Relationships between social forms of organic horticultural production and indicators of environmental quality: a multidimensional approach in Brazil

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Abstract:

Organic farming (OF) is increasingly considered as a possible alternative for designing a "new rural" in Brazil, where OF covers a wide range of production and certification systems. However, the ways small farmers adopt OF in green belts to meet an urban demand in organic vegetables have not been extensively investigated. Likewise, the impact of such practices on environmental quality components has not been sufficiently documented. Our objective was to relate forms of organisation to environmental assessment in a watershed where organic horticulture significantly contributes to landscape and water quality. We showed how small farmers were organised or how they organised themselves to meet urban demands and develop OF. We assumed that associated practices were consistent with environmental impacts, as evaluated by indicators. Based on interviews with stakeholders, we identified four forms of organisation and associated farmers' practices. We related them to environmental assessment in three compartments: landscape ecology, water quality and soil quality. Although organisations share some objectives, namely with regard to visual quality and the "right price" of products, differences appear in their scope and internal operation, their values and relationships with consumers, and their technical and environmental contents. As for technical content, input supply, planning processes and crop diversity vary among organisations, ranging from liberal to hierarchical. Our results also showed similarities and differences among various organisations in terms of environmental impact. Such results are interpreted and discussed in the light of technical and social dimensions that account for the progressive design of new systems in Brazil.

Introduction

The relationship between organic farming (OF) and environment is somewhat puzzling. On the one hand, it is assumed that OF respects the environment or contributes to this objective, due to the compliance with OF specifications. On the other hand, in keeping with field observations and international regulatory standards, OF is expected to contribute to a solution to environmental problems such as the reduction of biodiversity, soil degradation, and water contamination. Between these two poles, we acknowledge the fact that organic farmers actually wish to contribute to environmental preservation, based on the features of their production systems and specific environmental issues, generally at the local level. One challenge for OF is to go beyond acknowledged standards and propose a better management rationale for complex ecosystems whose consequences have to be assessed with the design of research and development programmes (Sylvander and Bellon, 2002).

In Brazil, OF is increasingly considered as a possible alternative for designing a "new rural" (Campanhola and Graziano da Silva, 2000), based on a diversification of economically oriented activities and the recognition of multiple dimensions in agriculture. OF covers a wide range of production and certification systems, including certification as a group. OF is also considered as a foundation for sustainable agriculture (Brazilian Law n° 10.831/03) and a way to comply with environmental legislation (Primack and Rodriguez, 2002). However, the ways that small-scale farmers adopt OF in order to collectively contribute to new markets and to environmental preservation in Brazil are at stake.

Based on this framework, we analysed how OF develops in the large community of Ibiúna (close to São Paulo) and the potential impact of organic horticulture on territorial resources. We proposed a comprehensive description of four basic forms of organisation dedicated to OF (Bellon and Abreu, 2005) and related these OF development patterns to environmental contributions.

Methods

We focussed our study on a territory with multiple status: it is both an organic vegetable crop supply area and a tourist destination for Brazilian citizens. It also contributes to the water supply in the neighbouring metropolis of São Paulo. We assumed that OF organisations (associations, cooperatives, etc.), technical methods and environmental impacts were inter-related. Subsequently, we did not refer to so-called "conventional" farming but focused on diversity in OF *per se*. We also assumed that differences among organisations were due not only to market integration but also to specific value systems within social groups. In order to identify OF development patterns in this community, we considered OF not only as a set of production methods but also as a social practice whose goal was to renew relationships among farmers, with consumers, and with the environment.

Based on secondary data, we identified the number and location of organic farmers. The aim of our sampling method was to explore the diversity of OF situations. We gradually identified and conducted interviews with stakeholders and active OF organisations: technical and political officers (3), organic inspectors (2), group leaders (4), and farmers (20). All of the farmers interviewed were vegetable growers. A total of 18 among the 20 interviewed farmers were affiliated with four farmers' organisations. The other two farmers sold their produce directly on local markets.

The questions obviously differed according to the people being interviewed.

As for technical officers, we focussed on their activities and relationships with organic farmers, as well as on their description of the OF universe. This enabled us to identify and locate various OF farmers and organisations.

The organic inspectors we encountered worked either for the IBD (Biodynamic Institute for Rural Development based in Botucatu, operating at the international level) or for the AAO (Association of Organic Agriculture in São Paulo, operating at the federal and state levels).

In conjunction with OF group leaders, we analysed group dynamics and operation, marketing channels and certification processes.

These interviews also enabled us to obtain a list of farmers for each organisation and their location, in order to define a randomised sample for farmer selection.

Interviews with farmers consisted of: (i) understanding the motivations, problems and changes related to conversion to OF; (ii) characterising their production methods and results; and (iii) identifying relationships with other farmers.

Concerning environmental impact assessment, we used part of the 62 indicators of the methodology developed by Rodrigues *et al*. (2003). This method covers five dimensions: landscape ecology, environmental compartments (soil, water, air), socio-cultural values, economic values, and management and administration at the farm level. It was adapted to our purpose and applied to a farm sample (20 farms), adjusted to the number of farmers present in each organisation. The breakdown is as follows: H&A (10), APPOI (3), APPROV (2), CV (3).

Results

Most of the organic farmers are located in the same water catchment basin of the community of Ibiúna. This is due to the past initiative of a private enterprise (H&A), which includes 60 organic farmers in the catchment basin out a total of 110 organic farmers in this community.

Individual and direct selling forms persist in OF and do not require certification, provided that monitoring is feasible in the form of traceability and access to operating data (Brazilian Law n° 10.831/03). Therefore, organisations are strongly encouraged. Four basic forms of organisation were encountered in Ibiúna.

* H&A operates vertically, with an effective planning at the regional level, specialised technical staff, and certification for city supermarkets and export markets. It supplies farmers with all organic inputs and operates without transfer of product property until the products are sold ("consignment" system). It includes 60 vegetable farmers in the community of Ibiúna.

* APPOI, another organisation, includes 15 farmers, with a more flexible relationship and a greater degree of autonomy in relation to the choice of crops and inputs. This includes individual certification and the possibility of direct sale on the market. Its markets are geared to supermarkets and the Catholic communities of São Paulo.

* APPROV, the third organisation, derived from the first one (H&A) and 12 farmers, joined an established conventional co-operative selling to medium-sized supermarkets in São Paulo state; its certification process is similar to that of APPOI.
* CV, the last one, is also an enterprise, operating in Ibiúna. It was created in 2002. Its focus is on organic inputs and sales to wholesalers as well as to large- and medium-sized supermarket chains. As opposed to H&A, product ownership is transferred from farmers to CV.

The main products sold by these groups are leafy vegetables, typically for salads, followed by fruits (tomatoes, cucurbits) and root vegetables (beets, carrots).

Interviews with group leaders made it possible to relate production processes to organic product valuation criteria. As a result, the four organisations share some objectives, namely in relation to visual quality and the "right price" of products. Differences also exist in their scope and internal operation, their values and relationships with consumers, and their technical and environmental contents.

Concerning environment, tension is due to the impact of human activities on soil or water resources and higher expectations in terms of environmental quality. In the case of environmental impact assessment, we used utility values for various compartments. These values range from 0 to 1, where 0 expresses the maximum negative environmental impact (unfavourable indicator) and 1 a maximum positive impact. A reference value of 0.7 was derived from the literature already published on the subject; values above this threshold are considers environmentally favourable. A global analysis shows critical values for some indicators, expressed in % of the total sample of 20 farms.

As for landscape ecology, global values can be ranked as follows: mere conservation of natural habitats (40% below threshold); medium landscape diversity (50% below); medium compliance with legal forest reserves (50% below); low mitigation of abandoned areas (70% below); and very low productive diversity (100% below). Other results related to water, soil and air compartments are more favourable (on the average, all are above the threshold) and differ according to the individual organisations.

Concerning indicators used by specific organisations, the results are as follows. For landscape ecology dimensions, indicators related to landscape and productive diversity show that H&A and CV have the most negative impact (85% of the contribution is from affiliated producers), due to the small number of vegetables (four to five crops) produced by farmers selling to these organisations. Conversely, crop diversity is higher with APPROV, direct sales, and APPOI, in increasing order. As a result, alternative markets, planning processes, and land use patterns would make greater crop diversity possible.

Concerning water and soil compartments where chemical analyses were used, H&A exhibits the lowest results (68% [water] and 75% [soil] of the producers monitored, respectively, are below the thresholds mentioned above), followed by APPOI (2/3 of the producers with low results). These results indicate a higher incidence of pests where landscape and crop diversity is lower, and when soil preparation and conservation (cover crops) conditions allow leaching and water contamination.

Discussion and conclusions

Our results indicate a relationship between forms of organisation and environmental assessment. Two of the organisations (H&A and CV) showed lower environmental performances. In such situations, OF would be considered as an input substitution and market opportunity (favouring visual quality of products) rather than a change in paradigm (identified as agro-ecology in Brazil) and the design of a new system interrelated with an ecosystem (Feiden *et al*., 2002). Certification processes also differ among organisations (Souza, 2003; Bellon and Abreu, 2005). H&A obtained group certification from the IBD, farmers selling to CV are certified by the IBD and the AAO, and CV is certified by the OIA (International Agricultural Organisation, whose headquarters are in Argentina), whereas the other organisations are certified by ECOCERT and their individual farmers by the AAO. One can then question whether certification (Seppänen and Helenius, 2004) and marketing as a group do not tend to standardise practices among farmers. Conversely, liberal or federal organisations allow more crop diversity and product variability (APPOI and APPROV), which is consistent with their marketing channels. This entails a better environmental assessment, on the basis of agri-environmental indicators.

The methodology used provided an initial ranking of cropping systems. Impact indicators were also evaluated in the field and during interviews, and weighted according to their spatial scale and their effect on environmental compartments. The selected reference value (0.7 in this case) can also be

adjusted according to locally delineated environmental and development objectives discussed with stakeholders, who in turn make it possible to establish a judgment standard. As in the case of other approaches (Cittadini *et al*., 2004), this methodology indicates some ways to assess the impact of OF on environmental compartments in relation to farmers' practices and organisations. However, differences among individual farm results can also be analysed *per se* and discussed in farmers' groups. Further work could include a systematic assessment at the watershed level, focussing on surface water flows and their relationship to areas of permanent protection, such as woodlands or legal reserves (Primack and Rodriguez, 2002), which also shelter springs and ponds. This challenge led to the implementation of a horizontal programme dedicated to the restoration of habitats and land care, where technical proposals are suggested for OF (CATI, 2001).

Conversion to OF in Ibiúna is recent and our interviews showed that the main reasons for conversion are not environmental preservation or restoration. The main OF benefits are considered to be the improvement of the farmer's quality of life and consumption level, the absence of agrochemical inputs, the reduction in production costs, and market opportunities. Such results are consistent with those obtained in the metropolitan region of Curitiba, Paraná, based on interviews and monitoring in a wider sample of 57 small organic horticultural farms (Darolt, 2001). That study showed that two main factors influenced the farmers when deciding to adopt organic production: family and personal health, and the economic issue. It also showed that the group with the most farms in relation to the ideal sustainability level were the organic family farmers with small farm units. This confirms the potential benefits of OF and, more generally, agro-ecology in Brazil, for small-scale family farming (Ormond *et al*, 2001; Assis, 2001).

More generally, diversity of and connections among forms of organisation contribute to strong OF dynamics. Small farmers relied upon their own needs and citizens' expectations to meet the needs of an internal market and possibly contribute to environmental preservation. They enlarged their relationships with other farmers, urban consumers, technical assistance and certifying agents. These initiatives put farmers in a better economic position by qualifying production and creating new values in Ibiúna and other communities.

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