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Socio-economic characterization of Portuguese kiwi growers: Facing current social and sustainability challenges

Fátima ALVES[1,2], Diogo Guedes VIDAL[1,2], João BICA[2] and Paula CASTRO[2]

Abstract

This paper reports a socio-economic characterization of the Portuguese kiwifruit sector. A survey was applied between 2019 and 2020 to a sample of 94 kiwifruit farmers (males 76%, females 24%). 72 percent of the participants declare that kiwi cultivation is a complementary occupation characterized by an intergenerational pattern (25.6%). Almost 70 percent of the orchards are under 5 ha, and 26.8 percent declare that their company does not have a positive turnover. The labour force is mainly seasonal. Regarding the challenges, 21.1 percent struggle with disease control in their orchards and 19.0 percent have difficulty in finding workers. The findings contribute to a nuanced understanding of the socio-economic dynamics underpinning kiwifruit cultivation in Portugal, offering insights for policy interventions and sectoral development strategies.

Keywords: kiwifruit growers, challenges, sustainability, socio-economic characterization, Portugal

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Introduction

The cultivation of *Actinidia deliciosa*, commonly known as kiwifruit, has a rich history dating back to the 12th century during the Song dynasty in China (Ward, C. and Courtney, D. 2013). Over time, this fruit spread from its native region to New Zealand (Morton J.F. 2013), where it underwent commercial development, transforming into a significant agricultural commodity (Costa, G. *et al.* 1992; Bano, S. and Scrimgeour, F. 2012). The subsequent introduction of kiwifruit cultivation in Portugal during the 1970s marked a significant expansion of the industry (Antunes, M.D. *et al.* 2018), particularly in regions like Entre Douro e Minho and Beira Litoral (Moura, L. *et al.* 2015).

However, despite its historical significance and growing importance, the Portuguese kiwifruit sector faces various challenges, particularly concerning sustainability and socio-economic factors. One of the most pressing issues is the decline in productivity due to the prevalence of *Pseudomonas syringae pv. actinidiae* (*Psa*), which causes bacterial canker disease. This pathogen poses a significant threat to both the viability of kiwifruit cultivation and the livelihoods of growers.

While previous studies have shed light on aspects of kiwifruit production in Portugal (Cruz, L. *et al.* 2004; Antunes, M.D.C. *et al.* 2007; Antunes, M.D. 2008a; Antunes, M.D. *et al.* 2018; Castro, H. *et al.* 2021, 2022; Abreu, C.C. 2022), there remains a dearth of information regarding the socio-economic profiles of

[1] Department of Social Sciences and Management, Universidade Aberta. Rua do Amial 752, 4200-055 Porto, Portugal.

[2] Centre for Functional Ecology – Science for People & the Planet (CFE), TERRA Associate Laboratory, Department of Life Sciences, University of Coimbra, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal. Corresponding author's e-mail: diogoguedesvidal@hotmail.com

those involved in the industry. Understanding the challenges faced by kiwifruit growers is essential for devising strategies to enhance the sector's resilience and sustainability.

Therefore, this study aims to fill this gap by conducting a comprehensive socio-economic characterization of Portuguese kiwifruit growers. Through a questionnaire survey, we seek to delve into the social and economic dynamics shaping kiwi production in Portugal, with a focus on the unique geographical, environmental, and social challenges encountered by growers. By examining the interplay between geography, socio-economic factors, and sustainability challenges, this study not only contributes to the existing literature but also provides valuable insights for policymakers, stakeholders, and practitioners involved in the Portuguese kiwifruit industry. Rather than viewing geography as a deterministic factor, we employ relational thinking to unravel the complex web of influences, including natural conditions, market relations, and policy frameworks, that mould kiwifruit cultivation practices and outcomes.

Understanding the socioeconomic dynamics of the Portuguese kiwifruit industry necessitates a multifaceted approach that transcends traditional disciplinary boundaries. At its heart, agricultural economics provides insights into the economic behaviour of kiwifruit growers, such as production decisions, input selection, and market interactions (Fuglie, K.O. 2012). The idea of farm size and its implications for economic performance, as demonstrated by the prevalence of small-scale kiwifruit farms in Portugal, is consistent with agricultural economics principles (Thirtle, C. *et al.* 2003). Furthermore, market structure and market power theories give light on the difficulties that producers confront when negotiating appropriate prices for their produce in the face of volatile market conditions. Rural sociology complements the economic approach by providing useful insights into the social aspects of kiwifruit growing (Bebbington, A. 2000). The sociographic profile of Portuguese kiwifruit growers, which is dominated by male, relatively young adults with high levels of education, mirrors broader demographic trends in rural communities (Marsden, T. and Smith, E. 2005). Furthermore, familial involvement in kiwifruit growing demonstrates the intergenerational transmission of agricultural knowledge and practices, emphasizing farming's social embeddedness (Bebbington, A. 1999). Drawing on sociological theories of social capital and networks, kiwifruit growers' strong associative linkages, as indicated by membership in industry associations, highlight the necessity of collective action and collaboration in tackling common challenges (Pretty, J. and Ward, H. 2001). In the context of sustainability research, the socioeconomic character of kiwifruit farming overlaps with broader environmental and societal concerns (Pretty, J. *et al.* 2005). In terms of sustainability, the emphasis on small-scale farming practices and familial involvement in kiwifruit cultivation is consistent with agro-ecology and community-based natural resource management ideas. Furthermore, the investigation of problems connected to bureaucratic complexities and legal compliance highlights the necessity for institutional arrangements that enhance agricultural systems' resilience and adaptive capacity (Lele, S. *et al*. 2013).

In addition to these established disciplines, recent advances in geography provide unique analytical frameworks for understanding the intricacies of kiwifruit production. Notably, the burgeoning fields of food geographies and economic geography of food provide new lenses through which to examine the intricate webs of commodity chains, labour geographies, and food system complexities (Kneafsey, M. *et al.* 2021; Joassart-Marcelli, P. 2022; Moragues-Faus, A. *et al.* 2023). By diving into the spatial features of agricultural operations, these pioneering publications shed light on the geographical complexities of kiwifruit cultivation and distribution networks. Furthermore, the emerging area of more-than-human geographies provides a paradigm-shifting viewpoint on the interactions between human agents, non-human ac-

tors, and the environment in kiwifruit agroecosystems (Hinchliffe, S. and Whatmore, S. 2006; Lorimer, J. 2015; Aldeia, J. 2023). These interdisciplinary investigations challenge standard anthropocentric narratives by emphasising the agency of non-human species and highlighting their critical role in changing agricultural landscapes (Aldeia, J. 2022, 2024). Set against this background, this paper is organized as follows: first, we provide an overview of the historical significance and global spread of kiwifruit cultivation, followed by an exploration of international and Portuguese trends in kiwifruit production. We then delve into the associative patterns of Portuguese kiwifruit farmers. Subsequently, we detail the materials and methods employed in our study, outlining our research question, objectives, and methodology. Next, we present our findings and engage in a comprehensive discussion of the socio-economic profiles of Portuguese kiwifruit growers, drawing implications for the sector's sustainability and viability. Finally, we conclude with reflections on the broader implications of our research and avenues for future inquiry.

International and Portuguese trends of kiwifruit cultivation

The presence of *Actinidia* is not recent, since it exists in Chinese historical records for centuries (Huang, H. and Ferguson, A.R. 2001; Ferguson, A.R. 2004; Franco, J. 2008; Meingassner, L. 2011), but it was until the beginning of the 20th century, mostly found in the wild. Although in the 19th century, specimens of this plant already existed in Europe, they were very few and only intended for botanical study, with *Actinidia* being botanically classified in 1845 (Ferguson, A.R. 2004). Nevertheless, the taxonomic distinction between the two main species of *Actinidia* – *A. deliciosa* and *A. chinensis* – is much more recent, accomplished in 1984 (Ferguson, A.R. 2004). The development of an agricultural sector devoted to the cultivation and commercialization of kiwifruit followed from the arrival of this species in New Zealand in 1904 (Ferguson, A.R. 2004). It was in the 1920s in New Zealand that the "Hayward" cultivar (*A. deliciosa*) was the world's most widely planted female variety, becoming predominant in almost all countries with significant crop size (Huang, H. and Ferguson, A.R. 2001; Ferguson, A.R. 2004; APK, 2007; Antunes, M.D. 2008b; Neves, N. 2008), including Portugal (APK, 2007; Antunes, M.D. *et al.* 2018). The international success of the New Zealand kiwifruit industry led companies from other countries including Portugal to enter this emerging sector from the 1970s onwards, planting orchards of *Actinidia deliciosa* and, though on a smaller scale, of *A. chinensis*, with increasing expansion (Huang, H. and Ferguson, A.R. 2001; Ferguson, A.R. 2004; APK, 2007; Franco, J. 2008; Antunes, M.D. *et al.* 2018). From the 1990s, a commercial success history began in most national and transnational markets dedicated to the domestic commercialization and export of *Actinidia,* with a significant increase of the planted area, the volume of production and the volume of capital generated.

According to FAOSTAT (2020) between 1988 and 2018, the world production of kiwifruit increased more than seven times, from 554,175 to 4,022,650 tons, representing a positive variation of ca. 200 percent *(Table 1).* Portugal also followed this international trend.

The global kiwifruit industry is controlled by a few primary producing countries, with annual production levels shifting depending on climate conditions, market demand, and agricultural policies. According to the most recent data available from the Food and Agriculture Organisation of the United Nations (FAO), China produces the most kiwifruit, accounting 2,380,304.47 tons in 2022 (FAO, 2024). Iran is close behind, with 294,571.01 tons in 2022. Portuguese kiwifruit producers face competition from both domestic and international suppliers, particularly in key markets such as Portugal and Spain. Understanding the competitive landscape is essential for Portuguese producers

Table 1. Evolution of kiwifruit plantation area with Actinidia and percentage change, 1988–2018

Area	Cultivated area, ha				Change of cultivated area, %		
	1988	1998	2008	2018	1988–1998	1998–2008	2008–2018
World	51,282	53,901	162,037	247,109	+5.1	+200.6	+52.5
Portugal	600	1,133	1,464	2,736	+88.8	+29.2	+86.9

to strategically position their products and maintain market share. In Portugal, native kiwifruit production competes with imports from other kiwifruit-producing countries, particularly during the off-season or when domestic supply is low. Countries such as Italy are important kiwifruit exporters to Portugal, providing customers with a variety of alternatives throughout the year. Italian kiwifruit, in particular, is well-known for its quality and frequently competes directly with Portuguese kiwifruit on the Portuguese market (Testolin, R. and Ferguson, A.R. 2009).

Portugal and Spain consume 95 percent of Portuguese kiwifruit production, which can be linked to historical preferences, market dynamics, and supply chain ties (Gallego, P.P. 2018). The dominance of Portuguese consumption in Portuguese kiwifruit production is determined by both historical and current market conditions. Historically, Portugal and Spain have been important kiwifruit eaters, with a predilection for locally grown cultivars (Antunes, M.D. *et al.* 2018). The proximity of kiwifruit-growing regions to consumer markets in Portugal and Spain, combined with favourable climatic conditions for production, has resulted in high domestic consumption rates. Furthermore, cultural considerations, nutritional choices, and culinary traditions may have influenced the appeal of kiwifruit in certain countries over time (Panagopoulos, T. and Antunes, M.D.C. 2011).

According to FAOSTAT (2020), there were 247,109 ha planted with *Actinidia* worldwide in 2018, generating an aggregate production of 4,022,650 tons. Portugal was the 10th largest producer, with 1.1 percent of the world's planted area (2,736 ha), and 0.85 percent of the world's production, namely 34,057 tons (INE, 2019; FAOSTAT, 2020).

This was the second year with the highest production of kiwifruit in the country, only surpassed by 2017. The *Actinidia* plantations are mainly concentrated in two agrarian regions: Beira Litoral (central region) and, above all, Entre Douro e Minho (north of Portugal). According to the agricultural statistics published by Statistics Portugal (INE, 2019), in 2018, of the 2,736 ha occupied by this agricultural crop, 1,916 ha (70.0%) were located in the north, and 799 ha (29.2%) in the central areas, representing 99.2 percent of the total national area planted with *Actinidia*. The same pattern was already observed in 2006 (INE, 2007), where 76.9 and 20.7 percent of the national area planted with *Actinidia* were located in the Entre Douro e Minho and Beira Litoral regions, respectively. These two agrarian regions are also responsible for almost the entire national production of kiwifruit. Of the 34,057 tons produced in Portugal in 2018, 27,097 tons came from orchards located in the northern area of the country (79.6%) and 6,711 tons in the central area (19.7%). Together, these two areas are responsible for 99.3 percent of national production this year (INE, 2019).

Most Portuguese kiwifruit farmers manage small orchards (INE, 2011). Therefore, and also because of the low profitability of these small-scale orchards, most of the kiwifruit farmers do not have the required logistical conditions to store their production after harvesting (e.g., refrigerated chambers) during the period necessary for the fruit to ripen to the point where it can be consumed (APK, 2007; Antunes, M.D. 2008c). The warehouses are, thus, central actors in this sector, receiving the annual harvest from various producers, storing it and controlling its maturation. There are six largest Portuguese warehou-

ses[3], that receive most of the national production. Most companies do not sell directly to retail, to major international brands or other production destinations but rather sell their annual production to warehouses, which subsequently sell the stored production.

As in most other kiwifruit-producing countries, the cultivar "Hayward" (*Actinidia deliciosa*) is the predominant female cultivar in Portuguese orchards (APK, 2007; Franco, J. 2008; Antunes, M.D. *et al.* 2018), although farmers have diversified the planted cultivars, either with *Actinidia deliciosa* or other varieties (especially *Actinidia chinensis*, but also a small amount of *Actinidia arguta*). Slightly less than half of the national production of kiwifruit is exported. Nevertheless, a considerable amount of this fruit is also imported. According to INE (2019), in 2017, the year in which the sector produced 35,411 tons of kiwifruit, of which 15,751 tons (44.5%) aimed at the international market. In 2018, this value reached 49.2 percent, corresponding to 16,747 tons. To meet Portugal's domestic market demand, 9,466 and 9,706 tons of kiwifruit were imported in 2017 and 2018, respectively. Although almost half of the national production of kiwifruit is exported, according to Antunes, M.D. *et al.* (2018), 95 percent of the production is intended for the Portuguese and Spanish markets, the latter being the main destination of exports.

Portuguese kiwifruit farmer's associative patterns

The kiwifruit market has grown both nationally and internationally. According to the available data, the Portuguese sector has consistently managed to be responsible for more than 1 percent of the world's kiwifruit production's gross value, approaching or surpassing the 2 percent barrier in several years, decreasing to only 1.3 percent in 2016 (APK, 2007).

The growth of kiwifruit production in Portugal has been economically positive for the actors in the sector. Some farmers fear that this upward trend, especially when framed within the world's growing trend in kiwifruit production, may saturate the Portuguese market, as well as Portugal's export markets for this fruit, leading to a drop in the price. In this scenario, the activity in the sector could become less profitable, especially the most recent business actors, who would have more significant difficulties in recovering the relatively high investment necessary to start their activity, since an orchard can take about three years post-planting to become commercially productive. In light of this, the Kiwifruit from Portugal Association (APK) was created in 2004 to promote the national kiwifruit sector (APK, 2007). By the end of 2020 APK had about 200 associates and it develops various activities to promote the sector, from participating in scientific research projects on the culture of the *Actinidia* to developing commercial strategies that bring together the actors in the sector, highlighting the creation of the brand "kiwifruits from Portugal".

Together with several kiwifruit farmers and warehouses, APK has sought to develop commercial strategies that ensure the economic sustainability of the sector. Among these strategies is the diversification of planted cultivars, such as *A. deliciosa, A. chinensis*, or *A. arguta* (on a smaller scale). This diversification of cultivars is accompanied by a commitment by several farmers to obtain agricultural and commercial certifications for their activity, such as the GLOBAL G.A.P. (a global reference framework for good agricultural practices) or the organic production method. Alongside these strategies, there is also emphasis on exporting national production, strengthening its presence in markets where it is already present, and entering new markets. Among other communication and marketing strategies, the brand "Kiwis de Portugal" was created by APK, intended to

[3] Frutas Douro Ao Minho, S.A.; Kiwicoop – Cooperativa Frutícola da Bairrada CRL; Kiwi Greensun – Conservação e comercialização de Fruta, S.A.; Kiwi Life, Lda.; Prosa – Produtos e serviços agrícolas, S.A.; e Terras de Felgueiras – Caves de Felgueiras CRL.

be a common banner under which the sector can organize itself with business success in national and international markets. While these efforts have been instrumental in advancing the interests of Portuguese kiwifruit producers, the role of European guidelines and frameworks have been pivotal in shaping this market.

The European Union's (EU) agriculture regulations and policies have a significant impact on the operating environment for Portuguese kiwifruit farmers. These policies include a wide range of issues, including agricultural subsidies, market access, environmental standards, and food safety laws, all of which have a substantial impact on the kiwifruit industry. The EU's agricultural subsidies under the Common Agricultural Policy (CAP) (European Commission, 2024a) have a direct impact on the financial viability of Portugal's kiwifruit farms, namely in influencing production decisions, investment strategies, and overall farm profitability. However, the distribution of subsidies across different agricultural sectors and locations in Portugal may not always reflect the special requirements and goals of kiwifruit farmers, providing hurdles to sectoral development (European Commission, 2024b). Alongside, market access is another important factor controlled by EU rules. The EU's internal market and trade agreements with other nations govern the circumstances under which Portuguese kiwifruit can be sold domestically and exported internationally. Tariffs, quotas, and sanitary and phyto-sanitary regulations set by the EU and its trading partners can have an impact on the competitiveness of Portuguese kiwifruit in foreign markets, as well as the sector's export plans.

Materials and methods

Research question and objectives

This study was guided by the following research question: What are the socio-economic dynamics shaping kiwifruit production in Portugal, and how do they impact the sustainability and viability of the kiwifruit sector? To answer this research question, the following objectives were established:

- To comprehensively characterize the socio-economic reality of the kiwifruit sector in Portugal;
- To elucidate the key socio-economic factors influencing kiwifruit production in Portugal, including but not limited to land tenure, farm size, labour force characteristics, income sources, and marketing strategies;
- To assess the challenges and opportunities faced by Portuguese kiwifruit growers in the current socio-economic landscape, with a particular focus on issues such as disease control, labour availability, market access, and sustainability practices.

With these objectives it is expected to provide a comprehensive understanding of the socio-economic characteristics of Portuguese kiwifruit growers and to identify key challenges and opportunities faced by kiwifruit growers in Portugal, along with recommendations for addressing these issues and enhancing the sustainability of the sector.

Methodological approach

To meet these objectives, a questionnaire survey was applied to producers/farmers and companies that planted *Actinidia* orchards. The questionnaire survey drew upon a combination of previous research, field observations, and expert input to ensure its comprehensiveness and relevance to the study objectives. Initially, before finalizing the questionnaire, we conducted an extensive review of existing literature on kiwifruit farming practices, socio-economic factors influencing agricultural activities, and the broader context of Portuguese agriculture. This literature review served as the foundation for identifying key themes and topics that warranted exploration in our study. Several significant topics concerning kiwifruit farming practices, socioeconomic

factors influencing agricultural activities, and the broader environment of Portuguese agriculture were identified: socio-demographic characteristics of growers; farm management practices and infrastructure; economic aspects such as income sources and market access; environmental considerations and sustainability practices; and social dynamics including family involvement and community networks

Moreover, we supplemented our literature review with field observations and informal discussions with kiwifruit growers, industry experts, and agricultural extension officers. These interactions provided valuable insights into the day-to-day realities and challenges faced by kiwifruit farmers, helping us to refine and prioritize the themes to be addressed in the questionnaire. We conducted direct observation during the winter and summer of 2018 to gain insights on relevant practices in the kiwifruit industry. Specifically, we attended a number of occasions where Portuguese kiwifruit growers met with the APK to address the obstacles of marketing their products. We also visited kiwifruit orchards in Entre Douro e Minho and Beira Litoral, Portugal's two key agricultural regions for the kiwifruit sector. During these visits, we accompanied specialists working in the orchards, obtaining first hand knowledge of their operations and witnessing the subtleties of kiwifruit production procedures. These direct observations provided vital insights into the daily reality and issues faced by kiwifruit growers, supplementing the quantitative data gathered through our questionnaire study. While the exact number of stakeholders who participated in these informal discussions was not systematically recorded, our goal was to collect a variety of viewpoints and experiences from the kiwifruit industry.

While existing research gave useful insights into these problems, our study sought to fill gaps and address unresolved issues. For example, there has been little research into the specific socioeconomic dynamics affecting kiwifruit production in Portugal, particularly in terms of land tenure arrangements, labour force characteristics, and marketing techniques unique to the Portuguese context (Eurostat, 2017). Furthermore, there was a paucity of detailed assessments of the challenges and opportunities faced by Portuguese kiwifruit growers, particularly in light of changing market conditions and sustainability concerns (Malla, S. *et al.* 2022; Zhang, X. *et al.* 2023; Gurbuz, I.B. *et al.* 2024).

We conducted a preliminary pilot survey with a small sample of kiwifruit growers to test the clarity, relevance, and feasibility of the questionnaire items. During this phase, numerous changes were made based on their feedback, including clarifying language, simplifying complex questions, removing repetition, rephrasing for clarity and precision, providing response choices, such as explanatory comments or examples, and improving visual layout and structure. For example, the term "sustainability practices" underwent refinement to delineate whether it pertained to environmental, economic, or social sustainability, thereby ensuring respondents understood the intended scope of inquiry. The feedback received from participants during this pilot phase allowed us to fine-tune the wording of questions, identify potential ambiguities, and ensure the comprehensibility of the survey instrument.

Questionnaire development and application

Drawing on this multi-faceted approach, the finalized questionnaire was designed to capture a comprehensive range of themes deemed crucial for understanding the socioeconomic dynamics of Portuguese kiwifruit farming. These themes included but were not limited to:

1. Socio-demographic characteristics of growers;
2. Farm management practices and infrastructure;
3. Economic aspects such as income sources and market access;

4. Environmental considerations and sustainability practices;

5. Social dynamics including family involvement and community networks.

Between the summer of 2019 and the spring of 2020, the questionnaire was available for an online response, duly anonymized, through the Google Forms platform. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964. There was informed consent, the study aims were explained to participants, and they received guarantees of confidentiality and anonymity. The email address was made available to representatives of the kiwifruit companies and farmers thanks to the help of the six national warehouses (mentioned earlier), and APK. The same questionnaire survey was also made available in a printed version (also anonymized) and distributed to farmers who preferred to fill it in this way.

A convenience sample was used to obtain as many responses as possible (Parker, C. *et al.* 2019). This was the best possible way to characterize socio-economically the kiwifruit farmers in Portugal, especially given the lack of reliable aggregate data on their numbers (Bornstein, M.H. *et al.* 2013), and also the actual numbers.

In 2019 the data available regarding this sector was most likely outdated by the 2009 Agricultural Census (INE, 2019) (the latest public data available at the time of the study), given the growth that the sector had been experiencing. An exhaustive agricultural census operation is held every 10 years and since the Covid-19 outbreak delayed the application of the 2019 Agricultural Census it was impossible at the time to secure the necessary figures by a representative sampling of the kiwifruit farmers. Thus, the search for the greatest possible number of answers appeared to be the best methodological alternative to carry out the socio-economic characterization of the sector.

Although it cannot be considered a representative sample of the kiwifruit producers' sector, this study makes a first attempt to provide some insights and trends in the sector based on producers' opinions about their activity and some of the main problems in the sector. From 100 answers, 94 were obtained online, and 6 were in printed format. Only 94 answers were considered valid since six were answered by non-owners of the companies in the sector (i.e., employees of these companies) or because the respondent did not explicitly consent to the processing of data (1 answer). It was considered more relevant for the socio-economic characterisation to work only with data from these 94 questionnaires answered directly by business owners.

Some reasons may be pointed out for the small number of answers: (i) the first may be related to the length of the questionnaire, whose 57 questions took at least about 20 minutes to answer; (ii) secondly, this questionnaire survey began to be made available at a time close to the harvest season, which is an unfavourable period to answer requests like this questionnaire because of the high workload that characterizes the season for the farmers; (iii) the third and, perhaps, most relevant, is that this study was conducted, in part, at the beginning of the current outbreak of Covid-19, which limited the possibilities of meeting face-to-face with national kiwi growers to make them aware of the importance of their participation in this study.

After the anonymization of the answerers, they were subsequently processed using the IBM SPSS Statistics ® software (IBM, 2018) through descriptive analysis.

Although our study attempted to cover some of these gaps with a questionnaire survey and descriptive analysis, certain subjects were left unaddressed due to methodological constraints and limitations. For example, the impact of EU agricultural policy on kiwifruit production in Portugal is an interesting subject of future research. While this topic was somewhat uncovered throughout the literature analysis, it was outside the scope of the current study to investigate further. Future research could investigate the connection between EU policies, socioeconomic dynamics, and the sustainability of Portugal's kiwifruit sector, providing additional insights into policy implications and prospective sectoral growth strategies.

Results and discussion

Sociographic profile

Regarding the sociographic profile of the sample, where males prevailed (76%), it reflects the typical gender composition of the agricultural sector. Agriculture has historically been seen as a male-dominated profession due to cultural norms and traditional gender roles, which may explain why males are overrepresented in kiwifruit production (Maman, M. and Tate, T.H. 2012). 64.9 percent are under 50 years old, which expresses a trend of a younger population since they are mainly concentrated in the 30–39 (33%) and 40–49 (26.6%) year-old age groups *(Figure 1).* At the time of the questionnaire survey application, the youngest respondent was 24 years old, and the oldest was 87 years old. Despite this youthfulness of the sample, it should be made explicit that some companies have more than one business partner and that only one was responding to this questionnaire on behalf of the other. Also, this trend can be ascribed to a number of factors, including generational succession within family-owned farms, greater interest among younger people in sustainable agriculture, and the adoption of contemporary agricultural techniques that appeal to a younger audience (Widiyanti, E. *et al.* 2018; Girdziute, L. *et al.* 2022; Srinivasan, S. and White, B. 2024). Regarding marital status, 81.9 percent are married or in de facto union, followed by single (12.8%), divorced (3.2%), and widow (2.1%).

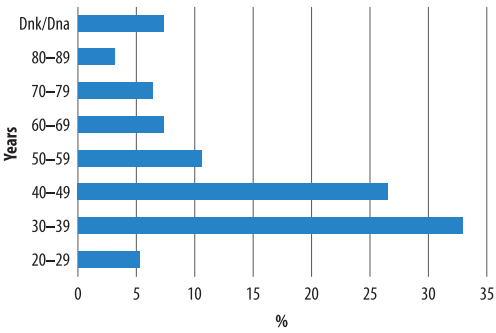

Fig. 1. Sample distribution of kiwifruit producers by age group. Dnk/Dna = Do not know / Do not answer.*Source*: Authors' own elaboration.

Of the 94 respondents, 61.7 percent were APK associates (N = 58), and 90.4 percent were associates of one of the national warehouses (N = 85), revealing that the actors of the Portuguese kiwifruit sector have strong associative links, which can be explained by the centrality of the warehouses as mediators between producers and retailers. Since the APK had 189 members when this survey was applied, this study sample represents 30.7 percent of its members. The sample revealed a high level of education *(Table 2)*, with approximately 60.7 percent of the respondents having completed at least one degree in higher education, to which must be added 8.5 percent of respondents who have attended higher education without completing any degree which may be related to the youth of the sample. Literature reveals that educated growers are likely to be more keen to adopt innovative technologies, implementing sustainable farming practices, and adapting to changing market dynamics, thereby enhancing the overall productivity and competitiveness of the kiwifruit sector (Klerkx, L. and Leeuwis, C. 2009).

Regarding the income from this activity, it can be stated that it represents a complementary economic activity and that, in most cases (72.3%), it accounts for half or less of the respondents' annual income. In fact, 26.6 percent of the respondent stated that their complementary occupation is related to intellectual and scientific activities, and 12.8 percent represents legislators, executive bodies, officials, directors, and executive managers. The complementary occupations of the sample is somewhat linked with the highly educated level of those working in the kiwifruit sector. This diversification of revenue sources may act as a risk mitigation technique, protecting growers from volatility in kiwifruit prices or yields and increasing their overall economic resilience (Lagerkvist, C.J. *et al.* 2007). The intergenerational profile of this activity shows that although not the majority, many of the respondents have family members who are also dedicated to kiwi-

Table 2. Sample distribution of workers by educational level

Educational level	Number	%	Educational level	Number	%
4th grade	3	3.2	University degree	39	41.5
6th grade, 2nd cycle	5	5.3	Post-graduate	4	4.3
5th year of high school*	2	2.1	Master's degree	12	12.8
7th year of secondary school**	7	7.4	Doctorate	2	2.1
12th year of secondary school	11	11.7	Other levels of education	1	1.1
Higher education***	8	8.5	*Total*	*94*	*100.0*

*9th grade, 3rd cycle, **11th year, secondary, *** But not completed.

fruit culture (43.6%). This study also finds couples where both spouses are kiwi growers (25.6%). These familial links not only allow knowledge transmission and skill development, but also help to ensure the sustainability and continuity of kiwifruit farming practices throughout generations (Chiswell, H.M. 2018; Sheridan, A. *et al*. 2021). In examining the sociographic profile of our sample, it's essential to recognize the multifaceted nature of kiwifruit farming. While traditional metrics such as age distribution and marital status offer insights into the demographics of growers, relational thinking prompts us to delve deeper into the intergenerational patterns and familial ties that underpin kiwifruit cultivation. Our findings reveal not just individual farmers, but families and communities engaged in this agricultural endeavor, shaping and shaped by socio-economic forces.

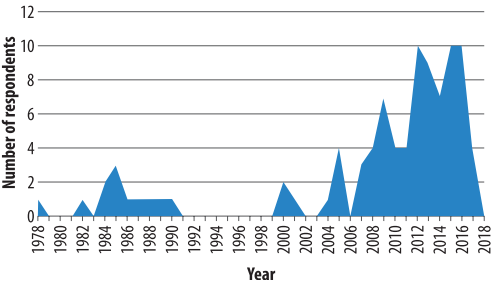

Fig. 2. Year of the beginning of the professional activity of respondents in kiwifruit producing. *Source*: Authors' own elaboration.

Socio-economic profile

Because kiwifruit production is concentrated in the Portuguese agrarian regions of Entre Douro e Minho and Beira Litoral (INE, 2019), most company headquarters are located here (97.8%). Based on the respondents' answers, the majority claim to work in kiwifruit culture either as an individual entrepreneur (58.5%) or as part of a limited liability company (29.8%). *Figure 2* shows that most respondents started producing kiwifruit in recent years, with 69.1 percent starting in the last decade (2010–2018), which is aligned with the youth of the sample. In relation to the progressive increase of the area planted with *Actinidia* in Portugal, it appears that this significant number of recent beginners to kiwifruit culture supports the growth of the sector in the last decade.

Concerning the size of the farms, the sample confirms the profile of the kiwifruit sector already identified by FAOSTAT (2020), Statistics Portugal (2019), and Antunes, M.D. (2008c). Almost 70 percent of these companies exploits farms under 5 ha, and 87.2 percent exploit up to 10 ha. In the entire sample, only two farms are bigger than 30 ha. This confirms the small scale of the farmers (97.9%), who do not have the conditions to store and mature their production after harvest. The predominance of small-scale farms in the kiwifruit sector reflects historical land distribution patterns, land availability, and economic considerations, but also sociocultural characteristics since small farms are characteristic of family-based agriculture and

may face challenges in accessing resources and markets compared to larger operations (Antunes, M.D. 2008a).

Observing companies' annual sales in 2018 reveals a significant number did not invoice or presented a reduced invoicing, in some cases, insufficient to cover the company's operating costs and/or to recover the investment made to start the activity. About 27 percent of the companies did not have a positive turnover (at least +1 EUR) in 2018. It was also found that half of the companies in the sample (52.4%) registered a turnover that did not exceed 5,000 EUR.

The recent data on orchards plantations of several companies (the sample contains 29 companies whose orchards were planted between 2016 and 2019) shows that a significant percentage of companies in the sector have reduced or non-existent turnover (INE, 2019). Furthermore, the small size of the farms in the sample demonstrates the difficulty in generating better turnovers unless these orchards were extraordinarily productive, which they are not. Despite this, it was found that some companies presented a turnover of several hundred thousand euros in 2018. Only 7 companies indicate that they have exceeded 100,000 EUR in their turnover for that year. Moving beyond surface-level measurements, our analysis reveals the complex socioeconomic framework in which kiwifruit growers operate. Rather from viewing farm size and turnover as discrete indicators, this analysis identified the underlying structures and power dynamics that shape these outcomes. A more comprehensive knowledge of the constraints and opportunities that kiwifruit growers face by contextualizing farm sizes within broader economic frameworks and investigating turnover in light of market changes and policy interventions is provided (Mishra, A.K. *et al.* 1999).

Since the companies are small, most farmers do not have permanent workers or only have one or two, and farming companies with 15 and 21 permanent workers are statistically rare in the sample (2 companies). The respondents reported considerable variations in the use of seasonal workers *(Figure 3)*: 81.9 percent had, in 2018, a maximum of 10 seasonal workers. Some companies use comparatively high numbers of seasonal workers (three companies used 20, and one company used 30). Additionally, thirteen companies did not use any seasonal workers in 2018.

In the case of the earnings received by the permanent workers, it was observed that the average wages of agricultural workers tend to be lower than those with administrative and/or management functions *(Table 3)*. Of the 33 companies with permanent agricultural workers, most pay monthly salaries close to the national minimum salary (at that time), and 11 companies pay their permanent agricultural workers between 750 and 999 EUR. As for the 18 companies that indicate they have permanent workers with administrative and/or management functions (in addition to the owner/s), the latter continue to earn salaries ranging between 500 and 999 EUR. But, three companies indicate that workers with such functions earn salaries above 1,000 EUR, and in one case, above 1,500 EUR.

Permanent workers with both types of functions receive less than 499 EUR (N = 2), assuming that, in such cases, these are part-time contracts, although this could not be confirmed by the respondents. On the other hand, more companies do not have permanent workers with administrative and/or management functions (N = 67) than com-

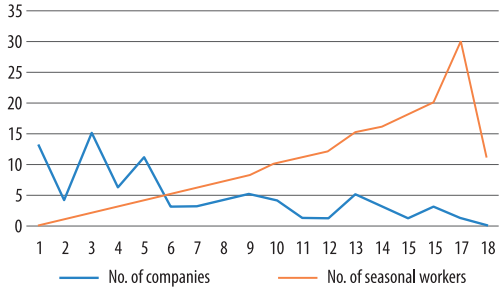

Fig. 3. Relation between the maximum number of simultaneous seasonal workers (axis y), and the number of companies (axis x). *Source*: Authors' own elaboration.

Table 3. The average salary of permanent workers

Salary, EUR	The approximate average salary of permanent agricultural workers		The approximate average salary of permanent workers with administrative and/or management functions	
	Number	%	Number	%
No workers for the role other than the owner	50	47.0	67	63.0
under 500	2	1.9	2	1.9
500–749	20	18.8	7	6.6
750–999	11	10.3	6	5.6
1,000–1,449	0	0.0	2	1.9
1,500 or more	0	0.0	1	0.9
Do not know/Do not answer	11	10.3	9	8.5

panies that do not have permanent workers with agricultural functions (N = 50), indicating that, in several of these companies, landowners primarily perform administrative and/or management functions. The amounts paid per hour of work to seasonal agricultural workers in this sample vary between 3 and 9 EUR *(Figure 4)*.

21 companies indicate that they paid these workers 5 EUR/hour (which is higher than the hourly wage corresponding to the national minimum wage). There were, however, companies that, plausibly, due to difficulties in finding workers, paid significantly higher amounts per hour of work (5 companies indicate paying 8 to 9 EUR per hour). On the other hand, 9 companies in the sample indicated that they paid less than 4 EUR/hour to seasonal agricultural workers, which is lower than the national minimum wage. While traditional assessments may focus exclusively on wage rates and workforce demographics, the relational approach applied in this study requires us to include the larger socioeconomic context that influences labour availability and remuneration. Factors such as urbanization trends, societal attitudes of agricultural work, and seasonal fluctuations in employment demand all interact to shape labour dynamics in the sector.

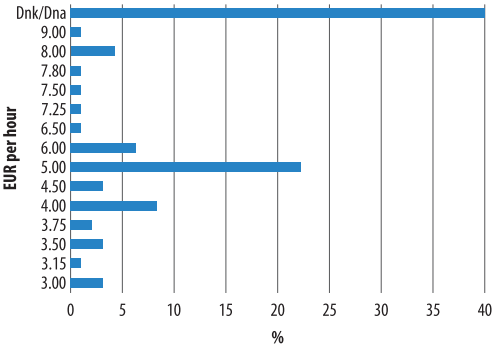

Fig. 4. Approximate average salary of permanent workers in EUR per hour. Dnk/Dna = Do not know / Do not answer. *Source*: Authors' own elaboration.

Exploratory mapping of the main current and future challenges

One of the most relevant pieces of information for the sector is to know which current and future challenges are perceived by these actors. Therefore, each respondent was asked to identify their company's top three challenges *(Table 4)*.

It is significant, from the outset, that the most frequent response was disease control in the orchards (N = 50). When this problem is combined with the challenges (mentioned less frequently) that are weed control in orchards (N = 26) and/or pest control (N = 12), we see that, agriculturally and economically, kiwifruit farmers are notoriously concerned about these issues. It is also significant that the second most frequently mentioned challenge is to find workers (N = 45). Plausibly, this difficulty explains why most of the companies in the sample pay seasonal workers remunerations higher than

Table 4. Main challenges the company faces

Challenge	Number	%
Disease control in the orchard	50	21.1
Difficulties in finding workers	45	19.0
Kiwi sale price lower than necessary to maintain the financial viability of the company	37	15.6
Weed control in the orchard	26	11.0
Difficulties with bureaucratic issues within the scope of investment projects	26	11.0
Difficulties associated with complying with legislation*	15	6.3
Pest control in the orchard	12	5.1
Logistical issues**	8	3.4
Day-to-day management difficulties of the company's employees	4	1.7
Competition from foreign companies	4	1.7
Competition from Portuguese companies	2	0.8
Other	8	3.4

*Social security, health and safety at work, etc. **Storage of production during harvest, transportation of production, etc.

the national minimum wage (in the case of some companies, more than twice as high).

A broad framework of the fluctuations of the Portuguese economy in recent decades would be necessary to adequately understand the difficulties of several companies in the sector to find workers. A discussion on employment in the primary sector would be necessary since this difficulty is extended to other agricultural sectors. The increasing urbanization that the country has experienced in recent decades (Fernandes, J.A.R. and Seixas, J. 2018), as well as the dominant social representations of what agricultural work means (when comparing country and city life), causes a significant depreciation and critical evaluation (Naiff, D.G.M. *et al.* 2009; Bonomo, M. *et al.* 2017), and may be relevant factors in understanding this challenge. Promoting fair and attractive payments to farmers is essential to enhance their willingness to stay (May, D. *et al.* 2019). Despite these reasons, the seasonal nature and inconsistency of the work, and the labour intensiveness should be also considered. The industry is perceived as low paying (despite it being found that these companies pay significantly higher amounts per hour of work to these workers) and is not particularly seen as safe (Hutchison, G. 2021).

Still, the third most mentioned challenge is the significant concern with the price at which their companies can sell their agricultural production (N = 37). There are several companies whose turnover in 2018 indicates that they had financial losses in that year, despite considering that there are other driving factors, such as the recent date of planting, which leads to the fact that they do not yet have marketable production. However, this does not invalidate that, for a significant part of the sample, kiwifruit culture was, in 2018, an activity that did not (yet) paid off the investments.

The recent date of many of the plantations that are not yet productive does not allow us to understand why, for 37 respondents, one of the challenges was the selling price of fruit, which they consider to be lower than the amount needed for their business activity to be economically viable. Other firms with older and more productive orchards also indicate difficulty in ensuring financial viability.

The national kiwifruit industry has generated an increasing overall gross production, which has benefited many of its actors. This sample seems to indicate that these economic benefits are not experienced by all, with some companies claiming to be, or at least fearing to be, in financial difficulties. It is also significant that several respondents indicate that their companies experience difficulties in administrative tasks, namely in situations where they must deal with bureaucratic and legal issues. 15 respondents mention a challenge to compliance with legislation, such as social security or

health and safety at work. At the same time, 26 say that it is a challenge to deal with bureaucratic issues in the scope of investment projects.

At this level, two possibilities are unveiled: On the one hand, these difficulties may be motivated by the obligation to comply with extensive sets of rules, sometimes not very flexible and not always easily decipherable for those without legal training. On the other hand, dealing with bureaucratic-legal issues in a business context increasingly requires full-time professional dedication or the existence of employees (or owners) permanently dedicated to administering such tasks. It is plausible that small companies, whose owners are not exclusively dedicated to the business activity and without administrative staff, as are many of the companies in the sample, experience more pronounced difficulties in this area.

Finally, our examination of the constraints and opportunities facing kiwifruit growers demonstrates the need of relational thinking in understanding complex socioeconomic events. Rather of addressing problems like disease control, labour shortages, and market prices as discrete issues, we see them as interwoven manifestations of larger socioeconomic factors. Using a relational view, it was possible to uncover underlying systemic causes and devise targeted interventions to improve the resilience and sustainability of the kiwifruit sector.

Conclusions

Data on kiwifruit sector is stills scarce at national level which limits the possibility to design and implement tailored and effective policies. To fill this gap, we conducted the first socioeconomic analysis of the Portuguese kiwifruit sector using a comprehensive questionnaire survey. While we recognise that our sample may not be statistically representative, our findings indicated tendencies consistent with indicators of the sector's economic expansion in previous decades. Given the presence of respondents with these characteristics in the sample, the data shows that several companies in 2018 did not have commercial production or positive turnover (at least not with significant values and capable of immediately ensuring the financial sustainability of these companies).

Some challenges may be pointed out, being the control of *Actinidia* diseases the currently severe problem leading to losses of plants and fruits, as well as having negative financial impacts. Equally relevant are two other challenges: the difficulties in securing workers to carry out crucial tasks in the orchards and the administrative complexities/bureaucracy that must be addressed mainly associated with investment projects, and complying with legal requirements (e.g., social security, health and safety at work). Although these are distinct problems, none of them can be solved through the actions of individual companies but rather, require coordinated collective actions. Problem resolution requires the establishment of recurrent dialogues with actors and entities outside the kiwifruit chain, such as state agencies.

It must also be stressed that several companies in the study sample declare to be concerned with their financial viability, stating that the price at which they sell their production may not be sufficient to guarantee the financial health of their companies. Even supposing that several of them will be in a more solid financial situation in a few years when their orchards have higher fruit production, the concern with the financial viability does not go unnoticed in the sample. It would also be relevant to obtain statistically representative information about the sector that would allow us to reach more reliable conclusions than those possible from this work and to conduct a more robust monitoring of the sector's evolution which could contribute to assure its socioeconomic and environmental sustainability.

The sociographic picture of Portuguese kiwifruit growers provided in this study, including demographic trends, educational levels, and family involvement in kiwifruit growing is uncommon in the previous research, which frequently focuses on larger agricul-

tural trends rather than specific subsectors such as kiwifruit cultivation. Our study fills a critical vacuum in the worldwide literature by providing researchers with a multifactorial understanding of the human components of kiwifruit farming, which may be applied to comparable studies in other geographical situations, facilitating tailored policy interventions and stakeholder engagement. While similar assessments exist for other agricultural sectors, our research provides fresh insights specific to the kiwifruit industry, such as disease management issues and labour limitations. By highlighting these sector-specific characteristics, our findings contribute to a better understanding of the socioeconomic landscape of kiwifruit production, expanding the international agricultural economics literature and informing comparative research across various agricultural sectors around the world, which may inspire similar analyses to uncover nuanced economic realities, informing strategies for enhancing sectoral resilience and sustainability.

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The authors declare no conflict of interest.

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