Ecological Economics xxx (2009) xxx–xxx

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

ANALYSIS

Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap?

Joni Valkila *

Institute of Development Studies, P.O. Box 26, FI-00014 University of Helsinki, Finland

ARTICLE INFO

Article history:
Received 4 April 2009
Received in revised form 29 June 2009
Accepted 1 July 2009
Available online xxxx

Keywords:
Organic agriculture
Fair Trade
Certification
Coffee
Nicaragua

ABSTRACT

This article assesses the impact of Fair Trade organic coffee production on the well-being of small-scale farmers in Nicaragua. Studying the results of organic management is crucial for evaluating the advantages of Fair Trade because approximately half of all Fair Trade coffee is also organically certified. A wide range of farmers, representatives of cooperatives and export companies in Nicaragua were interviewed during seven months of field work between 2005 and 2008. Fair Trade organic production raises farmer income when low-intensity organic farming is an alternative to low-intensity conventional farming. However, low-intensity farming produces very little coffee in the case of the most marginalized farmers, keeping these farmers in poverty. With higher intensities of management, the economic advantages of Fair Trade organic production largely depend on prices in the mainstream market.

1. Introduction

Many coffee farmers started a transition to organic production during the recent coffee price slump in the international markets in 2000–2004, encouraged by the growth of certified coffee markets, low prices in mainstream markets and assistance from development projects. The impact of organic production on farmer welfare is an important issue since organic coffee production has been suggested to lower yields and farmer income compared with what can be achieved using conventional methods (van der Vossen, 2005). Globally, approximately half of Fair Trade coffee is also organically certified and vice versa. Despite this substantial overlapping of the two certification schemes, most studies on Fair Trade do not analyze the economic viability of organic coffee production or the advantages conferred by Fair Trade compared with organic certification alone. Although studies have stated that farmers receive price premiums for Fair Trade organic coffee (Bacon, 2005; Daviron and Ponte, 2005), the impact of certification on farmer welfare is a complex issue because production intensities, yields, production costs and coffee prices vary widely both in conventional and organic production. The aim of this study was to evaluate the viability and advantages of Fair Trade organic coffee production and trade in the case of the Nicaraguan small-scale farmers. The following issues were studied: 1) yields in organic and conventional production, 2) costs of production, comparing especially the costs of organic and inorganic fertilization, 3) price premiums received by cooperatives and farmers for Fair Trade organic coffee, and 4) farmer income from Fair Trade organic and conventional coffee production.

Organic coffee production has multiple potential environmental benefits. Organic standards require coffee farms to have a structurally and floristically diverse shade cover (e.g. OCIA, Organic Crop Improvement Association International, Inc., 2005). Organic coffee farms thus provide environmental services that resemble those provided by forests (Bacon et al., 2008a: 338–339). As coffee farms are located in some of the biologically most diverse and most threatened environments in the world, their role as refuges for wildlife is important (Moguel and Toledo, 1999). Coffee fields store carbon from the atmosphere and protect watersheds by slowing down run-off. Organic coffee production also replaces inorganic fertilizers with organic fertilizers as well as pesticides and fungicides with less harmful alternatives and prohibits genetically modified organisms (OCIA, Organic Crop Improvement Association International, Inc., 2005; IFOAM, International Federation of Organic Agriculture Movements 2007). More shade trees and low-intensity farming methods, however, also imply lower yields (Perfecto et al., 2005), which is problematic from the point of view of rural poverty. On a global scale, population and economic growth associated with changing eating habits, limited arable land and biofuel production create pressures to agricultural intensification. A central question for sustainable agriculture is how production can be intensified without causing serious damage to the environment (Tinker, 1997; Pretty et al., 2003).

* Tel.: +358 50 542 88 44.
E-mail address: joni.valkila@gmail.com.

[1] The global organic and Fair Trade coffee markets are small, but rapidly growing. Organic coffee sales worldwide were 67,000 MT in 2006, representing approximately 0.9% of global coffee production. There was a 56% increase in global organic coffee sales from 2003 to 2006. Fair Trade coffee sales almost tripled from 2004 to 2007, from 24,000 t to 62,000 t, representing approximately 0.9% of global coffee consumption (UNCTAD/WTO, 2008).

[2] Exceptions include Calo and Wise (2005) and Martínez-Torres (2008).

0921-8009/$ – see front matter © 2009 Elsevier B.V. All rights reserved.
doi:10.1016/j.ecolecon.2009.07.002

Low-intensity small-scale coffee production needs to be analyzed against the backdrop of recent changes in coffee production and trade. There has been a downward trend in coffee prices in recent decades. The reasons for decreasing prices include the collapse of the International Coffee Agreement (ICA) and its production quotas, increased productivity through high-yield coffee varieties, "technification" (higher intensity farming) and some mechanization of production, as well as improved roasting techniques, which have enabled roasters to use larger shares of cheaper to produce Robusta coffee in their blends (Ponte, 2002; Gilbert, 2006). Fair Trade originated in response to declining and volatile coffee prices. It has grown into a certification system covering a wide range of products. In the case of coffee, Fair Trade aims to support democratically organized cooperatives of small-scale farmers in developing countries through payment of minimum prices, premiums for social development, improved labour rights and long-term trading relationships (Muradian and Pelupessy, 2005; Raynolds et al., 2007).

Fair Trade does not require organic production, but encourages farmers "to work towards organic practices where socially and economically practical" (FLO, Fairtrade Labelling Organizations International, 2007a: 6). To be able to sell their coffee as Fair Trade certified, there is a pressure on producer organizations to produce organically. When Fair Trade coffee is not organically certified, there is a structural mismatch of supply and demand. As a result, certified producer organizations typically sell only a small percentage of their non-organic coffee to Fair Trade markets (Muradian and Pelupessy, 2005; Bacon et al., 2008a: 344; Valkila and Nygren, 2009). The supply and demand situation is completely different for Fair Trade organic markets. Demand for organic products is high and supply is limited because gaining organic certification is demanding and organic producers forego potential higher yields that can be achieved using inorganic fertilizers. This article analyzes the possibilities of Fair Trade organic production and trade to improve the well-being of small-scale coffee farmers and their labourers while protecting the environment through organic production in the challenging global context of decreasing commodity prices.

The paper is structured as follows: Section 2 presents methods utilized in this study. Section 3 analyzes reasons for variations in intensities of coffee production in Nicaragua and responses of Fair Trade and organic movements to low-intensity production. Section 4 analyzes costs of organic and inorganic fertilization. Section 5 compares Fair Trade organic coffee prices with prices in conventional markets. Section 6 compares profitability of low- and medium-intensity Fair Trade organic and conventional coffee production in Nicaragua. Section 7 concludes.

2. Methods

This study is based on seven months of field work in Nicaragua. Semi-structured interviews were carried out with a wide range of coffee farmers, administrators and technicians of cooperatives, representatives of coffee export companies, governmental and non-governmental organizations working with coffee production and certification agencies. In March 2005, initial interviews were made with representatives of farmers, cooperatives, coffee export companies and Fair Trade Labelling Organizations in Central America. From September 2005 to February 2006 a total of 120 farmers were interviewed. Of these farmers 55 were Fair Trade and organically certified, 16 were organically certified, 39 were Fair Trade non-organic farmers and 10 were uncertified farmers. The interviewed certified farmers were from 11 cooperatives and unions of cooperatives in Boaco, Matagalpa, Jinotega and Las Segovias in Northern Nicaragua.

The cooperatives provided information of their members, such as the number of members, their location, types of coffee produced and yields. The farmers were selected based on the criteria that in each cooperative both larger (>3.5 ha) and smaller (<3.5 ha) producers, organically certified and non-organic producers, and when possible, men and women would be represented. The main topics discussed in the interviews were coffee production, income and costs, terms and channels of sales, hired labour and their working conditions, co-operative services, transition to organic production and experiences with conventional and organic production. Most producers were interviewed on their farm during coffee harvesting season. This enabled observations on coffee farming techniques and various stages of coffee harvesting and processing. The farmers also showed their documents for coffee sales, certification and farm management.

Although the number of uncertified farmers interviewed was limited, information regarding conventional coffee production was complemented from a variety of other sources. Observations on conventional coffee production and trade were made throughout the field work when visiting farms and informal discussions with conventional farmers and their workers. Information on coffee markets outside certified cooperatives was received from coffee export companies, interviews with the staff of coffee reception centres, representatives of organizations promoting coffee production and certified farmers, who typically sold part of their coffee in conventional markets.

During one month in 2008, follow-up interviews were made with 15 organic farmers and 15 of their non-organic farming neighbours. The main objective of this field work period was to compare the methods used by these farmers to fertilize coffee. The data were complemented by interviews of organic and inorganic fertilizer producers and sellers. The interviews were recorded and transcribed. To facilitate data analysis, the transcribed interviews together with field notes were organized by utilizing the Atlas-Ti qualitative data analysis program.

3. Low- and high-intensity organic and non-organic coffee production in Nicaragua

Organic coffee represents only 4–5% of Nicaragua's coffee exports, but it is a large part of coffee produced by small-scale farmers organized in cooperatives, most of which are also Fair Trade certified. Approximately 38% of the 10.7 million kg of coffee produced by the over 9000 members of the umbrella organization for Nicaraguan coffee cooperatives, Cafenica, was organically certified in 2007 (Cafenica, 2007:4). There are approximately 48,000 coffee farms in Nicaragua, 80% of which are micro-producers with less than 3.5 ha of coffee. Despite the vast number of micro-producers, farms larger than 3.5 ha produce more than 85% of the coffee harvest in Nicaragua due to significantly higher intensity of management and the associated higher yields that are typical of larger farms (Flores et al., 2002: Annex).

Small-scale coffee farmers have made the transition to organic farming with assistance from development projects implemented by organizations such as CLUSA (Cooperative League United States of America), ADDAC (Asociación para la diversificación y desarrollo agrícola comunal), Campesino a Campesino and Solidarity. These organizations have helped farmers become certified by providing training and financing, by organizing producers in cooperatives and by finding markets for organically certified products. Receiving organic certification is a three-year process, requiring considerable commitment from farmers long before coffee can be sold as certified. Without the support of cooperatives and development organizations, it would be practically impossible for small-scale coffee farmers to acquire organic certification due to the high cost of certifying individual small farmers in Nicaragua and the non-existence of organic trade channels for small producers outside the cooperative membership. Fair Trade certification is only available to cooperatives of small-scale farmers. Therefore, for a small-scale farmer to be Fair Trade and organically certified, a cooperative membership is mandatory.

There is a high variation in coffee yields in Nicaragua. A continuum of farms exists from low-input/low yields to high input/high yields. Small-scale farmers in conditions of rural poverty often grow

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002

coffee in low-input or no-input systems with low yields.[3] When inputs are extremely low, coffee yields are typically around or less than 300 kg/ha both in organic and conventional production.[4] Average yields in Nicaragua are approximately 750 kg/ha (Flores et al., 2002). The best yields achieved utilizing conventional methods by farmers interviewed for this study were above 2000 kg/ha, averaged over two consecutive years. According to the technicians of cooperatives interviewed for this study and the records of cooperatives, the organic yields for small-scale farmers were on average 329 kg/ha. The interviewed farmers reported two-year average yields of productive organic coffee ranging from 131 to 1196 kg/ha (average 522 ± 233 kg). The lowest yields were achieved with little or no fertilization, while the farmers with the highest yields used intensive organic fertilization (up to 6000 kg of compost/ha/year). Uncertified and Fair Trade certified farmers utilizing conventional methods reported yields from 236 to 2629 kg/ha (average 812 ± 534 kg), also largely depending on the intensity of management. Most farmers reported having 5700 coffee trees per ha and the most common coffee variety was caturra. There is more variation in conventional coffee yields: both organic and conventional yields can be very low with low-intensity management, but because organic yields tend to be lower when more intensive practices are concerned, the highest yields (above 1200 kg/ha) are missing on organically managed farms.

There is a strong perception among farmers that organic yields are significantly lower than conventional ones when intensive management practices are used. Farmers who had made a transition from intensive conventional to organic production complained that yields dropped dramatically, even when organic fertilizers were used. An organic farmer in Jinotega said: "Conventional coffee has better yields than organic coffee. Earlier, when we still fertilized with chemicals, the plants did not deteriorate, they kept their leaves, the production was good because the plants are like us, if we do not eat we do not have strength." When I asked an organic coffee farmer in Boaco if he used inorganic fertilizers before transition to organic production, he replied: "No, we used no fertilization. Because coffee prices were low and fertilizers were expensive. But neither did coffee produce well, yields dropped year by year."

There are large numbers of both organic and non-organic farmers in Fair Trade certified cooperatives, who only produce around 300 kg of coffee/ha. As many of these farmers grow coffee on 0.5–2 ha of land, most of them produce only 150–600 kg of coffee annually. The experiences of the farmers studied indicate that with higher intensity methods these yields could be significantly increased as other farmers have reached three times higher yields in organic production and eight times higher yields with conventional methods. However, many of these farmers lack funds to make investments that would intensify production. When credit is available, farmers reported using it for purposes other than the intensification of production, such as paying off other debts and normal living expenses. Farmers in conditions of poverty are often unable to maximize yields per hectare. In situations of poverty farmers avoid the costs of fertilizers as well as other costs of more intensive management.

The Fair Trade standards encourage transition to organic production and a gradual replacement of inorganic inputs with organic ones (FLO, Fairtrade Labelling Organizations International, 2007a:7). In the case of non-organic Fair Trade farmers, the use of inorganic fertilizers and other agrochemicals is limited by poverty. Some Fair Trade certified farmers use intensive conventional methods and have no plans of making a transition to organic farming, because in their opinion that would lower their yields drastically and they do not believe that organic price premiums would compensate for the losses in yields. With the exception of farmers who are actively involved in the administration of cooperatives, farmers in Fair Trade certified cooperatives do not know about the requirements of Fair Trade to farmers. In contrast, organically certified farmers are well aware on organic regulations and have a strong identity as "ecologically sound producers".

According to organic standards, intensive management and off-farm inputs must be avoided, but the degree to which organic farms can be intensified and off-farm inputs used is ambiguous (OCIA, Organic Crop Improvement Association International, Inc., 2005). In addition to recycling nutrients on the farms, many Fair Trade organic farmers use off-farm inputs such as organic fertilizers originating on neighbouring farms or fertilizer factories. This recycles waste products, although the nutrients do not originate on the farms. Again, intensification of production is limited by poverty in the case of marginalized producers. A manager of a Fair Trade certified cooperative in Matagalpa explained: "There are many areas where little local [organic] inputs are available, you have to buy the inputs outside the farm and that is expensive."

4. Fertilization for organic and conventional coffee

4.1. Estimation on fertilization required

Crucial questions for sustained coffee production are how nutrients can be supplied and at what cost. This is also important for evaluating advantages of Fair Trade organic coffee production: it is essential to know if use of fertilization and intensification of production are more expensive and thus less feasible to financially constrained small-scale farmers when coffee is produced conventionally or organically.

The coffee bean is a nutrient-rich fruit and its production requires a considerable amount of nutrients. The nutrient balance of a coffee field is a complex issue involving nutrients coming in from fertilizers, the atmosphere and shade trees through litter and mychorizas, and nutrients leaving the farm with coffee berries as well as leaching into the atmosphere and waterways. Without fertilization, this nutrient balance is negative — unless yields are extremely low — and sustained coffee production requires regular application of organic or inorganic fertilizers (van der Vossen, 2005).

Organic fertilizers can have benefits in addition to plant nutrition. They can increase soil organic matter, water infiltration and water-holding capacity. However, shade coffee farms have a constant supply of organic materials from coffee and shade tree litter and so additional organic matter is not desperately needed. In both conventional and organic coffee production, part of the nitrogen needed can be provided by nitrogen-fixing shade trees. Although all of the observed organic coffee producers had nitrogen-fixing shade trees on their farms, farmers with higher yields also applied additional organic fertilizers.

Coffee plants need the major nutrients nitrogen (N), phosphorus (P) and potassium (K) as well as minor nutrients. The amount of fertilization required depends on soil quality and how much coffee is produced, i.e. the quantity of nutrients removed each year as coffee beans. Van der Vossen (2005) estimated that in shade coffee production 53 kg, 85 kg and 150 kg of nitrogen and roughly equal amounts of potassium must be applied per ha to correct the nutrient balance of farms with per ha coffee production of 500 kg, 1500 kg and 2000 kg, respectively. In this case it is assumed that coffee pulp is not recycled, but taken away from the farm with the coffee beans. Roughly one-third of the nutrients removed as coffee berries can be returned to the farm by carefully recycling the coffee pulp, the nutrient-rich outer layer of the coffee fruit. In Nicaragua, this can be done relatively easily because coffee is usually pulped on the farms instead of transporting the berries far away to be processed. When pulp is recycled, as is typically done by organically certified farmers in Nicaragua, 36–80 kg

[3] Nicaraguan small-scale coffee farmers include both inorganic and organic fertilizer users as well as no-fertilizer users. One interviewed cooperative technician in Jinotega estimated that half of the members of the cooperative use some fertilization and half grow coffee without any kind of fertilization. Approximately 80% of the farmers of this Fair Trade certified cooperative were non-organic while 20% were organically certified.

[4] All coffee yields in this article refer to green coffee, the export stage of coffee processing.

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002

of nitrogen per ha needs to be supplied from outside the coffee field to replace the nutrients removed with shade coffee production of 500–2000 kg per ha. Thus, a rough estimation can be made that in order to keep coffee yields at a reasonable level and to maintain soil fertility, a minimum of 36 kg of nitrogen per ha need to be supplied annually in addition to recycling coffee pulp and using nitrogen-fixing shade trees.

4.2. Available organic fertilizers

Materials that organic coffee farmers in Nicaragua commonly use as fertilizers are described below. Nutrient contents of common organic fertilizers found in coffee production literature are summarized in Table 1.

4.2.1. Coffee pulp

Approximately 40% of the wet weight of the nutrient-rich coffee fruit is in the form of coffee pulp, which is removed and usually discarded as waste by conventional coffee farmers (Sánchez et al., 1999:35). Pulp is typically left to degrade in piles without any treatment, causing odours and nutrient-loaded leaches. Composting the pulp produces a high quality fertilizer. Because conventional coffee farmers regard pulp as waste, large quantities of pulp are available for those organic farmers with many conventional coffee farming neighbours.

4.2.2. Cattle manure

The nutrient content of cattle manure varies, but a rough estimate is that cattle manure contains 1% N, 0.5% P and 1% K. In Nicaragua, there are areas where both cattle and coffee production are common, providing opportunities for coffee farmers to utilize manure originating near their farm.

4.2.3. Bocachi and compost

Bocachi is a type of compost with recommendations on the mix of materials to be used. Bocachi may contain coffee pulp, household organic waste, cattle or poultry manure, ashes, molasses, yeast, stems from bean production and other organic waste. When the mix is simpler, e.g. containing only coffee pulp, cattle manure and bean stems, it is commonly called compost.

4.2.4. Chicken manure and biogreen

Chicken manure is rich in nutrients. Although small-scale chicken farming is widespread, few chicken farms have large quantities of manure for sale. Biogreen is poultry manure-based organic fertilizer. It originates from the largest chicken farm in Nicaragua. This factory farm has approximately 300,000 hens and its main product is eggs. All of the manure-based fertilizer produced by this farm is bought by organic coffee producers in Nicaragua. Biogreen recycles nutrients, but also connects organic farming to factory farming and involves transportation of fertilizers over long distances, contradicting the principles of organic farming. Use of Biogreen is approved by one of the two major organic certifying agencies in Nicaragua, Biolatina, but not approved by the other agency, OCIA.

4.3. Cost of organic and inorganic fertilization

When fertilizers are not purchased, the cost of organic fertilization is made up entirely of labour costs: collection of organic materials, transportation, preparation and application on the farm are all done with manual labour. The wages for agricultural work in Nicaragua are usually close to the minimum wages set by the Nicaraguan Ministry of Labour for agricultural work. To estimate the cost of preparation, transportation and application of fertilizers, the minimum wage for 2007 (2.44 USD/day[5]) has been used in the calculations (Ministerio del trabajo, 2007).

Interviewed farmers estimated the cost of transportation of organic materials and purchased fertilizers to their farm to be 0.53–1.06 USD per sack (46 kg). For the calculations below, 0.53 USD per sack has been used because it was the most common estimation presented. Because soil testing laboratories are not functional in Nicaragua, farmers are unable to test the need for nutrients on their farms and also cannot test the quality of their organic fertilizers. Despite their attempts to do so, no interviewed cooperative or farmer had been able to test the nutrient content of the final composted product. The nitrogen content of the compost is likely to vary between 1% and 3% depending on the amount of nutrient-rich components, such as coffee pulp and chicken manure, in the mixture and how well composting is done. For the calculations below, the nitrogen content of the compost was estimated to be 2%. Table 2 presents estimations of the cost of supplying 1 ha of coffee with 40 kg of nitrogen using organic or inorganic fertilizers.

Despite some uncertainties, such as the precise nutrient content of the applied compost, these calculations indicate that supplying equal amounts of nutrients using organic methods can be cheaper than using inorganic fertilizers.[6] Compost based on coffee pulp, cattle manure, bean residues and household organic waste was the cheapest option for fertilization. When compost was enriched with materials such as chicken manure or molasses to produce Bocachi, it was slightly more expensive, but the resulting compost is likely to contain more nutrients (Sánchez et al., 1999). Biogreen is the most expensive alternative for organic fertilizing, but an option for the intensification of production for organic farmers who do not have a supply of organic materials near their farm.

Although the same amount of nitrogen is supplied by these different fertilizers, differences exist in the resulting nitrogen availability to plants. With organic fertilizers, there is a poor synchronization of nutrient availability and crop demand, as organic fertilizers release their nutrients slowly and not necessarily at the times when nutrients are required by the crops (Berry et al., 2002). With inorganic fertilizers, timing fertilization is easier, enabling most of the nutrients provided to be absorbed by the coffee plants.[7] Rates of mineralization, and thus, nutrient availability and losses of nutrients through volatilization and leaching, vary between different organic fertilizers (Berry et al., 2002). As a result of losses of nutrients in organic fertilization, yields are likely to be lower in organic production when comparable amounts of nutrients are supplied in organic and inorganic fertilizers.

For reasons discussed above, to reach the same level of yields, more organic fertilizers must be applied than inorganic fertilizers. Organic materials are needed in great quantities. Although the first one or two tonnes of organic materials may be easily obtained as coffee pulp or cattle manure from a nearby neighbour, subsequent tonnes are often

Table 1
Nutrient contents of common organic fertilizers for coffee (% of dry weight).

	N	P	K	Source
Coffee pulp, fresh (Colombia)	3.0	0.2	3.3	Orozco et al., 1996
Coffee pulp, composted (Mexico)	3.8	0.4		Sánchez et al., 1999
Cattle manure (India)	0.7	0.2	0.7	Ghosh et al., 2004
Poultry manure (Mexico)	3.4	0.4		Sánchez et al., 1999
Poultry manure (Kenya)	3.5	1.4	1.3	Njoroge 2001
Biogreen (Nicaragua)	~2.0	~2.5	~1.8	Manufacturer's estimates

[5] These wages include meals, which are often offered as part of the salary in agricultural work in Nicaragua.

[6] An estimate was made for fertilization in 2007. Urea prices increased steadily since the end of 2002 and increases became more marked in 2008. The annual average price of urea in the world market went up from 309.4 USD per tonne in 2007 to 517 USD per tonne in 2008. Prices reached 770 USD per tonne in August 2008 before falling steadily during the remainder of the year (ICO, International Coffee Organization, 2009a.

[7] Because organic fertilizers release nutrients at times when crops do not utilize them, organic fertilizers may leach more nutrients into waterways than inorganic fertilizers (Trewavas, 2004).

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002

Table 2
Cost (USD) of providing 40 kg/ha of nitrogen to a coffee farm in Nicaragua in July 2007 (with the exception of urea, all fertilizers also contain the other major nutrients P and K).

	Amount needed to supply 40 kg of N	Cost of fertilizer per 40 kg of N	Cost of transportation to farm	Cost of application to 1 ha	Total
Inorganic fertilizers					
Urea (46% N)	87 kg	43	1	7	51
Complete fertilizer 15-15-15 (15% N)	267 kg	122	3	7	132
Organic fertilizers:					
Bocachi (~2% N) manufactured by the farmer	~2000 kg	70	(Included in cost of fertilizer)	14	84
Compost (pulp, manure, bean residues and household waste) (~2% N) manufactured by the farmer	~2000 kg	45	(Included in cost of fertilizer)	14	59
Biogreen (~2% N)	~2000 kg	176	23	14	213

located farther away and their transportation in mountainous areas with poor road conditions in many cases becomes more expensive than estimated above. To sum up, although organic fertilization is can be less effective than inorganic fertilization, organic fertilization is not necessarily more expensive, especially for those farmers who have access to large quantities of organic materials near their farm.

5. Fair Trade organic coffee price and financing for farmers

This section compares prices and financing that farmers receive through Fair Trade organically certified cooperatives and mainstream markets where coffee is sold as conventional coffee. The prices are compared in two situations: the lower international coffee prices in 2005 and the higher prices in 2008. Fair Trade is the only certification system, which defines minimum prices for products. Fig. 1 presents the development of the annual average price of conventional coffee in the mainstream markets and the Fair Trade minimum price for the organically certified Central American *arabica* coffee. The prices have been adjusted for inflation. Price volatility of mainstream markets is shown by indicating the highest and lowest monthly average prices of each year. These prices are an indication of prices received by Fair Trade certified cooperatives when they sell coffee to conventional or Fair Trade organic markets, although the prices also depend on quality and negotiations between buyers and sellers. The Fair Trade minimum price includes a social premium, which must be used by cooperatives in developing the cooperative or coffee growing communities by projects chosen by the members of the cooperatives. The Fair Trade standards stipulate that when the market price of coffee is higher than the Fair Trade minimum price, the market price plus the Fair Trade social premium applies. At the moment, the Fair Trade minimum price for Central American *arabicas* is 125 US cents per pound, plus 10 US cent social premium and a 20 US cent premium, when the coffee is additionally organically certified. During the last fifteen years, the minimum price has been increased twice, in 2007 and 2008, in response to higher market prices and inflation in producing countries (FLO, Fairtrade Labelling Organizations International, 2007b).

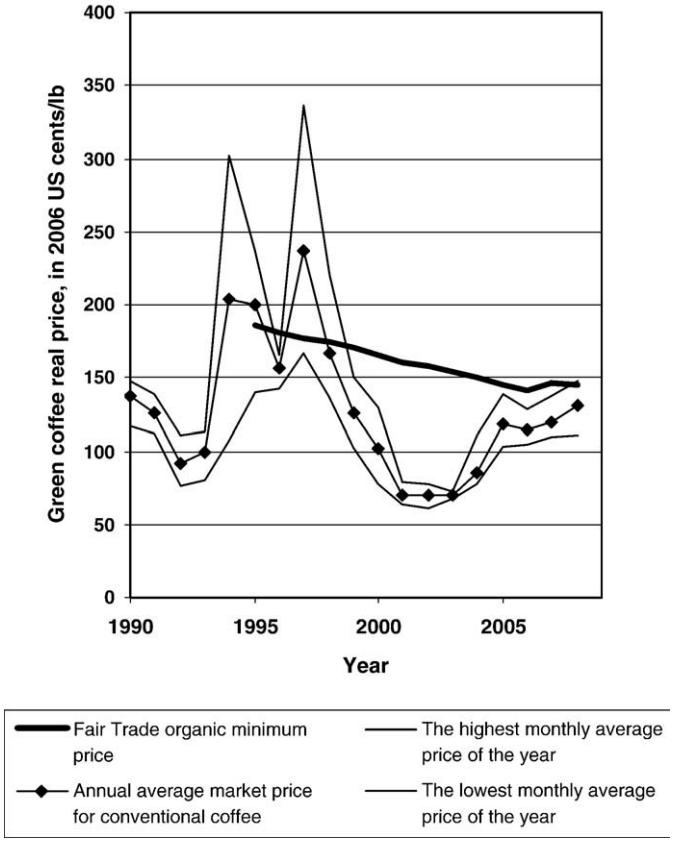

Fig. 1. Fair Trade minimum price (FOB) for organically certified Central American *arabicas* and the average New York market price for other mild *arabicas* in 1990–2008, deflated against the US consumer price index. The highest and lowest monthly average prices are shown to indicate price volatility within years (source data: FLO, Fairtrade Labelling Organizations International., 2007a and FLO, Fairtrade Labelling Organizations International, 2007b, ICO, International Coffee Organization, 2009b).

Cooperatives typically sell their coffee to several buyers under various contracts. Roughly half the organically certified coffee of the studied cooperatives is sold double-certified as Fair Trade organic and the rest is sold as organically certified only. It is debatable whether Fair Trade minimum prices have increased prices for cooperatives as several cooperatives reported having sold their organic coffee without Fair Trade certification for a similar price as with Fair Trade certification even during the extremely low market prices in 2000–2004. Since the end of 2004, when higher coffee prices have prevailed, prices paid for organic coffee have practically always exceeded the Fair Trade minimum price in Nicaragua, whether coffee has been sold as Fair Trade certified or organically certified only. Without Fair Trade certification, many cooperatives reported contracts of 150–170 US cents per pound in 2003–2005 and up to 185 US cents per pound in 2007–2008. Fair Trade organic minimum price therefore, is not extraordinarily high, at least in the case of the high quality organic *arabica* coffee.

The net price of coffee for cooperative members depends on the sales made by cooperatives and the costs members are charged. These costs include dry milling of coffee, exporting, administration, technical assistance to farmers, marketing, capital and costs of organic and Fair Trade certifications. The average net price paid to producers for Fair Trade organic coffee in seven interviewed cooperatives was 111.1 US cents per pound in 2005 and 127 US cents per pound in 2008. Comparing Fair Trade organic prices with conventional prices in the mainstream market is complicated because coffee prices are volatile. From the point of view of Nicaraguan small-scale farmers, the price during the harvesting season from December to March is particularly relevant. The prices farmers receive in Nicaragua depend directly on New York market prices. To establish a reference price, the average price for the month of January, the peak of the harvesting season, has been

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002

calculated.[8] The average net price for farmers was 85 US cents per pound in January 2005 and 118 US cents per pound in January 2008.

When the average conventional price for January in the mainstream markets is compared with the average organic price in the studied cooperatives, organic coffee received a 26.1 US cent (30.5%) premium in 2005 and a 9 US cent (7.6%) premium in 2008. This confirms an earlier observation that organic premiums tend to be higher when mainstream market prices are low (Kilian et al., 2006). In addition, organic farmers benefited from the Fair Trade social premium (5 cents per pound in 2005 and 10 cents per pound in 2008). A large part of these funds were typically used to improve cooperative infrastructure and to pay for organic and Fair Trade certifications (Valkila and Nygren, 2009).

It is also noteworthy that payments were faster and terms of financing better in mainstream markets than by cooperatives of the Fair Trade organic farmers. As a result, many organically certified producers sell part of their coffee as conventional coffee, with the advantage of receiving immediate payment. Export companies offered immediate payments (or, alternatively, payment and finalization of the sale at a time of the farmers' choice if there are expectations for higher prices in the future), while Fair Trade organic cooperatives paid in stages, with final payments arriving several months after the sale of coffee. Most cooperative members finance their coffee production with loans from cooperatives or export companies. Export companies gave financing to coffee farmers at an annual interest rate of 11%, including all costs. Furthermore, short-term pre-financing was provided during the harvesting season, with no interest charged, as the loan was guaranteed against the coffee harvest. By contrast, the Fair Trade organic cooperatives charged interest rates of 18–22% on loans given to their members.

6. Fair Trade organic coffee production — a poverty trap for marginalized farmers and hired labour?

Fair Trade organic coffee farmers are a heterogeneous group socio-economically. There are wide variations in wealth, levels of education and sources of livelihood. The most marginal coffee farmers live in chronic poverty and grow coffee using low-intensity methods. Other Fair Trade organic farmers are clearly not the poorest group of people in Nicaragua, they often have multiple activities both in agriculture and other businesses and they utilize higher intensity methods in coffee production. It is therefore important to consider the viability of Fair Trade organic coffee production for low-intensity and higher intensity farmers.

With low-intensity management and low yields, organic certification can slightly improve income compared with the low-intensity conventional coffee production, because the organic price premium is available and costs of production are low whether organic or conventional low-input (or no-input) agriculture is concerned. The smallest coffee farmers' typical annual coffee production of 150–600 kg generates a gross income of 420–1680 USD (calculated with the average Fair Trade organic sales price of 2.8 USD/kg in 2008). The low-intensity Fair Trade organic farmer who produced 300 kg of coffee/ha received 172 USD/ha more from his coffee in 2005 and 60 USD/ha more in 2008 compared with prices for conventional coffee in the mainstream market. This "extra" money is not enough to enable the low-intensity small-scale farmers to intensify their production or to expand their activities by buying more land, because this income can barely feed a family. The value of a basket of goods consisting of basic food items for a family of six in a rural area was 876 USD per year in 2007 (INIDE, Instituto Nacional de Información de Desarrollo, 2007: 356).

The net income depends on production costs and how the household's own labour is valued. The direct cost of certification is accounted for, because it is deducted by the cooperative[9]. The farmers studied considered the quality requirements of Fair Trade organic cooperatives to be strict compared with buyers of conventional coffee, but the costs of more careful harvesting and processing of coffee are not known. Although the production costs are not known precisely, when a few hundred dollars are divided between several members of the household working with coffee and in many cases some hired labour, low-input, low-yield coffee production "will not build palaces", as one interviewee expressed it. Whether organically certified or not, small-scale coffee farmers do not depend on coffee income alone. The farms typically produce a diverse range of agricultural products such as corn, beans, vegetables, fruit, poultry, eggs, cattle, milk and honey. Many of these products could be sold as organically certified, if market channels and certification were available. However, as these are lacking, organically certified farmers do not receive price premiums for the other products grown on their farms and in this respect the organic certification does not add to their income as the same products can be produced and sold for similar prices whether the farmers have organic certification or not.

When higher intensities of management are compared, the advantages of Fair Trade organic coffee production are not clear-cut. In Tables 3 and 4, Fair Trade organic and conventional farmer income per ha is compared when lower and higher market prices prevail and the farms are managed with medium-intensity. The estimations for the costs of production are based on calculations made by Conacafé (2008). An organic farm is estimated to produce one-third less than a conventional farm[10]. In the first scenario, prices are those observed in 2005: lower market prices prevail, and the price premium for organic coffee is higher, 30.5%. In the second scenario, the prices are those observed in 2008, higher market prices prevail and organic premiums for farmers are modest, 7.6%.

It is noteworthy that the Fair Trade organic price premiums calculated for 2005 and 2008 do not represent situations where the market prices have been extremely high or extremely low. With extremely low market prices, such as the prices prevailing in 2000–2004, and the associated high premiums for organic coffee, organic farming was more advantageous than these scenarios show. Likewise, conventional farming was more advantageous if coffee was sold at moments when the volatile conventional coffee price was at its highest.

Improved labour rights are one of the concerns of Fair Trade, but the standards are not very strict in the case of seasonally hired labour in coffee production. It would be difficult to demand that farmers pay higher wages, because the advantages provided by Fair Trade organic production are not clear to farmers and vary depending on prices in the mainstream market and the production intensity of the farmers. Many Fair Trade organic farmers struggle to pay the minimum wages for their hired workers. Wages paid outside harvesting season were around the minimum wage of 2.44 USD/day in 2007. During the harvesting season 2007–2008 wages were 3.9–4.6 USD plus three meals of rice and beans for hand-picking 102.5 l of coffee berries, estimated to take 8 h of work. Although Fair Trade organic farms paid slightly more than some of their neighbouring farms per *lata* (a 20.5-litre basket) of coffee, picking organic coffee was more time-consuming because of lower yields. Fair Trade organic coffee production therefore does not provide advantages to hired labour beyond those offered by agricultural labour in Nicaragua in general.

[8] Prices are based on Conacafé (2008) estimations.

[9] Farmers have costs from organic certification during the three-year transition period, when they do not receive organic price premiums. These costs have not been estimated.

[10] This is not a precise measurement, but estimation based on the experiences of farmers. With higher intensities of management organic yields may be even lower than one-third of conventional yields (van der Vossen, 2005).

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002

Table 3
Estimated farmer income/ha, scenario 1) low market prices, high organic premium (source data: field work data 2005–2006; Conacafé 2008).

Farm pair	Organic farm, production 789 kg/ha	Conventional farm, production 1183 kg/ha
Farm gate price of coffee	1.11 USD/pound	0.85 USD/pound
Gross income	1929 USD	2215 USD
Cost of production	1668 USD or 2.11/kg	2137 USD or 1.81/kg
Profit	261 USD	78 USD

Table 4
Estimated farmer income/ha, scenario 2) high market prices, low organic premium (source data: field work data 2008; Conacafé 2008).

Farm pair	Organic farm, production 789 kg/ha	Conventional farm, production 1183 kg/ha
Farm gate price of coffee	1.27 USD/pound	1.18 USD/pound
Gross income	2207 USD	3075 USD
Cost of production	1668 USD or 2.11/kg	2137 USD or 1.81/kg
Profit	539 USD	938 USD

A brief discussion is needed about the reasons farmers have to grow coffee organically, even though the economic advantages are not always clear. Farmers have observed how organic coffee prices are stable compared with the conventional coffee prices so fear of price collapse in the conventional market is an important incentive for organic production. The studied farmers were also proud of their identity as "ecologically sound" organic farmers. Many organic farmers regarded the use of inorganic inputs as extremely dangerous to health. Some cooperatives only include organically certified members, and thus to be a member, organic production is the only alternative. Farmers also gain advantages from cooperative membership; many development projects work through the cooperatives benefiting their members. Despite its limitations, credit is available through cooperatives.

7. Conclusion

Fair Trade organic coffee production can increase farmer income in the case of low-intensity coffee production. However, the increase in income is very modest, because so little coffee is produced by marginalized farmers. These farmers remain in poverty despite being connected to Fair Trade organic markets (Bacon et al., 2008b). In the case of more intensive Fair Trade organic coffee production the advantages conferred by price premiums are not straightforward, because yields tend to be lower compared with yields that can be achieved using conventional methods of comparable intensity. In this case, the advantages of Fair Trade organic production depend on prices in the mainstream markets: when prices for conventional coffee have been extremely low, Fair Trade organic prices have been attractive to farmers. As the future prices of coffee are unknown, it is impossible to say how relevant the price guarantee provided by Fair Trade will be.

The costs of fertilization are not necessarily more expensive when organic methods are used. Large quantities of organic materials are available, although these are not conveniently located for all farmers. Organic production substitutes inorganic fertilizers with manual labour. This creates employment in rural areas that have limited job opportunities outside agriculture (Martínez-Torres, 2008). However, this labour comprises back-breaking shovelling and carrying of heavy sacks of organic materials with no mechanical assistance. Working conditions in Fair Trade organic coffee production in Nicaragua are not superior to the working conditions in rural Nicaragua in general (Valkila and Nygren, 2009). Fair Trade organic farmers and their hired labour are not very well compensated for producing organic coffee. The ecosystem services provided by organic coffee production would merit a payment, as price premiums by certified coffee markets alone do not provide clear advantages to farmers.

Acknowledgements

I am grateful to the many informants interviewed for this study in Nicaragua. I would also like to thank Anja Nygren, Herbert van der Vossen, John Sumelius, Juhani Koponen, Ilmo Massa and the two anonymous reviewers of Ecological Economics for their valuable comments to earlier versions of this paper. Funding for this research was provided by the Academy of Finland (Grant numbers 1107665 and 1124189) and the University of Helsinki.

References

Bacon, C., 2005. Confronting the coffee crisis: can Fair Trade, organic, and specialty coffees reduce small-scale farmer vulnerability in Northern Nicaragua? World Development 33 (3), 497–511.
Bacon, C., Méndez, V.E., Fox, J.A., 2008b. Cultivating sustainable coffee: persistent paradoxes. In: Bacon, C., Mendéz, V.E., Gliessman, S.R., Goodman, D., Fox, J.A. (Eds.), Confronting the Coffee Crisis, Fair Trade, Sustainable Livelihoods and Ecosystems in Mexico and Central America Cambridge. MIT Press, Cambridge, pp. 337–372.
Bacon, M.C., Méndez, V.E., Flores Gómez, M.E., Stuart, D., Díaz Flores, S.R., 2008a. Are sustainable coffee certifications enough to secure farmer livelihoods? The millenium development goals and Nicaragua's Fair Trade cooperatives. Globalizations 5 (2), 259–274.
Berry, P.M., Sylvester-Bradley, R., Philipps, L., Hatch, D.J., Cuttle, S.P., Rayns, F.W., Gosling, P, 2002. Is the productivity of organic farms restricted by the supply of available nitrogen? Soil Use and Management 18 (s1), 248–255.
Cafenica, 2007. Boletin Informativo Vida Y Café. Cafenica, Matagalpa.
Calo, M., Wise, T.A., 2005. Revaluing Peasant Coffee Production: Organic and Fair Trade Markets in Mexico. Tufts University, Medford.
Conacafé (Consejo nacional de café), 2008. Fiscalidad del sector cafetalero. Managua, Conacafé.
Daviron, B., Ponte, S., 2005. The Coffee Paradox. Zed Books, London.
FLO (Fairtrade Labelling Organizations International), 2007a. Fairtrade Standards for Small Producers' Organizations. www.fairtrade.net. Accessed on November 10th, 2007.
FLO (Fairtrade Labelling Organizations International, 2007b. FLO Standards announcement: Fairtrade coffee prices, March 30th, 2007. www.fairtrade.net.
FLO (Fairtrade Labelling Organizations International, 2007c. FLO Standards announcement: coffee minimum prices, December 12th, 2007. www.fairtrade.net.
Flores, M., Bratescu, A., Martínez, J.O., Oviedo, J.A., Acosta, A., 2002. Centroamérica: El impacto de la caída de los precios del café. Comisión Económica para América Latina y el Caribe, México D. F.
Ghosh, P.K., Ramesh, P., Bandyopadhyay, K.K., Tripathi, A.K., Hati, K.M., Misra, A.K., Acharya, C.L., 2004. Comparative effectiveness of cattle manure, poultry manure, phosphocompost and fertilizer-NPK on three cropping systems in vertisols of semi-arid tropics. I. Crop yields and system performance. Bioresource Technology 95 (1), 77–83.
Gilbert, C., 2006. Value chain analysis and market power in commodity processing with application to the cocoa and coffee sectors. Proceedings of the FAO workshop on Governance, Coordination and Distribution along Commodity Value Chains. FAO, Rome, pp. 267–297.
ICO (International Coffee Organization), 2009a. Study on Fertilizer Prices. http://www.ico.org/show_document.asp?id = 2739. Accessed on March 30th, 2009.
ICO (International Coffee Organization), 2009b. Indicator Prices, Monthly and Annual Averages. www.ico.org/coffee_prices.asp.
IFOAM (International Federation of Organic Agriculture Movements), 2007. Definition of Organic Agriculture Report. www.ifoam.org/organic_facts/doa/pdf/Definition_of_Organic_Agriculture_Report.pdf. Accessed on February 7th, 2007.
INIDE (Instituto Nacional de Información de Desarrollo), 2007. Anuario estadístico 2006. INIDE, Managua.
Kilian, B., Jones, C., Pratt, L., Villalobos, A., 2006. Is sustainable agriculture a viable strategy to improve farm income in Central America? A case study on coffee. Journal of Business Research 59 (3), 322–330.
Martínez-Torres, M.E., 2008. The benefits and sustainability of organic farming by peasant coffee farmers in Chiapas, Mexico. In: Bacon, C., Mendéz, V.E., Gliessman, S.R., Goodman, D., Fox, J.A. (Eds.), Confronting the Coffee Crisis, Fair Trade, Sustainable Livelihoods and Ecosystems in Mexico and Central America. MIT Press, Cambridge, pp. 99–126.
Ministerio del Trabajo, 2007. Normativa salarial del café. Ministerio del Trabajo, Managua.
Moguel, P., Toledo, V., 1999. Biodiversity conservation in traditional coffee systems of Mexico. Conservation Biology 13 (1), 11–21.
Muradian, R., Pelupessy, W., 2005. Governing the coffee chain: the role of voluntary regulatory systems. World Development 33 (12), 2029–2044.
Njoroge, J.M., 2001. Advances in coffee agronomy. Proceedings of the International Scientific Symposium on Coffee, December 4th, 2000, CBI-CCRI. Bangalore, India, pp. 104–119.
OCIA (Organic Crop Improvement Association International, Inc.), 2005. International Certification Standards. Lincoln, OCIA International.
Orozco, E.H., Cegarra, J., Trujillo, L.M., Roig, A., 1996. Vermicomposting of coffee pulp using the earthworm *Eisenia fetida:* effects on C and N contents and the availability of nutrients. Biology and Fertility of Soils 22 (1–2), 162–166.
Perfecto, I., Vandermeer, J., Mas, A., Soto Pinto, L., 2005. Biodiversity, yield, and shade coffee certification. Ecological Economics 54 (4), 435–446.

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002

Ponte, S., 2002. The 'Latte Revolution'? Regulation, markets and consumption in the global coffee chain. World Development 30 (7), 1099–1122.
Pretty, J.N., Morison, J.I.L., Hine, R.E., 2003. Reducing food poverty by increasing agricultural sustainability in developing countries. Agriculture, Ecosystems and Environment 95 (1), 217–234.
Raynolds, L.T., Murray, D., Heller, A., 2007. Regulating sustainability in the coffee sector: a comparative analysis of third-party environmental and social certification initiatives. Agriculture and Human Values 24 (2), 147–163.
Sánchez, G., Olguín, E.J., Mercado, G., 1999. Accelerated coffee pulp composting. Biodegradation 10 (1), 35–41.
Trewavas, A., 2004. A critical assessment of organic farming and food assertions with particular respect to the UK and the potential environmental benefits of no-till agriculture. Crop Protection 23 (9), 757–781.
Tinker, P.B., 1997. The environmental implications of intensified land use in developing countries. Philosophical Transactions of the Royal Society of London B. doi:10.1098/rstb.1997.0080.
UNCTAD/WTO, 2008. The Coffee Guide. www.thecoffeeguide.org. Accessed on August 12th, 2008.
Valkila, J., Nygren, A., 2009. Impacts of Fair Trade certification on coffee farmers, cooperatives and laborers in Nicaragua. Agriculture and Human Values. doi:10.1007/s10460-009-9208-7.
van der Vossen, H., 2005. A critical analysis of the agronomic and economic sustainability of organic coffee production. Experimental Agriculture 41 (4), 449–473.

Please cite this article as: Valkila, J., Fair Trade organic coffee production in Nicaragua — Sustainable development or a poverty trap? Ecological Economics (2009), doi:10.1016/j.ecolecon.2009.07.002