successfully completed the training and assessment, from which 186 were initially selected. By the end of November, the remaining 42 qualified individuals were brought on board to replace those who had dropped out. To sustain the field operations, two additional calls for applicants were made during the census period, resulting in over 300 more individuals undergoing training. In the final two weeks of June, nine (9) Extension Officers were deployed to accelerate the data collection efforts.

Enumerators typically conducted fieldwork during evenings and weekends, with planned breaks for Christmas (two weeks in December) and for Grenada's 50th Anniversary of Independence in February. Despite these efforts, and the continuous recruitment and training, the data collection phase faced significant challenges. Exceptionally inclement weather, including a hurricane event, ultimately forced the Ministry of Agriculture to permanently halt census collection prematurely, leaving approximately one-third of Grenada unenumerated.

2.5 Dealing with the Incomplete Data Collection Issue in the Census

As noted in the previous section, the GCA 2023 encountered significant disruptions that severely hampered comprehensive data collection across most parishes. Initial efforts successfully contacted approximately 4,200 eligible farms, but the arrival and subsequent impact of **Hurricane Beryl** made it impossible to continue the enumeration process effectively. This unforeseen event directly resulted in incomplete data collection for much of the island, with only the parishes of St. Mark and St. Andrew achieving near-complete coverage before the storm. Consequently, relying solely on this partial dataset to derive agricultural statistics would grossly underestimate key indicators and render any comparisons to previous censuses, such as the 2012 census, unreliable and potentially misleading.

Recognizing the impracticality of a complete re-enumeration and the urgency to salvage the valuable information already gathered, a strategic and statistically sound approach was adopted. This involved exploring and adapting alternative methodologies to supplement the incomplete census data and generate a more accurate estimate of the **total number of eligible farms (N)** in Grenada for 2023.

To achieve this, the team leveraged Grenada's existing farm registration database and integrated it with data from the 2012 census to enhance the partially collected 2023 census data. A **two-sample statistical Capture-Recapture estimation strategy**, traditionally used in ecological studies to estimate animal populations, was adapted to estimate the number of eligible farms within each parish. This method is particularly valuable when a direct count of every individual unit (in this case, every farm) is infeasible.

The core principle of Capture-Recapture involves two independent "captures" or samples of a population, with an analysis of the overlap (recaptures) between them to derive a total population estimate. In the context of the GCA 2023, the method was operationalized as follows:

- **First Capture (Sample 1 – 2023 Census Data):** The data successfully collected during the 2023 census enumeration formed the first sample. Here, n_1 represents the number of eligible farms included in this initial 2023 census sample.
- **Second Capture (Sample 2 – Adjusted Registration Database):** Grenada's farm registration database, adjusted using insights from the 2012 Census data to better reflect the population of "eligible farms" in 2023, served as the second independent sample. "n_2" denotes the number of farms within this adjusted registration database sample.
- **Recapture (Matched Sample):** To identify farms "captured" in both samples, a meticulous matching process was conducted between the 2023 census data and the adjusted registration database. This involved both **direct matching** (based on unique registration numbers where available) and **"fuzzy" matching** (relying on a combination of farm owner names, addresses, and parish information to account for potential variations or data entry discrepancies). The number of farms successfully matched between these two samples is denoted as "m".

The validity of the **Petersen-Lincoln estimator**, which was used to calculate the estimated total number of farms ($\hat{N}$), relies on several key assumptions. These assumptions were carefully verified to hold approximately true for this application:

- **Closed Population:** This assumption posits that the total number of eligible farms in Grenada remained relatively stable between the data collection periods for the census and the registration database. Significant changes due to new farm establishments, farm closures, or shifts in the definition of "eligible" farms could potentially violate this assumption.
- **Equal Catchability (Homogeneity):** This assumes that each eligible farm had an approximately equal probability of being included in the 2023 census sample and, separately, an equal probability (though not necessarily identical to the census probability) of being included in the adjusted registration database. Factors such as farm size, remoteness, or operational status were considered for their potential to cause variations in catchability.
- **Independence of Samples:** This assumption requires that the selection of farms for the census was independent of their inclusion in the registration database. Any systematic overlap in the sampling frames or data collection processes beyond the inherent population overlap could violate this assumption.
- **Matching Accuracy:** The accuracy of the estimated "**m**" (the number of matched farms) is crucial. It was assumed that the matching process effectively identified true matches while minimizing false positives. Errors in matching could significantly bias the final estimate.

Under these verified assumptions, the estimated total number of farms ($\hat{N}$), in Grenada for 2023 was calculated using the Petersen-Lincoln estimator:

$\hat{N} = (n_1 * n_2)/m$

Where:

- $\hat{N}$ is the estimated total number of farms in Grenada in 2023 which is the sum of each the estimates derived by parish.
- n_1 is the number of farms in the census sample (First Capture).
- n_2 is the number of farms in the registration database sample (Second Capture).
- m is the number of farms matched between the two samples (Recapture).

Once the estimated total number of farms per parish was obtained, these figures were used to "weight-up" the data collected from the enumerated areas. This process is analogous to a classical post-stratified statistical estimation setup, allowing for a more robust estimation of agricultural statistics across the entire island, despite the incomplete enumeration due to Hurricane Beryl.

2.6 Data Entry and Cleaning

As mentioned before, the GCA 2023 utilized a CAPI application, which significantly streamlined the data collection process by eliminating the need for manual data entry. Enumerators used tablets to record information, with pre-programmed primary editing and validation rules built directly into the application.

These built-in rules included checks such as:

a) Consistency in building data on plots: Ensuring that information related to structures on agricultural land was logical and complete.

b) Farmer age validation: Verifying that the reported age of farmers met predefined criteria.

c) Minimum agricultural activity for farm classification: Confirming that the reported activities met the threshold to be officially considered a farm.

A key advantage of this CAPI system was its ability to handle offline data collection. If an internet connection was not available in the field, the collected data was stored locally on the tablet. Once the enumerator marked a questionnaire as complete and synchronized the device, the data would automatically upload when an internet connection was re-established. This feature ensured data integrity and efficient transmission regardless of connectivity challenges in remote areas.

With the data entry and initial cleaning phases complete, the focus then shifted to data processing and validation. This stage involved transforming the raw, cleaned data into a structured format suitable for analysis, while rigorously checking for accuracy, consistency, and completeness to ensure the highest quality of information for the census findings.

2.7 Data Processing and Validation

Once collected and initially cleaned, the raw data underwent a rigorous **data processing and validation** phase. The CAPI application facilitated this by outputting the collected information into a highly structured format, generating **independent .csv files for each major topic** covered by the census. For example, there were separate files for:

- **Household information:** Details pertaining to the farmer's household.
- **Household members:** Specific information about each individual within the household.
- **Plots of land:** Data related to agricultural land parcels.
- **Livestock:** Information on farm animals.
- **Crops:** Details about cultivated crops.
- And so on, ensuring a modular and organized dataset.

Comprehensive Validation Procedures

Extensive **validation rules** were applied to many variables within these distinct files to ensure data quality and consistency. A critical step involved **standardizing all area variables**, regardless of their initial unit of measurement, by converting them into a single, consistent unit: **Acres**. This standardization was vital for accurate aggregation and analysis.

To identify potential errors or unusual entries, **outlier detection** algorithms were run on these standardized area variables. Any units flagged as suspicious were then compiled into separate files for **further, in-depth validation**. This proactive approach allowed for targeted investigation of data points that deviated significantly from expected norms.

Similarly, **range checks** were systematically applied to all **age variables** to identify any implausible entries. Cases falling outside a sensible age range were also isolated for further investigation and verification. Beyond numerical data, crucial qualitative and categorical variables were also subjected to validation. Checks were performed on key attributes such as **Education levels, Farm classification, and Income ranges**, among others, to ensure their logical consistency and adherence to predefined codes.

Iterative Correction and Confirmation

The overarching strategy for this validation phase was iterative and thorough. It involved:

1. **Running specialized validation tools** designed to detect a wide array of potential errors.
2. **Reporting all detected errors** in a clear and actionable manner.
3. **Systematically correcting identified errors** where definitive corrections could be made.
4. For suspicious values that were not clear errors, a process of **confirming their legitimacy** was undertaken, often requiring re-evaluation of the original data source or consultation with subject matter expert.

This multi-layered approach to data processing and validation was essential in transforming the raw census data into a reliable and high-quality dataset ready for in-depth analysis and reporting.

3 Key Findings and Analysis

With the data processing and validation phases now largely complete, the census data has been refined into a more reliable and consistent format. This allows us to begin exploring the key findings that are emerging from the 2023 Census of Agriculture, offering preliminary insights into the agricultural landscape of Grenada.

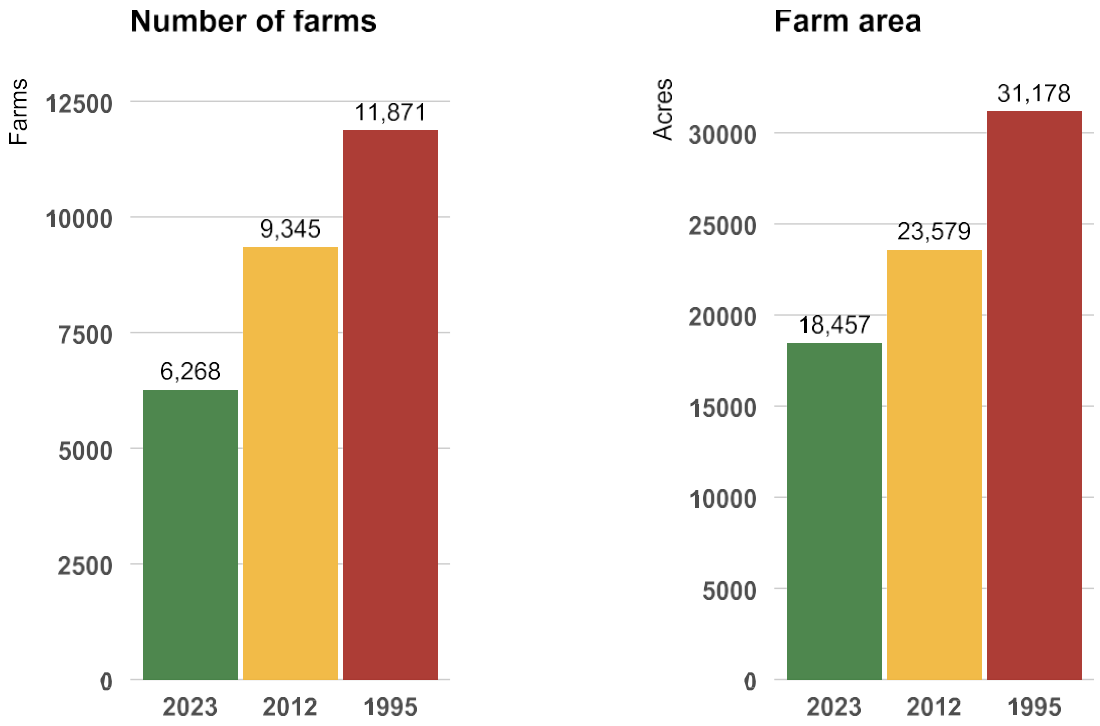
3.1 Farm Structure and Organization

This section provides a detailed examination of the farms that constitute the agricultural sector today. By analyzing the distribution of farms by size, their legal status and ownership structures, and current land use and management practices, we can gain a more nuanced understanding of the nature of these changes. This detailed breakdown will help identify the types of farming operations that are persisting and how agricultural land resources are being managed in the modern context.

3.1.1 Number and Sizes of Farms

We begin the analysis by looking at the overall number of eligible farms, as defined above, and the area that they represent in Grenada. To do so, we compared results reported in the past two censuses (1995 and 2012) to the current one, the 2023 census.

A key factor in this analysis is the methodology used to define an “eligible farm.” Notably, the criteria remained consistent in both 2012 and 2023, whereas the definition applied in the 1995 census differed. Nevertheless, the data demonstrates a clear and substantial downward trend in both metrics over nearly three decades. While the methodological change may account for the magnitude of the shift observed between 1995 and 2012, the trend from 2012 to 2023 reflects changes occurring under a stable definition.



Source: MoA Grenada

Figure 3: Number and Total Area of Farms in Grenada (1995-2023).

Figure 3 above indicates the number of farms over the last three censuses. The data indicates a steep and continuous decline in the number of eligible farms in Grenada across the three censuses. From 1995 to 2023, the total number of farms decreased by 5,612, representing an overall reduction of **47.3%**. The decrease between 1995 and 2012 was 2,526 farms (**21.3%** reduction). This initial drop is likely influenced by both a real decline in farming operations and the change in the definition of an "eligible farm" applied in the 2012 census. However, the subsequent decline of 3,086 farms (**33%** reduction) between 2012 and 2023 occurred under a consistent definition. This points to a substantial and accelerating real-term reduction in the number of farming operations in the most recent decade.

As for the Total Farm Area, its mirroring the trend in farm numbers, the total acreage dedicated to farming has also contracted significantly. The total agricultural area diminished by 12,721 acres from 1995 to 2023, a total decline of **40.8%**. The **24.4%** reduction in area between 1995 and 2012 can be partly attributed to the revised census criteria. However, the further **21.7%** decrease in acreage between 2012 and 2023 reinforces the trend of shrinking agricultural land use under a stable measurement framework.

The census data from 1995, 2012, and 2023 paints a clear picture of a contracting agricultural sector in Grenada. Both the number of farming operations and the total land dedicated to agriculture have decreased substantially over this period.

While methodological changes in the census definition between 1995 and 2012 may account for a portion of the initial decline, the continued and pronounced decrease between 2012 and 2023 under a consistent definition highlights a significant ongoing trend. This suggests that factors beyond census definitions—such as economic pressures, land use competition, climate change, or demographic shifts—are key drivers of this reduction. These statistics indicate a fundamental challenge for the agricultural landscape of Grenada, warranting further investigation into the root causes and potential implications for national food security and the rural economy.

Next, we consider the number of farms by parish.

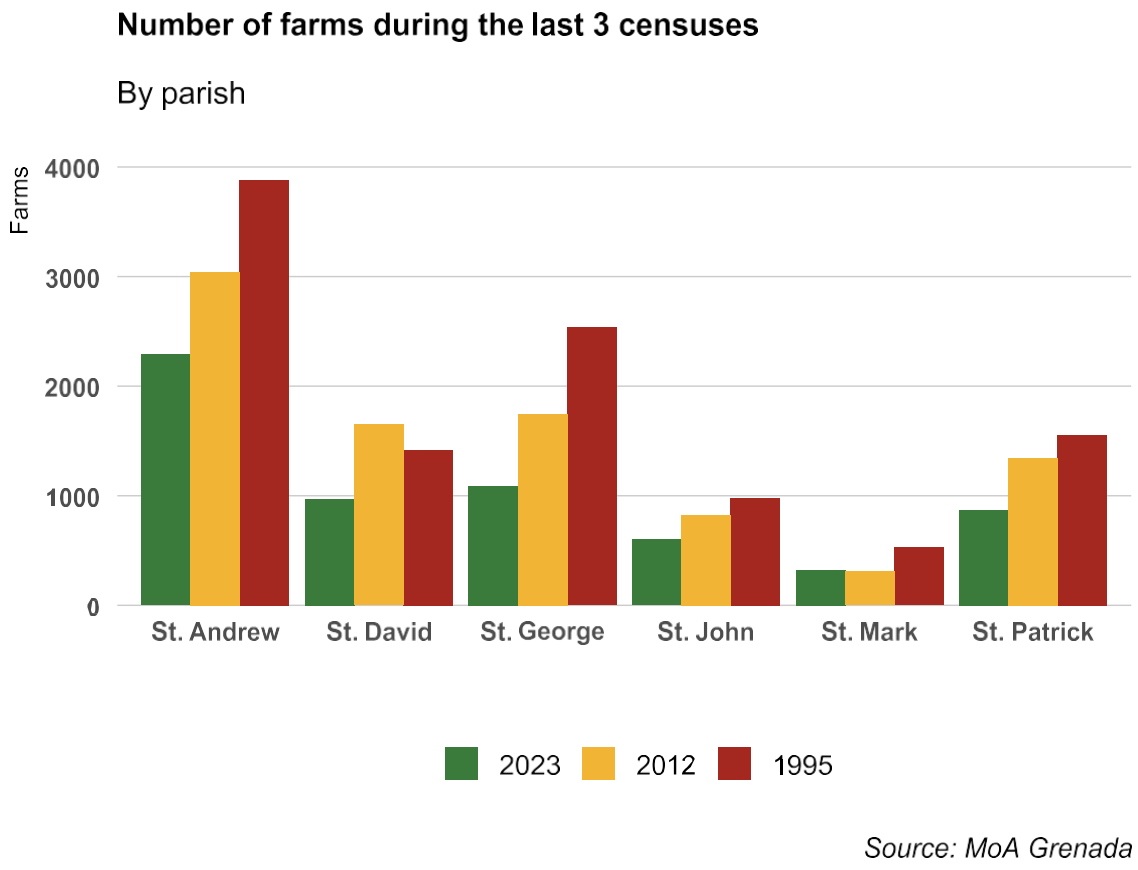
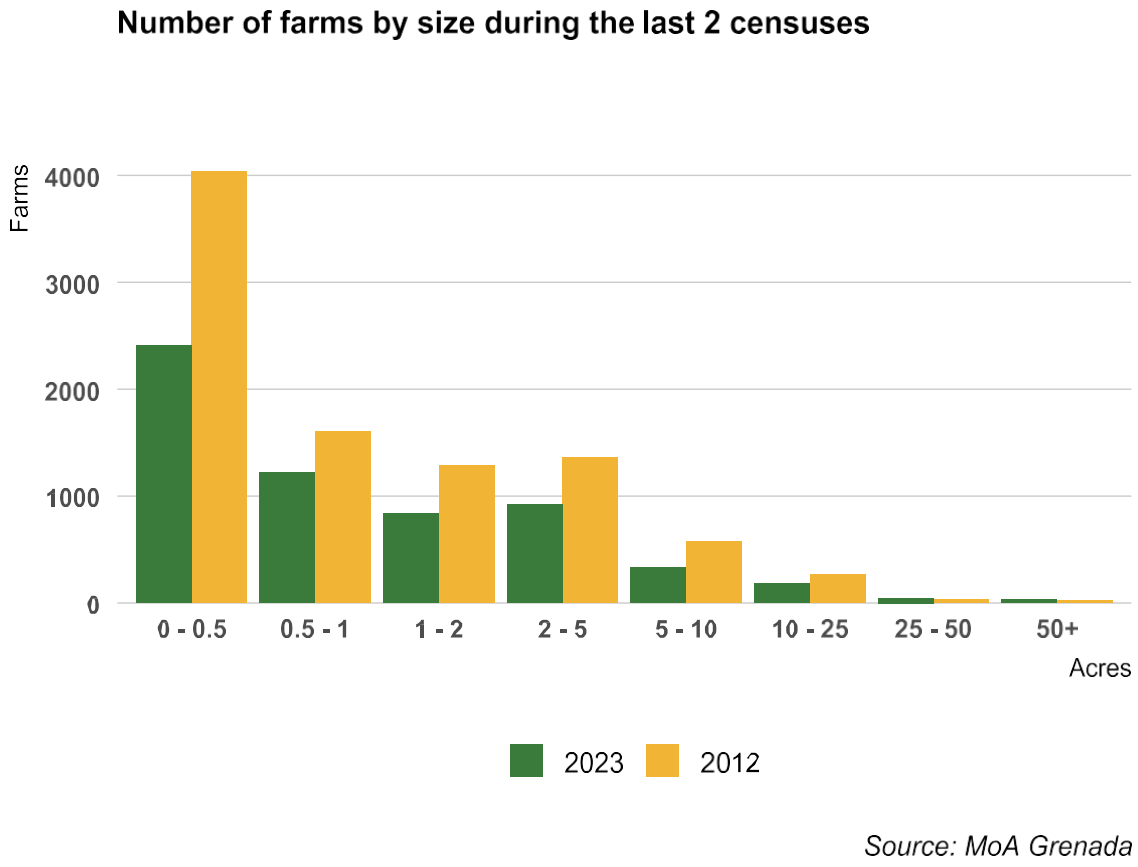


Figure 4: Number of Farms by Parish Across the Last 3 Censuses.

Figure 4, presents a comparison of the number of farms by parish. That parish-level data reveals a non-uniform decline in farm numbers across Grenada. Notably, St. Andrew experienced the most significant reduction, with the number of farms decreasing by approximately **42.5%**

from nearly 4,000 in 1995 to around 2,300 in 2023. St. George also saw a substantial decline of roughly **60%**, dropping from about 2,500 farms in 1995 to just over 1,000 in 2023. In contrast, St. David exhibited a distinct pattern, initially increasing by about **15%** between 1995 and 2012, but then showing a substantial decrease of approximately **40%** between 2012 and 2023, resulting in an overall decrease of over **30%** from 1995 to 2023. St. John saw a decrease of about **20%**, moving from around 1,000 farms to roughly 800. Similarly, St. Mark experienced a decline of approximately **40%**, from about 500 farms to roughly 300. Finally, St. Patrick witnessed a decrease of about **45%**, going from roughly 1,600 farms to around 900. Thus, the overall decline in Grenada's farm numbers is a composite of these varied parish-level changes, with St. Andrew and St. George showing the most pronounced decreases, while St. David displayed a distinct trend of past growth to recent decrease.



Source: MoA Grenada

Figure 5: Number of Farms by Size.

The distribution of farms by size reveals a consistent and deeply rooted pattern of small-scale agriculture in Grenada between 2012 and 2023. The most significant finding is the overwhelming predominance of micro-holdings, with farms under 0.5 acres accounting for over **40%** of all farms in both census years. This underscores that the fundamental structure of the sector is based on very small units. A notable shift occurred in the 0.5-1 acre category, where the

proportion of farms increased from **17.5%** in 2012 to **18.6%** in 2023, suggesting this category has grown in relative importance. In contrast, medium-sized farms (1.0 to 5.0 acres) exhibited remarkable stability in their share of the total, while all categories above 5.0 acres saw a slight decrease in their proportional representation. Overall, the data paints a clear picture of a sector dominated by smallholders, a critical consideration for all future agricultural policy and development strategies.

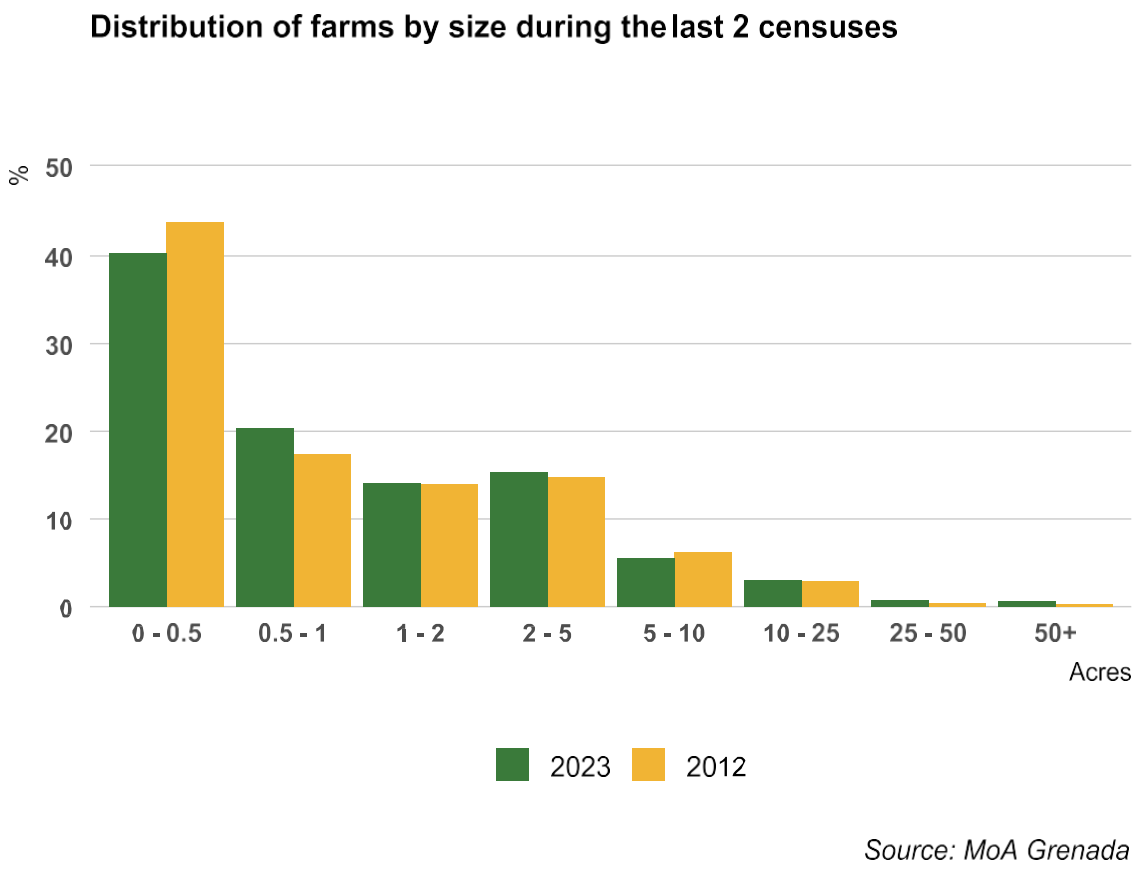
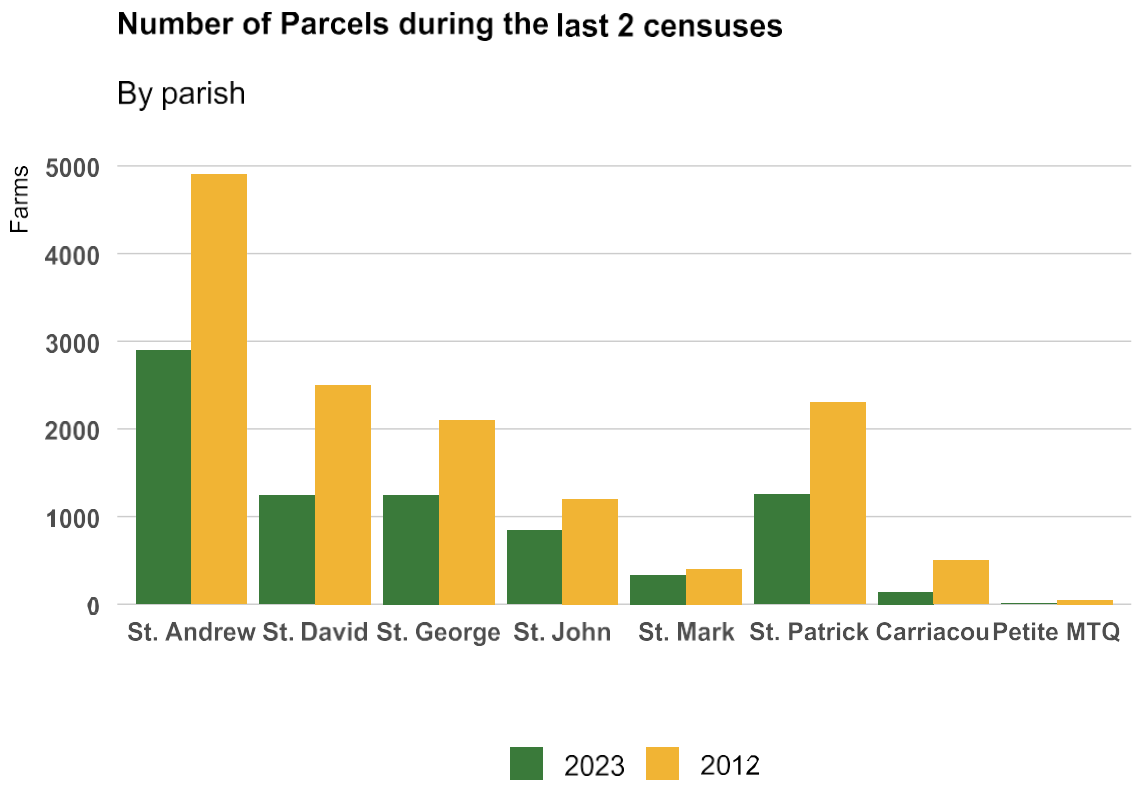


Figure 6: Distribution of Farms by Size.

The clear indication of the concentration of very small farms in Grenada's agricultural landscape, while the overall number of farms has decreased, suggests potential fragmentation of land, changes in agricultural practices favoring smaller-scale operations, or socio-economic factors influencing farm sizes. The relatively stable percentage distribution of larger farms, despite their numerical decline, implies that the trend towards smaller holdings is the dominant structural change occurring within Grenada's agricultural sector.

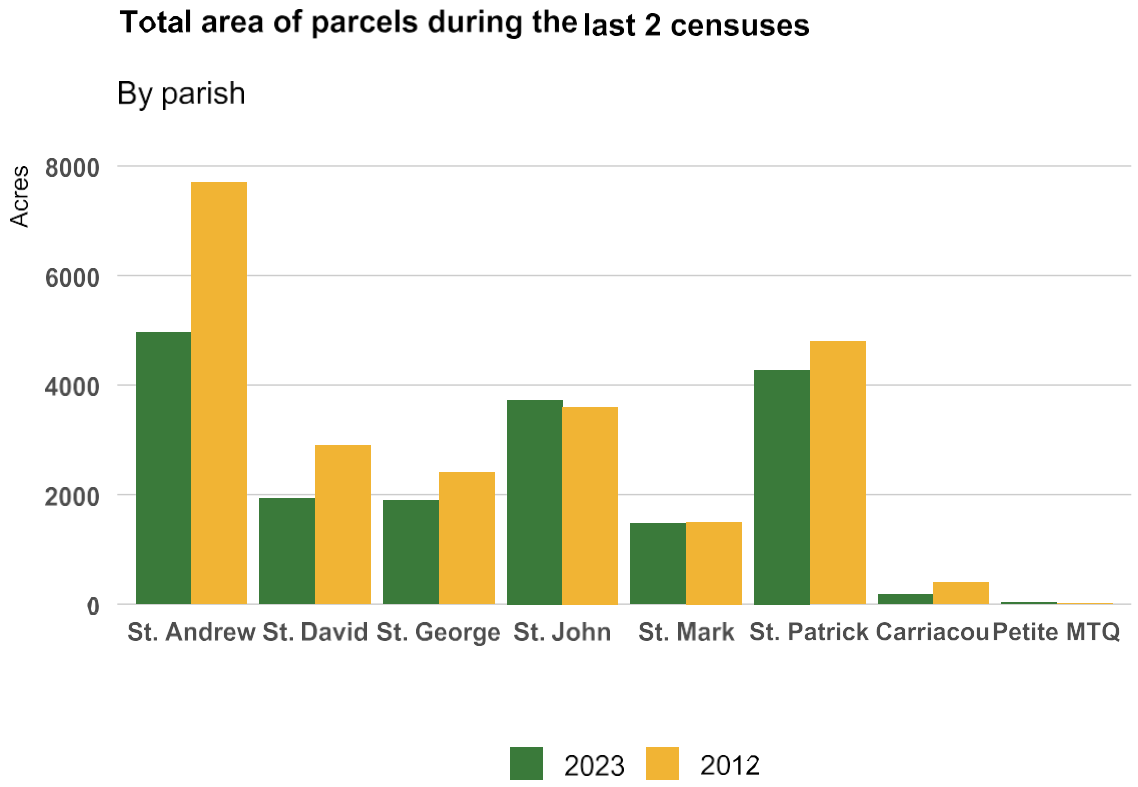
Building on the physical characteristics of farms, we now examine the geographic distribution and size of agricultural parcels.



Source: MoA Grenada

Figure 7: Number of Agricultural Parcels by Parish During the Last 2 Censuses.

An examination of the geographic distribution of agricultural parcels, as can be seen in Figure 7 above, reveals that the decline observed at the national level is a widespread phenomenon, affecting every parish in Grenada between the 2012 and 2023 censuses. The parish of St. Andrew, which possessed the highest concentration of parcels in 2012 at nearly 4,900, also experienced the most significant absolute reduction, falling to approximately 2,900 parcels by 2023. This downward trend was not isolated; other significant agricultural parishes such as St. David, St. Patrick, and St. George also registered substantial decreases. The pattern holds true even for the smaller administrative areas of St. John, St. Mark, Carriacou, and Petite Martinique, confirming that the reduction in farming operations is a nationwide phenomenon.



Source: MoA Grenada

Figure 8: Total Area of Agricultural Parcels by Parish During the Last 2 Censuses.

This trend of contraction is largely mirrored in the total agricultural area (acreage) of these parcels, as shown in Figure 8 above. Most parishes recorded a corresponding decrease in farm acreage, with St. Andrew again demonstrating the largest decline in absolute terms, shrinking from approximately 7,700 acres to 5,000 acres. However, the data reveals a notable exception in the parish of St. John. In direct contrast to the national trend, St. John experienced a slight increase in its total agricultural area, growing from approximately 3,600 acres in 2012 to 3,700 acres in 2023. This makes it the only parish to expand its agricultural land base during this period.

When analyzed concurrently, these datasets provide a more nuanced insight into the structural shifts within Grenada's agricultural sector. The combination of fewer parcels and an increased total area in St. John strongly suggests a pattern of land consolidation. This indicates that while some smaller farming operations may have ceased, their land has likely been absorbed into fewer, but larger, contiguous agricultural enterprises. This dynamic highlight that while the overall agricultural footprint is shrinking nationally, the underlying story at the parish level can vary, with some areas showing signs of consolidation and a move towards larger-scale farming rather than simple land abandonment.

3.1.2 Ownership and Legal Status of Farms

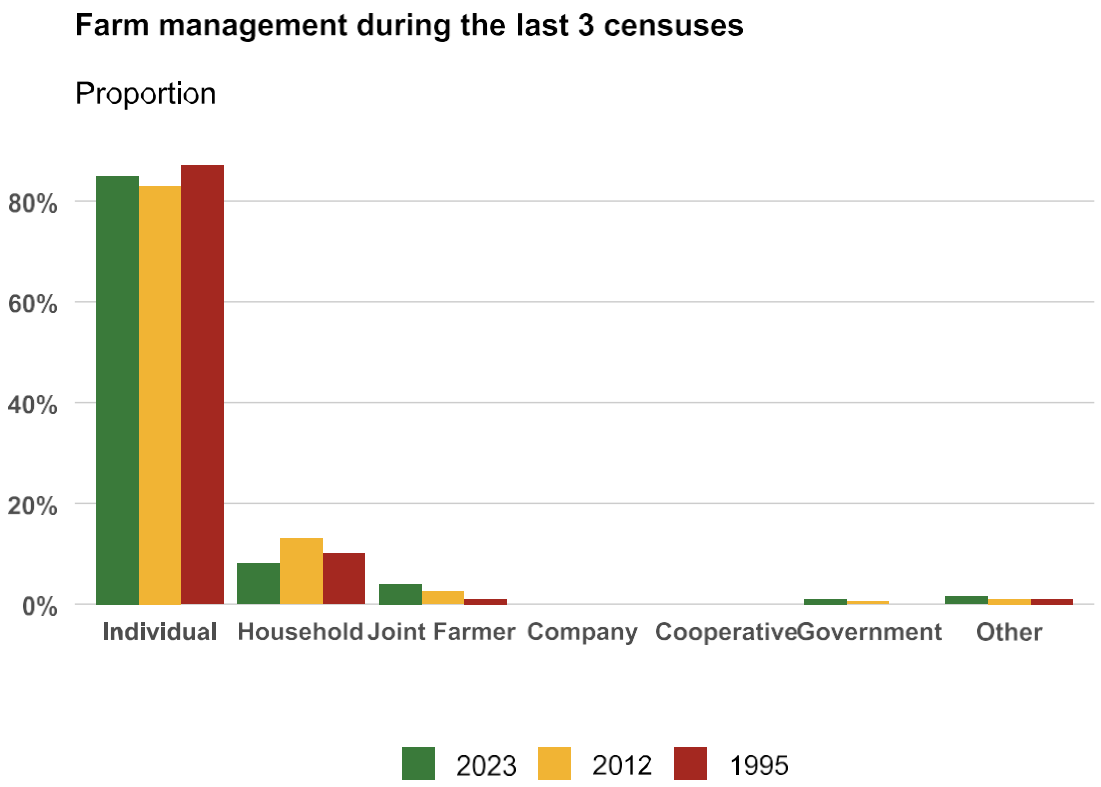


Figure 9: Distribution of Farms by Legal Status.

Figure 9 above illustrates the fact that across the three agricultural censuses (1995, 2012, and 2023), the legal status of farms in Grenada has shown a consistent pattern of individual ownership dominating the agricultural landscape. Most farms were individually owned, with this category representing **87%** in 1995, **82%** in 2012, and **85%** in 2023. While individual ownership remains the primary legal status, there have been slight fluctuations across the census years. Household-owned farms showed a small increase from **10%** in 1995 to **13%** in 2012, before decreasing to **8%** in 2023. Other categories, such as joint farmer ownership, company-owned farms, cooperatives, and government-owned farms, have consistently represented a very small proportion of the total number of farms across all three census years. This indicates that the structure of farm ownership in Grenada has remained largely unchanged, with a strong prevalence of individual proprietors.

3.1.3 Land Tenure and Ownership Patterns

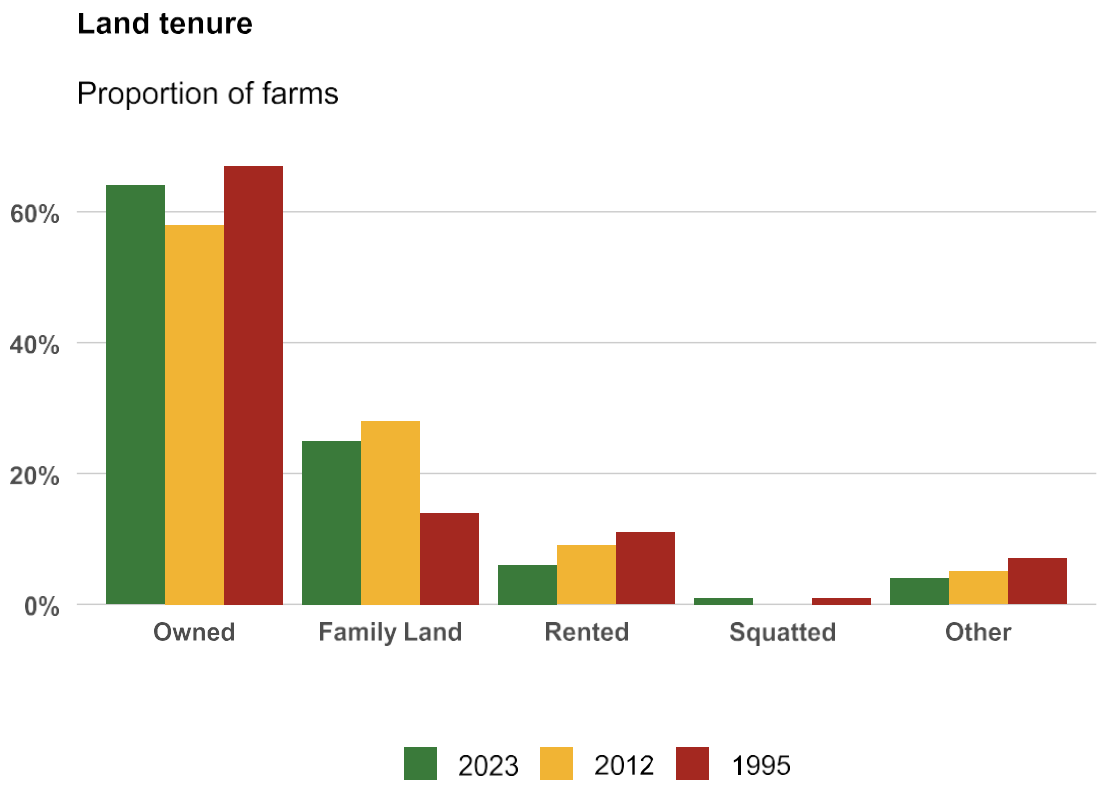


Figure 10: Proportional Distribution of Land Tenure Types Across 3 censuses.

As can be seen in Figure 10, the distribution of land tenure in Grenada has experienced significant shifts, though Owned land remains the dominant category. This form of tenure accounted for **67%** of total land in 1995, fell to **58%** in 2012, and rebounded to **64%** in 2023. Family Land saw a substantial increase from **14%** in 1995 to a peak of **28%** in 2012, before settling at **25%** in 2023. In contrast, Rented land has shown a consistent downward trend, decreasing from **11%** in 1995 to **9%** in 2012 and finally to **6%** in 2023. The Other category, which includes free use and communal arrangements, similarly declined from **7%** in 1995 to **4%** in 2023. Finally, Squatted land remains a marginal phenomenon, staying at approximately **1%** across the nearly three-decade period, indicating it is an insignificant factor in the national land tenure landscape.

3.2 Crop Production

3.2.1 Permanent Crops

Analysis of permanent crops reveals an important shifts in both the number of trees planted and the total area under cultivation between 2012 and 2023. The data points to a significant contraction in traditional crops, alongside a promising trend of diversification into other fruit varieties.

The most dramatic changes are observed in the total tree count for Grenada's primary crops. The number of Cocoa trees experienced a steep decline of nearly **47%**, falling from approximately 698,000 in 2012 to 371,000 in 2023. Bananas saw a similar, though less pronounced, reduction of **34.5%**, with the count dropping from around 759,000 to 497,000. Nutmeg, a cornerstone of the nation's agricultural identity, also saw its tree count decrease by about **14.6%**. In stark contrast to these declines, the aggregated category of "Fruit Trees" showed robust growth, increasing by **18%** from approximately 346,000 to 409,000 trees. This opposing trend is a strong indicator that farmers are actively diversifying their holdings away from the traditional "big three" and investing in a wider variety of fruit crops.

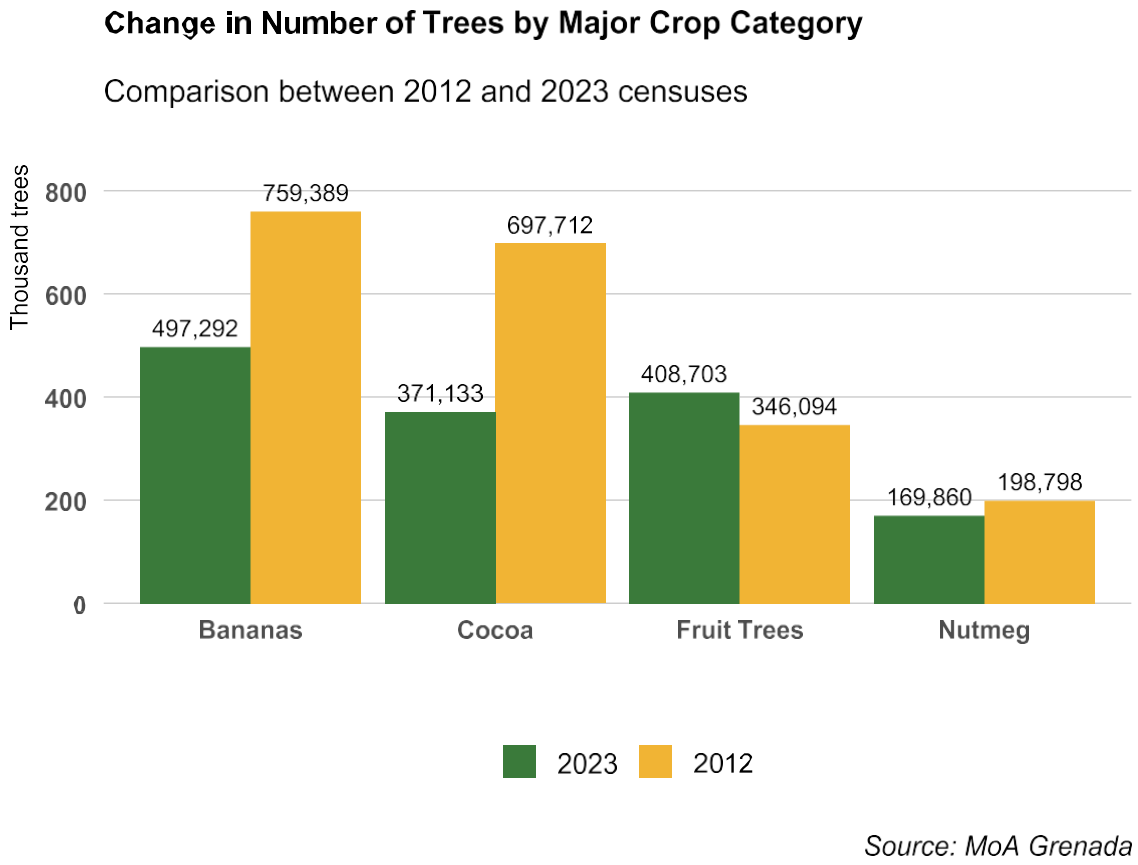


Figure 11: Number of Trees/Plants for Major Crop Categories.

This pattern of contraction and diversification is also reflected in the data on total area under cultivation, although with some key differences. The land area dedicated to Cocoa saw a significant drop of over **22%**, from 3,800 acres to 2,950 acres, mirroring the sharp fall in tree numbers. Nutmeg acreage, however, declined more modestly by about **8%**, suggesting that while fewer trees are being cultivated, the overall land footprint has not shrunk as drastically.

The most striking trend in land use is the surge in Soursop cultivation, which grew by over **58%** to 950 acres, establishing it as a major emerging crop. This, along with modest growth in the

area for Coconuts and Mangoes, reinforces the conclusion that farmers are shifting land use towards a more diverse portfolio of fruit crops.

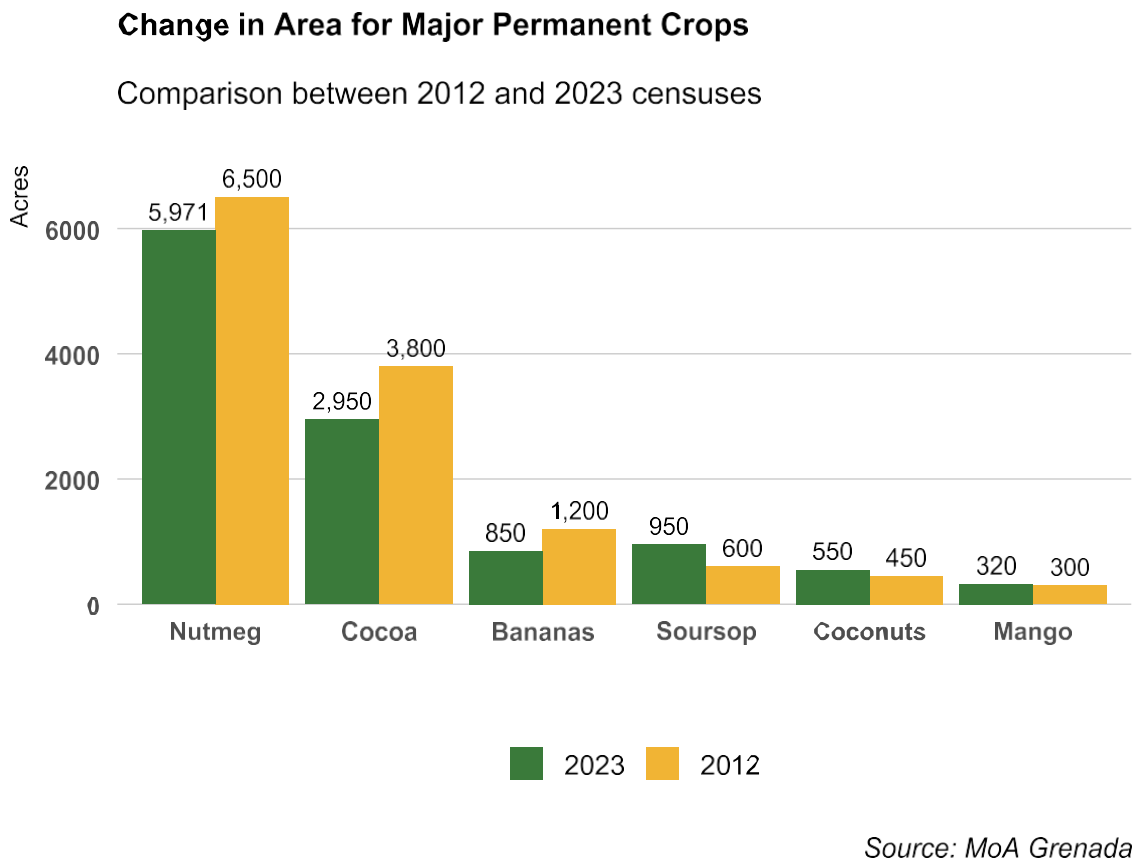


Figure 12: A Comparison of the Total Area Dedicated to Major Permanent Crops.

3.2.2 Temporary Crops

Beyond permanent tree crops, the cultivation of temporary crops, those with shorter growing cycles, represents a significant and dynamic part of Grenada's agricultural landscape. The 2023 census data on the number of plants reveals a strong concentration of production in specific parishes and provides an important contrast to the trends seen in other parts of the sector. The parish of St. George emerges as the dominant producer of temporary crops, accounting for over one million plants, which is nearly double the output of the next largest parish, St. Andrew. Together, these two parishes represent the vast majority of temporary crop cultivation in the nation. St. David, St. Patrick, and St. John form a second tier of significant producers, while Carriacou and St. Mark show much smaller-scale operations. Notably, the overall count of temporary crop plants in 2023 reached approximately 2.3 million. This represents a notable increase from the roughly 2.1 million plants estimated in the 2012 census. This growth in temporary crops, occurring alongside the decline in farm numbers and some permanent crops,

suggests a strategic shift among farmers towards shorter-cycle, faster-return produce, likely aimed at supplying local and tourism markets.

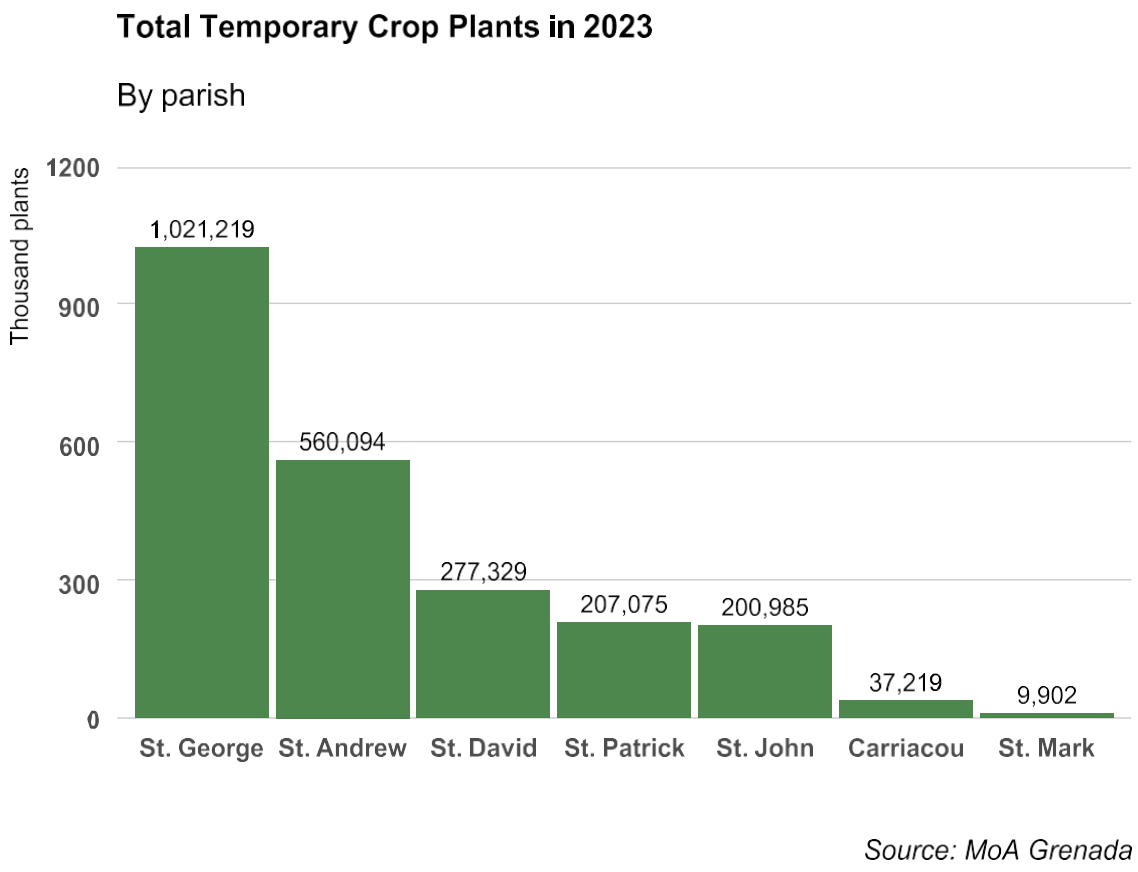


Figure 13: Number of Temporary Crop Plants by Parish in 2023.

Having examined the cultivation of permanent crops, the focus now shifts to another essential aspect of agriculture: livestock.

3.3 Livestock Inventory and Production

We begin by examining the livestock inventory across the last three censuses. The histogram below illustrates the changes in animal numbers over this period.

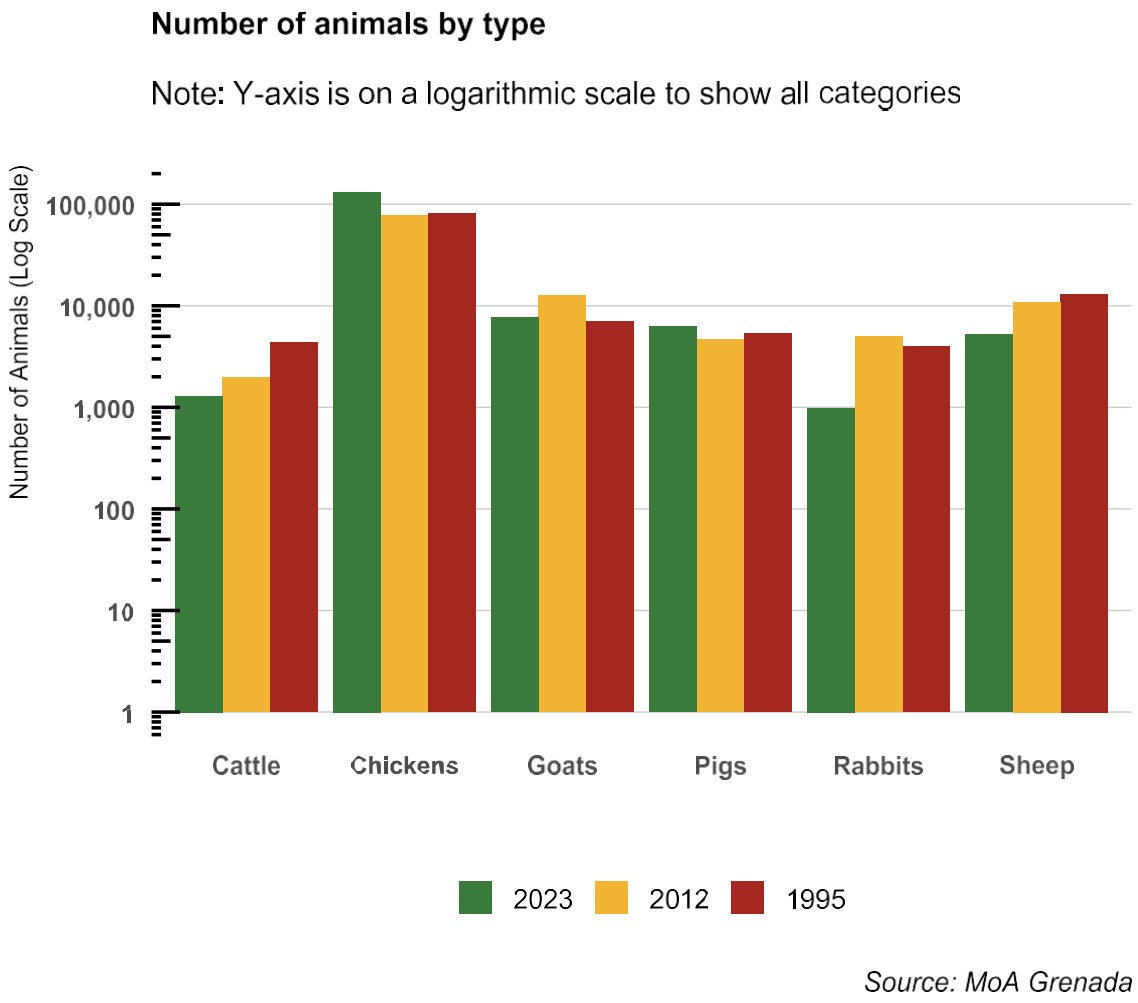


Figure 14: A Comparison of Livestock Populations Across the Last 3 censuses.

The analysis of livestock populations between the 1995, 2012, and 2023 censuses from Figure 14 reveals a dynamic and multifaceted picture of structural change within Grenada's agricultural sector. In stark contrast to the general decline in farm numbers, the livestock data shows diverging trends. The most significant development is the massive expansion of the poultry industry, with the chicken population surging to over 130,000 in 2023, indicating a decisive shift towards intensive, short-cycle production. Conversely, traditional grazing livestock have experienced a sustained and pronounced decline, with both cattle and sheep populations diminishing significantly over the three-decade period. Other categories show more varied patterns: the goat population, after peaking in 2012, has since contracted, while the pig population has demonstrated resilience and modest growth. Taken together, these trends illustrate a clear pivot in livestock farming—away from extensive, land-based ruminant systems and towards large-scale, commercial poultry production.

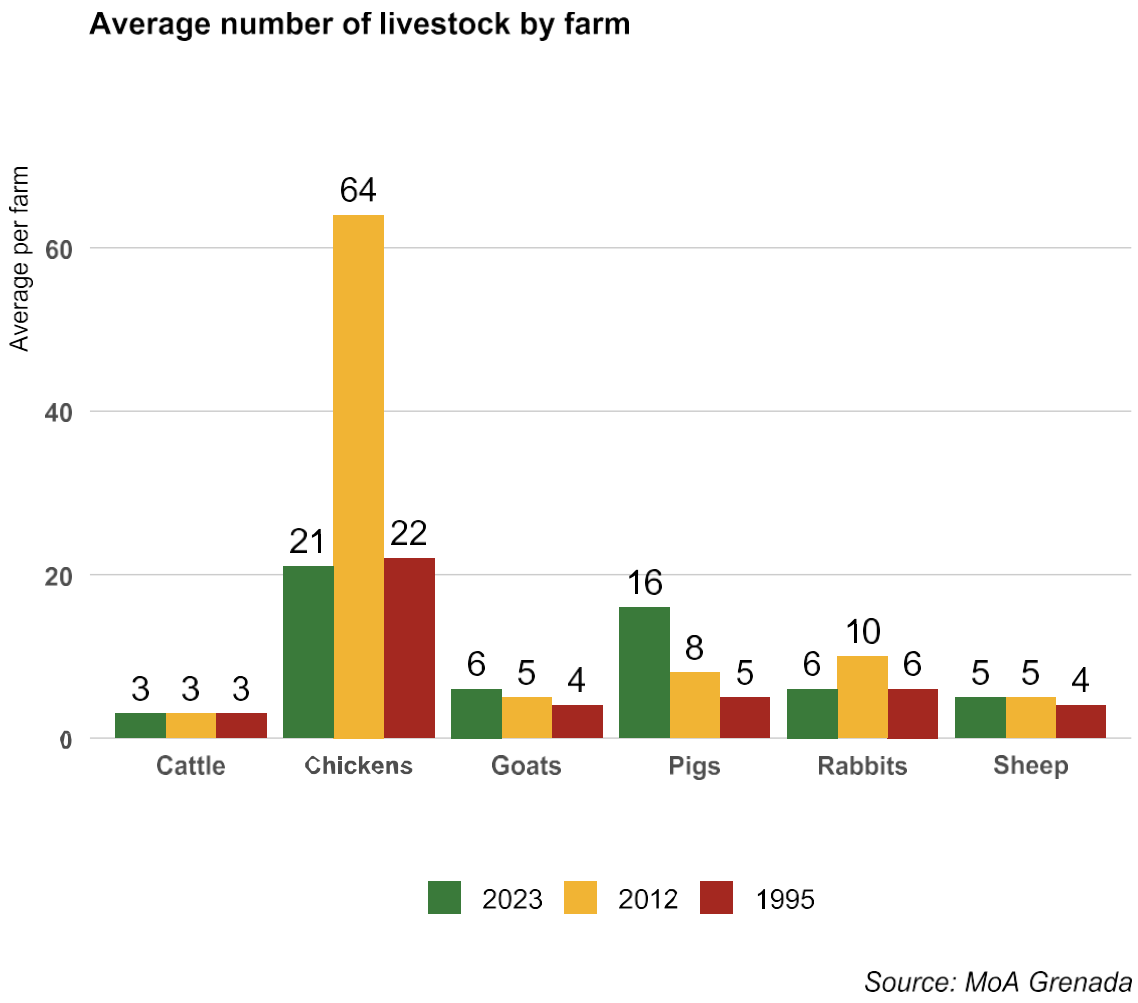


Figure 15: Average Number of Animals per Farm for Each Livestock Type.

A comparison of the average number of animals per farm, as can be seen in Figure 15 above, alongside the total livestock population, reveals a fundamental shift in the structure and intensity of livestock farming in Grenada between 1995 and 2023. While the total population of traditional grazing animals like sheep and cattle has plummeted over the last three decades, the average number of these animals per farm has remained remarkably stable, hovering around 3-5 animals. This indicates that the decline in total numbers is not due to farmers reducing their individual herd sizes, but rather a significant exit of farmers from cattle and sheep rearing altogether. The small-scale, traditional model of raising these animals persists among the remaining farmers, but far fewer people are participating. The story for chickens and pigs is one of intensification and commercialization. The total chicken population exploded to over 131,000 by 2023. While the average flock size per farm dipped in 2023 compared to a peak in 2012, it remains at a significant 21 birds per farm. Similarly, the total number of pigs has grown, driven by an increase in the average number of pigs per farm, which rose from 5 in 1995

to 16 in 2023. Together, these trends paint a clear picture: Grenada's livestock sector is undergoing a structural pivot. The extensive, smallholder model for ruminants is contracting due to a decreasing number of participating farms, while the pig and especially the poultry sectors are expanding through an increase in the scale and intensity of the remaining operations.

As can be seen from Table 1, an analysis of the geographic distribution of livestock reveals significant parish-level specializations, with the chart's logarithmic scale highlighting differences across orders of magnitude. The most prominent feature is the overwhelming concentration of the poultry industry in St. George, which reports a chicken population approaching 100,000—an order of magnitude larger than any other parish. In contrast, the traditional ruminant sector is clearly centered in St. Andrew, which leads in cattle, sheep (with a population approaching 2,000), and goat populations. The island of Carriacou also maintains its distinct agricultural identity with its own significant concentration of sheep, numbering well over 1,000. Pig farming appears more broadly distributed among several parishes, while emerging sectors such as apiculture show a clear concentration of beehives, with St. David and St. Andrew reporting the highest counts.

Table 1: Count of Animals by Parish.

Counts of animals by parish

Parish	Chicken	Cattle	Sheep	Goats	Pigs	rabbits	beeHives
St. George	81,751	228	571	2,351	1,433	37	27
St. John	7,198	82	262	668	2,288	291	88
St. Mark	504	50	189	468	143	18	0
St. Patrick	7,912	172	538	944	395	57	47
St. Andrew	19,569	582	2,239	1,929	1,535	423	355
St. David	13,062	152	520	1,011	426	131	437
Carriacou & Petite MTQ	1,941	27	884	357	87	30	64

Source: MoA Grenada

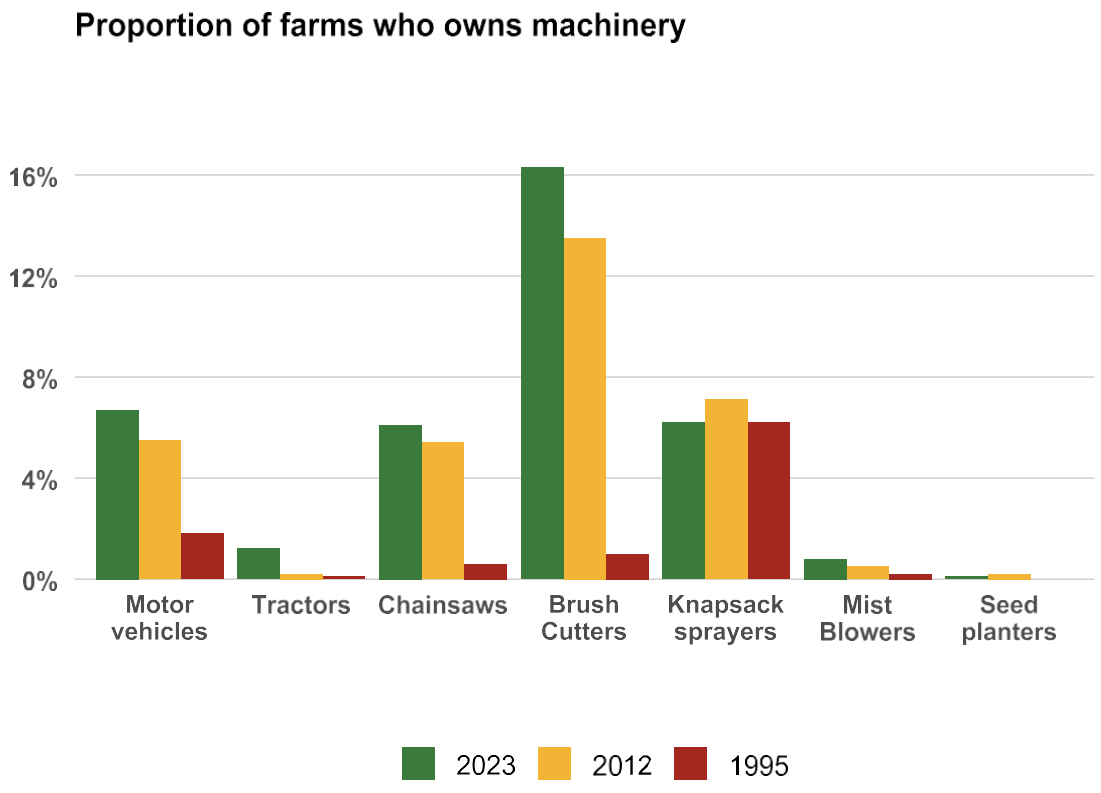
Having discussed the core characteristics of Grenada's farms in terms of crops and livestock, the analysis now shifts to the operational and economic dimensions of these agricultural enterprises. This next section examines the practical inputs used in modern farming, including the adoption of machinery and the application of agrochemical products. Finally, to assess the economic viability of agriculture as a profession, we will investigate the extent to which farmers can sustain their livelihoods from their farm, by analyzing the percentage of their income derived directly from agricultural activities.

3.4 Farm Operations and Economic Viability

We begin by analyzing the role of machinery in Grenadian agriculture, exploring its usage and impact on farming practices.

3.4.1 Machinery

Figure 16 below shows results on farm machinery ownership from 1995 to 2023. The data reveal a clear and significant trend toward the adoption of small-scale, labor-saving mechanization. The most striking development is the dramatic rise in the ownership of brush cutters, which have become the most common piece of equipment, reported by over **16%** of farms in 2023. This is complemented by steady growth in the proportion of farms owning motor vehicles and chainsaws. However, this mechanization trend is not uniform; ownership of knapsack sprayers, once a common tool, has notably declined since its peak in 2012. Furthermore, the adoption of heavy and specialized machinery remains extremely limited, with ownership of tractors, mist blowers, and seed planters staying at negligible levels, typically around **1%** or less. This overall pattern suggests that while Grenadian farmers are increasingly investing in hand-held power tools to enhance efficiency and reduce the burden of manual labor, the sector has not undergone a shift towards large-scale, industrial mechanization.



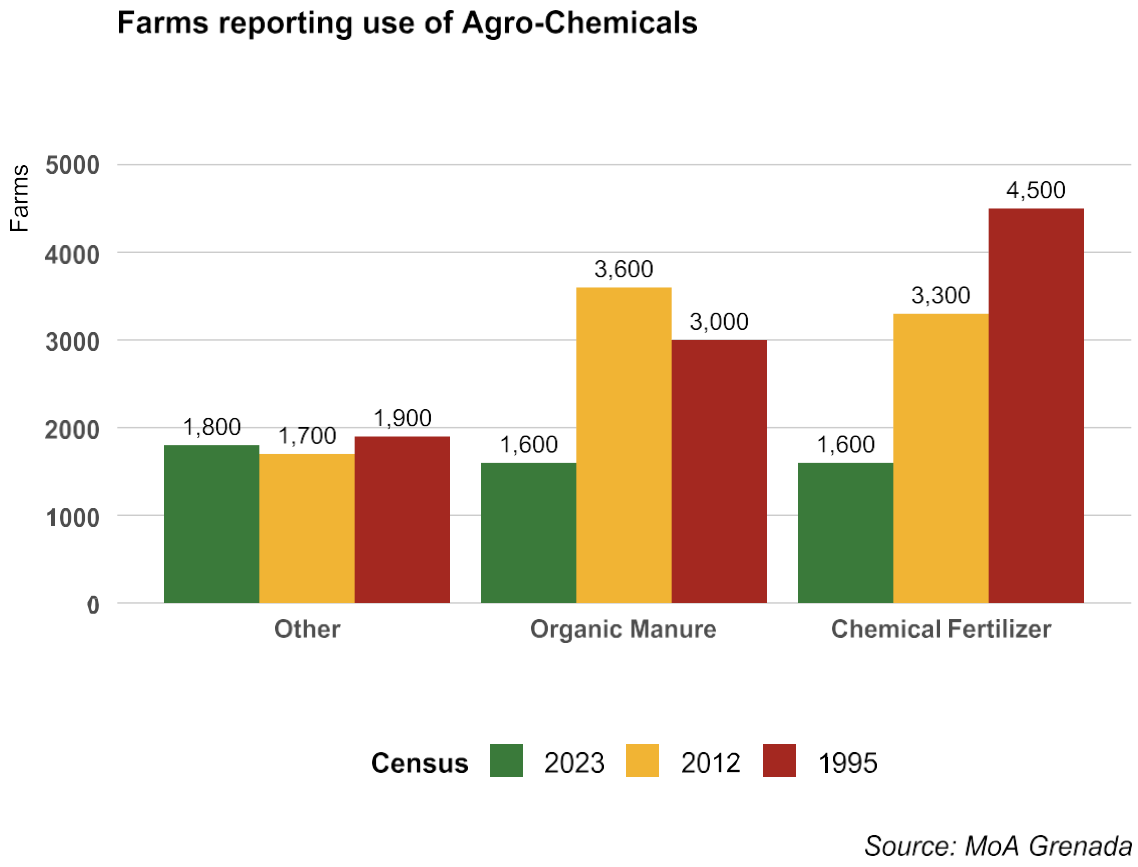
Source: MoA Grenada

Figure 16: Proportion of Farms Owning Various Types of Machinery Across 3 Censuses.

3.4.2 Agro-chemical Use

Turning our attention to the use of agro-chemical products, we noticed from Figure 17 below, that the reported use of agro-chemicals and soil amendments among Grenadian farms has

declined significantly in absolute numbers across the three census periods, a trend consistent with the overall reduction in the number of active farms. The total number of farms reporting the use of any such input fell from over 9,000 in 1995 to approximately 5,000 in 2023. Beyond this general decline, the data reveals a critical shift in the types of inputs being utilized. The use of chemical fertilizers has seen the most dramatic and consistent reduction, falling from being the most common input in 1995 (used by ~4,500 farms) to one of the least common by 2023 (used by ~1,600 farms). In contrast, the "Other" category of agro-chemicals has remained remarkably stable in absolute numbers throughout the period. As a result of these diverging trends, this "Other" category has emerged as the most frequently reported input in 2023, surpassing both chemical fertilizers and organic manure, signaling a fundamental change in soil management and crop protection practices among the remaining farms.



Source: MoA Grenada

Figure 17: Farms Reporting Use of Different Agro-chemical Types Across 3 Censuses.

3.4.3 Income from Farm

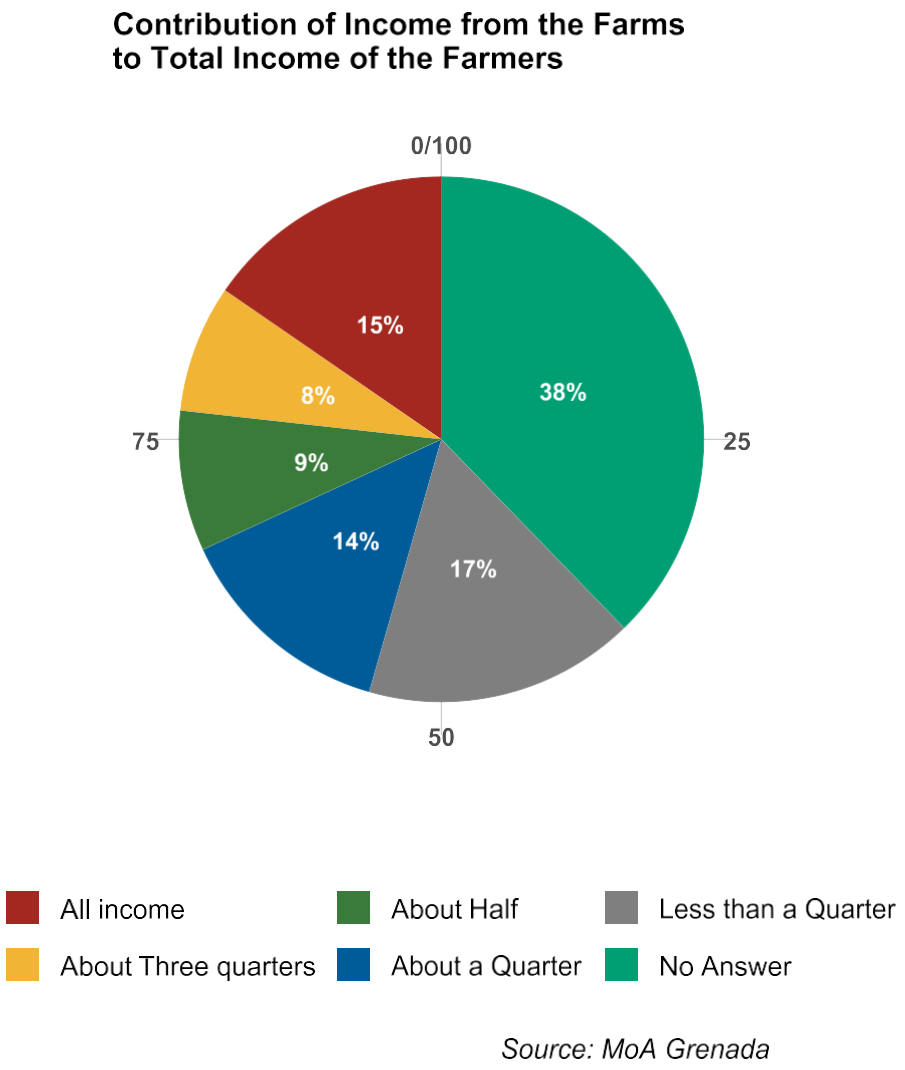


Figure 18: Contribution of Farm Income to the Total Income of Farmers in 2023.

An analysis of the contribution of farm income (refer to Figure 18) to the total income of farmers provides critical insight into the economic viability and role of agriculture as a livelihood in Grenada. The most striking initial finding, as can be seen from the pie chart, is the high proportion of non-responses (**38%**), which limits the definitiveness of conclusions but may itself indicate that many farmers do not track farm income as a distinct category. Among the farmers who did respond, the data shows that full reliance on agriculture is uncommon, with only **15%** reporting that their farm provides all of their income. A clear pattern of income diversification emerges when the data is aggregated: the proportion of farmers for whom agriculture is a primary source of income (contributing half, three-quarters, or all income) totals **31%**. This is precisely equal to the **31%** of farmers for whom agriculture is a supplemental source of income (contributing a quarter or less). This balance underscores that for most individuals engaged

in agriculture, farming is not a standalone profession but is instead a key component within a broader, diversified livelihood strategy that combines both on-farm and off-farm earnings.

To fully comprehend the observed shifts in farm operations and economic viability, it is essential to analyze the characteristics of the individuals behind these farms. This section therefore transitions to a demographic profile of Grenada's farmers. By comparing key indicators such as age distribution, gender participation, and educational attainment between the 2012 and 2023 censuses, we can gain insight into the changing human dynamics that are shaping the nation's agricultural sector.

3.5 Demographics of Farm Operators

3.5.1 Age

The age distribution of farmers in Grenada as can be seen below, reveals an aging agricultural workforce. In 2023, the highest number of farmers were in the 60-69 age group (approximately 1,560), followed by the 50-59 age group (around 1,500). Compared to 2012, there has been a noticeable decrease in the number of farmers across most age groups, particularly in the younger categories. For instance, the 30-39 age group saw a decline from roughly 1,300 farmers in 2012 to about 900 in 2023. Interestingly, the 60-69 age group showed a smaller increase compared to other cohorts.

Table 2: Median Age of Farmers Between 2012 and 2023.

Median age of farmers

by parish

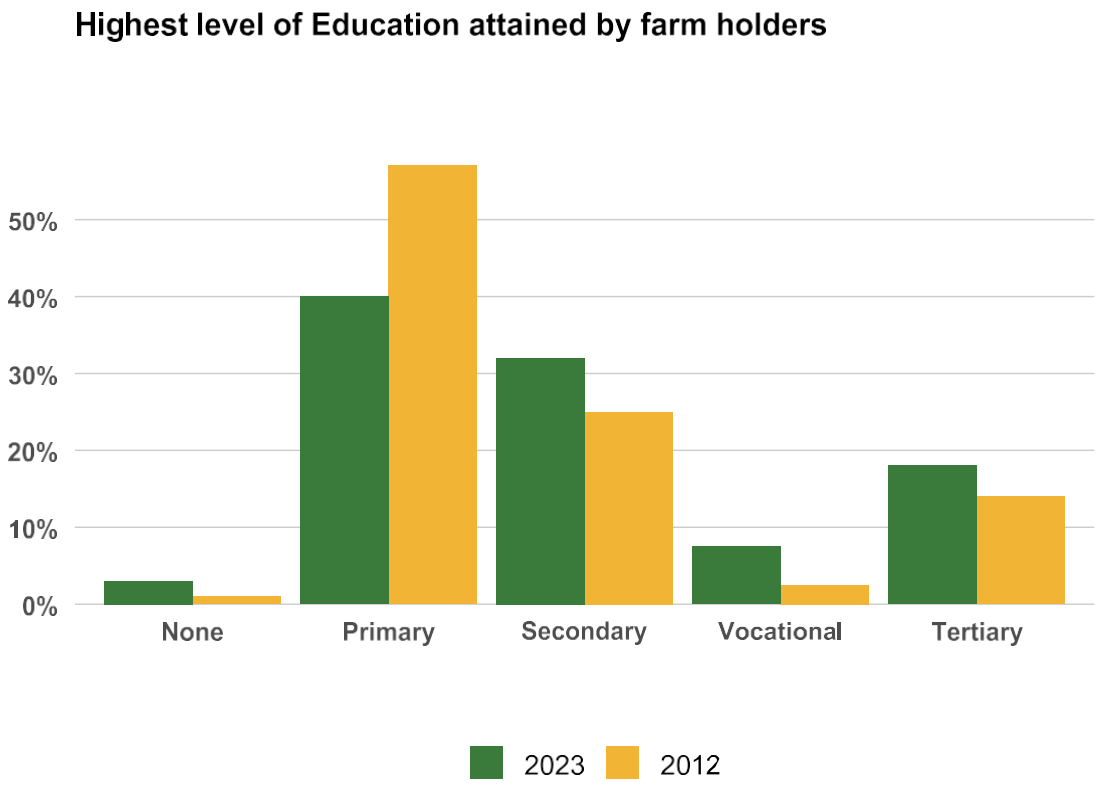
	Census 2012		Census 2023	
Parish	Male	Female	Male	Female
St. George	51	53	55	56
St. John	51	52	57	55
St. Mark	57	58	56	56
St. Patrick	52	54	54	54
St. Andrew	50	52	53	55
St. David	51	54	54	55

Source: MoA Grenada

As can be seen from Table 2, the median ages between 2012 and 2023, all parishes except St. Mark experienced an increase in the median age for both male and female farmers, reinforcing the trend of an aging agricultural population. For instance, in St. George, the median age for male farmers increased from 51 in 2012 to 55 in 2023, and for female farmers, it rose from 53 to 56. Interestingly, St. Mark showed a slight decrease in the median age for male farmers from 57 to 56, while the median age for female farmers decreased from 58 to 56. The Median age for female farmers in St. Patrick remained constant at 54. These parish-level variations suggest that the aging of the farming population is not uniform across Grenada, with

some regions experiencing a more pronounced increase in the median age of their farmers than others.

3.5.2 Education Level of Farmers



Source: MoA Grenada

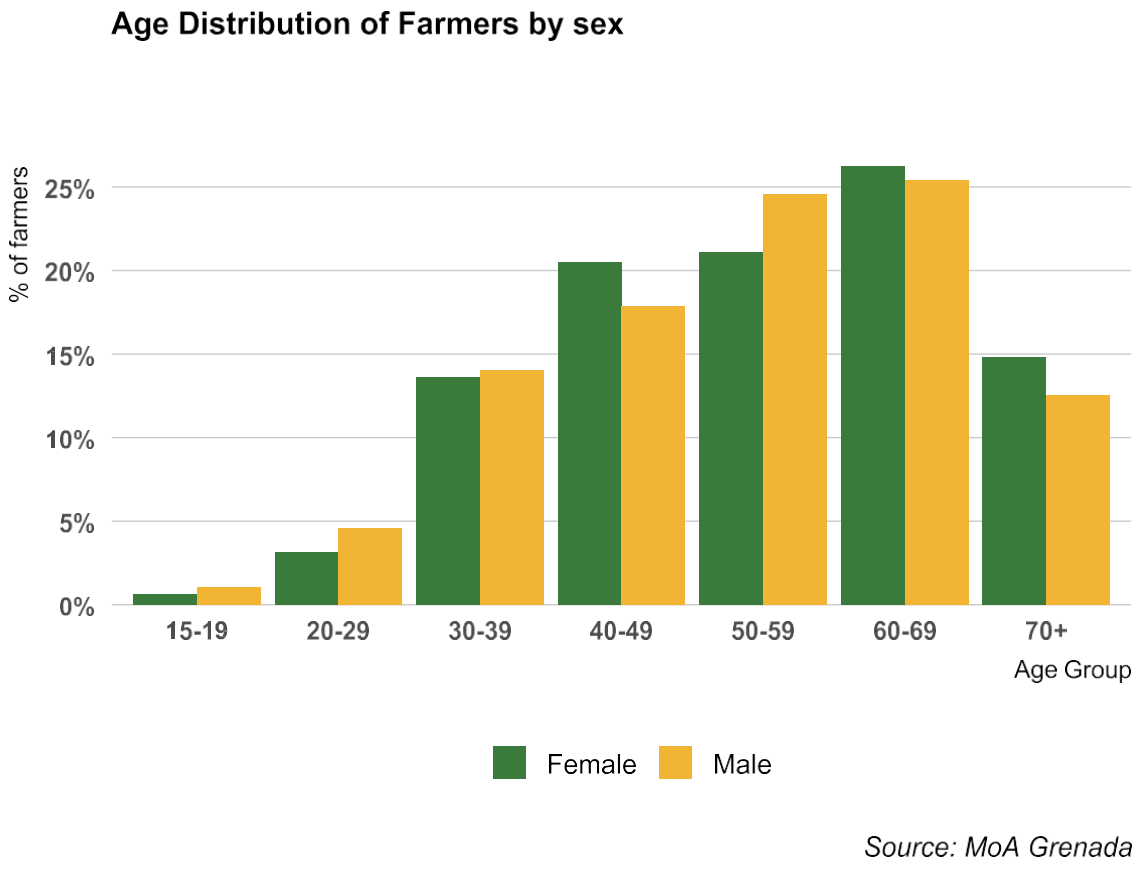
Figure 19: A Comparison of the Highest Education Level Attained by Farmers.

As can be seen from Figure 19, the education levels of farmers in Grenada are trending positively, though some concerns remain. There has been a notable decline in the proportion of farmers with only primary education, decreasing from **57%** in 2012 to **40%** in 2023, indicating a move away from solely basic education within the sector. Concurrently, the percentage of farmers attaining secondary and tertiary education has increased. Secondary education levels among farmers rose from **25%** in 2012 to **32%** in 2023, while tertiary education increased from **14%** to **18%** over the same period. These increases suggest a growing number of farmers are acquiring the advanced knowledge and skills necessary for modern and sustainable agricultural practices. However, the slight increase in farmers with no formal education, from **1%** in 2012 to **3%** in 2023, warrants attention. Overall, the data indicates a positive shift towards higher education levels within Grenada's farming community, which has the potential to modernize and expand the agricultural sector.

The main takeaway is that Grenada's agricultural sector is experiencing an aging workforce, coupled with a positive trend in rising education levels among farmers. The data indicates a decline in the number of farmers in younger age groups and a concentration in the older age brackets, with the median age of farmers increasing across most parishes between 2012 and 2023. Despite this aging trend, the education levels of farmers are also improving. There's a decline in the proportion of farmers with only primary education (from **57%** in 2012 to **40%** in 2023) and a concurrent increase in those with secondary (from **25%** to **32%**) and tertiary education (from **14%** to **18%**). This suggests that while the farming population is getting older, a growing number of farmers are equipped with the knowledge and skills necessary for modern and sustainable agricultural practices.

3.5.3 The Role of Women in Agriculture in Grenada

Women play a vital and substantial role in Grenada's agriculture sector, comprising approximately one-third (**32%**) of all farmers identified in the 2023 census. An analysis of their demographic profile reveals key characteristics regarding their age and educational attainment compared to their male counterparts.



Source: MoA Grenada

Figure 20: Percentage Distribution of Farmers by Age Group and Gender.

The age distribution for both male and female farmers follows a similar pattern, confirming the broader trend of an aging agricultural workforce. For both genders, the highest concentration of farmers is found in the 50-59 and 60-69 age brackets, with significantly fewer participants under the age of 40. However, the data indicates that female farmers are slightly more concentrated in the oldest age cohorts. For instance, **26%** of all female farmers are in the 60-69 age group, and **15%** are aged 70 or older. This is slightly higher than for male farmers, where the proportions are **25%** and **13%**, respectively.

When examining educational attainment, a clear trend emerges: female farmers, on average, have achieved higher levels of formal education. A significantly smaller proportion of women in agriculture have only primary education (**33%**) compared to men (**43%**). Conversely, a higher percentage of female farmers have completed secondary (**40%** vs. **34%** for men) and tertiary education (**9%** vs. **6%** for men).

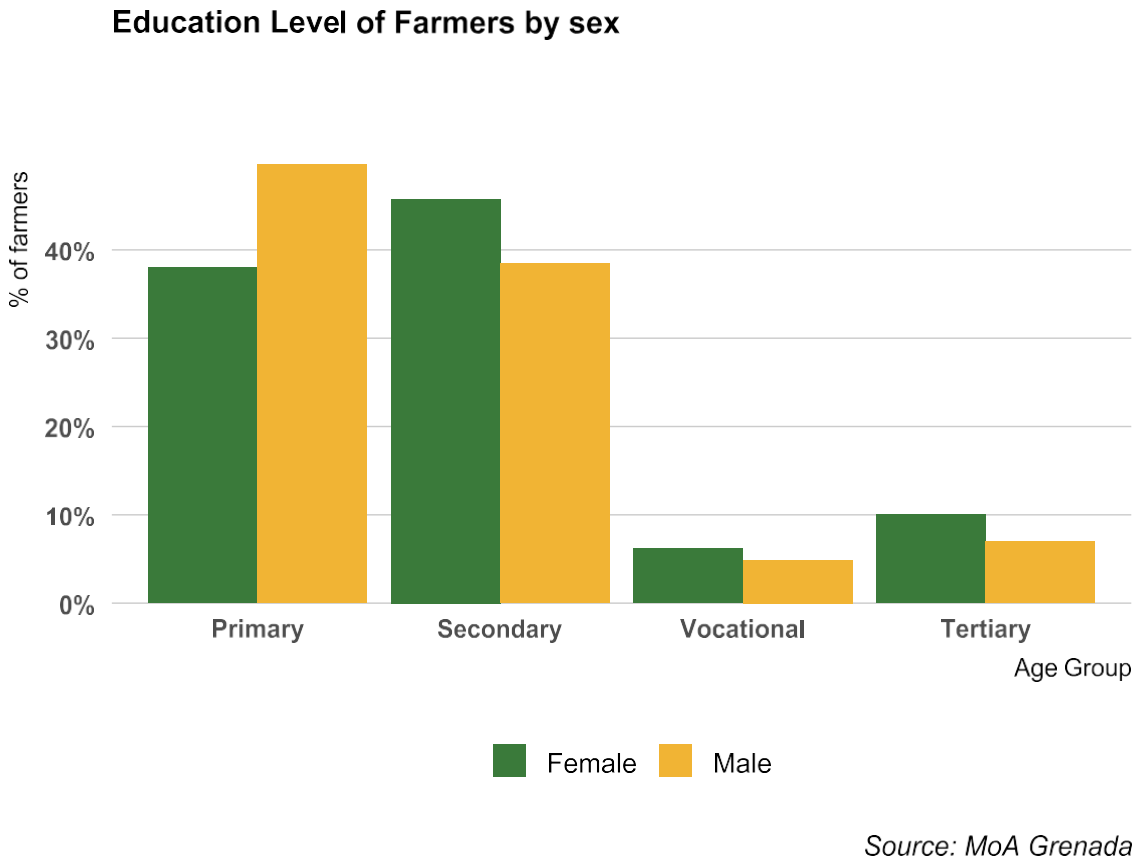


Figure 21: Percentage Distribution of Farmers by Age Group and Gender.

In summary, the demographic data reveals a nuanced picture. Women in agriculture in Grenada appear to be, on average, slightly older and tend to have higher levels of formal education than their male counterparts. However, the pronounced concentration of both male and female farmers in the 50+ age brackets underscores that this is not just a gender-specific trend but

rather a reflection of the overarching demographic challenge facing the entire agricultural sector: an aging workforce.`

3.5.4 Main Occupation of Farmers

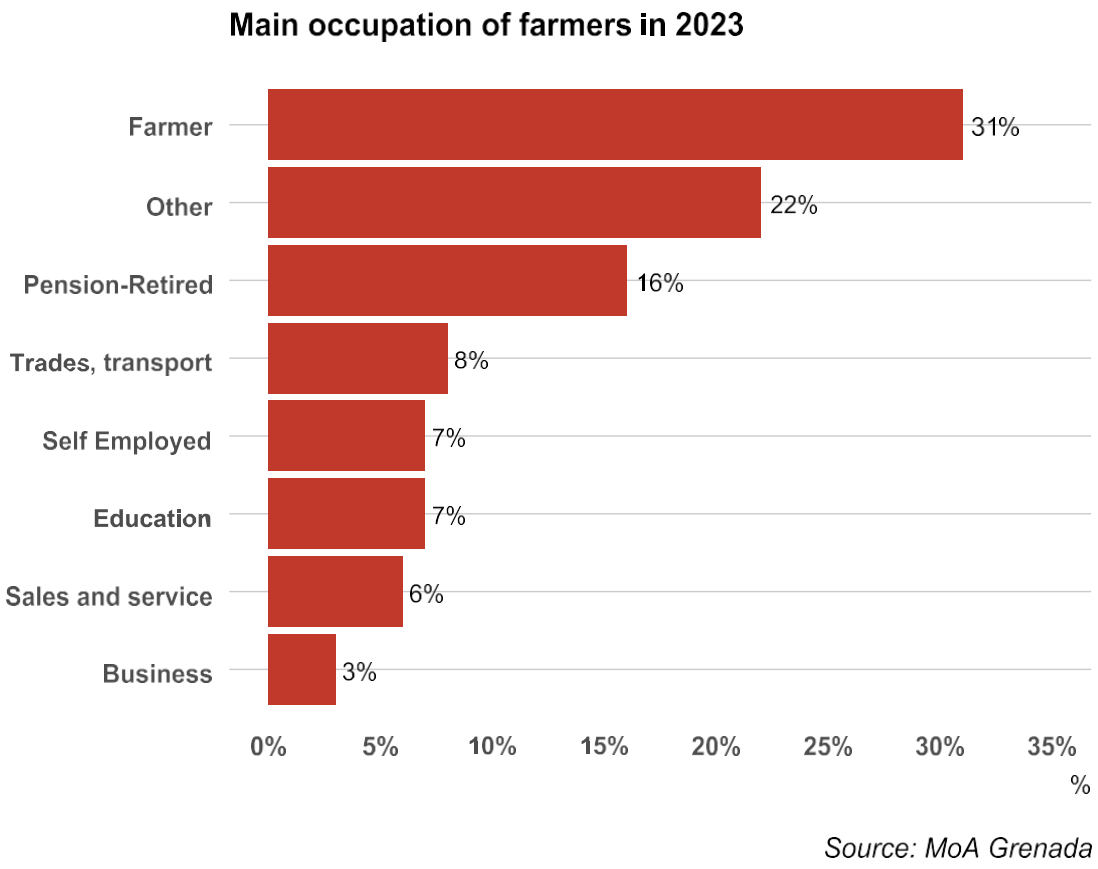


Figure 22: The Main Occupation of Farm Holders in 2023

From Figure 22 above, an analysis of the main occupations of farm holders in 2023 provides a clear picture of the role agriculture plays in their professional lives. While 'Farmer' is the most frequently cited main occupation at approximately **31%**, this finding underscores a crucial reality: for the vast majority (**69%**) of individuals operating farms, agriculture is not their primary profession. The data further reveals a significant portion of farm holders are engaged in other fields, with a large, undefined 'Other' category accounting for over **20%** of respondents. Crucially, 'Pension-Retired' individuals make up the third-largest group at **16%**, pointing towards an aging farming population and the role of agriculture as a post-career activity. The presence of farmers whose main occupations are in trades, education, and self-employment further reinforces the conclusion from the income data: for most, farming in Grenada is a vital component of a diversified livelihood strategy rather than a singular, full-time profession.

3.6 Farm Management and Organizational Linkages

To better understand how farms operate, this section looks at two important characteristics. First, we present data on the proportion of farmers who keep formal records for their business. Second, we analyze the extent to which farmers are members of an association or cooperative.

3.6.1 Farms Keeping Records

The adoption of formal record-keeping (as can be seen in Figure 23), a cornerstone of modern farm management, remains remarkably low across Grenada, with only about **11%** of all farms nationally reporting this practice in 2023. As can be seen from Figure 23, this low overall rate, however, varies considerably by parish, indicating regional differences in farm business practices. The parish of St. George, and Carriacou & Pt. Martinique combined show the highest rates of adoption, with **16%** of farms in each region keeping records, followed closely by St. David at **14%**. Conversely, the practice is least common in St. Andrew and St. Mark, where only **6%** and **8%** of farmers maintain records, respectively. This data suggests that while record-keeping is not a widespread practice, it is more prevalent in certain parishes, pointing to potential areas where targeted training and business support could be most effective.

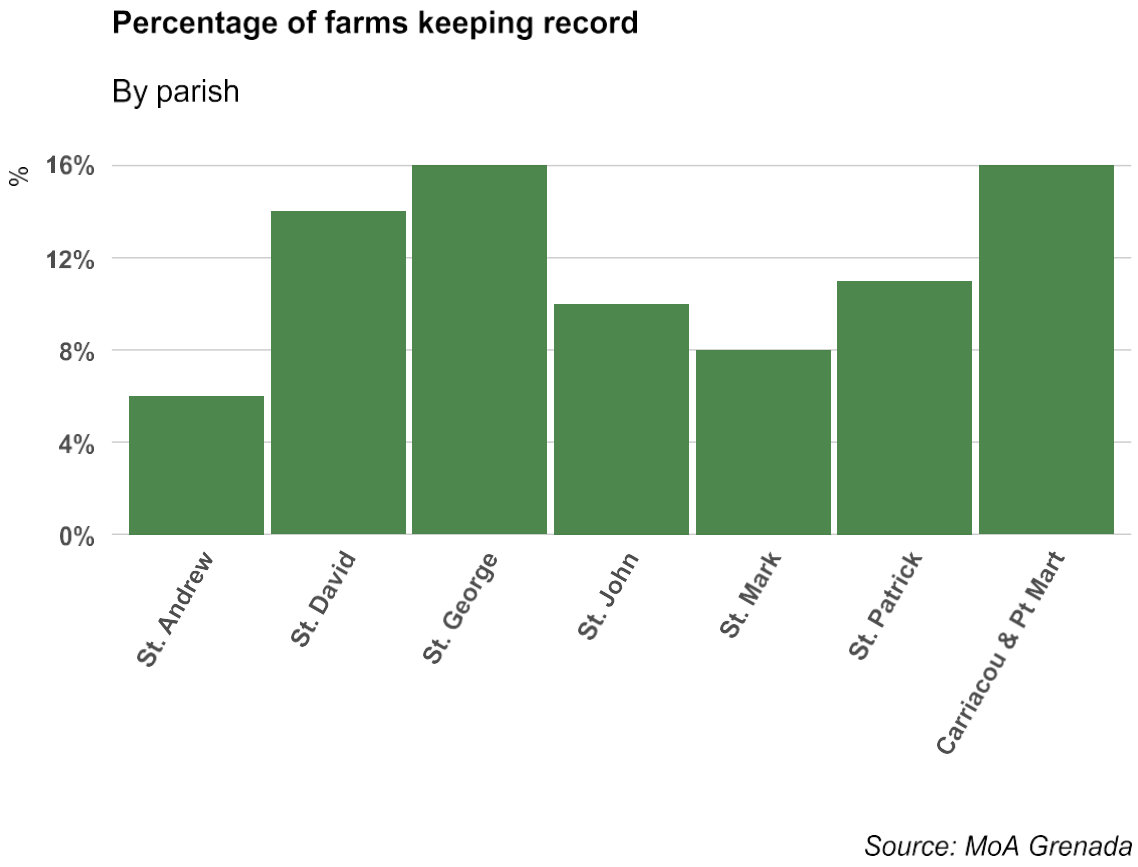


Figure 23: Percentage of Farms Keeping Records by Parish in 2023.

3.6.2 Farmers in Farm Associations

Participation in formal farmer associations (Figure 24) provides a key support structure for agricultural development, and the data as presented in Figure 24, reveals a clear concentration around Grenada's traditional export crops. The Grenada Co-operative Nutmeg Association (GCNA) and the Grenada Cocoa Association (GCA) are by far the most significant, with **20%** and **19%** of all farmers being members, respectively. This strong affiliation underscores the central role these historic sectors play in the agricultural community, particularly for nutmeg, where Grenada is a globally significant producer. The high membership in the GCA also reflects the ongoing national efforts to revitalize the fine-flavor cocoa industry. In stark contrast, associations for other sectors, such as poultry, bees, and general livestock, have a much smaller footprint, with each representing less than **2%** of the farming population. This indicates that while the commodity-based cooperative model is well-established, there is a substantial opportunity to expand associative and support networks into other emerging and domestic-focused agricultural areas.

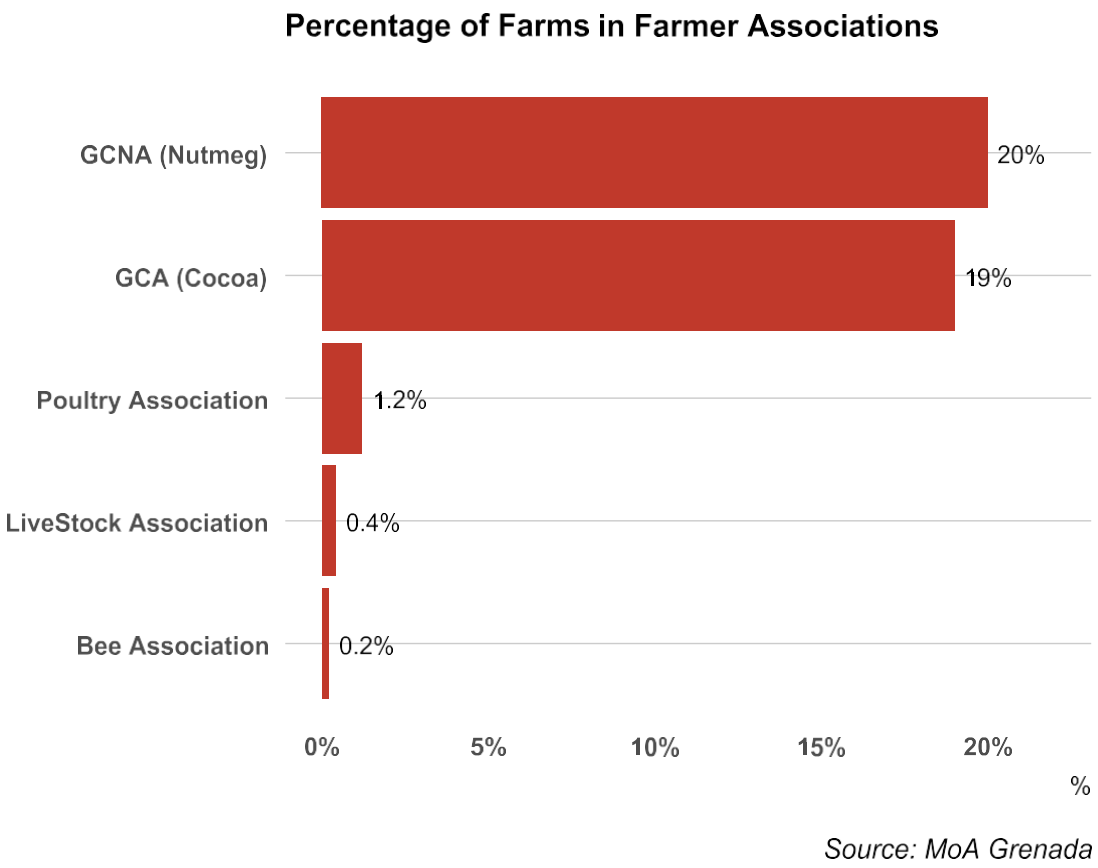


Figure 24: Percentage of Farms Belonging to Various Farmer Associations

4 Conclusion and Recommendations

The 2023 Grenada Census of Agriculture provides a critical and detailed snapshot of a sector in profound transition. The findings paint a picture of an agricultural landscape that is contracting in size and scale but also adapting through significant shifts in production systems, mechanization, and farmer demographics. The following section summarizes the most important insights, discusses their broader implications, and offers actionable recommendations to guide policy and support the future of agriculture in Grenada.

4.1 Summary of Key Findings

The most significant insights from the 2023 census can be summarized as follows:

1. **Significant Sectoral Contraction:** The agricultural sector has experienced a substantial and accelerating decline over the past decade. This is evidenced by a **33% reduction in the number of eligible farms** and a **21.7% decrease in total farm area** between 2012 and 2023, under a consistent census methodology. This contraction is widespread across most parishes.
2. **An Aging and Part-Time Workforce:** The demographic profile of the Grenadian farmer is characterized by an aging population, with the highest concentration of farmers in the 50-69 age brackets. Crucially, farming is not the primary occupation for the vast majority (**69%**) of farm holders, but rather a supplemental activity within a diversified livelihood, often undertaken post-retirement. This is counterbalanced by a positive trend of **rising educational attainment** among farmers.
3. **A Structural Shift in Production:** The nature of farming in Grenada is fundamentally changing. This is most evident in the livestock sub-sector, with a **massive expansion of intensive poultry production** and a concurrent decline in traditional grazing animals like cattle and sheep. Similarly, there is a clear trend toward **small-scale mechanization** (e.g., brush cutters) rather than heavy machinery, and a notable shift away from chemical fertilizers towards other agro-chemical inputs.
4. **Dominance of Small, Individually-Owned Farms:** The agricultural landscape continues to be dominated by small holdings, with a third of all farms being less than 0.5 acres. The legal and tenure structure remains firmly rooted in **individual and family ownership**, indicating that corporate or large-scale cooperative farming has not become a significant model.

4.2 Implications and Recommendations

These findings carry significant implications for Grenada's food security, rural economy, and environmental management. The following recommendations are proposed to address the challenges and leverage the opportunities identified in the census.

1. Addressing the Aging Population and Attracting New Farmers

- **Implication:** The aging workforce, coupled with a decline in younger farmers, poses a direct threat to the continuity of agricultural knowledge and the future productivity of the sector.

- **Recommendation 1: Develop Youth-in-Agriculture and Succession Programs.** The government and agricultural organizations should create targeted programs that link the rising education levels of young people to modern agricultural careers. This could include scholarships for agricultural science, mentorship programs pairing experienced farmers with new entrants, and dedicated access to finance and land for young entrepreneurs.
- **Recommendation 2: Formalize Support for Part-Time Farmers.** Recognizing that most farmers have other primary occupations, support services (e.g., training, extension services) must be flexible. Offering workshops and technical assistance outside of standard working hours could significantly increase engagement and knowledge transfer.

2. Supporting the Structural Transformation of the Sector

- **Implication:** The market is clearly driving a shift towards poultry and away from traditional livestock. While this meets a specific demand, it also creates vulnerabilities and highlights the need for a balanced approach.
- **Recommendation 3: Bolster High-Growth Sub-Sectors.** Targeted investment should be channeled to support the poultry industry's growth, focusing on areas like feed production, processing facilities, biosecurity, and marketing to ensure its long-term sustainability and reduce import reliance.
- **Recommendation 4: Revitalize the Ruminant Sector.** A detailed study is needed to understand the root causes of the decline in cattle and sheep farming (e.g., feed costs, praedial larceny, labor). Based on this, targeted incentives, insurance programs, and support for improved pasture management should be implemented.
- **Recommendation 5: Promote Appropriate Mechanization.** Since farmers are investing in small-scale tools, programs should focus on improving access to this type of equipment. This could involve creating credit facilities for purchasing small machinery or establishing parish-level tool rental schemes to reduce the capital barrier for individual farmers.

3. Enhancing Economic Viability and Land Use

- **Implication:** The data on farm income suggests that farming alone is not economically viable for the majority. Furthermore, while most land is individually owned, the overall acreage is shrinking, with the exception of St. John where consolidation is occurring.
- **Recommendation 6: Strengthen Farm Business Management Skills.** Training should go beyond production techniques to include financial literacy, record-keeping, marketing, and value-addition. This will empower farmers to better understand and improve the profitability of their operations.
- **Recommendation 7: Review Land Use and Tenure Policies.** To counter the decline in agricultural land, policies should be explored to protect prime agricultural areas from other development. Furthermore, mechanisms to facilitate the leasing of underutilized or abandoned family land could be developed to bring more area into productive use, supporting both new farmers and landowners.

4.3 Future Directions

To enhance the value of future agricultural censuses, the following improvements should be considered:

1. **Refine Data Collection Categories:** The large “Other” categories for both agro-chemicals and main occupations limit the depth of analysis. Future surveys should use more granular sub-categories to precisely identify the specific types of pesticides, herbicides, or alternative soil amendments being used, and to better classify non-farm occupations.
2. **Improve Economic Data Collection:** The high non-response rate (**38%**) on the farm income question highlights a significant data gap. Future censuses should pilot new methodologies or questions to more effectively capture farm profitability and economic performance, which are essential for targeted policy-making.
3. **Integrate Climate and Environmental Metrics:** To address modern challenges, future censuses should include questions related to climate-smart agricultural practices, water sources and irrigation methods, soil conservation techniques, and the perceived impacts of climate change on farm operations.
4. **Conduct Thematic Inter-Censal Surveys:** To understand the *drivers* behind the trends identified in the census (e.g., the specific reasons for leaving farming or the shift away from chemical fertilizers), it is recommended to conduct smaller, thematic surveys and qualitative studies in the years between major censuses.

5 Appendices

5.1 Appendix A: Census Questionnaire

This appendix contains a representation of the questionnaire used for data collection in the 2023 Census of Agriculture.

The questionnaire is available in the .HTLM version of the report

5.2 Appendix B: Glossary of Terms and Abreviations.

ABBREVIATIONS

ACF: Agricultural Census Frame

ED: Enumeration District

GCA: Grenada Census of Agriculture

GCA 2023: Grenada Census of Agriculture 2023

ACF: Agricultural Census Frame

CSO: Central Statistics Office

FAO: Food and Agriculture Organization of the United Nations

MoA: Ministry of Agriculture

WS: Watershed

5.3 Appendix C. Statistical Tables

! Important

The complete census tables will be published in a subsequent report. This report will contain additional statistical tables that expand upon the analysis presented here.

It is important to note that the tables derived from the 2023 census data are produced at both the parish and national levels and cover all categories of farm holdings and farm households. In addition to classifying the primary variables, each variable is stratified by household type. Permanent and temporary crops are systematically reclassified, and detailed crop data are grouped into broader, more comprehensive categories. At the national level, the tabulation process for the Farm questionnaire involves the cross-tabulation of variables by: - Size of Farm - Legal Status of Farm - Size of Farmer Household.

5.3.1 Classification of main variables:

1. **Parish**

- St. George
- St. John
- St. Mark
- St. Patrick

- St. Andrew
- St. David
- Carriacou
- Petit Martinique

2. **Age Group of Household Members**

- Under 15 Years
- 15 to 19 Years
- 20 to 29 Years
- 30 to 39 Years
- 40 to 49 Years
- 50 to 59 Years
- 60 to 69 Years
- 70 Years and over

3. **Sex of Household Members**

- Male
- Female

4. **Size of Farmer Household**

- 1 Person
- 2 to 3 Persons
- 4 to 5 Persons
- 6 to 10 Persons
- 10 Persons and more

5. **Size of Farm**

- Landless
- 0.001 – 0.49 acres
- 0.50 – 0.99 acres
- 1.00 – 1.99 acres
- 2.00 – 4.99 acres
- 5.00 - 9.99 acres
- 10.00 – 24.99 acres
- 25.00 – 49.99 acres
- 50.00 – 99.99 acres
- 100 and over acres

6. **Legal Status of Farm**

- Individual
- 2 or more of Same Household
- Joint Farmer
- Company
- Cooperative

- Government
- Other

6 Concept and Definitions

The key concepts and definitions used throughout the Grenada Census of Agriculture 2023 (GCA 2023) are presented below. To maintain methodological consistency with previous surveys, these definitions were adopted verbatim from the GCA 2012.

FARM

An “ECONOMIC UNIT” of agricultural production under single management comprising all livestock kept and all land used, wholly or partly, for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or household, jointly by two or more individual or households, by a clan, village, or by a juridical person such as a company, co-operative or government agency. The farm land may consist of one or more parcels located in one or more WATERSHEDS (WSs), providing the parcels share the same “PRODUCTION MEANS” utilized by the farm, such as labour, farm building, machinery or draught animals.

FARMER

He/she is a person or juridical institution who exercises management control over the agricultural farm operations and takes major decisions regarding resource use. The farmer has technical and economic responsibility for the farm and may undertake all responsibilities directly, or delegate responsibilities related to-day-to-day work management to a hired manager. The work of a farmer can be material, when he conducts directly by himself the physical agricultural activities of the farm or only intellectual, like in the case of that farmer who lives in the city, and travels periodically to the farm, or not, but takes the major decision on the farm operation. It is important to take into account the following considerations in the determination of a farmer:

• It always MUST be a one-to-one correspondence between a farmer and a farm.

• In rural areas, a one-to-one correspondence between a farm (farmer) and a household is quite common. Thus households serve to identify farms.

• In most of the cases the farmer is a person. But, in some households there can be more than one farmer, when each person operates different piece(s) of land. Then, each piece of land becomes a farm. However, if the agricultural operation and the production obtained in all those pieces of land is COMMUNAL for all members of the household, there will be only one farmer and only one farm to answer questions (farmer’s name & address), 3, 4, 5 & 6 of Farm Questionnaire GCA-02. In this case, the household member, who spends more time in the farm (for example, in some cases the wife may spend more time); and if more than one person spends equal time, the farmer will be chosen according to these priorities: father, mother, eldest son and so forth. The other household members participating in the work of the farm will be regarded as members of the labour force of the farm.

• When two or more persons belonging to different households operate the same farm, each one will be considered as JOINT FARMER. However, the enumerator MUST decide with the informant who is going to be the farmer to answer questions 1, 2, 3, 4, 5, 6 & 7 of the Farm Questionnaire GCA-02. The member of the household who spends more time in the farm will be considered the farmer. If more than one member of the JOINT households spend equal time, the eldest will be the farmer.

• A farmer can operate land that is owned and/or leased and/or under any other form of land tenure.

• A farmer can operate land without any rights to agricultural use of the land.

• A hired manager or administrator will not be considered as the farmer of the farm he is managing. However, if he has livestock and poultry in the land of the farm, which he operates, then he will be considered as a farmer of a farm without land.

• When a manager, administrator or any worker of the farm, has received land for his own use, then he will be considered a farmer.

• When a person, who has two or more households, is operating land for agricultural purposes in the different households with the same “PRODUCTION MEANS” in different WS, he will be considered as one farmer and one farm.

HOUSEHOLD

A household consists of one or more persons living together; i.e. sleeping most nights of a week within the household, and sharing at least one daily meal. In general, therefore, a household will comprise a father, mother and children living together. It is important to note, however, a member of the household is not necessarily a relative of the main family. For example, a boarder or a domestic servant, who sleeps in most nights of the week and shares at least one daily meal is also included as a member of the household. It is possible for a household to consist of just one person, or of more than one family; as long as they share living arrangements. A group of unrelated persons living together can also comprise a household.

PARCEL

A farm parcel is any piece of land entirely surrounded by other land, water, road, forest, etc. not forming part of this farm. A parcel may consist of one or more plots adjacent to each other.

LAND USE

The following represents the minimum classification for the Agriculture Census:

• Land under Permanent Crops - Land cultivated with long term crops which do not have to be replanted for several years. There are a few exceptions depending on the customs of the country such as the musa species, pineapple and horticultural crops which are temporary crops but are classified as permanent crops.

• Land under Temporary Crops - This includes all land used for crops with a growing cycle of less than one year.

• Fallow or Land Temporarily Fallow - is arable land at prolonged rest that is a period of one agricultural year before re-cultivation.

• Forest or Semi Forest - Land not classified as mainly agricultural land but has crown cover of more than **10%** of trees/forest trees able to reach a mature height of 5 meters or more. Shrub or bush cover of more than **10%**.

• Pasture - Includes land used permanently (6 years or more) to grow herbaceous crops through cultivation or naturally for grazing.

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