


**SOCIOECONOMIC CHARACTERIZATION OF EMPLOYMENT IN THE PAPAYA  
PRODUCTION CHAIN IN ESPÍRITO SANTO**

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ARTICLE INFO	ABSTRACT
<p><b>Article history:</b>  <b>Received:</b> February, 13<sup>th</sup> 2024  <b>Accepted:</b> May, 03<sup>rd</sup> 2024</p>	<p><b>Purpose:</b> This study evaluated employment in the papaya production chain in Espírito Santo, Brazil.</p> <p><b>Framework:</b> The methodological approach to production chains serves as an analytical tool for carrying out diagnoses and strategic simulations of a product in focus.</p>
<p><b>Keywords:</b>            Employment;            Production Chain;            Diagnoses;            Papaya.</p> <div data-bbox="172 936 480 1182" style="text-align: center;">  </div>	<p><b>Design/Methodology/Approach:</b> In preparing this study, quantitative research techniques and procedures and qualitative research were adopted based on the methodological approach of production chains, also called: agro-industrial complexes, agri-food system, agribusiness, sectoral innovation systems.</p> <p><b>Findings:</b> In rural papaya producing farms, the average was 10.9 jobs. The general average number of jobs per papaya company was 68.1 and, particularly, in the packing house, the average was 154.8 jobs. The papaya production chain had a much higher number of jobs when compared to other fruit farm production chains in Espírito Santo. It is also noteworthy that the predominant type of employment relationship is formal and permanent.</p> <p><b>Research, Practical &amp; Social Implication:</b> The State of Espírito Santo is the largest Brazilian papaya producer and exporter. With technological innovation, it guarantees crop quality and productivity, making it possible to serve the most demanding international markets. This chain is an important source of employment and income for the State.</p> <p><b>Originality/Value:</b> The study included field research with 93 producers and 14 companies that are part of the papaya production chain in Espírito Santo. Official data on the historical evolution of formal jobs in the chain are also presented, highlighting the socioeconomic importance of the sector.</p> <p>Doi: <a href="https://doi.org/10.26668/businessreview/2024.v9i5.4678">https://doi.org/10.26668/businessreview/2024.v9i5.4678</a></p>

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## CARACTERIZAÇÃO SOCIOECONÔMICA DO EMPREGO NA CADEIA PRODUTIVA DO MAMÃO NO ESPÍRITO SANTO

### RESUMO

**Proposta:** Este estudo avaliou o emprego na cadeia produtiva do mamão no Espírito Santo, Brasil.

**Estrutura Teórica:** Foi utilizada a abordagem das cadeias produtivas, a qual presta-se como instrumento analítico para a realização de diagnósticos e simulações estratégicas de um produto em foco.

**Projeto/Metodologia/Abordagem:** Na elaboração deste estudo, foram adotadas técnicas e procedimentos de pesquisa quantitativa e qualitativa com base na abordagem metodológica de cadeias produtivas, também denominados: complexos agroindustriais, sistema agroalimentar, agronegócios, agribusiness, sistemas setoriais de inovação.

**Conclusões:** Nas propriedades rurais produtoras de mamão a média foi de 10,9 empregos. A média geral de empregos por empresa que trabalham com mamão foi de 68,1 e, particularmente, nas packing house a média foi de 154,8 empregos. A cadeia produtiva do mamão apresentou um número muito superior de empregos quando comparado às demais cadeias produtivas da fruticultura capixaba. Destaca-se ainda que o tipo de vínculo de emprego predominante é o formal e permanente.

**Implicações Sociais, Práticas e de Pesquisa:** O Estado do Espírito Santo é o maior produtor e exportador brasileiro de mamão. Com inovação tecnológica, vem garantindo a qualidade e a produtividade das lavouras, possibilitando atender os mercados internacionais mais exigentes. Esta cadeia constitui-se em uma importante fonte de emprego e renda para o Estado.

**Originalidade/Valor:** O estudo contemplou uma pesquisa de campo com 93 produtores e 14 empresas que fazem parte da cadeia produtiva do mamão no Espírito Santo. São apresentados também os dados oficiais da evolução histórica de empregos formais na cadeia, evidenciando a importância socioeconômica do setor.

**Palavras-chave:** Emprego, Cadeia Produtiva, Diagnósticos, Mamão.

## CARACTERIZACIÓN SOCIOECONÓMICA DEL EMPLEO EN LA CADENA PRODUCTIVA DEL PAPAYAL EN ESPÍRITO SANTO

### RESUMEN

**Propuesta:** Este estudio evaluó el empleo en la cadena productiva de papaya en Espírito Santo, Brasil.

**Estructura Teórica:** Se utilizó el enfoque de cadena productiva, el cual sirve como herramienta analítica para la realización de diagnósticos y simulaciones estratégicas de un producto en foco.

**Proyecto/Metodología/Enfoque:** En la elaboración de este estudio se adoptaron técnicas y procedimientos de investigación cuantitativos y cualitativos basados en el enfoque metodológico de cadenas productivas, también conocidos como: complejos agroindustriales, sistema agroalimentario, agronegocios, agribusiness, sistemas de innovación sectoriales.

**Conclusiones:** En las propiedades rurales productoras de papaya, el promedio fue de 10,9 empleos. El promedio general de empleos por empresa que trabaja con papaya fue de 68,1 y, particularmente, en las empacadoras el promedio fue de 154,8 empleos. La cadena productiva de papaya tuvo un número mucho mayor de empleos en comparación con otras cadenas productivas de frutas en Espírito Santo. También cabe destacar que el tipo de relación laboral predominante es la formal y permanente.

**Implicaciones Sociales, Prácticas y de Investigación:** El Estado de Espírito Santo es el mayor productor y exportador brasileño de papaya. Con innovación tecnológica ha garantizado la calidad y productividad de los cultivos, permitiendo atender los mercados internacionales más exigentes. Esta cadena constituye una importante fuente de empleo e ingresos para el Estado.

**Originalidad/Valor:** El estudio incluyó una investigación de campo con 93 productores y 14 empresas que forman parte de la cadena productiva de papaya en Espírito Santo. También se presentan datos oficiales sobre la evolución histórica de los empleos formales de la cadena, destacando la importancia socioeconómica del sector.

**Palabras clave:** Empleo, Cadena Productiva, Diagnósticos, Papaya.

## 1 INTRODUCTION

Data from the Brazilian Ministry of Labor show that papaya production is the activity that generates the most formal jobs in fruit farming in Espírito Santo, being responsible for 8.61% of total formal jobs in farming in 2023 (Brasil-Caged, 2024).

The state of Espírito Santo is the largest papaya producer and exporter in Brazil (IBGE, 2022, Brasil-Agrostat, 2022). Due to the high technology used in its exploration, its crops achieve high productivity and excellent quality fruits. Espírito Santo was responsible for 49.0% of the value of Brazilian papaya exports in 2021 (Brasil-Agrostat, 2022) and, with technological innovation, it has ensured crop quality and productivity, making it possible to serve the most demanding international markets.

The Papaya State Pole is located in the Northern region of Espírito Santo, whose favorable soil and climate conditions enable its exploitation as a highly profitable agricultural activity (Lucena et al., 2021). In addition to representing an important source of foreign exchange for the country, this Pole has a great social function as it absorbs a significant amount of labor. Therefore, the papaya chain demonstrates its economic importance as a function of its high capacity to generate employment and income throughout the year.

This result was achieved with a joint effort by producers and entities linked to the sector, aiming to adjust fruit quality to international standards to increase the competitiveness of this Brazilian fruit. Incaper, in partnership with the organized production and export sectors, besides the support from the Federal Government, developed Integrated Papaya Production in the State of Espírito Santo. This system aims at fruit quality, produced with low environmental impact and with social justice (Martins et al., 2003; Martins et al., 2009). Another important work to be highlighted is the “System Approach”, applied for the first time in Brazil, in the Linhares fruit growing pole, which allowed Brazilian papaya to be exported to the USA, breaking down a quarantine barrier that prevented, for 13 years, the trade of this fruit to that country (Martins & Malavasi, 2003ab; Martins & Fornazier, 2014). This system is a concept that integrates pre- and post-harvest practices used in fruit production, harvesting, packaging and transportation.

Given its socioeconomic importance, this article presents a characterization of employment in the papaya production chain in Espírito Santo, Brazil.

## 2 IMPORTANCE OF PAPAYA PRODUCTION IN CAPIXABA FRUIT FARMING

The fruit farm sector is among the main generators of income, employment and rural development in national agribusiness. Fruit farming in Brazil is an activity with a high income multiplier effect and, therefore, with sufficient strength to boost stagnant local economies with few development alternatives. The example of the Petrolina – Juazeiro Fruit pole in Northeast Brazil is emblematic for its capacity to develop fruit farming in general (Buainain and Batalha, 2007). Data from Ibraf (2011), apud Nogueira et al. (2013), indicate that fruit farming generates three direct and two indirect jobs for every US\$ 10,000 invested in the sector, and farming is the activity that employs the most per hectare where, for each hectare cultivated, there is a job opportunity for two to five workers. Therefore, fruit farming has great potential to boost economies in places with few development alternatives.

The study carried out by Vinha and Dias (2018) in 465 family-based agro-industries in the state of Espírito Santo, found that 89 of these enterprises (19%) process fruit, and that agro-industrial activity is the main source of income for 48.3 % of families responsible for the businesses visited.

Brazil stands out on the international scene as the second largest papaya producer. The papaya tree is cultivated mainly in the southeast and northeast regions of Brazil, where the main production poles for this fruit are located. The most important producing states are Bahia and Espírito Santo, with around 70% of national production in 2020, in addition to Ceará, Minas Gerais, Paraíba and Rio Grande do Norte (IBGE, 2022).

In terms of Brazilian fresh fruit exports agenda, papaya is among the top seven, with an export volume of 43.7 thousand tons in 2020, corresponding to US\$42.6 million (Abrafrutas, 2020).

However, the volume exported by Brazil is still very small, representing around 2% of national fruit production. The European Union is the main destination for Brazilian papaya, consuming around 90% of exports. The main buyers of Brazilian papaya are, in descending order, Portugal, Spain, Germany, the United Kingdom, the Netherlands (Holland), the United States, France, Italy and Switzerland.

Brazilian papaya exports reached around 50.3 thousand tons in 2021. Espírito Santo was responsible for 47.8% of the volume of Brazilian exports. Rio Grande do Norte appears as the second largest exporter, being responsible for 18.1% of the volume of exports.

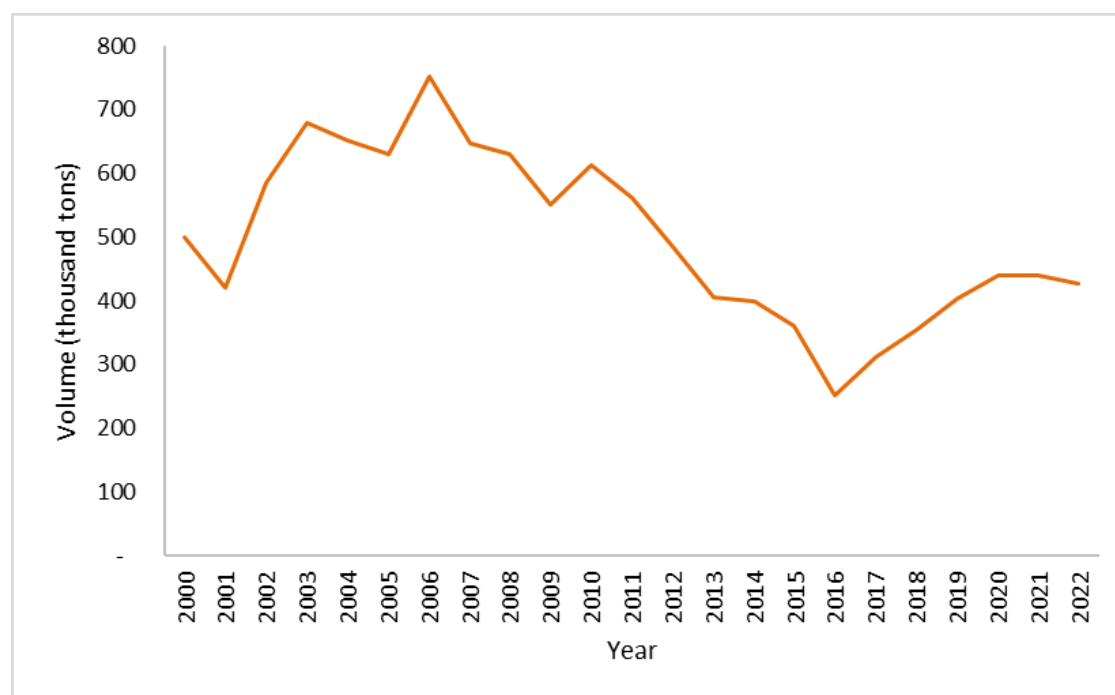
Espírito Santo papaya is exported to several countries around the world. In 2019, Portugal, the United Kingdom and the USA were the largest importers of papaya from Espírito Santo, followed by the Netherlands and Germany.

The 2017 Agricultural Census counted 3,181 rural establishments producing papaya in Espírito Santo, of which only 392 had 50 trees or more. Papaya production in Espírito Santo is highly technical and crops achieve high productivity and quality fruits.

Papaya production in the State was strongly affected by the water crisis that occurred between 2014 and 2017, with major losses (Figure 1). During this period, losses were estimated at 494.2 thousand tons, which corresponded, in monetary terms, to R\$544.3 million; 2016 was the most critical year and losses reached 41% of the expected production (Galeano et al., 2021).

**Figure 1**

*Papaya production in Espírito Santo*



Source: Prepared by the authors based on IBGE-PAM-Sidra, 2010 to 2022.

In Espírito Santo, papaya occupies the first place in fruit growing in terms of volume produced and production value, having accounted for 426.6 thousand tons in 2022 (Figure 1). The fruit is cultivated mainly in the municipalities of Pinheiros, Linhares, Montanha, Pedro Canário and São Mateus, located in the Northeastern Rio Doce region; these were the largest producers in 2022.

Papaya cultivation guarantees employment and income for a significant number of workers in the sector.

### 3 MATERIAL AND METHODS

Secondary data and information involving papaya production were collected, with a focus on generating jobs in the chain. Data were obtained from official databases from public agencies. Furthermore, data from the research by Galeano et al. (2022), which was carried out using a questionnaire, are presented. Sampling was conducted according to Triola (2005).

In preparing this study, quantitative research techniques and procedures (Triola, 2005) and qualitative research were adopted based on the methodological approach of production chains, also called: agro-industrial complexes, agri-food system, agribusiness, agribusiness, sectoral innovation systems (Dalcomuni et al., 2000; Nogueira et al., 2013). The methodological approach to production chains serves as an analytical tool for carrying out diagnoses and strategic simulations of each product in focus (Dalcomuni et al., 2000; Nogueira et al., 2013).

For didactic purposes, we initially started with an infinite population  $n$ , with size  $n$  obtained from equation 1, where  $Z$  is the critical value of the standardized normal distribution at 95% confidence ( $Z=1.96$ ),  $\sigma$  the standard deviation and  $E$  the margin of error.

$$n = \left( \frac{Z \cdot \sigma}{E} \right)^2 \quad (1)$$

Considering that the population size  $N$  of this research is considered finite, it was necessary to modify the margin of error  $E$ , with the inclusion of a correction factor, according to equation 2.

$$E = Z \cdot \frac{\sigma}{\sqrt{n}} \cdot \sqrt{\frac{N-n}{N-1}} \quad (2)$$

The correction factor was applied whenever  $n > 0.05N$ .

With this inclusion, sample size was dimensioned based on equation 3.

$$n = \frac{Z^2 \cdot \sigma^2 \cdot N}{E^2 \cdot (N-1) + Z^2 \cdot \sigma^2} \quad (3)$$

The municipalities with the greatest participation in state papaya production were selected. The sampling municipalities were selected based on the 2017 Agricultural Census. The number of questionnaires for each municipality included in the research was calculated.

Ninety-three papaya producers were interviewed in the municipalities of Linhares, Pinheiros, São Mateus and Sooretama in 2019 and 2020 (Table 1). This sample represents 58.5% of papaya producing establishments in the four municipalities where the questionnaires were applied and represents 2.9% of the total papaya producing establishments in the State. In terms of the quantity produced, the sample represented 59.2% of the state's production.

**Table 1**

*Scope of application of papaya questionnaires on rural papaya-producing properties*

Municipality	Production (Tons)	No. of farming establishments (Units)	No. of Questionnaires (Goal)	No. of Questionnaires (Applied)
Pinheiros	64,044	38	25	26
São Mateus	14,891	24	18	14
Sooretama	14,612	33	22	19
Linhares	135,470	64	33	34

Source: Prepared from data from the 2017 Agricultural Census and PAM-2017, IBGE, 2020.

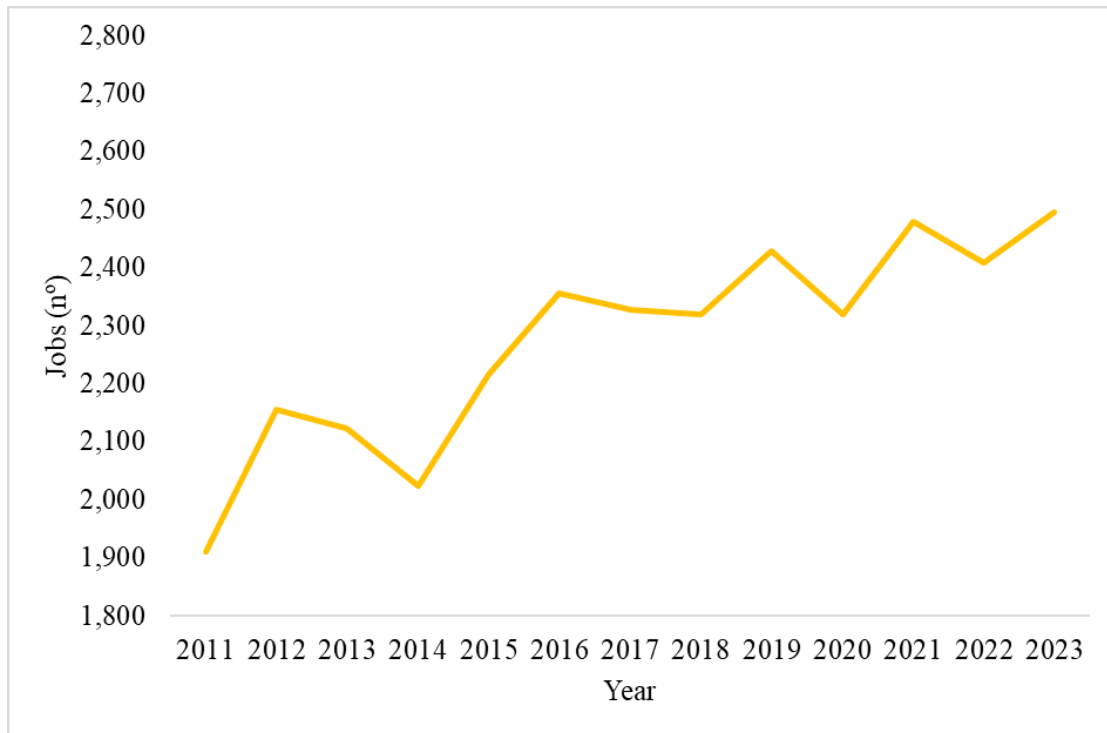
Fourteen papaya companies were also interviewed, nine agribusinesses that process the fruit and five packing houses that export papaya.

## 4 RESULTS AND DISCUSSION

The number of formal jobs in papaya production in Espírito Santo increased from 1,910 in 2011 to 2,495 in 2023 (Figure 2). Formal jobs are mainly located in the municipalities of Linhares, Sooretama and Pinheiros (Brasil-Caged, 2024) (Figure 3).

**Figure 2**

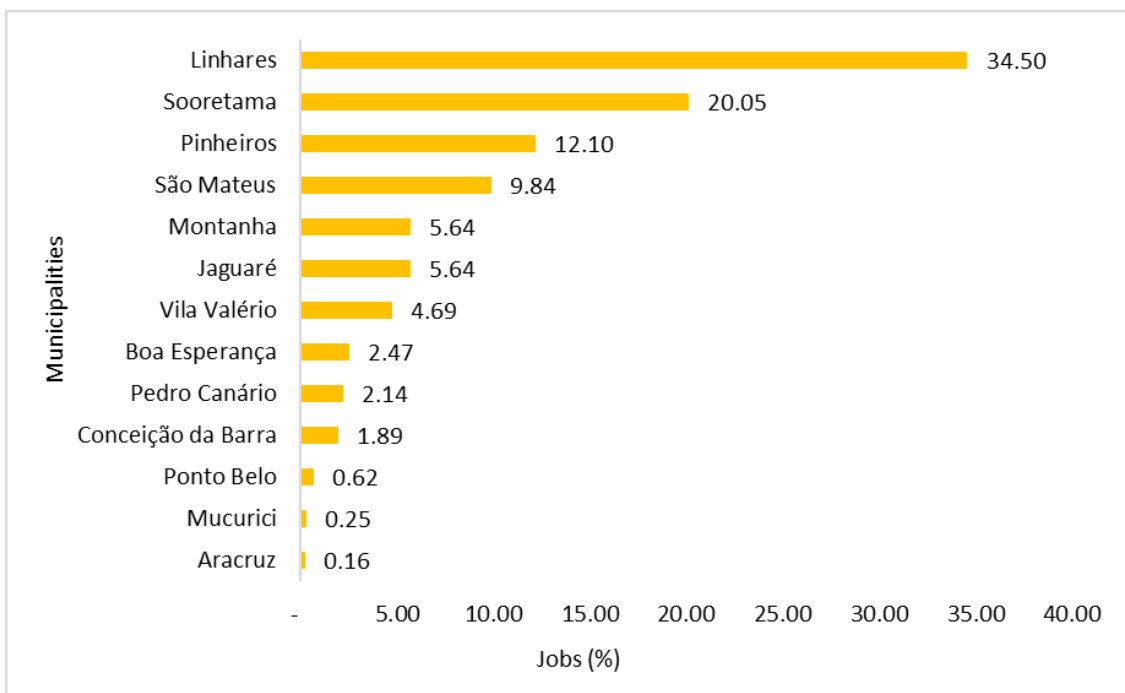
*Formal jobs in papaya cultivation in Espírito Santo*



Source: Prepared by the authors based on Brasil-Caged, 2024.

**Figure 3**

*Percentage distribution of formal employment in papaya cultivation among the municipalities of Espírito Santo in 2019.*



Source: Prepared by the authors based on Brasil-Caged, 2024.

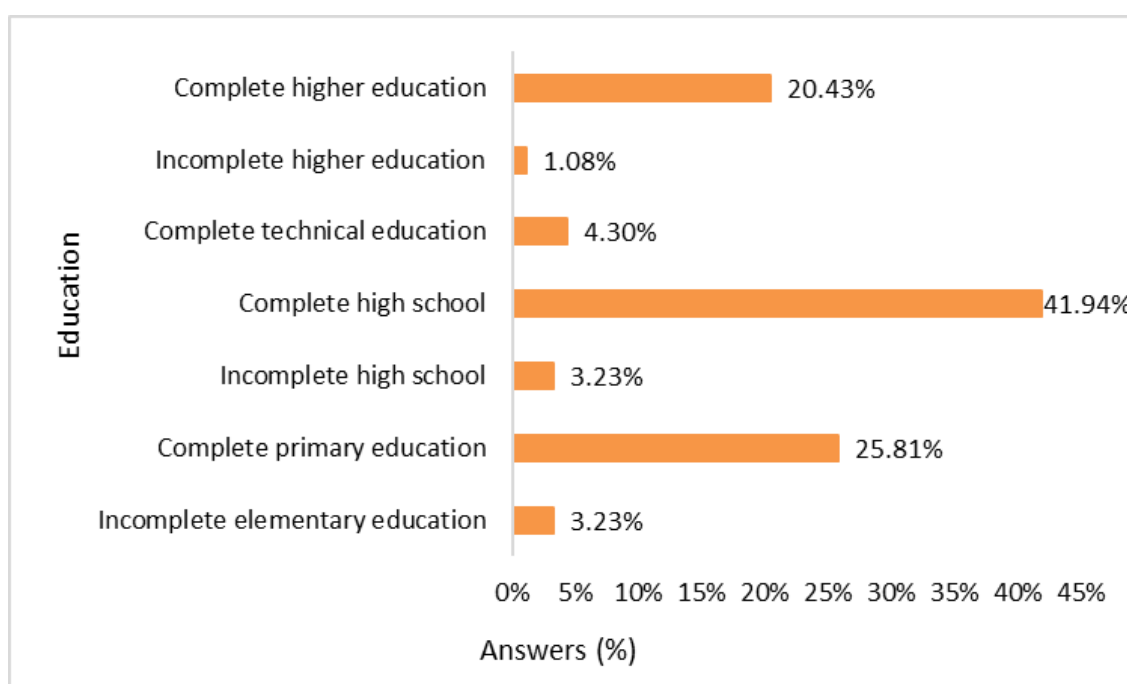


#### 4.1 EVALUATION OF EMPLOYMENT ON RURAL PAPAYA-PRODUCING PROPERTIES

Ninety-three producers were interviewed. The majority had completed basic education: 41.9% having completed secondary education, 25.8% having completed primary education and 20.4% having completed higher education (Figure 4). Training related to the agricultural area was observed in 42.1% of those with a degree.

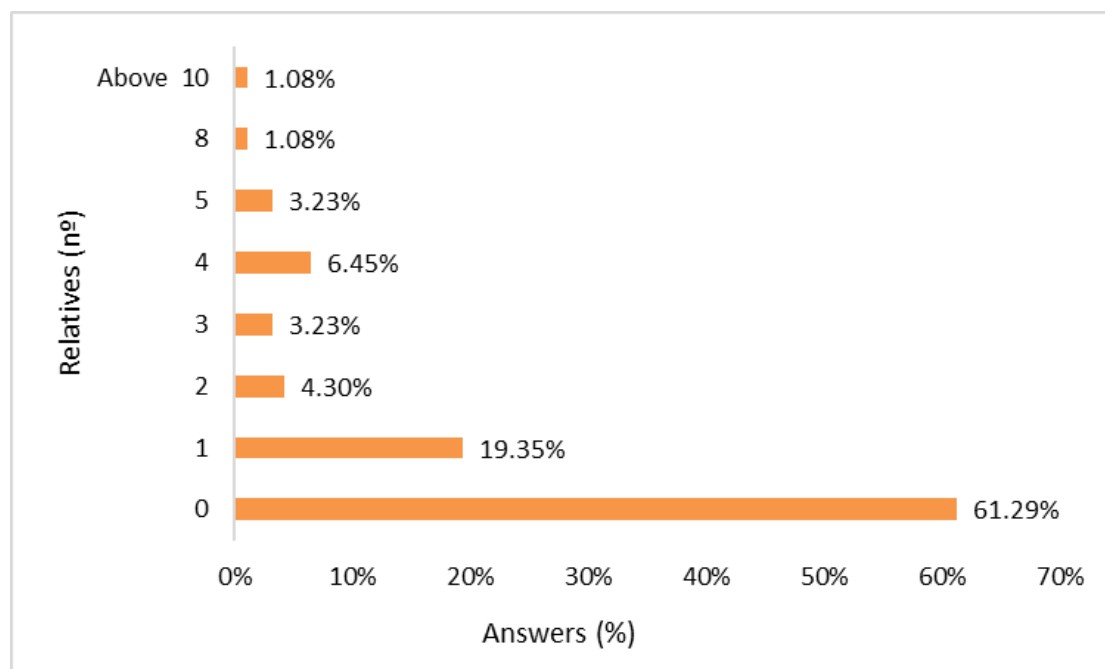
#### Figure 4

*Education level of the papaya producers interviewed*



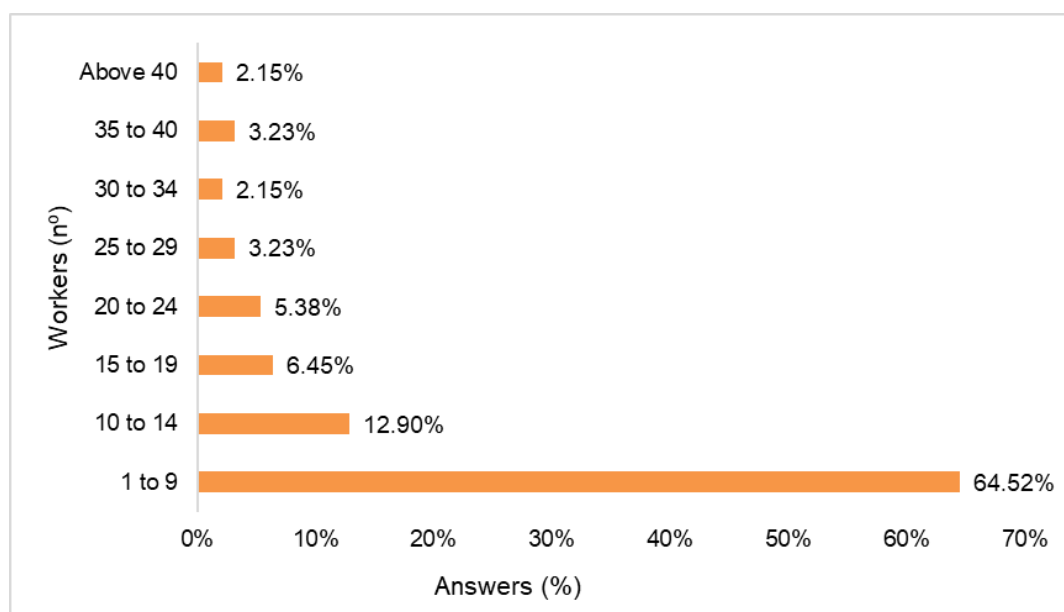
Source: Prepared by the authors based on research data.

Regarding the size of the family living on the property, the majority (61.3%) do not have a family living on the property. This is the case of producers who live in the city and the production area is located elsewhere (Figure 5). Among those who live on the producing property, the presence of a family member on the property is the most common situation.

**Figure 5***Family size on properties*

Source: Prepared by the authors based on research data.

Regarding the number of people working on the property, 64.5% of those interviewed reported that the work is done by one to nine people. However, there are properties with more than 40 workers, but with less expressiveness (Figure 6).

**Figure 6***Number of people working on the property, including family members*

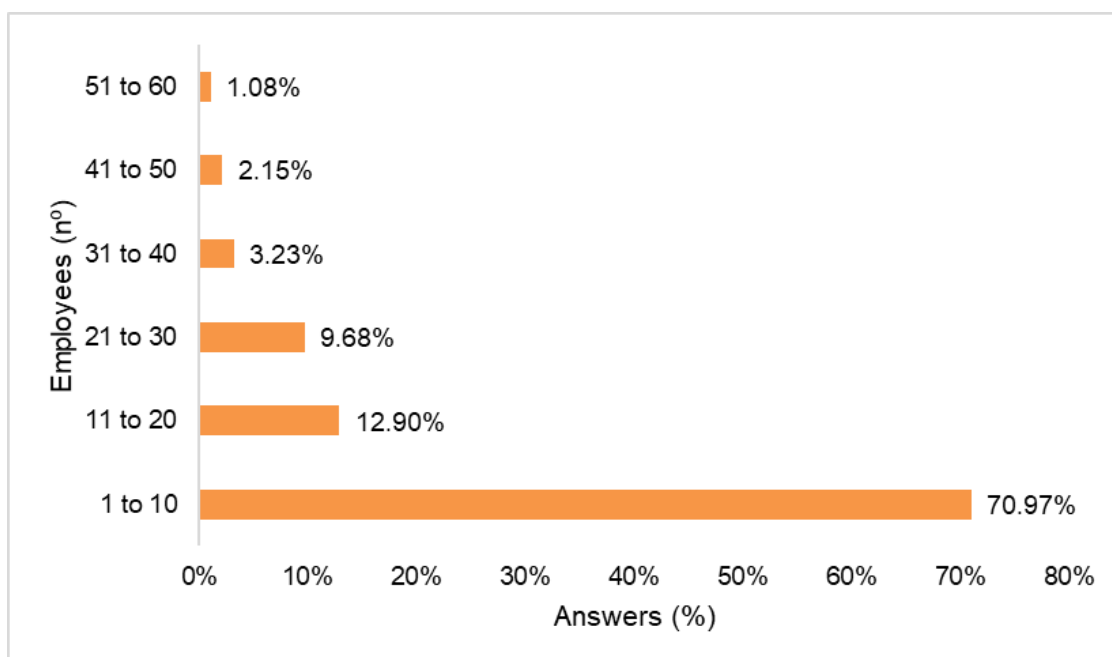
Source: Prepared by the authors based on research data.

In sampling, there was a predominance of properties with an area of 1 to 20 hectares (29%). Soon after, the second most common range was from 40.01 to 60 hectares (14%). There are properties with more than 1,000 hectares, but they are less significant (3.2%). For papaya cultivation, 57% of those interviewed have up to 20 hectares of papaya cultivation area and 44.1% have more than one papaya area. As for property ownership, 60.2% is owned by the interviewed producers themselves. According to the obtained data, producers are motivated to plant papaya mainly by market opportunities (44.8%) and also by tradition (41.9%).

The data collected in the questionnaires indicate that it is more common for farms to have up to 10 employees (70.9% of properties). Properties with 11 to 20 employees are next, with 12.9%. Properties with 51 to 60 employees appeared, but they were not very significant (Figure 7).

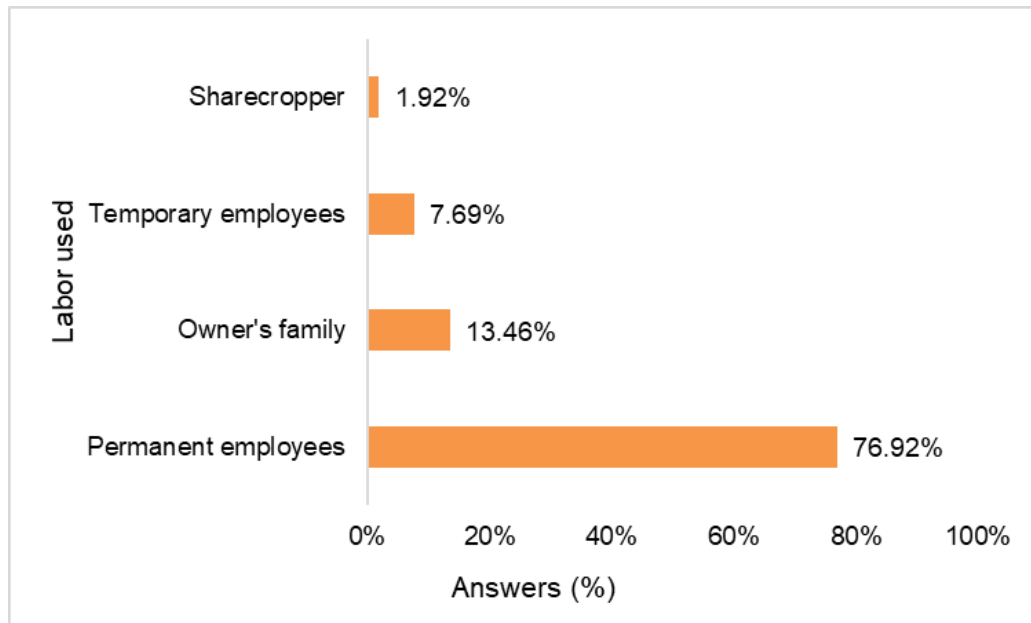
**Figure 7**

*Total number of people employed in papaya crops*



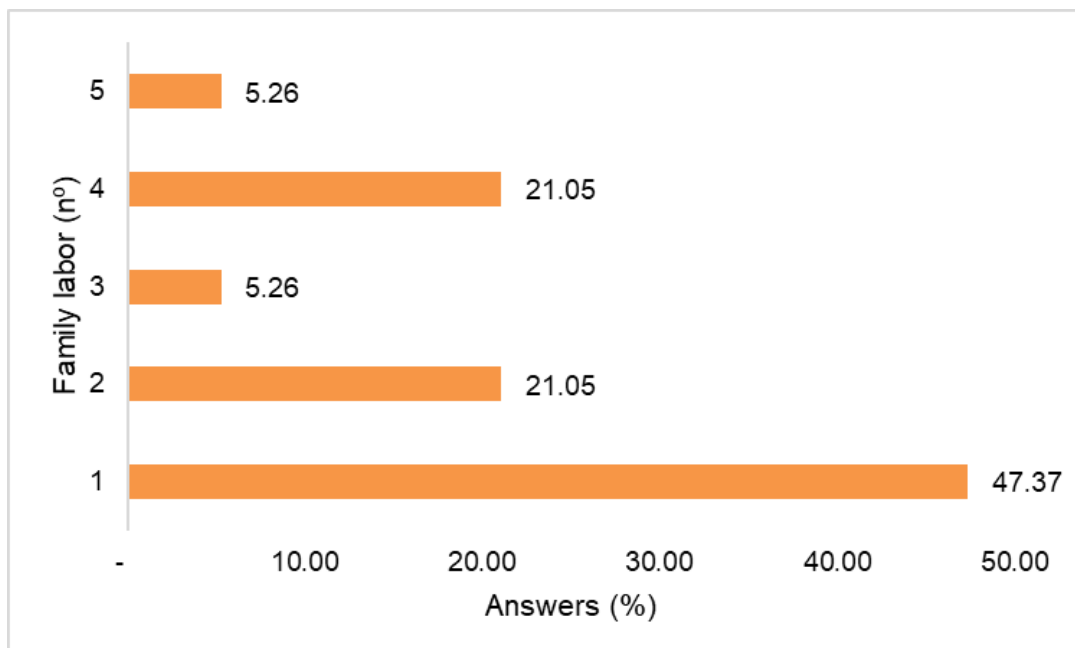
Source: Prepared by the authors based on research data.

The predominant type of contract was permanent employment for 76.9% of those interviewed and family work represented only 13.5% (Figure 8). At the time of harvest, the predominant workforce is permanent employees. The owner's family, temporary employees and sharecroppers are also used.

**Figure 8***Type of labor used in harvesting*

Source: Prepared by the authors based on research data.

When considering the number of family members who help with harvest, farms that have one family member predominate in this activity (47.37%), but the number can vary from 1 to 5 (Figure 9).

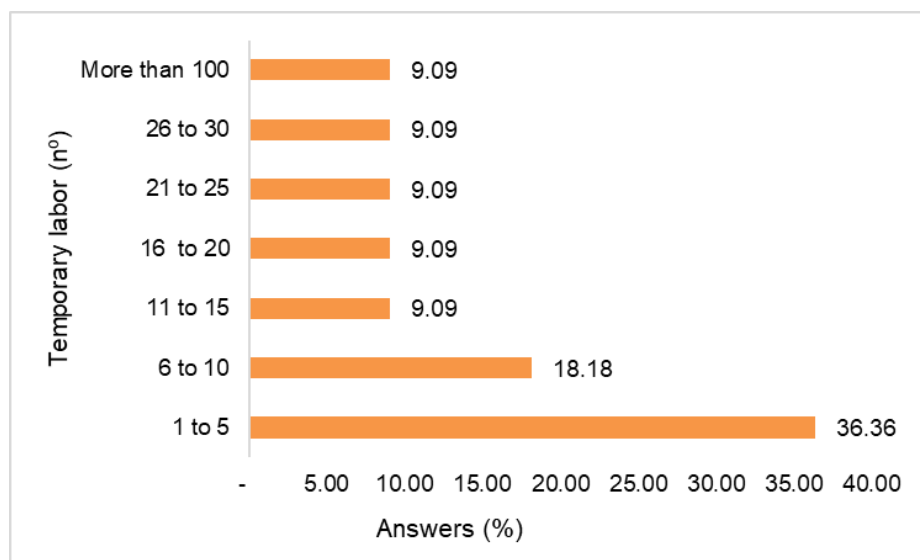
**Figure 9***Number of family people working in harvesting*

Source: Prepared by the authors based on research data.

In properties where there are temporary employees working during harvest, what predominates are properties with from one to five workers. A property where more than 100 temporary employees are hired was interviewed (Figure 10).

**Figure 10**

*Number of temporary employees working in harvesting*

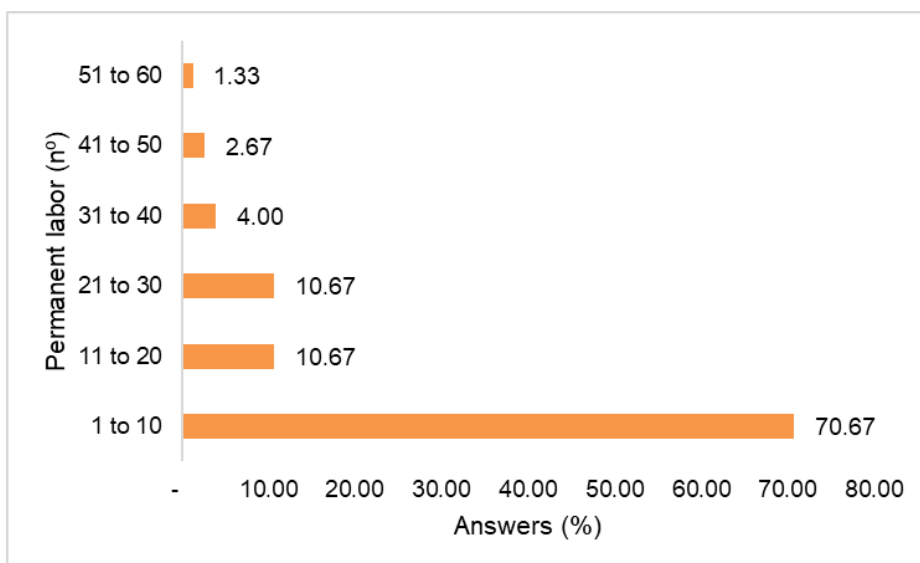


Source: Prepared by the authors based on research data.

For properties that work with permanent employees during harvest, the largest number of properties (70.67%) use from with 1 to 10 employees (Figure 11).

**Figure 11**

*Number of permanent employees working in harvesting*



Source: Prepared by the authors based on research data.

Two properties where sharecroppers work were identified: one of which has 3 sharecroppers helping with harvest, while the other works with 15 sharecroppers.

Regarding the cost of employees, when the worker is permanent, the value of the monthly salary varies between R\$1,068.90 and R\$2,400.00, with the average value of R\$1,800.00 being the most recurrent. For temporary employees, the most common daily value is R\$60.00 and can reach R\$80.00. All values refer to 2019 and 2020, the years in which data were collected.

In terms of prospects for the future, 81.72% of those interviewed intend to keep their planting area and 12.9% intend to expand their crops.

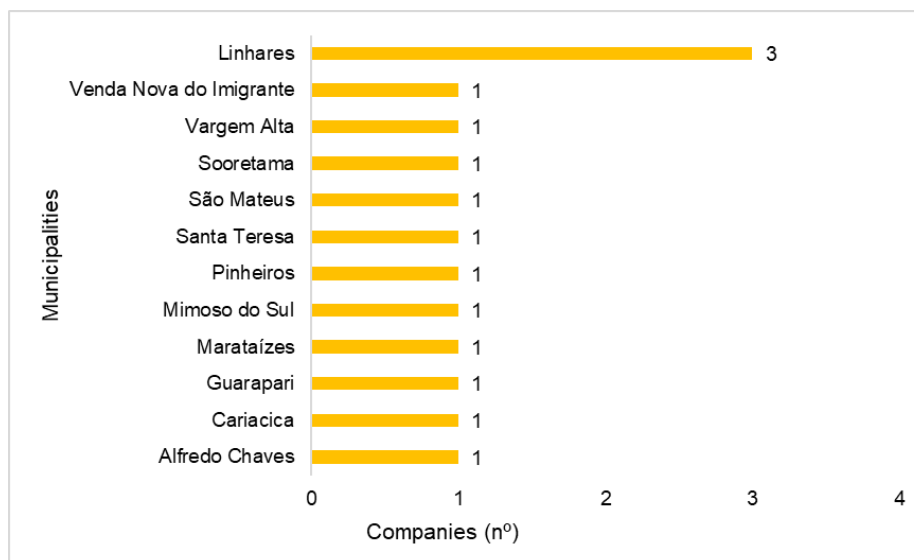
In the sample of 93 production units interviewed in Galeano et al. (2022), the total number of jobs was 1,014, representing an average of 10.9 jobs per property interviewed.

#### 4.2 EMPLOYMENT ASSESSMENT IN PAPAYA COMPANIES

As for papaya companies, 24 were identified, of which 14 agreed to participate in the research. Nine agribusinesses that process the fruit and five packing houses that export papaya were interviewed in 12 municipalities (Figure 12). Around 46.7% of the companies interviewed are located in rural areas and use their own production in packing houses and agribusinesses.

**Figure 12**

*Scope of the research with the companies interviewed*



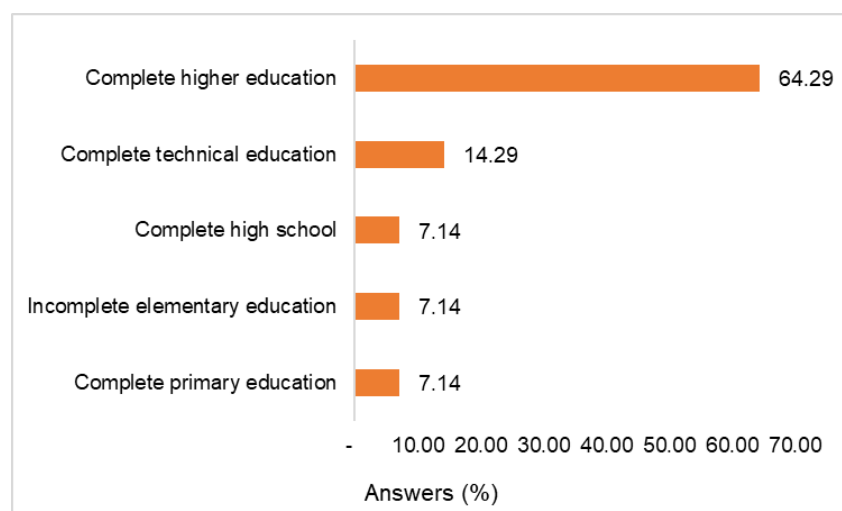
Source: Prepared by the authors based on research data

Companies whose owners have rural properties with commercial fruit production represent 71.4% of the total number of interviewed workplaces. Most of the companies interviewed have been commercially producing fruit for more than 20 years. The size of production areas is generally two hectares. Among the companies interviewed, 93.3% are located on the family's rural property.

Regarding the level of education, the majority of owners interviewed (64.29%) have completed higher education and 14.29% have completed technical education (Figure 13). Most of those responsible for companies have completed higher education (Figure 14).

**Figure 13**

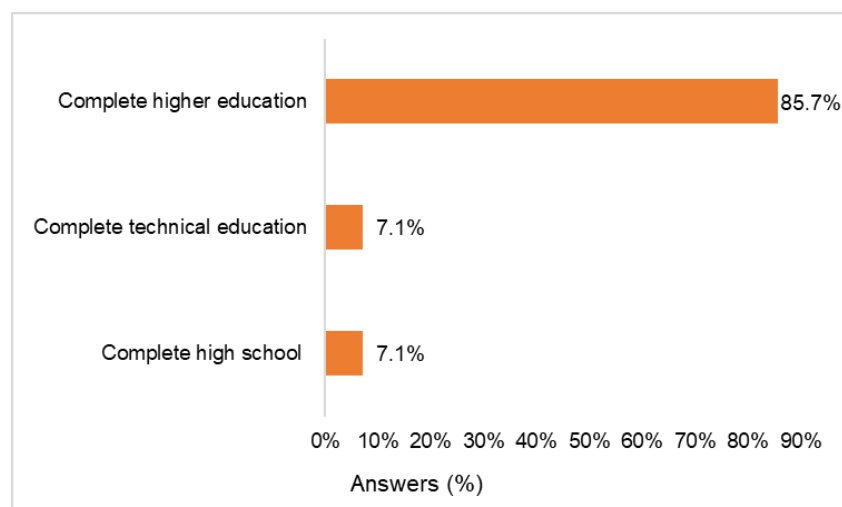
*Education level of company owners*



Source: Prepared by the authors based on research data.

**Figure 14**

*Education level of those responsible for the company*

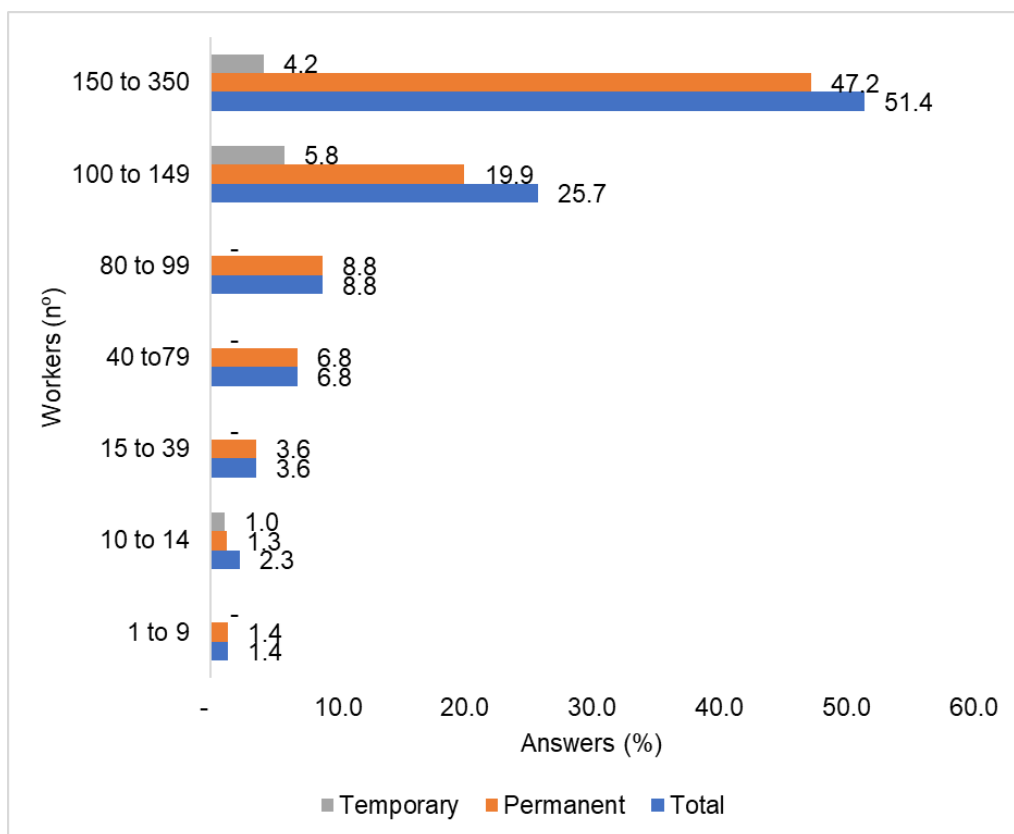


Source: Prepared by the authors based on research data.

In the sample of 14 companies interviewed, most jobs are concentrated in companies that have 150 to 350 employees (Figure 15). These companies with the largest number of employees are packing houses and papaya exporters.

**Figure 15**

*Number of people working in the sampled companies*



Source: Prepared by the authors based on research data.

The total number of jobs reported by companies in the sample was 953, which represents an average of 68.1 jobs per company. Considering only the five packing houses interviewed, the total number of jobs was 774, representing an average of 154.8 jobs per packing house.

The research showed that fruit growing in general is an activity that requires a lot of labor, distributed throughout the year, contributing to keep the rural population in country towns, thus reducing the problem of migration to large cities, generating income and employment in country towns, as already mentioned by (Fonseca, 2002). This research demonstrates the importance of the papaya chain for generating jobs, as already demonstrated by other researchers.

Quintino et al. (2010) showed that the various fruit growing promotion programs projected the papaya market in Ceará, generating an increasing trend in production and number



of jobs. Dota (2019) argues that contemporary migration is no longer linked to the belief in better living conditions in the city, but rather to the search for new opportunities in other municipalities. The papaya production chain proved to be an opportunity for employment and income generation in country towns of Espirito Santo.

## 5 CONCLUSION

Papaya cultivation has a great social function, as it absorbs a significant amount of labor, in addition to its economic importance, due to its high capacity for generating employment and income throughout the year. It has been an important source of foreign exchange for the country.

In the sample of 93 producers interviewed, the total number of jobs was 1,014, which represents an average of 10.9 jobs per property. The type of labor used in the papaya harvest is permanent employment for 76.9% of those interviewed.

In the sample of 14 companies interviewed, the total number of jobs was 953, which represents an average of 68.1 jobs per company. Considering only the five packing houses interviewed, the total number of jobs was 774, representing an average of 154.8 jobs per packing house.

This research is part of a broader study of the fruit production chain, where the chains of 12 other fruits were studied. The papaya production chain presented a higher number of jobs when compared to the production chains of other fruits studied, such as guava, banana and mango. The fruit production chain that presented the second highest average number of jobs was guava. This number was approximately four times lower than that of the papaya production chain.

## ACKNOWLEDGMENTS

The State Secretariat of Agriculture, Supply, Aquaculture and Fisheries (SEAG) and the Espírito Santo Research and Innovation Support Foundation (FAPES).

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