KNOWLEDGE GENERATION AND SHARING FOR ORGANIC AGRICULTURE IN COSTA RICA

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ABSTRACT

The research investigates the knowledge generation and sharing for organic farming experienced in Costa Rica, and the willingness to pay for advice by organic small holders. A desk study was followed by structured interviews to all 87 organic farmers active in three areas. The outcome has been validated with local stakeholders. Organic agriculture is based on a combination of knowledge, partly generated and transmitted informally by its practitioners, while more technical knowledge is generated and shared by a variety of institutions. Organic producers attribute great value to knowledge shared among farmers; but would like to access more technical and market information, and think their organic associations could facilitate it. Most respondents declare a willingness to pay to receive advice, but the only independent variable affecting this attitude is younger age.

INTRODUCTION

Organic agriculture (OA) was first introduced in 1962, when Rudolph Steiner, founder of anthroposophy, delivered six lectures
to a group of farmers and cattle breeders about his vision for agriculture in Eastern Prussia, now part of Poland, but only recently has a definition been formalized for the FAO-WHO code Alimentarius, “OA is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system” In 2009, OA was practiced by almost 1.8 million producers, over 37 million hectares of agricultural land, in 160 countries and generated a world market of about 40 billion euros (Willer and Kircher, 2011). Today, OA represents a thorough and far-reaching approach to the concept of sustainable agriculture as defined by the UN World Commission on Environment and Development in 1987: “Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs”. Taking into account all environmental, economic, and social components, OA is an alternative to the dominant conventional paradigm based on simplified farming systems and external inputs, for achieving sustainable development also in developing countries (Hage Scialabba and Hattam, 2002; FAO, 2007b), where at first OA had been perceived only as a small option for niche markets, mainly export-oriented, there is a growing acceptance of it by consumers and others. OA is more resilient than conventional systems, requires less water, reduces risky exposure to credit, demands more labour and produces more food than conventional systems. Compared to conventional agriculture, or to traditional production systems, OA demands different levels of technical knowledge and skills, due to its complex holistic approach (Krishtianses, Taji and Reganold, 2006; Olgun, 2002). Although OA may largely rely on traditional and local knowledge, this stock of knowledge may...
reveal some limitations and new knowledge and skills are demanded, for both production and marketing (Demiryurek and Guzel, 2006). For example, when farming systems are investigated, some traditional practices may not represent the best option for sustainability, such as the case of “slash and burn” systems in the tropics.

The conversions from input intensive conventional systems to knowledge intensive organic systems can be very difficult: it normally requires several years and greater levels of engagement in more labour intensive practices. The marketing aspects can also be different organic producers have implemented various forms of direct marketing and established different forms of cooperation with consumers at local level, but the last decade has witnessed an enormous increase of both international trade and processed organic foods, sold through conventional food retailers. This increasing complexity of the food chains makes the issue of traceability more relevant and organic products that are now aimed at distant markets must be certified, by certification bodies authorized by the competent authorities - normally the Ministry of Agriculture.

When all aspects are considered, even in a developing country, where conventional agriculture is not practiced at its most extreme levels, OA appears to be a complex mixture of innovations, formed by a variety of components, some of which are short term adaptations, while other ones are longer term changes. Although OA can be adopted by an individual farmer, as it was the case decades ago, OA provides better results (economically, socially, environmentally, and even at landscape level) when several producers join their forces. Taking into account that for approximately 60 years OA has been neglected or opposed by the institutions in the conventional sector (universities, research centres, ministries, conventional producer’s associations), there are limited research findings (Padel, 2001) documenting how
organic producers, some technicians and few scientists, often in cooperation with medical doctors, health conscious or “green” consumers and environmentalists have been working together to set up and operate and almost parallel Agricultural Knowledge Information System (Roling and Engel, 1991) to study, improve and promote both OA and a healthy nutrition. Organic producers have relied heavily on local resources and traditional knowledge and they have used participatory methods and different low-cost media to generate and share knowledge with larger audience. This includes new knowledge about the technical and economic aspects of OA and about its positive impacts on health, environment and long term sustainability of family farms (Morgan, 2010; Santucci, 2000; Sumane, 2010). Multidisciplinary and participatory on-farm research, interest groups, farmer-to-farmer extension, study groups, study tours, and alternative journals, bookds (often distributed through alternative channels), etc. have been widely used to elaborate and diffuse technical, economic and legislative knowledge.

Many of these bottom up experiences closely resemble never extension approaches (Leeuwis, 2004) as well as the “Communicaiton for Development” paradigm (Bessette, 2004; Ramirez and Quarry, 2004; Roling, 2007), increasingly adopted by international agencies and practitioners involved in agriculture and rural development (FAO, 2007 and 2009). In this context, a major issue linked to the long-term sustainability of any advisory services, managed either by public institutions or by civil society organizations, is the economic aspect (Rivera and Zijp, 2002). Today, investment and running costs for the advisory services cannot be supported entirely by public resources, even taking into account the public nature of some contents (Rivers, 2009), and at least a share of the services are expected to be provided directly by the users.
PURPOSE AND METHODS

This research aims respond to the following main questions: a) Which actors constitute the Agricultural Knowledge Information System for organic agriculture in Costa Rica?; b) which type of knowledge generation and diffusion has been/si experienced by organic farmers?; c) Which type of communication approach is implemented by the institutions formally in charge of research and extension ?; and d) Do small producers recognize the relevance of knowledge and are they ready to share, at least, a portion of the advisory costs? To address these research questions a desk study was conducted in Italy in 2007 and successively in Costa Rica, to consult documents unavailable elsewhere. Four filed visits took place, in November 2007, June 2008, February and June 2009, to meet and interview local experts (public officers, NGO personnel, scientists and politicians) and to conduct the field work in three areas of Central Costa Rica, where all 87 active organic small producers, members of three local associations, were interviewed. Local experts identified these areas and associations because the majority is smallholders, who produce mainly vegetable and fruits for the domestic market, which was the main focus of our research. In cooperation with the local experts, a questionnaire was prepared, tested and then modified, with 44 question divided into close-ended questions (yes-no and multiple choices) and open-ended questions where the producers could provide more in depth responses. Seven question refer to the relationship with the organization, seven questions specifically cover farming and marketing aspects and opinions about OA, 23 questions are about training, exposure to and use of media, relationships with and opinions about providers of advice in OA, and seven capture demographics. The interviewees were invited to add their opinions about experiences and expectations. Each interview required about 60 minutes and took place at the farmers’ home, or at the NGO office. 57 interviews were performed by one of the authors and 30 by a local agronomist, experienced in OA, who has cooperated
during the entire research project. The interviews were facilitated through previous contacts with the NGOs. The coherence and quality of the answers were daily cross-checked by the author and the local agronomist and a second meeting (or a telephone call), to clarify some aspects, was necessary in 12 cases.

The answers were transferred into a database in Microsoft Office Excel 2007, with data processing performed with SPSS 18. The declared willingness to share the cost of advisory services was considered a dependent variable of other potentially explanatory independent variables and the data was processed with the free software “R”, available on the internet. The outcome of the filed survey has been shared and validated in two meetings with local technicians during the last mission to Costa Rica.

**RESULTAS AND DISCUSSION**

Since the early 1980s, in connection with the general crisis of agriculture (falling prices, failing family farms, energy problems, food scandals, rural exodus, etc.) and the rise of the environmental movement, more environmentally friendly production systems have been proposed in Costa Rica, specifically targeted at smallholders, whose resource base is limited and often precarious. In some cases, the organic producers were foreigners (mainly US citizens) who were pioneering alternative forms of production. The first products marketed as ‘organic’ appeared in 1988 when some producers and technicians joined together in a first NGO. In 1992 another group was established, thanks to the efforts of a Japanese agronomist, acting within a project sponsored by a Japanese organic movement. Other groups and associations have been established, in all parts of the country. OA currently accounts for about 8,000 hectares managed by 2,921 producers; the most important corps in 2006 were bananas (37% of total organic area), almost totally for export (Europe and USA), cocoa (22.3%) and coffee (14.3%) Organic vegetables and fruits are mainly marketed
domestically, through weekly open markets, supermarkets, and periodic organic fairs, as it happens in other countries. Local consumers increasingly search for organic products and are willing to pay premium prices. There is also a demand coming by resorts and restaurants catering to ecologically oriented clients and food conscious foreign tourists.

In the OA sector, only in recent years, some public centres and universities have been involved, together with local NGOs in applied research, mainly for export crops, such as cocoa, coffee and bananas (IFAD, 2003). Due to the absence of public research and extension, technical and commercial knowledge has been generated by the farmers themselves, through trials and on farm simple experiments, sometimes supported by local technicians and NGOs. Diffusion has happened through farmer to farmer contacts and has been facilitated by group meetings and on farm demonstrations, occasionally supported by local advisors and interested researchers.

The field survey of the 87 organic producers interviewed in this survey, 31 are women (35.6%) and 56 men (64.4). The average age is 47, with 18.4% being under 35 years, 63.2% between 36 and 60, and 18.4% over 60, the youngest producer being 16 years old and the oldest is 81. These data indicate that OA does not attract only young and alternative producers, but rather it can draw older people also. As a matter of fact, during the interviews many relatively producers, but rather it can draw older people also. As a matter of fact, during the interviews many relatively older respondents declared their happiness to see that their knowledge and experience, which seemed to be totally useless in conventional level of the producers is relatively high because, although the majority have only completed primary (59.9%) or secondary school (21.8%), there is a relevant minority with technical (6.9%) or university (10.3%) level education; this share of very qualified producers is much higher than in conventional agriculture, where the number of farmers with higher education is quite low. The
average size of the household consists of four people, with only 11.5% having from six to 10 members; there is a strong movement of people towards the capital city: 34.5% have relatives in San Jose, while only 3.4% have relatives emigrated abroad.

Forty-seven percent of holdings are smaller than five hectares and 53% are larger, but below 10 hectares. Land tenure is characterized by ownership, with only two tenants. As expected, several different vegetables and coffee are the main crops, complemented by fruit trees, tubers, sugar cane, bananas, chayote squash, cabbage and pineapple. Most farmers also have some small animal breeding.

Sixty-five percent of the farms are totally organic, while 35% are still in the transition period, indicated as three years by the legislation. Legal aspects aside, the farmers consider themselves organic after a long process that involves the adoption of a series of technical innovations: reshaping of the fields, planting of shrubs and shadow trees, introduction of green manure, production of compost, selection of appropriate varieties for fruit trees and annual crops, strategies for the control of pests and insects, etc. Many of the respondents have demonstrated a deep knowledge of the subject: 29.9% have between seven and 10 years of experience and 25.3% have between three and six. The average experience in organic farming is 7.4 years.

As stated in the previous paragraphs, OA owes much of its success to proactive farmers, who contribute with their time and resources to the movement. Also in this survey, 81% of the respondents classify themselves to be active members of their association, meaning that they go to meetings, participate in demonstrations, offer plots for trials and facilities for demonstrations, receive visitors from town, cooperate to organize events, and volunteer if required for whatever could be needed. Sixty-one percent of respondents have been enrolled for over five
years and only 16% have been members for less than one year. When asked about the conditions for the successful organic management, the majority of respondents indicated knowledge and information as the most relevant assets for success. In this context, they underline the importance of documenting and sharing the locally available technologies and information that support the production and marketing of organic produces, through meetings, demonstrations, short training courses, and printed materials. Some names are frequently mentioned and it is evident that in each area there are leader farmers, who are pivotal for the functioning of the associations and who represent a sort of knowledge bank to be accessed in case of need. Due to limited resources and the small number of affiliates, the three organic NGOs investigated by this research do not produce any printed material and rely on items supplied by other institutions. More sophisticated and modern technologies, like video and internet-based systems are almost non-existent, reflecting the general conditions of the Costa Rican countryside. This oral transmission of knowledge is both richness and a problem, because almost nothing is stocked and codified. The risk of losing knowledge when people die or move away has been mentioned by a few respondents.

Thus, a specific question regarding initial learning about OA was raised (Table 1). The farmers recognize the special role of the Istituto Nacional de Aprendisaje, a public agency, due to its OA program, but all respondents say that these course, lasting few hours over several meetings, are a simple introduction to some aspects of OA and that the real learning about OA occurs through years of experience and thanks to interactions within the NGO and with relatives and neighbours.

Table 1 - Initial learning about organic agriculture
Respondents also mention MAG and INTA technicians, occasional meetings, stimuli from expatriate members of the family, booklets, and people met at the markets, etc. A relevant share indicates that learning is a consequence of a combination of factors, opportunities, and coincidences, as well as of different sources. The organic producers’ associations often organize meetings, field visits and farmer-to-farmer exchange events to learn about organic agriculture. More than half of the respondents have attended such activities in the previous year. Twenty-four percent of the farmers identified their organizations as the primary support for their continuing learning.

Public agencies and institutions seem to cover a fair amount of the knowledge needs expressed by the producers (Table 2): 50.6% receive some direct advice from INA and 43.7% are supported by MAG.

Table-2 Providers of advice about OA

<table>
<thead>
<tr>
<th>Source of advice</th>
<th>no.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>INA</td>
<td>44</td>
<td>50.6</td>
</tr>
<tr>
<td>Organic producer’s organizations</td>
<td>42</td>
<td>48.3</td>
</tr>
<tr>
<td>Others</td>
<td>40</td>
<td>46.0</td>
</tr>
<tr>
<td>MAG</td>
<td>38</td>
<td>43.7</td>
</tr>
<tr>
<td>Other farmers</td>
<td>25</td>
<td>28.7</td>
</tr>
<tr>
<td>Other NGOs</td>
<td>20</td>
<td>23.0</td>
</tr>
<tr>
<td>Certification Bodies</td>
<td>10</td>
<td>11.5</td>
</tr>
<tr>
<td>Universities</td>
<td>7</td>
<td>8.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>87</td>
<td></td>
</tr>
</tbody>
</table>

Note: multiple answers were allowed
At the same time, important, sources of advice are the organic producer’s associations (48.3%), other producers from the same village and nearby farms, other conventional NGOs certification agencies and universities. 46% of the answers are classified under the category ‘other’ including different providers: Specific reference is made to the input suppliers who sell new types of organic inputs, like compost and natural pesticides. In many cases, the owners assist the clients in their plots, and sometimes offer a kind of monitoring, in relation to the results obtained with the inputs utilized. Other providers of information are friends, relatives and even the middlemen, whole sellers, and retailers, who sometimes suggest new varieties or new crops, as well as some technical guidelines. However, when specifically asked to indicate the main information source about OA (Table 3), on topics like production techniques, marketing, and organization-related issues respondents decidedly point to their local organization (32.2%) or other (25.3%) active in the area, while the MAG local offices are indicated by only 14.9%.

Table 3- Main provider of advice about OA

<table>
<thead>
<tr>
<th>Information source</th>
<th>no.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic producers’ organizations</td>
<td>28</td>
<td>32,2</td>
</tr>
<tr>
<td>Others</td>
<td>23</td>
<td>26,4</td>
</tr>
<tr>
<td>Other NGOs</td>
<td>22</td>
<td>25,3</td>
</tr>
<tr>
<td>MAG</td>
<td>13</td>
<td>14,9</td>
</tr>
<tr>
<td>Traders</td>
<td>1</td>
<td>1,1</td>
</tr>
<tr>
<td>Total*</td>
<td>87</td>
<td>100,0</td>
</tr>
</tbody>
</table>
Other sources of information (26.4%) include dialogue with neighbour farmers, information exchange during the organic markets and in general at the selling points and information gathered at the input suppliers. Only few farmers explicitly refer to electronic media such as internet or communication networks to get the specific information they need. In general, these respondents are the most advanced and dynamic producers, who play a special role in the organization, both in terms of leading the association, or technical tasks like promotion, training and advising. The technical support provided by the three organic NGOs is considered good by 56.3% of the respondents and acceptable by 18%. In line with this trend, the possibility that the associations could provide technical advice more intensively is considered by 82.8% of farmers a viable option in response to the lack of systematic support by the public agencies. It is in case of problems that farmer-to-farmer knowledge sharing becomes the most frequent answer. When something goes wrong and problems appear in the field or in the markets, other members of the organization become the main source of advice (33.3%), followed by other farmers (13.8%). Only rarely, in case of problems, respondents turn to technical agents from MAG or from INA, or to providers of agricultural inputs. Farmer-to-farmer advice is considered relevant by almost all the interviewees, with only 9.2% considering not valid this type of information. There is a strong preference in receiving support and advice from other people who have experienced OA, possibly under the same conditions and in the same area. “Other tried and the results are visible” is considered the main trigger (36.8% of respondents) for adopting any innovation in organic agriculture. Of the 82.8% who desire more advice from their association, 69.4% declare to be ready to share the cost for such service (57.5% of all respondents) and this group deserves to be better studied. Their willingness to pay (WTP) is considered a dependent variable 11 potentially explanatory variables (some were not described in the text): good opinion
regarding the advice received from producers’ associations, relevance of organic farmers’ experience, quality of advice received during the meetings, frequency of advice, opinion about quantity of advice received, awareness of the need for advice, profitability, existence of certification, age, gender, and education. Most cross tab analyses do not reveal any meaningful associations, with the only exception of age, since the average age of respondents willing to pay is 43.5, whereas those not willing have an average of 51.38 years. For this variable, the value of the Welch Two sample t-test (unequal variances) t=2.157, df=46, p-value=0.36) indicates a significant impact. The WTP is established as the depended variable and the following four variables are used as the potentially explanatory ones:

- Positive opinion about the organic associationist: POSAS
- Positive Opinion of the experience of other organic producers: POSOTH
- Frequency of search for advice during the last year : FREADV
- Presence of certificate : PRECERT

The strategy pursued is the following: the effect of the potentially explanatory variables on the WTP evaluated by considering separately each one of them in a univariate logistic model. The Pearson’s Chi-Squared test and the Cramer’s V index are calculated.

Results of categorical analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cramer’s V</th>
<th>Pearson’s Chi-squared</th>
<th>DF</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>-POSAS</td>
<td>0.107</td>
<td>0.096</td>
<td>2</td>
<td>0.608</td>
</tr>
<tr>
<td>-POSOTH</td>
<td>0.016</td>
<td>0.022</td>
<td>1</td>
<td>0.882</td>
</tr>
<tr>
<td>-FREADV</td>
<td>0.258</td>
<td>5.784</td>
<td>2</td>
<td>0.055</td>
</tr>
<tr>
<td>-PRECERT</td>
<td>0.098</td>
<td>0.775</td>
<td>1</td>
<td>0.379</td>
</tr>
</tbody>
</table>
Their values indicate that only the other variable FREADV - the frequency of the advice received in the past months has some impact on the WTP, although it is moderate. All other variables (the positive opinion about the functioning of the association, the positive opinion about the experience of other farmers, the existence of certification and a good educational level) do not seem to significantly impact the WTP for advice. This lack of relevant impact on the WTP can also be interpreted positively, since it may mean that also the respondents with negative opinions, without certification and with lesser education might be willing to pay for advice.

CONCLUSIONS

This research - desk study and field work combined - offers several points of reflection to extension practitioners and scientists, on both the institutional aspects and the methodological ones.

The expansion of OA, like in many other countries, is mainly due to a bottom-up movement, led by a multiplicity of organizations, where different professional profiles can be found: expatriate and local farmers, young and open minded scientists and technicians, environmentalists, traders, free lance advisors, medical doctors and even consumers. These people have been able to organize themselves, without any support from the agricultural institutions (but sometimes with the help of foreign donors) and to dialogue with the public institutions, influencing some agricultural policies. Grassroots communication activities have spread the message, from an initial minority to the more recent adopters. The State has been fast and efficient in the elaboration of the legal framework for the certification - as required by international markets, but has failed to set up an efficient research and extension system. OA is a complex combination of innovations, based on knowledge, values and a vision of development and society, that imply sustainable use of natural resources, appropriate farming
techniques and equity values., Organic producers consider the participatory elaborations and access to knowledge to be essential for their ability to compete in the national and international markets. Consequently, on farm trials, small experiments, farmer to farmer exchange of experiences have characterized the life of many Costa Rican organic farmers. According to the producers and experts interviewed during this study, this is not enough and the organic systems can be further improved through more on-farm research, in a collaborative effort by organic producers’ organizations, universities and other research centres, because this participatory approach supports the generation and validation of technologies and knowledge at local level, as required by OA. Under a methodological point of view, even though the majority of the farmers has been exposed to formal training and sporadically receive some advice from agricultural institutions, group learning and person to person communication processes are the key modalities that influence the adoption of OA practices, because farmers are motivated primarily through experiential learning, observation and knowledge sharing. All these considerations clearly point at the “communication for development” paradigm, where extension methods and media are used to design strategies for a shared wellbeing, rather than for imposing top-down solutions. On the other hand, the organic NGOS are too small and a major effort should be spent to enhance aggregation and to strengthen their capabilities. Our research has proven that the financing of NGOs could be at least partially covered by their associates, since the majority of the respondents, especially the younger ones, indicate their willingness to share the cost of useful information, when provided by the NGOs but the monetary amount has not been quantified and this leaves the room for further investigation.
References


