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What future for organic farming? Foresight for a smallholder Mediterranean agricultural system

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Abstract

This study aims to foresee the future of organic farming in the smallholder agricultural systems of the Valencian Region (Spain), as well as to identify how different drivers of change may affect such a future. To do so, two qualitative methodologies were combined: The Delphi method and the participatory scenario development. The results estimate an upward trend for organic farming area and sales, which would contribute to a greener and more sustainable economy in the region, a slight drop in organic versus conventional food prices, the entrance of large operators and a "dualisation" of the models of production and consumption of organic food. The key role that the public sector plays for the future of organic farming is underlined by the stakeholders, who suggest that the civil society may counterbalance the lack of public support by way of collective action and an increasing awareness about health and sustainability. This study concludes by highlighting the main findings obtained, both regarding the expected evolution of organic agriculture in the region and the key factors that would influence such evolution, emphasising the applicability of the results to other similar smallholder Mediterranean farming systems.

Keywords: Participatory foresight, Delphi method, Scenario development, Organic farming, Spain, Sustainability

Introduction

Agriculture in Europe has moved in the last decades towards globalised markets, fewer and larger farms and vertical integration into the value chains (Guiomar et al. 2018; Arnalte-Mur et al. 2020). Conventional-productive agriculture has been found to negatively affect sustainable agriculture in the continent (Agovino et al. 2019), farm intensification jeopardising environmental integrity wherever fertilisers, chemical pesticides, irrigation water and agricultural machinery are improperly used (Scherer et al. 2018).

Responding to these problems, organic farming has steadily progressed as an alternative, sustainable productive model (Eyhorn et al. 2019) that contributes to the transition to a green economy (Aceleanu 2016). Organic farming has been increasing its importance in Europe in terms of sales, farmland area and number of certified farm holders. In the period 2012–2020, the organic area in the European Union (EU henceforth)

increased by 56%, the number of organic producers by 40% and the monetary value of retail sales by 114% (Eurostat 2022a; FiBL & IFOAM 2014, 2022).

Although organic farming has been regarded by some scholars as an inefficient approach to food production (Pickett 2013; Kirchmann et al. 2016), its potential to balance multiple—environmental, economic and social—sustainability goals has been widely acknowledged in reports and academic studies (Reganold and Wachter 2016; Saffeullah et al. 2021). It is argued that organic agriculture could provide enough food for a growing population, without needing much more land and, at the same time, reduce the environmental impacts from agriculture if important societal and productive transformations are also put in practice, such as the reduction of animal products consumption and the reduction of food waste (Muller et al. 2017). Also, innovative practices could help organic farming to increase yields and adapt to climate change (Reganold and Wachter 2016; Purnhagen et al. 2021).

It is on these grounds that the EU has included the promotion of organic agriculture as a key element of the Farm-to-Fork (F2F) Strategy—which is at the core of the European Green Deal—with the aim of achieving a greater sustainability of the whole food system (Moschitz et al. 2021). In order to help organic farming to reach its full potential and to meet the objective of having at least 25% of the Utilised Agricultural Area (UAA) certified as organic by 2030, the EU has launched a specific Organic Action Plan. This Plan considers actions to boost demand, stimulate the conversion to organic, reinforce the entire value chain and achieve an even more environmentally friendly organic agriculture (European Commission 2021).

The particular case of Spain is outstanding with regard to organic agriculture. Whereas the overall long-term sustainability of Spanish agriculture has been put into question (Ortiz-Miranda et al. 2016), Spain is also the second European country with the largest area of certified organic agricultural land and the sixth in the world, with 2.437.891 certified hectares in 2020 (Eurostat 2022a; FiBL & IFOAM 2022). Around 45% of the Spanish organic production is exported, mainly to other European countries (Agence BIO 2021; MAPA 2021a, b).

This article is focused on organic agriculture in a Mediterranean region of Spain, the Valencian Region (VR henceforth), regarding this case study as a single phenomenon that is framed into a general setting (Vilsmaier et al. 2015). Agriculture in the VR presents the typical traits of many Mediterranean farming systems, pervaded by small-scale, export-oriented farms (Prosperi et al. 2023) where permanent crops predominate. These commonalities make our case study relevant beyond the local context. The farm structure is characterised by very small holdings, another distinctive feature of Mediterranean agriculture compared to that of Central-Northern Europe (Guiomar et al. 2018)—not to mention other developed countries such as the USA or Australia. The recent literature has acknowledged the role that small farms play as providers of food and nutrition security in Europe (Galli et al. 2020; Rivera et al. 2020; Pinto-Correia et al. 2021), as well as their importance for rural sustainability (Shucksmith and Rønningen 2011) and as supporters of biodiversity and ecological resilience (Guiomar et al. 2018).

The future of organic farming in the VR may be affected by the processes of global change (e.g. climate change) and the unexpected shocks (natural disasters, economic crises) that threaten the food systems as a whole (Tendall et al. 2015). The COVID-19

pandemic and the Russia–Ukraine war, which have entailed profound implications for the food systems, are good examples of these shocks (Devereux et al. 2020; Hellengers 2022).

This study proposes an exercise of foreseeing such a future by the combination of two qualitative techniques: the Delphi method and the participatory scenario development with key stakeholders of the region. Our approach represents a novel contribution to foresight in the field of organic agriculture, which we believe has yielded robust findings.

Based on this methodology, the objectives of this article are threefold: (i) to envisage the future of organic agriculture in the VR, as a paradigmatic example of a Mediterranean farming system; (ii) to identify how different drivers of change may affect such a future, and (iii) to discuss the stakeholders' assumptions underlying the foresight process. We believe that this study is relevant for scholars, stakeholders and decision-makers to anticipate the challenges that the development of organic farming has to face, not only in the VR, but also in other areas with similar characteristics.

Methods

The case study

The VR borders the Mediterranean Sea (Fig. 1). According to the Agricultural Census of 2020, there are 100,259 agricultural holdings that occupy 589,311 ha of UAA in the region, which makes an average size of 5,9 ha—although more than a half of the farms have less than 2 ha. The majority of the farm holders work part-time on the farm. The prototypical Mediterranean agricultural landscape of this region is pervaded by woody crops such as vines, citrus fruits and olive trees. Vegetables are also grown outdoors and—particularly in the Southern coast of the region—in greenhouses.

Fig. 1 Valencian region (Spain). *Source*: Own elaboration

The data from the Agricultural Censuses show that an intense process of farm consolidation has taken place in the VR since the 1990s (Arnalte et al. 2008, 2013; Moreno-Pérez 2013). The comparison between the last two censuses, performed in 2009 and 2020, reveals a 16.1% drop in the number of farms and a 6.8% increase in their average size in the region. Meanwhile, the UAA has fallen 10.4%, what may relate to the problem of land abandonment, as many retiring smallholders tend to be reluctant to sell or lease their lands, but also have difficulties in finding someone in the family who wishes to continue working on the farm (García Álvarez-Coque et al. 2021).

The Government of the VR enacted the Law of Agrarian Structures (DOGV 2019) that promotes joint cropland management strategies, facilitates access to land for some groups (professional farmers, initiatives of joint management, women and young people), introduces tax incentives for the acquisition, transfer and lease of rural properties, includes penalties for the owners of underutilised or abandoned lands, as well as public support for land restructuring processes to help farms achieve a viable size (García Álvarez- Coque et al. 2021).

Some studies report the trend towards intensification that many farming areas of the VR are undergoing (Moreno-Pérez et al. 2011; Moreno-Pérez and Lobley 2015; Sese-Minguez et al. 2017). However, organic agriculture—certified by the Valencian Region Committee of Organic Agriculture (CAECV by its Spanish initials)—has also been practised for decades and has expanded particularly fast over the last years. In the 2011–2021 decade, the agricultural area certified as organic increased by 135%, reaching 153,503 ha by the end of the period—which amounts to 20.5% of the UAA of the region (CAECV 2021). There are 4263 organic operators, from which the big majority (78.7%) are producers, the rest being firms and importers (19% and 2.3%, respectively). The turnover has also followed an upward trend, reaching 732.2 million euros in 2021—an impressive 380% increase with respect to 2015.

Approximately half of the total certified area corresponds to pastures in the mountainous interior of the region, arguably due to its easy conversion to organic. As for the cultivated land, vineyards for winemaking, almonds, olive grove for oil and citrus fruits are the main organic crops (CAECV 2022)—following the same pattern of the general productive orientation of the region. The production of organic wine is especially relevant, as the VR is the third Spanish region in terms of vineyard area converted to organic farming (MAPA 2021a).

The strong foreign demand—61% of the organic production of the VR was exported in 2021, particularly to European countries (CAECV 2022)—and the increasing domestic demand (Scarpato et al. 2017; MAPA 2021b) would be the main reasons for this expansion. Moreover, organic agriculture in the VR has also been recently promoted by the Regional Government, with the launch of the "I Organic Production Plan of the Valencian Region" (2016–2020), followed by the "II Valencian Agroecological Transition Plan" (2021–2025). The 114.3 million € budget of the latter Plan includes the Common Agricultural Policy subsidies to organic farmers, plus additional funds for training activities, award grants and promotional campaigns, among other actions. The regional government aims at reaching the goal of 25% of

the UAA certified with organic farming by 2030, in line with the objective set by the European Green Deal.

Methodology

Foresight has been defined as "*a systematic participatory process to create collective intelligence about the medium- to long-term future*" (Störmer et al. 2020: 131). This process is gaining ground in strategic planning and becoming institutionalised in policymaking (EU Commission 2020; Ringland 2010). Applied to agriculture, foresight helps to understand its future and related challenges (Prager and Wiebe 2021). The engagement of stakeholders that are not foresight practitioners has been claimed as a key element for the success of foresight processes (Barret et al. 2021). Their participation is regarded as a way of sharing the burden of political responsibility between the ruling minority and the ruled majority, as a part of a continuous process of democratisation (Nikolova 2014), promoting citizenship, incorporating local knowledge and values, identifying socially relevant issues and legitimating decisions through bottom-up participatory processes (Soste et al. 2015; Popper 2008). Foresight activities tend to use more than one method and privilege the qualitative techniques (Popper 2008).

The results of this study were obtained from the combination of two anticipation methodologies, i.e. the Delphi method (with some modifications, as explained below) and the participatory scenario development. There are examples in the foresight literature on organic agriculture that have applied the Delphi method (Padel and Midmore 2005; Kretzschmar and Schmid 2011; Chamorro et al. 2012) and the scenario development (Zanoli et al. 2012; Shkuratov et al. 2018). The two methodologies have been also combined in previous studies on agriculture (Rintamäki et al. 2016; Antonelli et al. 2022; Ehlers et al. 2022).

Prior to the application of these methods, the research team conducted some interviews with a technician of the CAECV, who provided us with an overall picture of the organic sector in the VR and access to detailed data about the recent trends of the organic crops and operators. This information was useful to prepare a foresight participatory workshop, which was held on 19 October 2021 at the CAECV headquarters in Valencia and involved 16 stakeholders of the organic food sector.

The stakeholders were previously contacted by email and later by phone. They were selected as *actors who have a clear interest in the issue at stake, who are involved in, affected by, knowledgeable of, or having relevant expertise or experience in the issue at stake* (Soste et al. 2015). The stakeholders' profiles are shown in Table 1.

The chosen stakeholders comprised several organic farmers, as well as representatives of different farmers' unions, several cooperatives, retailers, the regional agricultural administration, and organic agriculture organisations. Some participants had a double or triple role. The stakeholder selection aimed to capture diverse perspectives on organic agriculture, prioritising a comprehensive understanding rather than statistical representativeness. The primary focus was to ensure that the stakeholders' contributions collectively provided a holistic view of the various aspects related to organic farming.

Table 1 Workshop participants' composition. *Source*: Own elaboration

Description of the participants' profile	No. of participants
Representatives of two regional farmers' unions	3
Technicians of the Regional Agricultural Administration	4
Organic products' retailers	3
Representative of the Committee of Organic Agriculture of the Valencian Community/organic farmer/representative of a farmers' union	1
Technician of the Committee of Organic Agriculture of the Valencian Community	1
Representative of Spanish Society of Organic Agriculture/representative of an organic agriculture cooperative	1
Representative of an organic agriculture cooperative	1
Organic vegetable farmer	1
Manager of a Regional Denomination of Origin that produces organic wine	1

The participants were selected to meet two criteria: first, to have an extensive knowledge of organic farming in the study area, so that they could provide informed answers to the Delphi questionnaire as experts, and second to be professionally involved in this sector; thus, they were entitled to have a voice in the discussions over the future scenarios as stakeholders.

In the workshop, after a presentation of the study by the research team, the participants first answered the Delphi questionnaires and later were split into four groups for the scenario development exercise, in such a way that different stakeholder profiles were evenly represented in each group. Figure 2 synthesises the different steps of the two methods utilised in this study, which are explained in detail in the following subsections.

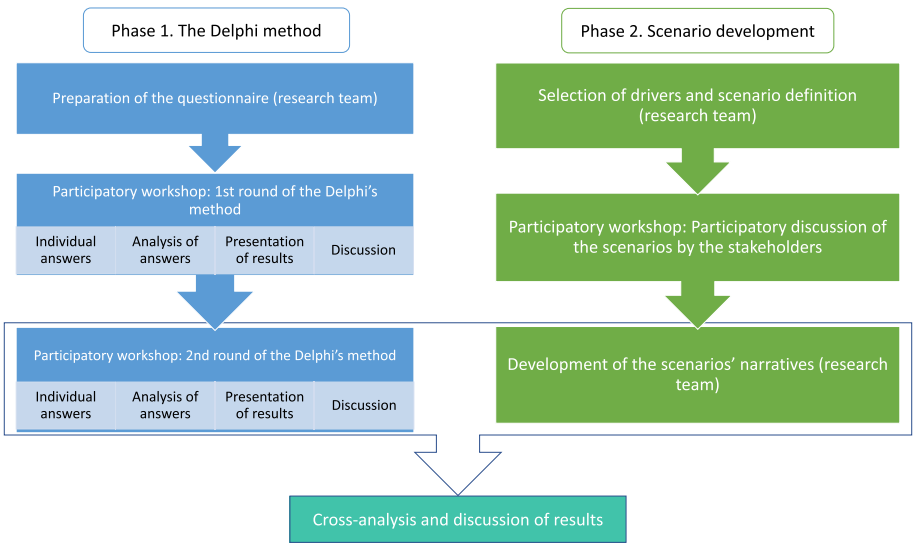

Fig. 2 Scheme of the methodology. *Source*: Own elaboration

The Delphi method

The Delphi method (Linstone and Turoff 1975) is a semi-quantitative technique that aims at quantifying subjectivity (Popper 2008) by combining the judgments of 5–20 experts in two or three rounds of response (Rowe and Wright 2001). After each round, the facilitators provide the experts with a statistical summary of the group responses and ask them to submit a revised version of their responses or resubmit the first response (Belton et al. 2019). In contrast to other methods in which samples are randomly selected, the selection of experts for the Delphi method is purpose-oriented and aimed to capture and make emerge the knowledge of key stakeholders involved in the situation being analysed.

In our study, some modifications to the Delphi method were necessary to adapt it to the face-to-face participation of the experts/stakeholders in the workshop. After the method was explained to all the participants, they were first asked to respond individually to a sequence of 9 questions, which are shown in Tables 3 and 4 within the Results section. The questionnaire was context-specific, but also informed by previous studies on organic farming that conducted a Delphi method (Padel and Midmore 2005; Kretzschmar and Schmid 2011; Chamorro et al. 2012). Questions referred to a variety of critical aspects related to the evolution of organic farming by 2030, including prices, exports, imports, sales, farming area of different crops, domestic consumption, marketing channels, limitations to the expansion of organic farming, etc. Four questions could be answered by means of a 1–5 ordinal Likert scale, and five questions asked the participants to provide quantitative estimates. The justifications of the responses or any additional information or ideas that the experts wished to provide were collected in a "commentary" section after each question.

The questionnaire was answered completely in the first round and then again in a second round. After the first round, the medians of the group responses were calculated and shown to all participants in a projector, prompting an exchange of opinions and information among them that informed the second round of individual responses. Although face-to-face Delphi approaches have been criticised arguing that they may cause degradation of results and loss of ideas of the shyest personalities (Graefe and Armstrong 2011; Boulkedid et al. 2011), other studies that have opted for this approach (Field et al. 2017; Mullender et al. 2020) observed that the debate among stakeholders was a means to refine the results, make new information emerge and move towards consensus. Moreover, when the participants represent a variety of perspectives and have different expertise, the discussion among them may be the only way for each group of stakeholders to be aware of the ideas and interests of the others (Mullender et al. 2020).

The scenario development

The first step of the scenario development was the scenario definition performed by the research team before the workshop. A scenario has been defined as *a plausible description of how the future may develop, based on a coherent and internally consistent set of assumptions about key driving forces* (IPCC 2007). These "future images" or scenarios are not intended to describe the most probable realities in the time horizon of the analysis, but to explore a wide range of possible futures that give rise to a creative and collaborative debate among the workshop participants. Scenarios were formulated at European

level, and stakeholders were asked to downscale them to the VR level in the workshops. We thus followed a hierarchical system in which the broad geographical scale of the scenarios set the boundary conditions for smaller scales (Zurek et al. 2021).

The scenario definition requires, first, identifying the *drivers* that may influence the future changes in organic production and consumption. Béné et al. (2019) defined the drivers of food systems in general as *endogenous or exogenous processes that deliberately or unintentionally affect or influence a food system over a long-enough period so that their impacts result in altering durably the activities, and subsequently the outcomes, of that system* (p. 152).

The selection of drivers for the scenario definition in this study builds on the previous work conducted by Zanoli et al. (2012), who identified two driving forces that showed the highest level of uncertainty and impact on the European organic market: *the global socio-economic conditions* and the *relative competitiveness of organic with respect to conventional farming*. We have added a third driver to shape our European scenarios, i.e. *the strength of the public sector spending and regulations*. The inclusion of the last driver is based on three reasons: (i) public spending and regulations have been found to influence the contribution of small farms to food security in Europe (as shown by Arnalte-Mur et al. 2020) and have been considered as drivers in other foresight studies based on scenarios applied to small producers (Ortiz-Miranda et al. 2022); (ii) the EU regulatory and financial support to organic farming may change in the future in the face of new challenges for food and agriculture (Brzezina et al. 2017; Wallace et al. 2020); and (iii) the addition of the public sector action as a third driver provides a greater degree of specificity to the scenarios and was expected to prompt the stakeholders' discussions when the scenarios were downscaled at the VR level.

It is worth noting that we have not included climate change as one of the drivers shaping the future scenarios. In a previous study (Arnalte-Mur et al. 2020) aimed at identifying the drivers of change for the contribution of small farms to food security based on the consultation to 94 European experts (Arnalte-Mur et al. 2020), the research team found that the experts rarely mentioned climate change as a driver, as they somehow took the change of ecological conditions for granted. Moreover, in their comprehensive analysis of food system drivers, Béné et al. (2019) also argue that "climate change" is too vague to be considered a useful driver.

We thus selected the three above-mentioned drivers to shape the scenarios. Two opposite "states" (e.g. "high" or "low") were associated with each driver, and four combinations of the drivers' states were chosen to give rise to consistent and meaningful scenarios for Europe in 2030 (Table 2).

Table 2 European-level scenarios for 2030. *Source*: Own elaboration

Driver	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Global socioeconomic conditions	Unfavourable (crisis)	Favourable (growth)	Favourable (growth)	Unfavourable (crisis)
Public expenditure and regulations	High expenditure and strong regulations	Low expenditure and weak regulations	High expenditure and strong regulations	Low expenditure and weak regulations
Difference of prices conventional versus organic	Has dropped	Has increased	Has dropped	Has increased

Note worthily, it has been decided that public expenditure and the strength of regulations are either both "high" or both "low." There is a rationale behind this decision—apart from narrowing down the number of possible combinations. High public expenditure scenarios tend to align with more interventionist economic policy orientations, while low public expenditure scenarios are often associated with more neoliberal economic policies and, therefore, weaker regulations. The same decision regarding this driver was taken by Ortiz et al. (2022).

Scenario 1 can be regarded as Business as Usual (BAU); scenario 2 is the opposite of 1 in all the drivers' states; in scenario 3 all drivers show states that can be considered positive for organic farming—it is thus an "enabling" scenario for organic production and consumption, and scenario 4 is the opposite of 3 and thus expected to be negative or disrupting for organic agriculture. The same scheme of scenario building was used by Ortiz-Miranda et al. (2022); similarly, Oteros-Rozas, et al. (2015) and Woodhill et al. (2020) used in their works a desirable scenario, a disrupting scenario and others in between.

Importantly, the scenarios employed in the foresight analysis are not equally likely; in fact, they are not intended to be highly probable. The primary objective of a foresight exercise based on scenarios is to expose stakeholders to a wide range of future realities, regardless of their likelihood. This approach aims to stimulate creativity in their responses and, through the cross-cutting analysis of their deliberations for each scenario, identify commonalities or specificities of interest—as we will see later.

The second stage of the scenario development took place in the workshop, when the participants were split into four groups to discuss the scenarios separately. A brief description of the scenario was first read by the facilitator of each group, and then, a focal question was asked to the participants aimed at downscaling the scenario to the VR level: *What would the organic farming of the VR be like in 2030 in this European scenario?*.

The discussions of each group were recorded. The participants first wrote ideas on sticky notes about how different variables related to the Valencian organic sector would be in each 2030 scenario (number of operators, type of crops, certified farmland area, farm structure, exports, imports, domestic consumption…) and later explained their ideas to the rest of the group. With the assistance of a facilitator, the group interacted, discussed, disagreed or reached agreements. The sticky notes were pasted on a flipchart, in such a way that all the ideas related to the scenario were captured in sticky notes and grouped thematically to ease the posterior analysis (Fig. 3).

At the end of the discussion, the stakeholders were asked to give a title to each scenario. The titles generate a feeling of authorship among the participants, help to differentiate the scenarios, and facilitate the communication and memory retention (Ortiz-Miranda et al. 2022).

The third stage of this method is the comparative analysis of the scenarios' narratives and took place after the workshop. Based on the poster papers that resulted from the group dynamics and the recordings of the discussions, the research team developed the scenario "narratives", which explain how the organic sector in the VR would be 2030 according to the stakeholders. The interaction of the drivers with each other and with other variables, the cause–effect relationships, the points for which there was

Fig. 3 Flipchart resulting from the scenario 4 participatory discussion. *Source*: The authors

a consensus among the participants and the disagreements were captured in the narratives. Finally, the four narratives were cross-compared and discussed based on the literature.

Results

Results of the Delphi method

Tables 3 and 4 show the median, mean and standard deviation (SD) of the responses of stakeholders to the Likert-scale and quantitative questions, respectively, of the Delphi questionnaire. As expected, the SD decreased in nearly all the answers in the second round, which shows that the experts reached a higher level of consensus after viewing and discussing the results of the first round. The discussion also enriched the results, as it helped the participants to clarify and nuance their position with respect to the different questions (Rintamäki et al. 2016), thus making explicit their knowledge, at times undocumented and overlooked by others.

Similar percentages of growth (around 30% as a median) are expected for the value of total sales of organic products, the consumption of organic products in the VR and the exports of organic products to other countries by 2030. In line with this upward trend, the participants foresee that the land certified as organic in the region will strongly increase by 91.8% compared to 2019, especially in the case of permanent crops (153%). In relation to the different channels of commercialisation of organic food (Table 3), the participants consider that all of them will maintain or increase their sales up to 2030, being the Internet the channel by which the most important increase in sales is expected. During the discussions, they also suggested the value of the imports of some specific products not produced in the VR—such as coffee, chocolate or sugar—would slightly increase.

Table 3 Responses to the Delphi Likert-scale questions. *Source*: Own elaboration

Questions	Round 1			Round 2		
	Median	Mean	SD	Median	Mean	SD
Q1. How important will the following limitations be for the expansion of organic food in the VR by 2030? (1 = Not important at all; 5 = Critically important)						
Lack of marketing channels	3.5	3.50	1.03	4	3.6	1.03
Difference in conventional *versus* organic food prices	3	3.25	1.00	3	3.2	0.98
Lack of young farmers	4	4.13	0.62	4	4.3	0.60
Lack of experience and knowledge in marketing of organic operators	3	3.06	1.00	3	3.3	0.86
Little cooperation and communication among actors in the organic chain	3	3.13	0.81	3	3.3	0.77
Insufficient premium price	3.5	3.38	0.96	4	3.6	0.73
Low level of public support to organic farmers	3	2.93	0.96	3	3.1	0.81
Competition from alternative quality and environmental schemes	2	2.00	0.73	2	1.9	0.57
Lack of information about organic products by consumers	3.5	3.50	1.15	3	3.3	1.14
Insufficient consumers' awareness to buy organic products	4	3.63	1.20	4	3.9	0.96
Lack of purchasing capacity of national consumers to buy organic products	4	3.56	0.81	4	3.5	0.73
Lack of credibility of the organic certification in the eyes of consumers	3	3.25	1.44	3	3.4	1.15
Lack of availability of inputs necessary for organic production	3	3.00	1.32	3	3.2	1.22
Limitations due to pests and diseases difficult to treat within the organic regime	3	3.13	1.09	3	3.1	1.09
Q2. As far as you know, the difference in prices of the organic food products *versus* conventional products in the VR, by 2030… (1 = Will decrease a lot; 5 = Will increase a lot)	2	2.25	0.68	2	2.3	0.68
Q3. How much do you think the sales of organic food will expand or contract by 2030 in each of the following marketing channels? (1 = There will be much less sales than now; 5 = There will be much more sales than now)						
Exporters	3	3.50	1.15	3	3.4	1.09
Supermarkets	4	3.94	0.68	4	4	0.52
Small shops	3	3.31	0.79	3	3.3	0.77
Public procurement in the VR	4	4.38	0.62	4	4.3	0.58
Hotels, restaurants and catering	4	3.69	0.60	4	3.8	0.58
Direct sales by producers in local markets or on the farm	4	3.81	0.83	4	3.8	0.68
Internet	4.5	4.31	0.79	4.5	4.5	0.64
Q4. How do you think the value of the imports of organic food will evolve in the VR by 2030? (1 = Will decrease a lot; 5 = Will increase a lot)						
Fresh vegetables	3	2.81	1.05	3	2.9	0.81
Processed products	4	3.50	0.97	4	3.6	0.89

Compared to the growth rates experienced in the VR regarding the certified area (135% between 2011 and 2021) and the value of total sales (380% between 2015 and 2021), the growth rates estimated by the experts for 2030 can be considered conservative. This may be linked to some limitations to the expansion of the organic market that they pointed out as important in the questionnaires (Table 3): (i) the lack of young farmers; (ii) the lack of consumers' awareness and/or purchasing capacity; (iii) the lack of

Table 4 Responses to the Delphi quantitative questions. *Source*: Own elaboration

Questions	Round 1			Round 2		
	Median	Mean	SD	Median	Mean	SD
Q5. By what percentage do you think the number of organic farmers will increase (or decrease) by 2030? (Note: Between 2019 and 2010 the number of organic producers increased by 9%)	11	33.13	51.23	12	32.3	34.58
Q6. By what percentage do you think the value of total sales (national plus exports) of organic food from the VR will increase (or decrease) by 2030?	30	60.78	81.40	30	62.3	80.25
Q7. By what percentage do you think the total consumption of organic food (domestic or imported) by consumers in the VR will increase (or decrease) by 2030?	27.5	34.84	28.35	29	32	18.27
Q8. By what percentage do you think the value of total exports to other countries of organic food from the VR will increase (or decrease) by 2030?	30	41.25	46.57	30	34.7	24.36
Q9. Considering the hectares of organic agricultural area of the VR in 2016 and 2019[1], what certified area do you think there will be in 2030?						
Crops on arable land	10,000	10,693.3	3885.41	10,000	15,062.5	17,551.71
Permanent pasture	85,000	98,253.3	30,914.49	80,000	91,250	21,870.83
Permanent crops	87,500	92,000	24,932.05	100,000	139,062.5	190,824.69

[1] Hectares of organic agricultural area in 2016 and 2019: Crops on arable land: 6154 ha (2016), 7083 (2019); permanent pasture: 37,959 ha (2016), 65,910 (2019); permanent or woody crops 36,883 ha (2016), 54,917 ha (2019)

marketing channels that bring organic products closer to consumers; and (iv) an insufficient premium price to compensate farmers for producing in an organic regime. Additional limitations emerged during the open discussion between rounds 1 and 2, such as the lack of regulations that protect organic farmers, integration of fertigation practices within irrigation communities that encompass both conventional and organic farmers, and the difficulties that climate change will entail for agriculture. On this matter, it was pointed out that climate change could affect the ecosystems of crops causing the appearance of new pests and diseases that cannot be treated with organic farming practices.

The number of organic farmers in the VR is expected to grow by 32.3% as an average, although the median of 12% in this response shows a certain degree of disparity in the general opinion of the group (Table 4). Some experts argued in the discussions that this increase, whether large or small, will largely depend on the public support that organic farming receives in the upcoming years. In any case, they agreed that large-scale farms will gain importance with respect to small holdings.

Finally, the participants expect a slight decrease in the difference in prices between organic and conventional products by 2030. Some reasons for this that emerged in the discussion between the two rounds are the upscaling of organic food production in the region and a more intense rise of conventional food costs comparative to those of organic agriculture. These issues were developed more in detail during the scenario development.

Results of the scenario development

For the sake of simplicity, the full narratives of the four scenarios are displayed in an Appendix. Here we will summarise the most outstanding results that can be distilled from such narratives.

The members of each group quickly identified what kind of a "future" they were facing, as the titles given to the scenarios show. The scenario 1, which was defined by the research team as BAU, was titled "*The future is here*" and described by the stakeholders as a 'continuist' situation with respect to the trends observed at the moment of the workshop. They expected organic farming to keep growing by 2030 even in a context of economic crisis, with the help of the public support that is set in this scenario. They also assumed, first, an increase in the consumers' awareness about health and sustainability, and second, the introduction of organic food in supermarkets, which would improve the consumers' access to these products in terms of proximity and opening hours' convenience. The importance of the latter two issues was also highlighted in the Delphi responses.

The scenario 2, defined as the opposite of the BAU, was called "*Green Capitalism*". The organic sector is expected to thrive in 2030 in a context of economic expansion, free trade, and low public spending. Imports of organic food from non-EU countries will intensify—favoured by the greater facilities to certify food as organic in other countries—and will compete with domestic organic products. Farmers are expected to respond to the lack of public support to organic farming by means of collective action. The participants envisioned organic producers organising promotional campaigns aimed at generating loyal consumers, based on the environmental advantage of local organic farming and the links of organic food to other social and territorial values.

The scenario 3, in which the three drivers present the more favourable states for organic farming, was called the *"Hollywood-ish scenario*". This is the only scenario where an increase in R&D specifically targeted to organic farming is expected. A broader conception of sustainability would pervade in 2030, and a reduction in food waste is foreseen. However, concerns were also raised when the stakeholders confronted this "enabling" scenario, as they feared that an increase of organic food supply by means of technology adoption could lead to a drop in prices—which would make organic farming fall into the 'agricultural treadmill'. In fact, the insufficient premium price to compensate farmers also emerged in the Delphi responses as an outstanding limitation of the future expansion of organic farming.

Finally, the most unfavourable scenario 4 received the title of *"An organic Titanic… but with lifeboats*", which gives an idea of the critical situation that the sector would face. Unlike the other scenarios, the certified area and the number of organic farmers are expected to drop by 2030. The demand would also decrease, as a result of the high prices of organic versus conventional food and also the low income of the population due to the economic crisis that are set in this scenario. However, the participants still believe that organic farming (though not always certified) would survive, and the organic products would be self-consumed and informally exchanged in rural areas.

Discussion

The Delphi method conducted at the beginning of the workshop was useful for participants to scan the manifold variables that could be taken into account when forecasting the future of organic agriculture in the region. Moreover, it summarised the stakeholders' views and provided a common context and understanding of the variables that are subsequently going to be mobilised in the scenario development (Ehlers et al. 2022).

The results of the comparative scenario analysis, which come from the cross-comparison of the scenario narratives displayed in Appendix, were fairly consistent with the responses to the Delphi questionnaire. The stakeholders are, in overall terms, optimistic regarding the prospects of organic farming in the VR, which would continue its upward trend in terms of number of certified producers, sales and organic farming area—although with more moderate growth rates than in the recent past. They foresaw an expansion in all the scenarios except the most unfavourable one, scenario 4. This trend contrasts with other regions of Europe where the certified land has been declining over the last decade, such as the UK (Organic Farming Statistics UK 2021), allegedly due to the farmers' unrealistic expectations when converting to organic, their negative experiences with the certification process or the lack of premium prices in livestock items (Harris et al. 2016).

Examining the underlying assumptions of the stakeholders

The scenarios' narratives unveil several assumptions that stakeholders took for granted during the foresight exercise. First, they expect an increase in the consumers' awareness about health and sustainability, a general trend that the literature is already pointing out (Vittuari et al. 2021; Tandon et al. 2021) and that is consistent with the increase in organic food consumption in Spain after the COVID-19 (MAPA 2021b). Second, they assume that the supply of organic food in supermarkets would increase the purchases. Indeed, a study conducted in another Spanish region found that the typical profile of a consumer of organic food shops in supermarkets (Rodríguez-Bermúdez et al. 2020). Moreover, some scholars have found the convenience of shopping to be relevant to increase organic food's consumption and the consumers' willingness to pay for it (Katt and Meixner 2020; Srinieng and Thapa 2018).

Third, the participants believe that the smallholders' collective action would help coping with the difficulties that the low public support (set in scenarios 2 and 4) would entail. In fact, collective action as an adaptive strategy for the survival of small farmers has been emphasised in the literature (Ortiz-Miranda et al. 2022; Sanderson Bellamy et al. 2021). In the particular case of the VR, collective action may take the form of joint cropland management strategies to recover abandoned cropland, in order to increase the volume of production and the sustainability of the cooperatives (García Álvarez-Coque et al. 2021).

Finally, it is noteworthy that, as shown in the previous section, stakeholders made some nuances in the development of the most favourable and most unfavourable scenarios (3 and 4, respectively) that follow the pattern "in the good there is something bad in the bad there is something good", something that also happened in another participatory foresight exercise which included extreme scenarios (Ortiz-Miranda et al. 2022).

Downscaling the drivers' influence on organic farming at a regional level

In the scenario development process, the stakeholders interpreted how the three drivers that shape the scenarios, defined at a European level, would influence the future of organic farming at the VR scale.

Regarding the first driver, the economic conditions, the stakeholders expect more opportunities for organic sales and exports to expand in scenarios of economic growth in Europe (2 and 3), due to the increase in the overall purchasing capacity of the population—moreover, the demand would also expand for "luxury" organic food products. Conversely, situations of crisis (1 and 4) were expected to be detrimental to the organic market expansion, unless the policy intervention counterbalances its effects.

As for the second driver, the participants associated scenarios of weak regulations and low public spending (2 and 4) with a context of liberal economic policies, in which the international trade of organic food would increase and the economic support for organic production and consumption would drop. In the disruptive scenario 4, the public organic certification would step back in favour of private standards. This would align with the fact that, originally, many non-state-market-driven standards (including organic) emerged as a reaction to the lack of state action (Arcuri 2015). Conversely, strong regulations and public expenditure are associated with better prospects for the organic sector (scenarios 1 and 3), which is consistent with the results of previous studies conducted in Europe (Lindström 2020).

The third driver is the difference of prices of organic *versus* conventional products. According to the Delphi responses, the stakeholders expect this gap to slightly squeeze by 2030. The increase in the relative competitiveness of organic agriculture is set in scenarios 1 and 3, and the participants attributed it to two reasons. First, the rise in the demand of organic food would make it possible to reach economies of scale on the supply chain—such as in marketing and distribution- thus reducing the costs (Krissoff 1998; Haas et al. 2010). Second, the cost of the inputs used in conventional agriculture would increase relatively more, due to the lower quantity and variety of external inputs used in organic agriculture (Gabriel et al. 2013; Rosa-Schleich et al. 2019). In this line, organic systems have been found to be more energy efficient than their conventional counterparts in several European countries (Reganold and Wachter 2016)—and these cost savings would be relevant in a context of high energy prices.

However, stakeholders had also to confront two scenarios (2 and 4) in which the organic versus conventional price gap was set to be higher by 2030. In such cases, they concluded that the organic certification would have to cope with the competition of other quality schemes, such as PDOs, for which consumers showed their preference in Spain (Gracia and de-Magistris 2016). In the context of weak public intervention of scenario 4, the stakeholders assume that organic standards would have lost credibility by 2030. This aligns with the results of the review performed by Hemmerling et al. (2015), who suggests that the involvement of the public sector in certification contributes to supporting the trust in organic labelling.

Unveiling cross-scenario commonalities

Remarkably, some of the participants' prospects for 2030 are common to all scenarios' narratives (see Appendix), despite the great differences among them. First, the stakeholders took it for granted that the process of farm consolidation will continue in VR's agriculture, following the pattern observed in Southern-European countries, where the number of small farms has decreased by 33% between 2010 and 2019 (Prosperi et al. 2023).

A second commonality is that stakeholders assume in all the scenarios that new, large operators will come into play in the VR organic system. This is consistent with what they stated in the Delphi responses—an increasing importance of large-scale organic farms in comparison with small farms. There would be "macro-organic farms" in 2030 that would take the form of corporations and benefit from economies of scale. Large investment funds would enter into the organic sector, and in scenario 4, Spanish organic enterprises would relocate to developing countries to take advantage of lower labour costs.

The literature has already warned about the 'conventionalisation' of organic agriculture and the entrance of industrial actors in this sector (Darnhofer et al. 2010). This is eased, first, by the laxity of the standards set in organic certification schemes, and second, by the complexity and costs of certification, that favour the most economically and technically robust organisations over the small farms (Dufeu et al. 2020). The entrance of macro-operators opens the debate as to whether small organic farms could be marginalised within the organic sector, what would have important consequences considering the environmental, social and food security-related functions that are attributed to small farms in studies conducted in Europe (Guiomar 2018; Guarín et al. 2020; Rivera et al. 2020; Pinto-Correia et al. 2021).

Third, and related to the former point, a process of differentiation is expected, i.e. different models of organic production, marketing and even consumption will co-exist in the future. The groups that approached scenarios 1 and 3 concluded that there would be a model of large, organic farms that would sell their production to supermarkets and a model of small farms that would sell their products through small stores and proximity markets. In scenarios 2 and 4, a consumer-side differentiation would take place: in scenario 2, organic products could be purchased mainly by high-income consumers, while low-income consumers would buy conventional food at lower prices, as long as there is no equity in the distribution of the income derived from the economic growth. In Scenario 4 of crisis and low public support, another type of "dualisation" of consumption is proposed: products with an organic certification would only be consumed by high-income urban minorities, while organic farmers would self-consume their products and exchange them informally in rural areas. This assumption connects to the fact that small farms have been found to be a key part of informal food flows that are critical for the vulnerable part of the population living in the rural areas or connected with them (Pinto-Correia et al. 2021). This is also related with one of the main limitations to the expansion of organic farming highlighted in the Delphi process: the lack of purchasing capacity of consumers. Moreover, inequality in income distribution, which is higher in Spain and other Mediterranean countries in comparison with the rest of Western Europe (Eurostat 2022b), could hinder the expansion of organic farming in these areas unless the difference in the prices of organic food with respect to conventional food

decreases significantly. This evolution in prices, which would favour the consumption of organic food among the majority of the population, is at the same time one of the main concerns raised by stakeholders regarding the future expansion of organic farming in the VR, making evident the complexity of the issue.

Four, the scenario development made it evident the critical role that the public sector plays in the future prospects of organic farming, both in scenarios 1 and 3, with a supportive public sector, and in scenarios 2 and 4, where the lack of this support is expected to have significant negative consequences. The influence of public policies on organic farming performance was also highlighted by Zanoli et al. (2012) in their scenario analysis. The scenario narratives (see Appendix) unfold the several ways by which the public sector can contribute to promoting organic systems. On the supply side, it may (i) support organic farmers financially, (ii) set regulations and controls that protect the credibility of the organic certification, as organic labels have been found to positively influence organic food consumption (Lee et al. 2020; Gatti et al. 2022), and (iii) ensure public funding towards R&D specifically targeted to organic systems.[1]

On the demand side, the role of the public policy is also determinant to boost changes towards more sustainable food consumption habits (Aschemann-Witzel and Jansen 2022). In our study, the public sector is expected by stakeholders to support organic consumption by (i) increasing public procurement from organic agriculture, (ii) encouraging consumption through awareness campaigns and education on sustainable and healthy eating from an early age, and (iii) implementing social policies that support the income of the most vulnerable groups. Thus, in the future, a lack of public policies aimed at protecting organic farmers and boosting the consumption of organic products would be an important limitation for the expansion of organic farming.

Conclusions

Organic agriculture has been regarded as a component of a green economy (Imanov 2021). The foresight process conducted here shows the future prospects for organic farming in a Spanish Mediterranean region and identifies a number of key factors that would influence such a future.

It is noteworthy that the estimations made for the future of organic agriculture in 2030 may be subject to bias, as all stakeholders involved in the workshop belong to the organic farming movement. Therefore, while providing valuable insights, these projections should be approached with caution, taking into consideration the underlying assumptions involved.

The stakeholders foresee that the certified area and the number of organic farmers will continue growing, and the organic *versus* conventional food prices will drop by 2030. However, they also expect the entrance of large operators in organic agriculture, which would gain importance with respect to the small farms—something that could also happen in similar farming systems in Southern-European countries, which are also pervaded by small farms focused on fruit, vegetable, olive oil and wine exports (Prosperi

[1] The latter is only expected in the most favourable scenario, arguably because, at present, considerably less public funding has been put towards R&D in organic systems than in conventional systems worldwide (Reganold and Wachter 2016).

et al. 2023). Notably, this would take place hand-in-hand with a process of differentiation or 'dualisation' in the models of production and consumption of organic food. Indeed, the dualisation of Mediterranean farming systems, pervaded by a myriad of small farms together with an increasingly important "hard-core" of large, intensive farms specialised in fruits and vegetables, olive oil and wine, has been already established in previous studies applied to Mediterranean countries (Moreno-Pérez 2013).

Another key finding is the central role that the public sector is called to play for the future prospects of the organic systems, which was emphasised during the foresight process. This result is relevant beyond the local context, as organic agriculture is supported by the Common Agricultural Policy in all the EU. The stakeholders considered that civil society could, to some extent, counterbalance the lack of public support by way of collective action (an assumption that, as stated above, is supported by the literature) and by raising awareness about health and sustainability.

Appendix: Scenarios' narratives

Scenario 1: "the future is here"

By 2030, there has been a process of farm consolidation—i.e. the number of farms has dropped in the VR and those that remain active are, on average, larger. However, organic farms have increased in number, as well as the farming area certified as organic. Organic farms are also larger and employ more workers. Young farmers have access to abandoned land. The advance of climate change and all the harmful aspects of intensive agriculture (soil degradation, water contamination, etc.) have reinforced the conversion to organic production.

The difference of prices between conventional and organic products has dropped. This is explained, first, by the expansion of organic food production, which has led to economies of scale in the stages of processing, transport and distribution. Purchasing centres are larger and logistics are more efficient, which ultimately reduces the costs of organic food. Second, in this context of strong regulations and high public spending part of the cost of organic certification is subsidised by the regional Administration, and third, the price of the inputs of conventional agriculture have considerably increased.

The consumption of organic products has risen by 2030, despite the economic crisis. This is not only due to the drop in the price gap with respect to conventional products, but also to a higher awareness of the consumers of the need to produce and consume organically—which is partly a consequence of the increased concerns about health prompted by the COVID-19 pandemic. The public sector carries out campaigns to promote sustainable agricultural production and organic food consumption, has increased the share of organic products in public procurement and provides social assistance for the most vulnerable families—those that would have the most difficulties in acquiring organic food.

Due to the increased demand for organic food, many points of sale have incorporated it, including supermarkets. Their proximity and convenient opening hours have improved the physical accessibility of organic food to consumers; thus, the sales of these products have grown faster for the big retailers than in other distribution channels.

A process of differentiation in the organic sector is observed: the model of large organic farms and sales in supermarkets coexists with that of small producers and consumer-led initiatives. In addition, investment funds will have entered the organic sector buying land on a large scale. They also take over the small organic businesses that already existed, "*turning them into an emporium*".

More organic agricultural products are exported from the VR due to the expansion in European demand. Regarding imports, only the organic products that are not produced in VC are brought from abroad, due to the high transport costs.

Scenario 2: "green capitalism"

The consumption of organic products in 2030 has increased both in the VR and in the EU, due to the awareness of climate change and sustainable farming practices, as well as to the rising incomes in this context of economic expansion. This has favoured the expansion of the organic farming area and animal production in the VR. Moreover, the scale of the sales of organic products have enabled the development of the cold chain for those products that require it.

There are "macro-organic farms"—often owned by corporations—that take advantage of the favourable market conditions and the economies of scale. The large companies have easily developed online sales. As the public support for organic farming has decreased, and so has the share of organic products in public procurement, the small farmers have undertaken collective action to survive the market pressure.

There is a strong competition between the organic certification and other certifications such as the zero residue, due to the appealing premium prices perceived by the producers and the similar perception by the consumer of the latter. Organic producers organise promotional campaigns targeted at generating loyal consumers, based on the environmental advantage of local organic farming and the links of organic food to other social and territorial values.

Some participants indicate that there will be a clear segmentation of consumers; the most affluent households buying organic food—including "non-essential" and processed products, such as wine or *cava*- and those with lower income consuming conventional food. Other participants, however, state that the increase in organic consumption has led to a significant presence of organic products in the supermarkets, which would lead to an increase in organic sales for all income strata. Part of the controversy revolved around the issue of whether the income generated by economic growth is distributed more or less equally in the society.

The international trade of organic products has increased in a context of liberal economic policies. Imports of organic food from non-EU countries have intensified, favoured by the greater facilities to certify food as organic in other countries, and compete with domestic products. There has also been an increase in exports of organic products from the VR, especially to the Centre and North of Europe.

Scenario 3: "hollywood-ish scenario"

In this scenario the overall trend of farm consolidation has continued. However, the number of organic producers has increased and so has the organic farming area. The VR has more than 25% of the UAA and thus meets the European Green Deal's goal. The role

of R&D in agriculture, both from the private and the public sector, has been reinforced, and organic farms have progressively become more technology-intensive. Big investment funds operate in the organic sector.

The conventional model of agriculture is being abandoned, although some small plots will resist, fundamentally, as providers of local markets.

In a context of economic growth, reduction of the price gap between conventional and organic products and high public spending, the consumption of organic products has increased both in Spain and in other European countries. On the one hand, the role of education on healthy diets from the early stages of schooling plays a key role in this. On the other hand, campaigns are launched by the public sector to promote sustainable agricultural production and the consumption of organic products. Public aid is also granted for the consumption of certified organic products.

The consumption of organic food by tourists has also increased; in fact, the promotion and enhancement of organic products has become one of the attractions for VC tourism. However, globalisation has also increased the problems related to the variety and frequency of pests and the lack of pesticide controls in competing regions.

Participants point out that the increase in the supply of organic products could lead to an excessive drop in prices, putting the viability of the organic farmers at risk. The role of the public sector is once again highlighted to cope with this problem. EU-funded subsidies to organic farmers and operators have increased; in addition, farmers receive support as land and landscape managers.

The organic processing businesses have undergone a revolution. The range of processed products is greater, and they provide added value, quality, exclusivity and variety of options for consumers that are increasingly aware and informed.

Since the demand for organic products has increased, sales through the different marketing channels have also risen. The sales by means of supermarkets and Internet have gained great importance—and with them, home delivery companies. At the same time, local stores have made a strong comeback for the sale of perishable, fresh and gourmet organic products.

Food waste has decreased. In a context of climate change and increased awareness, the use of resources has been optimised.

There is a differentiation in the organic sector: the model of large organic farms and sales in supermarkets and online coexists with that of small farms for proximity sale.

Scenario 4 "an organic Titanic… but with lifeboats"

The participants identified this scenario as a critical situation for the organic sector in the VR. The organic food production in the region has dropped in parallel to the decrease in demand for organic products. This is the result of their high prices compared with conventional farming and the low income of the majority of the population due to the economic crisis. Also, the demand for organic products for public procurement has disappeared.

The scarce intervention of public administrations has led to the privatisation of organic certification schemes, which has also entailed a loss of credibility by consumers due to, first, an increase in frauds in organic certification, and second, the absence of public campaigns promoting food with the organic seal. The organic certification

has thus lost value. These factors have led to a notable drop in the number of Valencian farmers and operators certified as organic.

There is a polarisation of organic production and consumption in VR. On the one hand, certified organic food is only affordable for a minority of urban consumers with high purchasing power, who access these products through gourmet-type marketing channels, since the low demand prevents their distribution by supermarkets. The consumption of organic products is associated with special occasions (Christmas, family celebrations).

On the other hand, many of the small farmers who continue to produce organically do not certify their production, which is largely intended for self-consumption and, partly, for informal proximity sales in rural areas. These informal marketing relationships give rise to a favourable environment for local associations and collective action, which will allow for the maintenance of an informal organic sector in rural areas. However, the absence of mandatory standards will also make farmers to sometimes use chemical inputs in the face of specific pest or disease problems. In other words, this is an organic production from which one can easily "exit". In addition, small-scale organic production prevails in rainfed agriculture rather than in irrigated farming. Farmers have to deal with an increase in robberies in the field, a consequence of both the high value of organic products and the problems of access to food for an impoverished population.

There are imports of organic food from third countries, where the production is in charge of a few large farms owned by Spanish companies which take advantage of the weak regulations that allow relocating production and the lower labour costs in developing countries.

Abbreviations

BAU	Business as Usual
CAECV	Valencian Region Committee of Organic Agriculture
EU	European Union
F2F	Farm to Fork
PDO	Protected Designation of Origin
SD	Standard Deviation
UAA	Utilised Agricultural Area
VR	Valencian Region

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Author contributions
OMMP designed the methodology of this study and led the foresight participatory workshop on which most of the results of this article are based. ABS did the Delphi data analysis. OMMP and ABS did the writing of this article. All authors read and approved the final manuscript.

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Declarations

Competing interests
The authors report there are no competing interests to declare.

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