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RURAL EXTENSION

Work in organic farming: an overview

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ABSTRACT: *In addition to the expansion of sustainability with crop rotation and use of residues from the property itself, the main characteristics of organic agriculture are the extinction of the use of chemicals and producing food free of these contaminants. This review aimed to find evidence that substantiates the improvement of the health and working conditions of farmers working with this model of agriculture. To this end, the ProKnow-C instrument was used, which recommends seven steps to select and evaluate the publications found. Exclusion criteria included studies related to the consumption of these products, school feeding, management, and cultivation techniques or studies conducted with non-organic farmers. After the exclusion, 11 documents remained for content analysis. Results of these studies indicated that when compared to conventional agriculture, there is an increase in cognitive load due to the variety of tasks; however, no mental suffering was identified. Despite the absence of appropriate technology and technical assistance, there is an increase in job satisfaction and an improvement of the health of the family as a whole, improving the quality of life. Additionally, the results of this review pointed to the gaps of research that can be carried out, such as longitudinal studies on organic agriculture, social interactions, environmental working conditions, and studies in the technological area. Finally, the results evinced that organic agriculture has a positive impact on the health of workers. Thus, the need for empirical research is important to develop innovations that improve work in organic agriculture.*
Key words: *working conditions in agriculture, cognitive load, quality of life of workers.*

O trabalho na agricultura orgânica: uma visão geral

RESUMO: *A agricultura orgânica tem como principal característica a extinção do uso de produtos químicos gerando alimentos livres desses contaminantes, além de ampliar a sustentabilidade com rotação de culturas e uso de resíduos oriundos da própria propriedade. O objetivo desta revisão foi encontrar evidências que comprovem a melhoria das condições de saúde e trabalho de agricultores que trabalham com esse modelo de agricultura. Para tanto, foi utilizado o instrumento ProKnow-C que preconiza 7 etapas para selecionar e avaliar as publicações encontradas. Os critérios de exclusão foram estudos ligados ao consumo desses produtos, alimentação escolar, técnicas de manejo e cultivo ou estudos realizados com agricultores não orgânicos. Após, 11 documentos restaram para a análise do conteúdo. Como resultados, os estudos apontaram que, quando comparado à agricultura convencional, há aumento da carga cognitiva devido à variedade das tarefas, no entanto não identificou-se sofrimento mental. Apesar da ausência de tecnologia apropriada e de assistência técnica, há um aumento da satisfação com o trabalho, melhoria da saúde da família como um todo, melhorando a qualidade de vida. Ainda como resultados, esta revisão aponta as lacunas de pesquisas que podem ser realizadas, como estudos longitudinais sobre a agricultura orgânica, as interações sociais, as condições ambientais de trabalho, e estudos na área tecnológica. Enfim, concluem que a agricultura orgânica interfere positivamente na saúde dos trabalhadores. Portanto, a necessidade de pesquisas empíricas é iminente para desenvolver inovações que aprimorem o trabalho na agricultura orgânica.*
Palavras-chave: *condições de trabalho na agricultura, carga cognitiva, qualidade de vida do trabalhador.*

INTRODUCTION

It has been proven that the health of farmers is threatened by the indiscriminate use of toxic agrochemicals and pesticides that, besides contaminating workers and consumers, impact the environment, preventing sustainable development (BOMBARDI, 2019; NASRALA NETO et al., 2014; RATTNER; FRANCO NETO, 2009). Several studies indicated an association between the increased use of pesticides and health-related problems such as the incidence of fetal malformation, childhood and

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juvenile cancer, impacts on hearing loss, and the numerous occupational contamination events of rural workers registered in the health system (PIGNATI et al., 2017; SENA et al., 1996; STOPPELLI; MAGALHÃES, 2005). There is a contradiction when talking about the "safe use" of pesticides because the user usually lacks sufficient information regarding the proper transportation, handling, or even sanitization of the garments used for the application of the products (ABREU; ALONZO, 2014). Thus, the list of harmful effects caused by the use of pesticides is wide and increases every day, confirmed by new studies that investigate the relation between pesticides and diseases (CARNEIRO et al., 2015).

Sustainable agriculture models have been adopted, and among them, organic agriculture is highlighted as it stimulates food production, avoiding the use of chemicals and decreasing energy consumption. Thus, sustainable agriculture reduces external dependence on inputs and expands the sustainability of properties, presenting itself as an alternative to industrial agriculture. The techniques used are based on crop rotation, use of green fertilizer, crop residues and manure, among others (ALTIERI, 2010; EHLERS, 2017).

Organic agriculture has shown growth in recent years, reaching a 300%-increase of production units between 2010 and 2018 (BRASIL, 2019). This trend, both in production and consumption, influences farmers to change from their working mode to organic farming.

In Brazil, an important policy to ensure the health and safety of workers is the National Policy on Occupational Safety and Health (PNSST), which seeks health promotion, improvement of the workers' quality of life of workers, and prevention of accidents occurring in the workplace (BRASIL, 2011). Among the principles, health promotion and prevention actions present priorities related to care, rehabilitation, and repair. In this regard, organic agriculture can be adopted as a strategy for fostering workers' health as this mode of production does not use chemicals that cause diseases or harm the environment (AZEVEDO; PELICIONI, 2011, 2012; RÜCKERT et al., 2018).

However, as far as the environmental conditions of agricultural work are concerned, a number of risks are present in the working environment, which are beyond those linked to chemicals. As an example, uncomfortable postures, long working hours, individual handling of loads, accidents with respect to machinery and equipment, among others, can cause health problems for the farmers (EUROPEAN COMMISSION, 2015).

Hence, this review analyzed existing publications on the health and safety of organic farmers, seeking evidence of improved health and working conditions as organic methods do not use chemicals, and this risk is eliminated from the work environment.

MATERIALS AND METHODS

The study has an exploratory character, gathering information via a review of the literature to reveal scientific studies conducted on working conditions and the relation with the health of organic farmers. Data collection was conducted between May and August of 2017.

The Proknow-C instrument, developed by the Multicriteria Methodology Laboratory to Support Decision-Making (LabMCDA) of the Federal University of Santa Catarina (UFSC), was used to map the data. This methodology systematizes seven steps to be followed: (1) elaboration of the research question based on the objective, (2) definition of keywords, (3) selection of databases, (4) search and selection of searches (application of exclusion criteria), (5) use of a manager to organize research (Mendeley), (6) number of citations of each survey (Google Scholar), and (7) analysis of the content found (ENSSLIN et al., 2010).

Keywords were selected according to the area where the base was inserted. We conducted a search with combinations of terms related to the theme, based on the three axes of the study and on the research objective. The first group of keywords was linked to ergonomics and health. Therefore, the words "ergonomic," "health," or "disease" were used, identifying the circumstances. The second was linked to organic agriculture with the words "organic agriculture" and "organic farmer," depicting the population under study. The third group, represented the working conditions that may be linked to occupational diseases, with the terms "working conditions" and/or "organization of work," reflecting the scenario. The word groups were combined so that they could return the largest number of works, using "OR" Boolean operators between the keywords and "AND" between the axes.

The selected bases were Web of Science, Scopus, Capes Bank of Theses and Dissertations, and AGRIS because these were related to the area under study. There was no period restriction for publications, and the research returned 1323 papers to compose the portfolio of articles.

The exclusion criteria covered were studies that relate health to the consumption of

organic products, as well as those related to consumer nutrition, school feeding, and studies that were not conducted with organic farmers. Moreover, the study of techniques used in the production and management of organic agriculture has recently increased, which has resulted in a large number of articles recovered, but excluded from content analysis because they did not mention the farmer's working conditions. Articles not fully recovered or duplicated were also discarded.

After applying these criteria, 32 studies continued to the reading of the material in full. Thus, it was possible to verify that 21 studies still did not adhere to the theme because they contained exclusion factors, with only 11 studies remaining for the analysis (Figure 1). As this is a new topic and the quantity of remaining research was limited, the representativeness test was not applied as a criterion for deleting documents.

RESULTS AND DISCUSSION

For better organization, the results of the studies were classified by the main theme, but some elements cited by the authors were retained to broaden the discussions of other topics, even if outside their main classification.

In terms of the methodology adopted in the research retained, Ergonomic Work Analysis (AET) was the most used, appearing in 30% of the studies. This methodology is widely used for work conducted in agriculture because it allows for analysis of the tasks performed by the worker, allowing for the use of various data collection instruments (ABRAHÃO et al. 2015).

The most used instruments were interviews, applied in 54% of the studies, questionnaires, and observations. For the analysis of the quality of life, two researchers used the World Health Organization Quality of Life (WHOQOL), an instrument used globally in quality of life assessment surveys, including studies conducted with farmers (PESSOA; ALCHIERI, 2014; THE WHOQOL GROUP, 1998).

Although, interviews were the preferentially selected instrument for portfolio studies, it was possible to observe that some authors included other instruments, such as observations, to complement the information collected (ABRAHÃO et al., 2015; GEMMA et al., 2010; LORENZZON, 2014; POUBEL, 2006). The use of more than one instrument for data collection lends depth to the research and a greater reliability of the results reported.

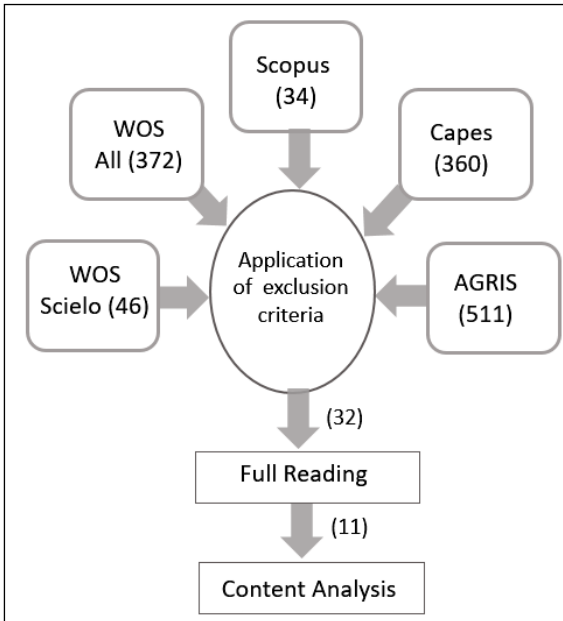

Figure 1 - Search selection flow for the review.

Source: prepared by the authors.

Working conditions

The working conditions of organic farmers were the subject of studies by VAN CALKER et al. (2007) and LUNDQVIST (2000) (Table 1). ABRAHÃO et al. (2015) made a synthesis of several studies conducted by the Research Group in Ergonomics, Work and Agriculture, of the Graduate Program of the Faculty of Agricultural Engineering of UNICAMP. The link between the studies was the use of AET, but some studies presented in the article were not aligned with the theme of this research; consequently, they were ignored.

The study by GEMMA et al. (2010) showed the lack of specific mechanization for organic agriculture, previously raised by LUNDQVIST (2000). This condition resulted in the fact that there are physical requirements and uncomfortable postures for carrying out activities. However, it was possible to identify adaptations made by workers related to manual handling of cargoes and cultural treatments (GEMMA et al., 2010).

Although experts in the field of organic agriculture interviewed by LUNDQVIST (2000) indicated the increase in workload as a negative aspect, for VAN CALKER et al. (2007), this increase is not much higher than in conventional agriculture, portrayed by the small difference in the instrument score used for the comparison. Further, ABRAHÃO et al (2015) reported that for most workers, from a cardiovascular point of view, work in organic horticulture was considered mild or moderate. Similarly, GALANTE (2016) did not identify differences in relation to physical requirements, given that both organic and conventional farmers reported back pain, i.e., for production activities, there is no significant difference in the physical workload when comparing conventional and organic systems.

Over the years, organic agriculture has developed techniques for soil protection and for reducing weed control activities, such as soil enrichment with organic matter, increasing soil biodiversity, and soil cover, among others (PRIMAVESI, 2003; RIVERA, 2014). These techniques reduce the demand for weed controls, resulting in a decrease of management activities.

Another risk factor reported was the cognitive load (ABRAHÃO et al., 2015; GEMMA et al., 2010), which is related to the use of memory, attention, decision-making, and problem solving (ABRAHÃO et al., 2009). Diversification of organic production required great knowledge and an increased amount of information as each crop requires specific handling. Additionally, work in organic agriculture, both for the manager and the farmer, was complex and presents great diversity (GEMMA et al, 2010). Thus, the demand for constant learning and the intense use of memory to solve problems resulted in cognitive overload.

The lack of assistance was another aspect raised with regard to working conditions, indicating it as the main factor responsible for slowing down the development of organic agriculture (ABRAHÃO et al., 2015; LUNDQVIST, 2000) or even for interrupting work (POUBEL, 2006). Technical assistance is a recurrent theme in several studies carried out over time and in several regions of Brazil, and it is still claimed to be insufficient or non-existent for those who work with a non-industrial agriculture model (FANTINI et al., 2018; SANTANA et al., 2018; SANTOS et al., 2014).

However, research assessing the working conditions of organic farmers showed, as widely disseminated, that the main improvement in the working environment is the suppression of the use of pesticides (LUNDQVIST, 2000). When there is a comparison between the activities of organic production and conventional agriculture, similarities occured in terms of physical requirements; however, there is an increase in cognitive load, an insufficiency of technical assistance, and a lack of specific mechanization.

Quality of life

MAGALHÃES (2015) and AZEVEDO (2004) studied quality of life using a specific instrument (WHOQOL), and GALANTE (2016) used interviews to collect data (Table 1). The studies showed organic family farming as a strategy for promoting quality of life and positive social valorization.

The insufficiency of income from organic agriculture was identified by AZEVEDO (2004) and later by GALANTE (2016), a recurrent problem that showed no progress. However, MAGALHÃES (2015) identified enhanced quality of life considering economic autonomy, showing that these are yet other elements that determine the quality of life.

Despite lower income, workers are happier and more satisfied with the activity and lifestyle, citing as positive aspects the cohesion of the group and appreciation of their work through the price paid for production (AZEVEDO, 2004; GALANTE, 2016).

In short, for the groups studied, quality of life is related to job satisfaction, a healthy food supply, environmental care, and the social benefits that the work provides (AZEVEDO, 2004; GALANTE, 2016; MAGALHÃES, 2015).

Table 1 - Synthesis of studies with objectives, theme classification, and principal findings for organic agriculture.

Authors	Objective of the study	Classification of the main theme	Number of quotes	Main findings for organic farming
(LUNDQVIST, 2000)	Evaluated the working environment in organic agriculture.	Working conditions	6	- Main aspect of the working condition is suppression of pesticides; - Positive psychological condition; - Increased physical workload; - Lack of technical assistance; - Lack of specific mechanization.
(VAN CALKER et al., 2007)	Compared organic and conventional dairy farms, using indicators for human physical health and sustainability.	Working conditions	51	- Physical load similar to conventional.
(GEMMA; et al., 2010)	He characterized and understood the work of the manager in the organic management of agricultural production.	Working conditions	21	- Diversified, requires knowledge about crops; - Complex work of managers (many different activities); - Physical, cognitive, and affective requirements; - Lack of specific mechanization.
(ABRAHÃO et al., 2015)	Summary of experiences on the analysis of agricultural work using Ergonomic Work Analysis (AET).	Working conditions	11	- Cognitive load; - Uncomfortable postures and repetitive movements with temporal pressure; - Light or moderate work (horticulture); - Lack of technical assistance.
(AZEVEDO, 2004)	Made the interweaving between quality of life and organic family farming.	Quality of life	9	- Maximizing social benefits; - More pleasurable and socially recognized work; - Valuation of culture; - Income deficient and economic balance.
(MAGALHÃES, 2015)	Assessed the quality of life of organic farmers, including their perspective regarding the quality of life and impacts on health.	Quality of life	12	- 72.5% good quality of life; - 70% satisfied with health; - 62.5% without health problems; - Good quality of life considering economic autonomy; - More time to stay with family, leisure and recreation activities, coexistence with friends and neighbors.
(GALANTE, 2016)	Compared self-declared health and well-being perceived by organic and conventional soybean producers, and analyzed the reasons that organic producers started this activity.	Quality of life	0	- Ergonomic impacts (back pain) for both conventional and organic. - Lower income than conventional; - Happier and more satisfied; - Group cohesion.
(POUBEL, 2006)	Studied motivations for eating practices.	Healthy Eating	17	- Diversity of cultivation, - Nutritional deficiency; - Interruption of work due to lack of technical assistance.
(PORAZZI, 2013)	Assessedeating practices and nutritional status of farmers who practice agriculture from the perspective of Agroecology.	Healthy Eating	2	- Diversity of crops; - Nutritional deficiency; - Agroecological practice does not guarantee healthy eating or traditional varieties of the region; - Agrotourism = healthy practices.
(COSTA et al., 2014)	Assessed genetic damage and immunological changesin farm workers.	Genetic damage	31	- Conventional = Increased DNA damage and increased risk with pesticides; - Organic = no DNA changes.
(LORENZZON, 2014)	Analyzed the social representations regarding work and the mental health of a group of organic family farmers.	Mental health	1	- Strong link between health and work; - Absence of signs of mental distress originated by work.

Source: prepared by the authors.

Healthy eating

Both POUBEL (2006) and PORAZZI (2013) approached farmer health from the perspective of consuming the products produced (Table 1). Despite the diversity of crops in organic production, food still presents nutritional deficiencies for farmers, as revealed in the study by PORAZZI (2013) that identified a high prevalence of overweight, obesity, abdominal obesity, and hypertension. It should be noted that the concern about the consumption of foods free of pesticides does not carry over when the issue relates to a balanced diet.

Organic farming contributes in various ways to the farmer's lifestyle but does not guarantee healthy eating; nor does the conservation of traditional varieties of the region. However, farmers linked to agroturism have healthy eating practices, consume more vegetables, greens, and whole products, and less fried foods and powdered juices (PORAZZI, 2013). That is, when they offer their products to tourists, they end up eating better than farmers who are not linked to agroturism.

Genetic damage

To highlight the data related to genetic damage linked to pesticide use, COSTA et al. (2014) conducted a survey among conventional farmers and compared them with organic farmers and a control group (Table 1). Results showed that there is an increase in DNA damage in workers exposed to pesticides, and the exposure condition may influence the observed effect; however, this information should be used cautiously due to the small sample size (n=85). The data were consistent for conventional farmers but not for organic farmers when compared to the control group, which in itself can be a positive result. Despite this, it is important to emphasize the risk of working with chemicals in agriculture, demonstrating once again that the type of agricultural practice adopted is a determinant factor for health.

Although, many pesticides that cause serious health problems have already been withdrawn from the market, many others are still being marketed. Therefore, it is essential to train workers to reduce risks. Results of the research by COSTA et al. (2014) confirmed that the use of pesticides is the most important risk that harms the farmers' health.

Mental health

Elements listed in the literature as factors that aggravate the mental health of farmers are seasonal work, long working hours, pesticide use, geographic and social isolation, economic insecurity, and the influence of climatic conditions, among others (BRIGANCE et al., 2018; SOTO MAS et al., 2018) (Table 1).

LORENZZON (2014) studied the mental health of organic farmers in the southwest region of the State of Paraná and reported a strong link between health and work, i.e., when they talk about work, they talk about health and again talk about work. Further, he pointed toward the absence of signs of mental distress originated by work. However, farmers indicated that if they were unable to work, they would probably develop a serious mental illness. In this case, suffering would be generated by the absence of work.

The work methods of organic farmers cause a reduction in factors that may aggravate mental health, such as the suppression of pesticide use, the reduction of seasonal work, and the consequent reduction of long working hours, and the cohesion of groups of organic agriculture (GALANTE, 2016). However, income insufficiency (AZEVEDO, 2004; GALANTE, 2016) is a relevant factor identified in mental health studies.

For producers who respect the environment, it is stimulating to develop work systems with organic production, contributing to positive psychosocial working conditions (LORENZZON, 2014; LUNDQVIST, 2000), reducing mental health problems.

In the study by LORENZON (2014), farmers reported that the use of pesticides is unacceptable and see their use as a means to avoid manual labor. However, discussion of the idea of organic production with conventional farmers can be frustrating (LUNDQVIST, 2000). This shows that the convictions of organic and conventional farmers are in disagreement, far from each other, and that dialog between the parties requires effort.

Emerging factors

In the text "Work and Technological Innovation in Organic Agriculture", ABRAHÃO et al. (2015) describe the state of technological innovation in organic agriculture. The aim of this study was to map the technological innovations used to minimize workload and difficulties in the execution of tasks, which together contributed to the increase of labor productivity. As a result, innovations that produced competitive advantages or that led to higher labor productivity took place in the form of processes, organization, and marketing (ABRAHÃO et al., 2015).

Thus, they identified the main innovations in the marketing area, such as home delivery of baskets of products and the development of their own brands. In fact, marketing has been shown to be the main obstacle to the growth of organic agriculture in

Brazil, forcing the farmer to develop skills related to the sale of products, in addition to those linked to agricultural production.

A successful intermediary company experience was reported by LORENZZON (2014) pointing out that the quality of production, technical assistance, and greater number of conversions is stimulated by this partnership between farmers and companies.

The needs of this sector require the integration of several segments, ranging from government authorities to the population, being indispensable the development of technologies, financial incentive policies, and technical assistance, among others (GEMMA et al., 2010; MAGALHÃES, 2015).

In summary, it is possible to see that authors agree that organic agriculture has a positive impact on the health of farmers, even though in some situations the control variables is quite complex. However, no study related the working conditions of organic farmers to public policies. Furthermore, the authors list several areas for new studies, explaining that the field still lacks information, such as technological development, working methods, and management models adopted, both to increase production and to reduce damages to health (ABRAHÃO et al., 2015; LUNDQVIST, 2000; VAN CALKER et al., 2007).

Assistance and technical support, cited in several studies as insufficient, can be fostered by the reformulation of public policies and by studies that include the understanding of the importance of relations with consumers, tourists, and researchers, as well as the role of associations in the process of organic agriculture (AZEVEDO, 2004; GEMMA et al., 2010; MAGALHÃES, 2015; PORAZZI, 2013; POUBEL, 2006).

CONCLUSION

Currently, the considerations regarding the health conditions of rural workers are still strongly linked to the use of pesticides. Moreover, organic farmers understand their activity as safe because they do not work with such products. However, there are several risks in the agricultural environment that go beyond those linked to the use of chemicals.

Taking into account the studies analyzed, work in organic farming presents a similar physical load, but higher cognitive load when compared to conventional farming. Nevertheless, farmers are pleased with their choices and lifestyle adopted, with no mental health problems identified. In other words, they find a balance between the difficulties and advantages of organic farming, bringing satisfaction in the work carried out.

It should be noted that the relationship between health and work among farmers is essential, especially when it comes to family farming, wherein organic farming is strongly fostered. Further, job satisfaction and social respect are also fundamental aspects, and organic farmers are satisfied with their choices, while also recognizing improvements in their health and quality of life.

At the same time, it was possible to note that several areas are interested in the subject, since organic agriculture is interdisciplinary, interacting with food security, the environment, work health, and safety. Given this, it is important to recognize that strengthening the health area of agricultural workers can be fostered by intersectoral discussions, in to foster effective public policies.

However, studies on the health and working conditions of organic farmers, although they are intensifying, are still scarce, pointing to a long path toward the development of research. Highlighted aspects that may compose new studies are long-term studies on the quality of life of organic farmers, social interactions, crop characteristics, certification processes, and access to credit. Moreover, the relationship between the elements of this system and public policies was also pointed out as an important gap deserving future studies.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

AUTHORS' CONTRIBUTIONS

All authors contributed equally for the conception and writing of the manuscript. All authors critically revised the manuscript and approved of the final version.

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