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Why working conditions are a key issue of sustainability in agriculture? A comparison between agroecological, organic and conventional vegetable systems

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ABSTRACT

This study investigates whether 'green jobs' in agriculture could contribute to better working conditions. We examine a sample of 41 conventional, organic and agroecological vegetable producers who provide fresh produce for markets exploring their working conditions and the employment conditions of their workers, in Wallonia (Belgium). Drawing on the sociological, economic and agricultural literature, we identify nine dimensions that determine working conditions: leeway and control level; income and social benefits; work (in)security; political experience at work; time at work; intrinsic benefits of work; work-related discomfort; occupational health; and competence. We also assess the employment contracts of workers and the way producers manage their workers. Overall we identify four key issues. First, working conditions were not necessarily better for producers in systems that put more emphasis on ecological values. The socio-economic viability of three production systems, including agroecological market gardening on small areas of land, is insufficient. Second, workers in all systems, except in one agroecological system, experience poor employment conditions. Third, each group of producers has to make trade-offs between the ecological, societal and economic dimensions of their business. Finally, we note that socio-economic and political context, history, work orientation and socio-cultural heritage have more influence on producers' working conditions than their degree of mechanization.

1. Introduction

Since the financial crisis of 2008, Europe has been confronted by major socio-economic and environmental challenges. The issue of whether 'green jobs' can help to develop better working conditions has become an important one for European governments. In agriculture, some scientists and associations claim that organic and/or agroecological agriculture can offer better working conditions and be less environmentally damaging than conventional agriculture (Gliessman, 2007; Maynard and Green, 2006; Ollivier and Guyomard, 2013; Timmermann and Félix, 2015).

The working conditions in agroecological systems, however, remain almost unexplored. In Europe and North America, in vegetable production, empirical studies on working conditions usually focus on producers' situations in alternative food networks (e.g., in short food chains or community-supported agriculture (Bon et al., 2012; Dufour and Herault-Fournier, 2010; Galt, 2013; Hinrichs, 2000; Mundler and Laughrea, 2015; Perez, 2004)) or workers' situations in conventional and organic systems (Barndt, 2008; Gray, 2014; Guthman, 2004a; Morice and Michalon, 2008; Shreck et al., 2006). There are few studies on the working conditions of producers in conventional systems or of farm workers in alternative systems (Allen et al., 2003; DuPuis and Goodman, 2005; Tregear, 2011; Weiler et al., 2016). The few papers focusing specifically on agroecology are based on a normative approach rather than on empirical studies (Gliessman, 2007; Timmermann and Félix, 2015). In order to improve working conditions in alternative systems, such as agroecological systems, we need a better understanding of the advantages and difficulties of working in these systems in the present context. This study was carried on with this objective in mind. It aims to build bridges between normative and empirical studies in agroecology.

We conducted our study with a comparative approach. We

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identified four main technical orientations of vegetable production for fresh food markets in the Walloon region in Belgium, from market gardening on a few hectares to cereal farming where the crop rotation system included some vegetable production. The technical orientations were: market gardening on small areas (MGS); market gardening on medium areas (MGM); market gardening on large areas (MGL); and growing vegetables in combination with field crops (VFC). These four technical orientations were studied in organic and conventional agriculture. In addition, organic MGS and MGM systems could be considered as agroecological based on a definition of agroecology integrating 13 socio-economic principles (Dumont et al., 2016). This gave us a total of eight production systems: organic and agroecological (referred to as agroecological) MGS and MGM systems; organic and non-agroecological MGL and VFC systems; and conventional MGS, MGM, MGL and VFC systems.

The specific goal of this study was to answer two questions regarding mainly the producers: (1) To what extent do the production systems differ in terms of working conditions? (2) To what extent do agroecological production systems offer better working conditions than other systems?

In order to address our research questions, we consulted the sociological, economic and agronomic literature. No definition on working conditions has yet been unanimously accepted (Méda and Vendramin, 2013). We built a theoretical framework in which work was considered as multidimensional, affected by work orientation and work expectation, as well as by political issues (Section 2). We then conducted 60 comprehensive interviews with different vegetable producers, experts and farm advisors. Most of the producers were seen three times (Section 3). Our sample and the vegetable systems are presented at Section 4. We respond to the research questions and discuss our results in Section 5.

2. A theoretical framework linking sociology, economy and agronomy

2.1. Nine dimensions of working conditions

In the literature we identified nine dimensions that determine working conditions and related variables (Table 1). This theoretical framework is based on:

- contemporary sociological literature (Cultiaux and Vendramin, 2008; Ferreras, 2007; Méda and Vendramin, 2013);
- publications on specific features of self-employed workers (Baudelot and Gollac, 2003; Bessière and Gollac, 2015; Gollac and Volkoff, 2000);
- studies summarizing current approaches (including sociological and economic ones) used to measure work quality (Dahl et al., 2009; Muñoz de Bustillo et al., 2009);
- agronomic, and rural sociological and economic literature related to working conditions in Europe and North America (38 papers and three books by Béguin et al. (2011), Guthman (2004a) and Morice and Michalon (2008)).

So far as we know, there have been no studies on working conditions in the agricultural sector. The nine dimensions in our framework sometimes relate only to the workers or only to the farmers, and many of them are interwoven, with some variables being related to more than one dimension. We have tried to disentangle the dimensions as far as possible in order to facilitate comparisons.

The dimension of leeway and control level relates to the economic and technical flexibility that producers have to practice agriculture as they want to.

For self-employed workers, income refers to salaries or amounts they pay themselves. These payments are not always correlated with the financial situation of the farm and depend on the policy of each producer. Not all producers have the same juridical status (natural person or legal person). In order to compare their situations, we constructed a proxy indicator of income: the profit before tax for a natural person, and the profit before tax, plus the salary paid by the company to the associates, for a legal person. These amounts are comparable and have the advantage of usually being known by the producers.[3] Social benefits are diverse, including premiums, personal and health insurance and even productive capital.

Work (in)security refers to the risk of losing a job.

Occupational health refers to physical and mental suffering due to work. Intrinsic benefits of work and work-related discomfort focus more broadly on (un)pleasant tasks at work, on the (dis)interest producers have in their work and on the (dis)advantages of work. Together, these dimensions determine producer well-being (i.e., the state of being comfortable, healthy and happy).

Political experience at work refers to (1) the extent to which producers feel they are equal to other individuals met for work purposes (authorities, customers, neighbours, inspectors, etc.) and (2) the extent to which producers feel able to express their point of view and collectively mobilize themselves in order to influence decisions that affect them (e.g., make customers more aware of producers' situation with regard to vegetable prices). This dimension is based on the work of Ferreras (2007), who found that people often have to arbitrate between different conceptions of justice in their workplace and that they expect democratic justice to take precedence over other norms, such as the subordination norm.

The time at work dimension refers to all working hours (production, marketing and sales, and administrative tasks).

The last dimension, competence, refers to the extent to which producers feel they have access to knowledge and advice in order to master the skill, competence and know-how necessary for the conception and completion of required tasks.

Qualitative variables were evaluated through the perception of the producer on its own situation. We payed attention to evaluate the gap between the expectations of the producer and the reality experienced. Each qualitative variable were studied through comprehensive interviews starting with the producer history (see section 3).

2.2. Work orientation and history

In addition to the nine dimensions of working conditions, we looked at producers' history and work orientation in order to better understand their work experience. Their history was addressed through a study of their education, professional career, the evolution of their work expectations, inheritance and origin (agricultural family or not). For work orientation, we distinguished expressive orientation to work (strong interest and pleasure in work) from instrumental orientation to work (work chosen for financial reasons and social status) (Cultiaux and Vendramin, 2008). In order to better understand the concept of expressive orientation, we added a second distinction proposed by Ferreras (2007, 70-79) between

[3] We identified and adapted the variables related to the income and social benefits dimension based on the advice of accountancy experts and the local social secretariat (exponent FS in Table 1). There is almost no financial accounting obligation for producers with the status of 'natural person'. Few of them have any idea of their accounts, even sometimes of basic aspects such as their income. We sought to find a compromise between having representative and reliable data on income and a farm's financial situation.

Table 1
Dimensions and related variables of producers' working conditions.

Dimensions	Qualitative variables	Quantitative variables
Leeway and control level	- Capacity to take decisions on production and marketing, climate issues, premiums and relationships with clients and suppliers[AL][a] - Capacity to innovate[SL][b] - Appreciation of the quality of services offered and products sold[SL] - Choice of peers and workers[SL]	
Income and social benefits	- Perceived level of income fairness[SL] - Qualitative evaluation of productive capital[SL] - Qualitative evaluation of level of investment in the farm[FS] - Level of social security for self-employed workers such as farmers[SL] - Additional personal insurance in case of illness[FS] - Crop insurance[FS] - Partner's job or status as a worker on the farm[FS]	- Proxy indicator of annual income[FS][c] - Turnover [SL] - Premiums[AL] - Number of volunteers[SL] and their origin (familial or not)[AL]
Work (in)security	- Level of risk taken[AL] - Access to and ownership of productive capital[AL] - Trading conditions and client reliability[AL] - Perception of influence of socio-economic context on work security[SL] - Previous experience of unemployment[SL] - Evolution of turnover and income[SL]	- Time spent as a producer on the current farm[SL]
Occupational health	- Level of exposure to workplace accidents[SL] - Illness problems, such as insomnia or back pain[SL] - Serious illness due to work[SL] - Use of pesticides and application of safety precaution[AL]	
Political experience at work	- Extent to which producers feel equal to other individuals[SL] - Capacity to express points of view, collectively mobilize to pursue common interests and influence external determinants of working conditions[SL] - Perceived level of standing of the work by society[SL] - Being unionized in order to influence political decisions[SL] - Direct contact with consumers[AL]	
Time at work	- Appreciation of number of work hours and schedule flexibility[SL] - Appreciation of pace of work[SL] - Balance between private and work lives[SL]	- Number of work hours[SL] (per day/week/year, during the season)[AL] - Number of overtime hours (weekends and evenings)[SL] - Holiday allowance[SL]
Competence	- Training considered sufficient[SL] (technical, organisational and administrative)[AL] - Easy access to new knowledge and trainings[SL] - Level of qualification$_{SL}$ - Field experience[SL]	
Intrinsic benefits of work	- Pleasure derived work and its various tasks[SL] - Interest in the work and the extent of expressive orientation to work[SL] - Appreciation of level of task complexity and learning potential[SL] - Appreciation of relational level[SL]	
Work-related discomfort	- Importance of unpleasant tasks[SL] - Work-related moral issues and stress[SL] - Overwork situations[SL] - Experience of psychological abuse at work[SL]	

[a] SL = sociological and economic literature.
[b] AL = additional variables found in the agronomic literature.
[c] FS = field survey.

endogenous and stand-alone expressive orientation.[4] Endogenous refers to appreciation of the work that has to be performed. Stand-alone refers to appreciation of the work due to external aspects (typically, for producers, this means doing work considered as useful to society or being proud of the work they perform).

3. Methodology and the definition of agroecology

There were four steps involved in our field surveys. The first one was an exploratory phase conducted between March and October 2014. Fifteen open interviews were conducted with experts, farm advisors and farmers. Based on this exploratory phase, we built an initial qualitative classification of farms using the comparative agriculture (agriculture comparée) approach developed in France (Cochet, 2011).

In the second phase, between December 2014 and March 2015 we conducted 41 comprehensive interviews with vegetable producers to assess the qualitative variables of working conditions. The interviews were conducted with a comprehensive sociological approach. Producers were considered to be able to judge the situations they experience. That means that the qualitative variables of working conditions were studied through the judgment of the producers addressing real working situations. The interviews were semi-directed, structured with a guide and conducted according to the requirements set by Kaufmann (2011) and Olivier de Sardan (2008). In addition to evaluating the nine dimensions, we also looked at history, work orientation and perception of the future. The employment contract and recruitment of workers, the way producers manage their workers, as well as the tasks workers have to perform were also evaluated through producers' interviews.

At first, the producers selected for interview were those considered (1) to be key players in their production system by vegetable production experts in the Walloon region or (2) to have special features that distinguished them from other producers in their production system. We tried to avoid producers with less than

[4] 'Endogenous and stand-alone expressive orientation to work' are translations of the French concepts 'rapport au travail expressif endogène et autonome' (Ferreras, 2007).

Table 2
Number of producers interviewed (the proxy indicator of income was obtained from fewer producers: as some producers were unable to give the required data or did not want to share information).

Technical orientation	Model	Qualitative interviews	Technico-economic appraisals	Proxy indicator of income
MGS – Market gardening on small areas	Organic - AE[a]	10	7	4
	Conv[b]	4	3	2
MGM – Market gardening on medium areas	Organic - AE	5	5	3
	Conv	4	4	3
MGL – Market gardening on large areas	Organic - Non AE	4	4	0
	Conv	6	4	0
VFC – Vegetable growing in field crops	Organic - Non AE	5	4	3
	Conv	3	3	1
Total		41	34	16

[a] AE = Agroecological.
[b] Conventional.

Table 3
Main techno-economic characteristics of the production systems.

Technical orientation	Main characteristics				
	Gross vegetable production area (hectares)	Full-time equivalent per hectare of vegetable	Level of mechanization [0–1][d]	Number of cultivated vegetables	Marketing routes[e]
MGS	A[a]: <2.5	A: [1–2.5]	A: 0	A: [25–45]	A: Collective buying groups, producers' cooperative
	C[b]: <2.5	C: [0.25–2.5]	C: [0–0.125]	C: [20–30]	C: Small farm store
MGM	A: [2–10]	A: [1.5–5]	A: [0–0.125]	A: [30–45]	A: Farm store, local market
	C: [2–10]	C: [0.5–2.5]	C: [0–0.25]	C: [40–50]	C: Farm store, retailer
MGL	O[c]: [12–38]	O: [0.25–1]	O: [0.30–0.5]	O: [25–35]	O: Farm store, wholesaler
	C: [12–38]	C: [0.25–1]	C: [0.5–0.7]	C: [3–13]	C: Supermarket, farm store
VFC	O: >25	O: <0.20	O: [0.5–1]	O: [5–10]	O: Supermarket, wholesaler
	C: >18	C: <0.10	C: [0.5–1]	C: [2–8]	C: Auction

[a] A = organic and agroecological producers.
[b] C = conventional producers.
[c] O = organic and non-agroecological producers.
[d] The level of mechanization represents the percentage of vegetable production (of four vegetables: carrots (without tops), green bush beans, lettuce and squash) for which planting and harvesting are mechanized.
[e] The food chains listed are those through which at least 50% of the producers in the production system sell more than 20% of their vegetables.

five years of experience and met no producers with less than three years of experience. Then, in order to cover the diversity of work situations in each production system, we included, as far as possible, producers of different ages, origins (agricultural family or not) and socio-economic contexts. In each production system, interviews were conducted until they ceased to produce any new information (see Table 2).

The third phase was conducted alongside the second one. Of the 41 producers, 34 were seen twice to collect quantitative technico-economic data for the year 2013–2014. Quantitative variables of working conditions (Table 1) and technical data (Tables 3–5) presented in this paper are drawn from these interviews.

Finally, we validated the more sensitive data in a final series of interviews conducted between January and March 2016. These producer interviews were conducted in order to gather some qualitative data that was not sufficiently addressed during the first interviews. We also conducted interviews with other actors of the agrifood system (including one farm laborer who had worked in several organic and agroecological MGS and MGM farms, a local advisor on agricultural subsidies, an expert on farm accountancy, a local social secretariat, and a member of collective buying group) to triangulate the information given by the producers.

As there is currently no consensus on the definition of an agroecological system, we assigned an agroecological model to a producer a posteriori when he/she met two conditions: compliance with organic farming regulations and adherence to at least nine of 11 agroecology socio-economic principles defined by Dumont et al. (2016). These principles are: environmental equity; social equity; financial independence; market access and autonomy; sustainability and adaptability; partnership between producers and consumers; geographic proximity; rural development and preservation of the rural fabric; shared organization; diversity and exchange of knowledge and joint implementation of the various principles in practice. Dumont et al. (2016) considered agroecology, from a socio-economic point of view, as an ideal-type based on 13 principles. Two principles (limited profit distribution and democratic governance) were not addressed, as they did not fit well with the context of our study.[5] Our definition avoids reducing the term agroecology to a mere technical solution. It provides a practical and precise definition that stresses the socio-economic dimension, which is central to the context of our study on work. For simplicity, we will refer to the organic and agroecological model as the agroecological model.

This definition excludes farmers who apply the ecological principles of agroecology (Altieri, 1995) but who are not organic. In fact, we met only one producer with more than five years of experience who had strong ecological practices but refused organic certification. We included him within the agroecological MGS

[5] The two out of the 13 agroecology socio-economic principles not addressed were limited profit distribution and democratic governance. The first principle could not be systematically evaluated given most producers have the juridical status of a natural person. The second principle was not applied in most systems given they have very few or no permanent external workers. We did not evaluate governance between family members.

category.

Only the producers of the smaller systems applied socio-economic agroecological principles. Based on our definition, we could only considered MGS and MGM organic producers as agro-ecologic. This fall in line with the conception of the founders of agroecology who restrict agroecology to agriculture on small areas with little mechanisation (Altieri, 2009).

4. Eight systems of vegetable production for fresh food markets

In this section we introduce each system of production within the Walloon region, the number of producers interviewed as well as their main techno-economic, socio-cultural and personal characteristics. The last part of this section summarizes the employment conditions experienced by the workforce' in each production system.

4.1. Context and sample

Vegetable farming for the fresh food markets in the Walloon region has been little census and studied by research centers. Producers number less than 300. Most of them are MGS producers (154 out of 264 producers in 2015 according to the Wallonia public service) recently established. They appear to be oriented towards agroecology.

Within our sample, in two production systems, MGS and MGM, all the producers could be classified as either agroecological or conventional. In the MGL and VFC systems, none were considered to be agroecological. Some organic MGL and VFC producers showed an interest in agroecology, but did not prioritize socio-economic agroecological issues.

Some of the results related to criteria set out in our theoretical framework (Table 1) appeared similar to all the production systems, largely because of the Walloon region context. First, producers have limited access to information and training (competence dimension). This is particularly true for organic producers, who, until now, have received less support from research centers than conventional producers. There is little sharing of experience or information among producers, except for some marketing activities and some exchange of knowledge among agroecological MGS and MGM producers.

Second, very few vegetable producers are members of unions, that is political lobbies organized by producers (political experience at work dimension). When they are members, it is almost always to obtain technical information rather than to have an impact on political decisions.

Third, with regard to social security (income and social benefits dimension) all the producers have minimal coverage, including health care and pensions. Spouses working on farms are allowed to retain this social coverage in case of separation.

4.2. Production and associated marketing systems

Most farms are diversified and, at least, partly sell their products through short food chains (Table 3).

4.3. Main socio-cultural and personal characteristics of the producers

Personal and socio-cultural characteristics influence working conditions. Here, we summarize the most important characteristics among each production system (Tables 4.1 and 4.2). These are: age; agricultural family origin; education; professional experience other than agricultural production; and agricultural field experience.

MGS and MGM orientations include a higher number of younger producers than the other groups. Agroecological producers tend to come less frequently from an agricultural family.

In the conventional MGS, MGM and MGL orientations, there are fewer producers who have undertaken studies after college. In the conventional MGM, MGL and VFC orientations, there are fewer producers who have had other work experience. In the MGS and MGM orientations, there are more producers with less than 10 years of experience, due mainly to the recent growth of these orientations covering smaller areas.

4.4. External and family workforce

In all systems, the main producer (who is self-employed) is also employer, at least during a short period of the year (Table 5). MGM, MGL and conventional VFC farms are usually family-owned. In general, the husband is responsible for production and the wife manages a farm store. In other cases, a single producer manages the farm. Except for two agroecological MGS farms, the associates are always family members.

Both agroecological and conventional MGS producers employ few workers. The workers usually have seasonal or student contracts and are mainly Belgian. They are employed during peak production periods only and work on manual tasks. The MGS producers, especially the conventional ones also work with volunteers. They have the highest share of volunteers per hectare of vegetables. The volunteers are generally family workers in conventional MGS agriculture, whereas in the agroecological MGS group the volunteers are 'WOOFERS' (voluntary workers on organic farms), members of collective buying groups or trainees in agriculture.

The MGM agroecological system is the only one to offer a high proportion of long-term contracts (permanent contracts) to their employees, mostly Belgian. These workers undertake a diverse range of tasks including commercialization and production, manual tasks and mechanized tasks.

Conventional MGM system and both VFC systems mostly offer short-term contracts (mainly seasonal contracts and, to a lesser extent, fixed-term contracts) to their workers. Their seasonal workers are mainly foreigners, from Poland and Romania in general; occasionally they are Belgian citizens (of foreign origin) who have financial difficulties. These workers are mostly assigned manual repetitive tasks. The conventional VFC producers employ few workers during peak periods only. We do not have enough economic data to present average.

The MGL producers who accepted to give economic data were not enough to calculate averages. However, our qualitative interviews and the limited quantitative data show that the employment pattern of the MGL systems is similar to the conventional MGM system except that the MGL systems rely much more (probably the highest at the farm level) on volunteers who are family workers. Some MGL farms also offer a high proportion of permanent contracts, mostly to qualified Belgian workers who operate machinery or work in the farm store.

5. From working conditions issues to concerns about sustainability

This section discusses general patterns, specificities and trade-offs of each vegetable production group in relation to eight out of the nine working dimensions.[6] We start with an overview of work

[6] We did not address the competence dimension as we could not identify features that were specific to each production system, as in the Wallon region context, there is little technical supervision in vegetable production (see Section 4.1.).

Table 4.1
Main socio-cultural and personal characteristics: agricultural family origin and age.

Orientation	Model	Total number of producers	Number of producers from an agricultural family	Number of producers by age range [years]				
				[20, 30]	[30, 40]	[40, 50]	[50, 60]	[60, 70]
MGS	Organic - AE[a]	10	1		3	5	1	1
	Conventional	4	3	2		2		
MGM	Organic - AE	5	2		1	3		1
	Conventional	4	4	1	1	1	1	
MGL	Organic - Non AE	4	3			2	1	1
	Conventional	6	5			1	4	1
VFC	Organic - Non AE	5	4			3	1	1
	Conventional	3	3			1	1	1

[a] AE = Agroecological.

Table 4.2
Main socio-cultural and personal characteristics: education; professional experience other than agricultural production; and agricultural field experience.

Orientation	Model	Total number of producers	Number of producers with education after college	Number of producers with other professional experience	Number of years since farm established				
					[3; 5]	[5; 10]	[10; 20]	[20; 30]	[30;50]
MGS	Organic - AE[a]	10	7	9	3	2	3	1	1
	Conv[b]	4	2	4	1	1	2		
MGM	Organic - AE	5	4	4	1	1	1	1	1
	Conv	4	2	1		2	1		1
MGL	Organic – Non AE	4	3	2			1	2	1
	Conv	6	3	2				4	2
VFC	Organic – Non AE	5	3	3			1	2	2
	Conv	3	2	1		1	1		1

[a] AE = Agroecological.
[b] Conventional.

situations (Section 5.1.). We more deeply investigate the situation of the three less viable systems of production, where producers and workers experience bad working and employment conditions (Section 5.1.1.). We highlight the distinctions between the two agroecological systems (Section 5.1.2.). We then discuss the part played by the context and technical factors on working conditions (Section 5.2.). We examine the trade-offs each producer has to make between social, ecological and economic dimensions. Finally, we look at the unexpected results with regard to agroecology (Section 5.3.). Our discussions focus on the general patterns within each production system and we do not explore the (doubtless interesting) exceptions that we discovered.

5.1. Working conditions in vegetable production: an overview

Our theoretical framework enabled us to characterize the working conditions within each production system and to reveal common patterns peculiar to each system (Table 6). This table is based on a systematic analysis of each variable of each dimension for each producer interviewed. The approach is illustrated in Section 5.1.1.

In general, we can already show that each dimension had important effects on working conditions in all the production systems and is relevant in a comparison of work situations in agriculture.

In every system, producers derive positive intrinsic benefits from their work. They have a strong interest in their work. They see vegetable production as technically challenging and feel it makes a useful contribution to society. They show both an endogenous and a stand-alone expressive orientation to work. Conventional MGL producers are an exception, as shown in Section 5.1.1.

For each model, some production systems scored positively (no higher than a minus [-]) for eight out of the nine working conditions' dimensions. In agroecology, these were MGM; in conventional, MGM as well and VFC; in organic (and non-agroecological), MGL. A the same time, three production systems showed less viable situations, with a minus (-) for at least three dimensions, including the work-related discomfort dimension. These were conventional MGS and MGL producers and agroecological MGS producers. The peculiar situation of these three less viable systems in terms of working conditions is discussed in Section 5.1.1. The variation in work situations in agroecology, from one of the most positive situations (MGM) to one of the least viable (MGS), is discussed in Section 5.1.2.

5.1.1. Issues relating to the viability of three production systems

Three systems showed less viable situations, with a minus (-) for at least three dimensions (conventional MGS and MGL producers

Table 5
Status of the workers (average of the proportions of working hours).

Orientation	Model	Salaried employee: long-term contract	Salaried employee: short-term contract	Undeclared	Volunteer	Self-employed	Associate (including the main producer)
MGS	Organic - AE[a]	0.03	0.15	0	0.16	0.07	0.59
	Conventional	0.03	0.05	0.01	0.35	0.01	0.55
MGM	Organic - AE	0.31	0.34	0	0.03	0.01	0.31
	Conventional	0.06	0.38	0.05	0.02	0	0.49
VFC	Organic - Non AE	0.09	0.53	0.01	0	0.06	0.31

[a] 1 AE = Agroecology.

Table 6
Summary of working conditions dimensions in each production system, classified first by model and then from the least viable situation to the most positive one.[a]

Model	Technical orientation	Working conditions dimensions							
		Leeway and control level	Income and social benefits	Work (in)security	Time at work	Political experience at work	Intrinsic benefits of work	Work-related discomfort	Occupational health
Organic and Agroecological	MGS	+	-	-	+	++	++	-	++
	MGM	++	+	++	-	++	++	++	++
Organic and Non agroeco.	VFC	-	++	+	+	+	++	++	+
	MGL	+	+	-	+	+	++	++	++
Conventional	MGL	+	+	-	+	-	-	-	-
	MGS	+	-	+	-	+	++	-	++
	VFC	++	++	+	++	+	++	++	-
	MGM	+	+	++	+	+	++	+	+

[a] To construct the table we assigned a symbol -, + or ++ to each variable (presented at Table 1). For each dimension we then gave the symbol in the majority regarding the variables related. When there was equality, we assigned the most positive symbol, or the middle one if the equality was between ++ and -. This type of quotation system has its limitations because the result may differ slightly with subjectivity, but it allows the major trends to be highlighted.

and agroecological MGS producers).

For each of them, we will look initially at why producers chose the particular method of production and then at the first dimension: leeway and control level [Leeway]. We then discuss the following dimensions: income and social benefits [Inc], work (in) security [WI], time at work [T] and political experience [Pol] at work. The dimensions of occupational health, intrinsic benefits at work and work-related discomfort are discussed together. These three dimensions represent well-being [WB]. It includes the variable which evaluates the relationship between the producers and its workers (intrinsic benefits at work).

5.1.1.1. Agroecological Market Gardening on Small Areas [MGS]. **[Leeway]** Agroecological MGS producers have chosen to work in this system because it corresponds to their social and ecological values. For the same reason, they have chosen to market their products through short food chains only and have fewer links with conventional markets. They see this as a guarantee of their autonomy and viability. Having a highly diversified agriculture, based on minimal use of fossil fuel and chemical inputs, is important to them. They consider the human factor as central in this system, mainly because the possibilities of mechanization are extremely limited, their products are sold directly to consumers, the cultivated areas are small and there is room for other producers. They recognize that there are constraints in this approach. With regard to marketing, in order to be profitable they need to find enough customers not too far from their farm. The supply of vegetable boxes has greatly increased in the region in recent years. Agroecological MGS producers sell most of their products to collective buying groups known as "GACs" in French. They face difficulties in creating customer loyalty with the increasing competition. They also feel limited for financial reasons, not being owners of their land and not being able to benefit from local agricultural subsidies. They enjoy autonomy from input supply industries and, to some extent, from clients, but at least for half of them this autonomy does not make up for the other constraints that characterize their production system.

[Inc] Agroecological MGS producers feel that they do not earn enough money and half of them feel they lack any means of increasing their current income. The proxy indicator of annual income (divided by the number of associate or not) lies between 20,000€ and 30,000€. This is lower than in many other production systems. The turnover is the lowest one; between 70,000€ and 120,000€. Agroecological (with conventional) MGS farms use a high number of voluntary workers per hectare. They can offer only precarious employment (such as seasonal contracts).

[WI] The financial situation of agroecological MGS producers is stable. The investment capacity generated by the system is low. MGS tend to have low levels of personal capital and therefore a limited ability to gain the confidence of the banks. Some of them prefer not to borrow money in order to safeguard their autonomy. The vegetable box system to which customers pay a subscription in advance is a good way to generate cash flow, but it is becoming difficult to ask for subscription because of increasing competition in the supply of vegetable boxes. There are three other main barriers to their investment capacity. First, they had to buy more land because they did not come from an agricultural family. Land prices in the Walloon region are unaffordable (there are no official data, but the average price is between 8000€ and 40,000€ or more per hectare; (Zoé Gallez (Terre-en-vue Organization), pers. comm., 6 September 2016)). When they do not own their land, some investments are impossible. Second, the investment subsidies are granted only for a minimum amount of equipment (e.g., machinery), and most of the unitary equipment is not expensive enough to benefit from grants. Third, it is not beneficial for agroecological MGS producers to get an outside contractor for some production tasks. Contractors prefer not to work in this kind of system because of the expensive transaction costs for a few hectares. All these issues create a situation of insecurity at work, which is exacerbated by the fact that these producers tend to have been in agriculture for a shorter time than in other production systems.

[T] Agroecological MGS producers work 2000–3000 h per year (with a median of 2340 h) on all the tasks linked to their farm (production, marketing and administrative tasks). They take 0–3 weeks of holidays per year (with a median of 3 weeks). This is a lower number of working hours than in the other production systems. Compared with the other systems, their marketing routes give them a lot of flexibility. The timing for preparing and fulfilling orders is known in advance and is regular throughout the year (even if it includes weekends, as in most systems). These farmers give importance to social and family life and half of them would like to have more free time, especially in the evenings and at weekends.

[Pol] Like most market gardeners, agroecological MGS producers are not members of unions, but they are involved in initiatives to sensitize consumers to their situations. They choose marketing routes in which they strive for a co-construction of supply and demand (sometimes being collectively mobilize for that). They encourage members of their collective buying groups to work on their fields in order to introduce them to the realities of production. Some of them have also implemented a participatory guarantee system that involves consumers in the certification process. They sometimes invest in associations that defend their particular interests, such as access to land. Agroecological MGS

producers feel they benefit from society's support for their production methods, although most of them think this support exists in debates and talks but is still not enough reflected in vegetable prices. They feel a lack of recognition for what they are trying to achieve, and this is reinforced by the absence of investment subsidies for agroecological MGS, the lack of legal status adapted to their needs and the lack of appreciation from some producers with a family agricultural background.

[WB] Agroecological MGS producers are passionate about their work and the complexity of market gardening. In the current socio-economic and political context, however, they face considerable difficulties, which affect their well-being. At least half of them are frustrated by their inability to put their vision of agriculture completely into practice. They also have a strong stand-alone expressive orientation to work. Some of them chose this production system mainly because they saw it as a way to change society, but they feel frustrated that they are not having the impact on consumers and society that they hoped for. Some of them have begun to question the need to reduce mechanization for the benefit of the environment and human health. There is no scientific proof that their tools consume less fuel (including energy required for manufacturing). A low level of mechanization can make tasks difficult for them and their workers. Often, they have to work alone, which can be discouraging particularly with some manual tasks. Finally, from time to time they work with volunteers. These occasional 'workers' cannot do all tasks and are less efficient than regular employees. Producers have to take care of them, to offer them food, be sure they do something fun and not too difficult, etc. Sharing work with volunteers could be pleasant only if there is no possibility of having workers.

5.1.1.2. Conventional Market Gardening on Small Areas [MGS].
[Leeway] In conventional agriculture, MGS producers are engaged in this technical orientation because they see it as the only way to practice their passion: vegetable farming. Most of them practice it alongside another professional activity because they consider it is impossible to live only on the income from vegetable production. They enjoy the low financial risk and high level of autonomy in the system, but, as in agroecological MGS, they feel limited for financial reasons and they struggle to find enough customers who are not too far from their farm. Due to their second profession, they are restricted to work on their farm only in the evenings and at weekends.

[Inc] The proxy indicator of annual income (per associate or not) is high (more than 50,000€) thanks to their second professional activity and to the high level of family volunteers implication. Family volunteers tend to be in charge of the farm store and/or farming operations involving heavy machinery. MGS conventional producers consider that prices are too low for them to be able to live only on vegetable production. The turnover (including their second profession) lies between 150,000€ to 300,000€.

[WI] Conventional MGS producers have better work security than agroecological MGS producers, due mainly to their other professional activities and/or their free access to family land. This gives them several advantages, including: less borrowing; contracting work done by a family member; own funds generated by their service company; and access to workers employed thanks to the service company. They also face less competition as they sell their produce mainly through a small farm store rather than using the vegetables box approach.

[T] Conventional MGS producers work more than 4000 h per year and tend to do a lot of overtime, given that they have another professional career. The time spent at work and the poor balance between work life and family life is seen as unbearable by most of them.

[Pol] Society is positively disposed towards conventional MGS, but, like agroecological MGS producers, conventional MGS consider that this support is not adequately reflected in vegetable prices. They have not invested in marketing strategies or in initiatives to sensitize customers. They tend to be pessimistic about the influence they have on political decisions and societal choices.

[WB] Conventional MGS producers are passionate about vegetable cultivation, but their system is unsustainable because of the excessive time spent at work. All of them wonder how long they will be able to continue working in something that causes considerable stress.

5.1.1.3. Conventional Market Gardening on Large Areas [MGL].
[Leeway] MGL producers inherited of a small cereal farm or part of one. They chose to develop vegetable crops with the aim of changing the small cereal farm into a large vegetable farm. They consider a high level of mechanization essential. They sell their products in long market chains and/or directly to supermarkets. Between 2000 and 2010, some of them developed short chains. This corresponded with a period of low prices and greater competition among supermarkets. Many conventional MGL producers went bankrupt at this time, especially those focusing on one or a few crops. It is now considered too risky to grow less than three types of vegetable. They still depend to a great extent, however, on the buying policy of supermarkets. They innovate in line with market evolution and develop new farm stores. Attracting workers is a real challenge because the work they offer is hard and repetitive. Half of them hire foreign workers, despite the difficulties this entails (e.g., language, providing accommodation). The other half hires Belgians of foreign origin.

[Inc] The data on MGL producer income are very poor. It appears, however, that there is great disparity in terms of turnover and profit before tax. MGL producers consider that a price is good when it allows them to develop their farm. They do not pay much attention to their income. They like the prices in short food chains, except for supermarket where they see prices as insufficient. Whereas producers in other production systems continue to invest in their farm, two conventional MGL producers stopped to invest in the maintenance of their heritage. They do not find anyone to take over the farm. MGL producers benefit from one of the highest levels of volunteer workers (family workers) at the farm level.

[WI] Work security is better among MGL producers since most of them have reoriented themselves towards short food chains. They also benefit from a semi-monopoly situation, being few in number in the region and yet able to sell a considerable volume of vegetables at low prices, thanks to the high level of mechanization. They do seem to experience the most variable turnover and proxy indicator of income, however, and some of them are still trying to repay large amounts borrowed.

[T] MGL producers work from 2500 to more than 4000 h per year (with a median of 3157 h). Their pace of work is usually very intensive. Some partnerships with supermarkets impose unexpected demands at the last moment, even at weekends and in the evenings. No MGL producers appear to resent this situation. They do not see it as stressful and are not concerned about holidays. Working is a core value for these agricultural families. The interviews, however, did make some producers question the time they spent at work, particularly those facing difficulties transferring their farm to the younger generation and those who have developed short food chains. The last ones did consider they had achieved a good family/work life balance since they have developed short food chains.

[Pol] We identified two groups of MGL producers in terms of political experience at work. A minority has used the difficulties of

other producers to achieve a semi-monopoly situation in the markets and is proud of this achievement. The other MGL producers are unhappy with their general work situation. They feel less supported by society than the producers of the other production systems. Conventional agriculture, particularly the highly mechanized system, is criticized in social debates. MGL producers have difficulties transferring their farm to new generations, who question the value of the enterprise. They also feel that their point of view is not heard and taking into account in most interactions with external to the farm. They see the conditions imposed by supermarkets and suppliers since the dioxin crisis in Belgium as too heavy and feel that when there are health problems like this they have to carry most of the responsibility. They also feel misunderstood and some of them talk of being insulted by inspectors during quality control exercises. Reinforcing this feeling of not being respected are the low prices at auction sales (and to a lesser extent in supermarkets) and the non-compliance with verbal contracts by some supermarkets. MGL producers are not members of unions. They consider they might not have any political impact to change their situation. They enjoy running their farm stores, where they feel they are treated with respect by their customers.

[WB] The political experience at work of most conventional MGL producers has a negative impact on their well-being. One source of stress for them is that, although they enjoy running a business with all its challenges, they do not enjoy the complexity of diversified gardening. They also find it stressful to manage large acreages of vegetables and having to negotiate prices with supermarkets. Selling produce to supermarkets also requires a high level of administration. In addition, half of the MGL producers found their relationship with their seasonal workers stressful. They did not have a good rapport with seasonal workers who often do not speak French well, if at all. When workers are foreigners, producers dislike working alongside them on a same production task. Aside from cultural misunderstandings, foreign workers often face difficult situations that producers sometimes find it hard to identify with (workers who want to return home ahead of schedule, who get drunk on their days off work, etc).

5.1.2. Agroecology: a variety of work situations

The work situation of agroecological MGM producers differs radically from that of agroecological MGS producers, even though they chose their production system for the same reasons. Most MGM producers began with an MGS system but they now see a MGM system as being more in tune with socio-economic trends.

The difference in situations is due mainly to what is known as 'purchase/resale operations'. Purchase/resale activities are necessary to ensure that the system provides them with a living. This involves buying vegetables from a wholesaler selling foreign and local vegetables mainly from MGL and VFC producers. MGM producers then sell these products in their own farm store and at local markets (usually indicating the origin). These sales often account for 50–85% of their turnover (compared to MGS producers who generally generate around 20% of their turnover in this way). However, this practice is sometimes criticized, even by agroecological MGM producers, since the vegetables have not been produced locally and/or MGL and VFC producers are not considered to be agroecological farmers from a social and/or an ecological point of view. However, agroecological MGM producers could not sustain their livelihoods if they were to rely solely on their agroecological production. Purchase-resale activity allows MGM producers to have one of the highest turnovers among any of the groups we studied: between 400,000€ and 900,000€. It also allows them to have a higher investment capacity than agroecological MGS producers.

In addition, the agroecological MGM producers claim that their purchase-resale activity allows them to offer better employments conditions to their workers. Indeed, agroecological MGM producers offer more permanent contracts to their workers than in other production systems (Table 5). They also offer the possibility to learn agroecological practices that interest more Belgian workers than conventional and organic (and non agroecological) practices. As a result, the agroecological MGM system attracts more Belgian workers than any other production system.

Agroecological MGM producers experience less work-related stress than MGS producers. They take advantage of having some mechanization and of sharing manual tasks with motivated employees.

Choice of marketing routes is a second key characteristic that helps to explain why agroecological MGM producers are more viable than the MGS producers. The agroecological MGM producers are able to sell their produce in well-located local markets and farm stores. They do not sell their products through vegetable boxes they have better protection against competition.

Nevertheless, the working conditions of the agroecological MGM production system cannot be said to be optimal yet. Agroecological MGM producers have more capital than MGS producers and their proxy indicator of annual income is increasing every year but, currently, it still comparable to the MGS income (it lies between 20,000€ and 35,000€). In addition, agroecological MGM producers work between 2500 and 4000 h per year (with a median of 3074 h). This thwarts their aspirations to achieve a good family/work life balance. The high number of hours worked by this group is probably due to their commercialization system (markets and/or a farm store with long hours of operation) and the time they spend supervising their workers. They take 1–2 weeks holiday per year.

5.2. The key role of context and the resulting trade-offs

The work situations cannot be understood without referring to the influence of the socio-economic and political contexts. All the groups of producers feel constrained by these contexts, but agroecological producers, particularly those with limited land, are the most constrained, affected by factors such as the unaffordable price of land, the policy of low food prices, the policy of subsidies and the increasing competition in the supply of vegetable boxes. In Wallonia there is no explicit support for those systems with the strongest ecological base, despite increasing social demand.

Conversely, the part played by the level of mechanization appears less important than we expected. In the following section, we first develop the key role of the context and the resulting trade-offs deployed by each production system. We then examine the part played by mechanization.

5.2.1. The trade-offs deployed by organic (and non-agroecological) and conventional producers

Given the contexts in which they operate, each group of producers has to make trade-offs between ecological, social and economic dimensions. These trade-offs affect the work quality of producers and their workers. Organic (and non-agroecological) as well as conventional producers have a lower stand-alone expressive orientation to work than agroecological producers. They like their work mainly "to move things forward", "to address technical challenges", "to see their company growing". Because of that, they favor economic dimension, sometimes at the expense of the environmental dimension and/or fairness to their workers. MGL and VFC organic producers express interest in some ecological practices that are not an obligatory part of organic certification and in socio-economic agroecological practices, but they do not give them a high priority. Most of the time, organic (and non-agroecological) and

conventional producers considered the trade-offs they make to be inherent to their production system and that they cannot change the situation. For instance, VFC producers have difficulties in prioritizing social dimensions. The low level of crop diversity makes manual tasks repetitive and hard for their workers. Our study suggests that changing the balance of trade-off may imply changing from one production system to another.

5.2.2. The trade-offs deployed by agroecological producers

Agroecological producers give more weight to environmental and social dimensions, at the expense of their income (especially the MGS producers). They try to work in ways that reflect their vision of the ideal society, but to achieve this they have to make one additional compromise to overcome an ethical dilemma: choosing between better working conditions for themselves and their workers or financial independence from non-agroecological producers.

Agroecological MGM producers chose the first option and as a result they appear to offer the best employment conditions to their workers. They offer the highest shares of permanent contracts per hectare of vegetables. They are also the only producers who receive many job applications from Belgian workers not facing financial difficulties, who are motivated by the job itself. Yet, they are only able to offer such conditions because of their high level of external purchases made from less ecological and less socially-fair producers. Conversely, agroecological MGS producers chose the second option. They do not offer such good employment conditions, but are less dependent on non-agroecological producers.

Some MGS producers believe their compromise is the best option or do not understand well the MGM compromise. They would not want to follow this strategy. Other MGS producers do desire to pursue the MGM agroecological path. Four out of the five agroecological MGM producers originally started as MGS producers. A change from MGS to MGM system implies technical modifications (Table 3) that appear to be manageable at an individual level.

Some MGS producers are collectively attempting transcend the limits of their dilemma: to avoid offering bad employment conditions to workers and to simultaneously be independent from non-agroecological producers (by having no or few purchase/resale activity). These agroecological MGS producers are trying to set up farming cooperatives with associates only (and to have no other workforce). Two to four associated producers usually own and manage a farm. These initiatives are too young to draw any clear conclusions as to whether they are viable or are meeting their objectives. At present, they are not generating better earnings and they still face the same limitations as other agroecological MGS farms in terms of leeway and control level, income and social benefit and work (in)security. However these initiatives do encounter less work related discomfort. They enjoy sharing manual tasks between associates.

5.2.3. Degree of mechanization and working conditions

Finally, we noticed that the producers' working conditions is less affected by the degree of mechanization than by context, professional career, work orientation or socio-cultural heritage. Producers with a MGS and MGM technical orientation are less prone to work accidents than the MGL and VFC orientations, which have a higher level of mechanization combined with a higher stress level, which gives rise to more incidents. The choice of mechanized or manual approaches in the various systems depends on each producer's preferences and does not greatly affect work-related discomfort. Other, external conditions, such as having to perform manual tasks alone and having to work with poor quality equipment, affect this dimension much more.

5.3. Explaining the unexpected results with regard to agroecological producers

Some of the findings relating to agroecological systems (for example, in organic agriculture and in short food chains, in the context of our definition of agroecology) could have been expected. The literature highlights the positive effects of organic systems on producers' health (Ollivier and Guyomard, 2013), the satisfaction they get from their work and the recognition they get from society when they are involved in short food chains (intrinsic benefits and political experience at work) (Bon et al., 2012; Dufour and Herault-Fournier, 2010). The literature also highlights the difficulties that ecological systems and short food chains have in being profitable (income) (Brown and Miller, 2008; Dufour and Herault-Fournier, 2010; Ekers et al., 2015; Galt, 2013), of combing family and work lives (time at work), and of overworking and physical exertion (work-related [dis]comfort) (Dufour and Herault-Fournier, 2010).

The working conditions in agroecological systems, however, appears to be worse than expected for the following dimensions: work (in)security, leeway, intrinsic benefits of work and work-related discomfort.

5.3.1. Strong competition in the vegetable box sector

The viability of vegetable box schemes differs depending on the local context. Vegetable boxes are not easy to sell (work [in]security dimension), contrary to what is sometimes said in the literature from other countries (Dufour and Herault-Fournier, 2010). In Wallonia, supply in the vegetable box market has expanded greatly, creating strong competition for producers. The number of small producers, and other actors (such as small retailers, and work integration social enterprises in market gardening), who sell vegetable boxes has significantly increased in recent years.

This increase of vegetable box supply raises two competition issues. First, vegetables boxes are sometimes made up of products from a wholesaler selling both foreign and local vegetables mainly from MGL and VFC producers. This can be misleading for consumers who assume the products are from small-scale agroecological producers.

Second, the conditions of sale have become more flexible than before, with consumers being able to select the vegetables, have them delivered to their homes, and not being under any obligation to have a long-term commitment or to pay a subscription in advance. This shift toward conditions of sale that are more characteristic of conventional markets is unfavorable to producers. For example, they now find it difficult to include some less appealing vegetables (that are useful within their rotation systems) or to include less visually attractive vegetables, and their cash flow no longer benefits from advance subscriptions.

These issues have led some agroecological MGS producers to reduce the number of vegetable boxes they make up for sale. It is likely that such tendencies are not limited to Belgium given the risk has been already identified by other authors (Galt, 2013; Goodman, 2004; Guthman, 2004b). So far, there is no indication from MGM producers that these issues are affecting sales at local markets or farm stores.

As mentioned in papers on the situation in France (Dufour and Herault-Fournier, 2010; Maréchal, 2008), we observed that farms in short food chains, and in agroecological systems have a certain leeway, both from input supply industries and, to a lesser extent, from customers. In Belgium, in the Walloon region, however, there are other socio-economic and political constraints (e.g., unaffordable price of land, no access to investment subsidies, strong competition in vegetable box sales, etc.) that affect profit and restrict flexibility. This was the case for at least half the MGS producers in our survey. This was evident in the response of some

producers, who said they managed to get by in agriculture, but no longer got the rewards from market gardening that they had originally expected. This leads us to conclude that agroecological MGS producers do not benefit from a high level of leeway. The situation is better for the MGM producers, but they depend on purchase/resale activities.

5.3.2. Political experience at work and the symbolism of low food prices

The assessment of political experience at work and the stand-alone expressive orientation to work allowed us to highlight the role of product pricing and its impact on the work-related discomfort dimension.

Agroecological producers usually start out offering products at low prices and raise them slowly over time. Currently, however, all agroecological MGS producers consider that prices are still too low. They choose marketing routes in which they strive for a co-construction of supply and demand, with the goal of having the impact on consumers and society that they hoped for. One producer said he had shown his accounts to collective buying group members to demonstrate that he was earning only 4 euros/hour, and had suggested that each group member should choose between three prices for the same vegetable box as a function of his or her income (without having to unveil it). The group refused because its members had already accepted a price increase in the past. After many years of selling boxes to this collective buying group, the producer quit.

Agroecological MGS producers do not feel ready to change their system in order to be more profitable (e.g., by getting involved in purchase/resale operations). They want to influence their consumers and society. They appear more frustrated than producers in the other systems because of this strong stand-alone expressive orientation to work and their feeling of not being able to make consumers more aware of what they are trying to achieve. This system and the conventional MGS and MGL systems were the only ones where we found producers not enjoying their day-to-day work.

> One agroecological MGS producer (quote translated from French): “I am fed up! The compromises I have to make to set up an economically feasible project make it become a company like any other. If it is a company like any other, I would certainly do something else. Because then, I wouldn't have any more social impact, it's only negotiation on prices and work on its productivity”.

> Another agroecological MGS producer, who was in the process of changing the status of his farm to a non-profit organization (quote translated from French): “In the end the entire system always brings you back. You see, it is a centripetal force, when you try to move away from the stereotyped functioning, you're brought back to the stereotype. Always. And so, at a certain point, there is only one solution. If you want to do it otherwise, you need to move away from the economic constraints altogether, because I don't think you can deal with it.”

Agroecological MGM producers say they do not suffer from the low prices for their produce because they are still increasing their income. They sell their products mainly in local markets and farm stores where there is less involvement of consumers in the co-construction of supply and demand. They do participate in producer organizations to address pricing issues and raise consumer awareness about working conditions in agriculture, but they do not believe that price increase is the only solution. They feel more inclined to find solutions in tune with the current socio-economic context. Moreover, as for MGS, high prices are not concomitant with their values on food accessibility.

5.3.3. A systemic and systematic comparative approach highlighting agroecological features

Our multidimensional theoretical framework enabled us to conduct a systemic and systematic analysis of working conditions. Each dimension and its related variables was systematically studied for each producer of each system, including organic and conventional producers from small systems in short food chains to producers from large systems in long food chains. This systemic and systematic approach produced original results. On the one hand, it highlighted specific features of agroecological producers: they are able to better express their point of view and have a greater tendency to collectively mobilize themselves than other producers (political experience at work dimension) and they enjoy a high level of occupational health. On the other hand, it showed that some positive aspects of vegetable production, such as an expressive orientation to work or the feeling of being positively challenged technically, are not the prerogative of agroecological systems (intrinsic benefits of work).

Our comparative approach also highlighted differences between the agroecological groups, with the MGM producers experiencing good working conditions and the MGS producers experiencing one of the least viable situations. Three major aspects explain this situation. First, these production systems do not implement agroecological principles in the same way. MGS producers prefer to have a high independence from non-agroecological producers (by not (or very few) practicing purchase/resale operations) and to not be able to offer good employment contracts to their workers. They favor the agroecological principle of financial independence at the expense of the social equity principle regarding their own workers. Agroecological MGM producers opted for the opposite choice. Second, the context of increased competition in vegetable box sales has been more damaging to the working conditions of agroecological MGS producers than MGM producers. Third, the stronger MGS stand-alone expressive orientation to work affects their quality of work, as described earlier. Studies with a more developed classification system with regard to work organization and marketing strategies might lead to a better understanding of the diversity within each production system, especially in terms of income and work load (Aubry et al., 2011; Bon et al., 2012; Dufour and Herault-Fournier, 2010; Navarette et al., 2015).

6. Conclusion

Our multidimensional and political theoretical framework of working conditions in agriculture, combined with our comparative approach, allowed us to identify general trends, specificities and trade-offs for each production system in agroecological, in organic (and non-agroecological) and in conventional agriculture, highlighting four key issues of sustainability in agriculture.

First, in the current socio-economic and political context, we cannot simply say that agroecological vegetable production systems offer a better work experience for producers than conventional and than organic (and non-agroecological) ones. Agroecological market gardeners on medium areas (MGM) experience one of the most positive situations, whereas agroecological market gardeners on small areas (MGS) experience one of the most difficult. In all situations, however, the agroecological production systems are not yet enough profitable. Second, the employment conditions of workers are poor in all systems, except in the agroecological MGM system. Third, the work and employment situations are due mainly to the context and to the trade-offs each producer, of any model, has to make between social, ecological and

economic dimensions. These trade-offs depend on the type of production system, which itself relies on professional career, inheritance, work orientation, socio-cultural heritage, believes and values of the producers. Finally, for the producers, having to perform manual tasks alone and having to work with poor quality equipment affect more greatly the work-related discomfort dimension than degree of mechanization.

This approach has shown what researchers, associations and governments need to focus on if they really want to improve working conditions in sustainable agriculture. Some sociologists defend that the setting of standards is likely to be necessary in order to improve poor working conditions, especially for farm workers (Gray, 2014), but they are likely to not be effective unless the socio-economic and political context is taken into account. For self-employed producers, context appears to be decisive, especially for those struggling to create alternatives to the dominant socio-technical regime (Geels and Schot, 2007).

A change in context would be helpful in achieving a balance of the economic and social conditions that favor ecological systems. In order to achieve such a goal, this study highlights the need for more collaboration between agroecological producers (in our case study, between MGS and MGM agroecological producers). They sometimes disagree on the strategy needed to improve their working conditions weakening their capacity to influence society.

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