Performance in the Production of Organic, Biofertilized and Conventional Guava in Zitacuaro´s Region, Michoacan, Mexico

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Abstract

The organic market is growing at a steady pace of 20 percent annually; this farming method can bring several advantages to the consumers and also to the farmers. Among other things organic farming does not have to rely on access to external inputs such as fertilizer and pesticides because the farmers make use of their own resources. This not only represents a friendlier environment to the farmer or the land but also can be cheaper. The aim of this study is to find out the yield differential between three productions systems (organic, biofertilized and conventional) of guava crops in Zitacuaro, Michoacan, Mexico.

The results indicated that the most profitable crop in terms of production costs and profits on Zitacuaro´s region is the biofertilized crop that takes up the sustainable practices combined with conventional practices in a lesser proportion. While organic and conventional crops shows a slide difference between them.

Keywords: Profitability, Yield, Regional production systems, Cost-benefit, Sustainability

1. Introduction

There is a strong trend towards the consumption of friendly products to the environment. The tendency of consumers around the world has been changing. The demand for healthier products has increased substantially in recent years; among these products include the strong demand for organic products. The main consumers of these products are the development countries such as U.S, Japan, Canada and European Union´s economies (Gomez, L. *et al*., 2001).

The demand for organic products has seen annual growth of 32 per cent and is expected that the consumption of organic products continue to rise in coming years (CIESSTAM, 2001, 2005). Over these years, the organic food sector underwent a transformation; by the time retail sales reached $21.1 billion usd in 2008, structural changes had revamped organic food marketing (Nutrition Business Journal, 2009).

Mexico has not lagged behind in this trend because nowadays some fraction of farmers begin to use different technologies to conventional farming, either partially or completely suppressed chemical inputs and allowing the introduction to the organic system. These products can be found crops such as coffee and avocado (FIRA, 2003). However there is a wide variety of products that begin to be cultivated by following these trends, as is the case of

Michoacan guava.

It is noteworthy that the province of Michoacan is currently the first producer of guava in Mexico with a share of the domestic production of 40 per cent of national production and harvested area of 8 726 tons with a growth rate of over 18 per cent in the last five years Susupuato, Juárez, Jungapeo, Tuxpan and Zitácuaro. These municipalities were selected for the research.

It is important that prior implement and promote a change on harvest in the province of Michoacan from the conventional agricultural system to an organic one is necessary know the yield differential between the different production system mentioned including the biofertilized (Note 1). In order to gives an accurate guidance to producers and decision makers being this the objective of this study.

The tool used in order to accomplish the objective is the Policy Analysis Matrix (PAM). This methodology has been applied to several countries (Barichello *et al.*, 1998; Yao, 1997; Yao & Tinprapha, 1995; Nelson & Panggabean, 1991) because this methodology can show the profitability differential of each type of crops pointing out the possible problems on the production process.

2. Research Methods

In many countries have been defining food securities as grain security, bringing policymakers' active interference in grain markets and trade (Crook, 1997, 1999). The Policy Analysis Matrix (PAM) is methodology provides a tool for identifying the problems of the production process, with a systematic vision, stretching from the inputs obtaining until the product finally reaches the consumer's hands, this matrix allows us to measure effects on the economy and the effects of the economy in the production system; so it is useful for producing agents, implementers and decision makers (Monke & Pearson, 1989) and (Pearson *et al.*, 1991).

To construct the matrix, costs are classified in tradable and nontradable inputs. Economic valuation of the prices of the internal factors is done on the basis of respective opportunity costs, with the aim of estimating the values of scarcity that represent the net lost income, because the factor is not oriented towards its better alternative use (Hernandez, García, Valdivia & Omaña, 2004).

2.1 Accounting entities of the PAM

In the PAM are provided two accounting entities:

1) Earnings are measured as the difference between revenue and production costs.

$$Ganancias = \sum P_i X_i - \left[\sum P_j Y_j + \sum P_k Z_k\right]$$

Where:
Pi: price of product in the domestic market.
Xi: number of tons produced per hectare.
Pj: price of tradable inputs in the domestic market.
J: number of tradable and indirectly tradable inputs applied per acre.
Pk: price of domestic factors in the domestic market.
Zk: number of internal factors applied per acre.
The first accounting identity represented by $\sum P_i X_i$ (price of the product by the number of tons produced per hectare) represents the producer's income received by harvest a given product, and the second identity represented by $\sum PjYj + \sum PkZk$ (the sum of the price of tradable inputs by number of tradable inputs and the prices of domestic factors by the number of internal factors, everything in domestic prices) presents the costs borne by the producer in order to reap certain product (Kray, 2002) and (Winter and Aggrey, 2008) .

2) Measures the effects of policy and market distortions and is determined by the differences between the private evaluations, i.e. income, gains and costs incurred by the producer, and the economics of revenues, costs and profits (Ramanovich, 2002).

It is important to point out that this paper focus on the first accounting entity, corresponding with the valued at private prices. In order to get the information it was apply a questionnaire to the 80 per cent of the farmers of the region being in total 147 interviews. This stage of the research starts on october 2008 and finish early 2009.

3. Analysis Result

With the purpose of find out the profitability differential between the different production system the analysis of the results obtained is divided in five subsections the first one show the production per tree, the second one the average yield, the third one the cost of tradable inputs, the fourth the cost of internal factors and the fifth one the cost-benefit relation for the three methods of farming (organic, biofertilized and conventional).

3.1 Production per tree

The results shown (figure 1) that the average productions per tree are the highest in biofertilized crops, followed by the production per tree of conventional crops.

Organic guava crops show the lower average production for each tree; this production is comparatively lower compared to conventional crops in a 10.14 per cent and 29 per cent lower than production under biofertilized technique.

3.2 Avarage yield of guava production

Analyzing the yields obtained by crop type can be seen that on average the lowest yield is obtained from organic production is 13.2 tons per hectare, followed by conventional production 18.8 tons/ha. The crop with the highest yield is the biofertilized with a production of 22 tons per hectare. These results show that the guava production is lower in organic farming being 5.6 kg less than conventional farming and 8.8 lower than biofertilized farming. It is important to point out that on average in conventional or traditional farming there are 336 trees planted per hectare while in biofertilized and organic the planted trees per hectare are only 300.

3.3 Cost of tradable inputs by type of crops

The cost structure according to the PAM is divided into tradable inputs costs and internal factors cost.

Tradable inputs cost consists on costs of fertilizers, pesticides, supplies to fight plants disease and eliminate the weeds. It is important to note that herbicides were not counted because the population of the region that uses them is a very small fraction, being the brush cutters the most common method used.

The bigger spend on tradable inputs is occupied by the conventional crops, followed by biofertilized crops, so the organic farming is the one that have the lowest cost on tradable inputs. There is an important differences between the three types of crops in terms of tradable inputs as it show the figure 3, were the amount between organic farming and traditional farming is more than half.

3.4 Cost of internal factors by type of crops

The internal factors cost compose three items pruning, irrigation and harvesting, where the main factors are labor and water, regarding pruning and irrigation areas there were no technological differences.

In figure 3, can be seen that the cost of international factors once again the lowest costs is occupied by the organic crops with almost have the cost on biofertlized and conventional crops. The biofertlized and conventional crops cost in this items are almost the same being a little more expensive the biofertilized crops.

3.5 Cost-benefit relation

The cost/benefit relation could be the most important data in terms of profitability and gives a closer picture of the differences between the different technologies in the cultivation of guava, and which one is the most beneficial financially.

According to the data the results show (Figure 5) a big difference between each type of production. The most profitable type of production, with a clear advantage is the biofertilized production with 5.65 points, while organic and conventional crops shows a slide difference with values of 3.45 and 3.75 respectively. These results indicated that the most profitable crop in terms of production costs and profits of the farmer for the case of Zitacuaro region on the state of Michoacan is the crop that takes up the sustainable practices combined with conventional practices in a lesser proportion but without a complete elimination.

Worth noting that the organic farmers are not getting the premium paid by the final consumer at a premium ranging above conventional products by the cultivation of guava, factor that could be key for future conversion.

4. Discussion

Agricultural development can no longer do without sustainability. The different approaches to Sustainable Agriculture focus on: 1.giving greater consideration to the environment in agriculture, 2.reducing external input (but not generally rejecting chemicals in all cases), and 3.usually, an integration of local elements (Misereor, 1995, 2003).

Many factors have to be considered when comparing organic and conventional farming. Area productivity as a conventional measure is not meaningful on its own. There is plenty evidence in the literature review (Rosset, 1999), (Rosen, S. & Larson, B.A., 2000), (Röhm, O. & Dabbert, S., 1999), (FAO, 2002) y (UNDP, 1992) of yield increases having been attained with organic farming. However, in most cases, and in all local conditions, increases in income have been recorded for poor smallholders thanks to using local resources and not having to rely on expensive external means of production decreasing the cost of tradable inputs as is the case of the present work.

Pimentel, Hepperly, Hanson, Douds and Seidel (2005) analyzed the environmental, energy and economic costs/benefits of growing soybeans and corn organically versus conventionally the study found that organic farming produces the same yield of corn and soybeans as does conventional farming, but uses 30 percent less energy, less water and no pesticides.

Some other works point out that farmers expend more in labor intensive, since farmers avoid chemical fertilizers, pesticides and herbicides relying on hand weeding for example, where the crop yield is usually lower being the production cost more expensive in the short term (Alvarez, 2008).

In the case of the present study in the short term the most profitable type of production is the biofertilized. This type of farming use sustainable practices and conventional ones. The results also show that the organic farming is cheaper in terms of tradable inputs cost this because the farmers instead of using external inputs use local resources like compost, labor work, etc. Being this an important factor of competitiveness when the international prices are increasing constantly and events as the present crisis could affect the stability of the crops yield. However the production per tree in the research area is lower than the biofertilized and conventional crops. This could represent a discourage to convert the crops into a more sustainable farming but the final results show in the cost-benefits relation that the sustainable practices and the reduction of the use of chemicals increase the profitability in guava crops of Michoacan, Mexico.

In the long run, organic farming can offers advantages compared to conventional farming because it not only promises higher yields but also ensures higher yield security, reduces dependence on external input and thus makes poor households less crisis-prone. However an important factor to achieve the increase on profits is that the farmers be able to get a good selling price instead of see how the brokers perceive all the yields.

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Note

Note 1. Biofertilized is term used for crops that implement sustainable practices and reduce the chemicals partially.

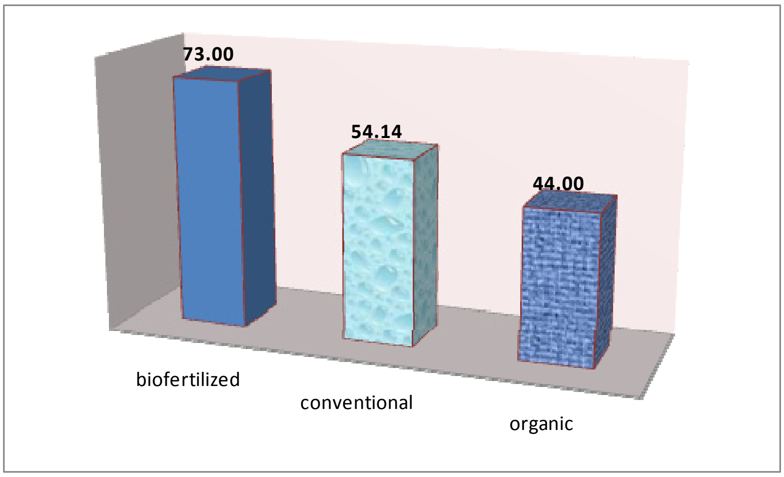

Figure 1. Production per tree (avarage in kilograms)

Source: Authors´s calculations based on data obtained from questionnaires

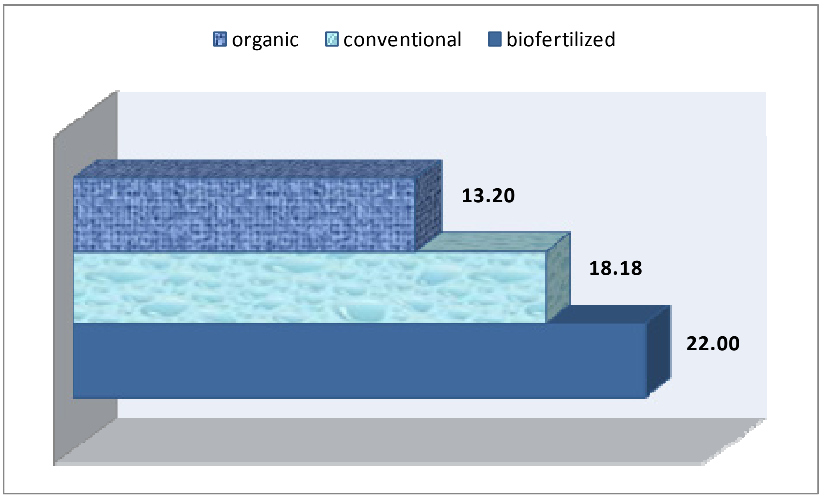

Figure 2. Avarage yield of guava production by crop type (Ton/ha)

Source: Authors´s calculations based on data obtained from questionnaires

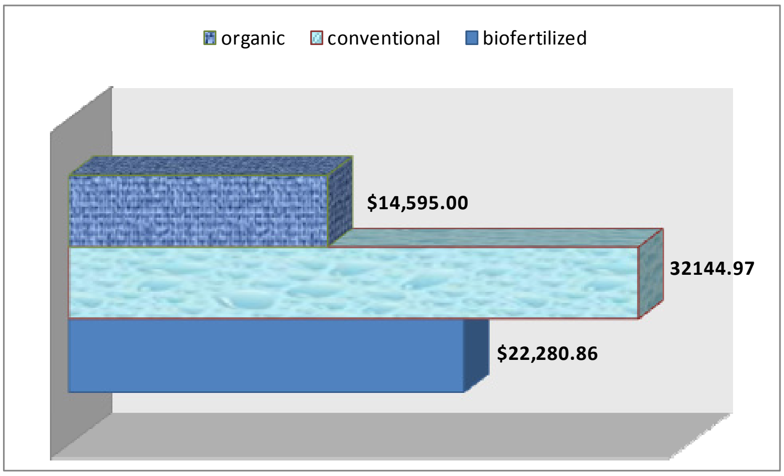

Figure 3. Cost tradable inputs type of crops (per hectare)

Source: Authors´s calculations based on data obtained from questionnaires

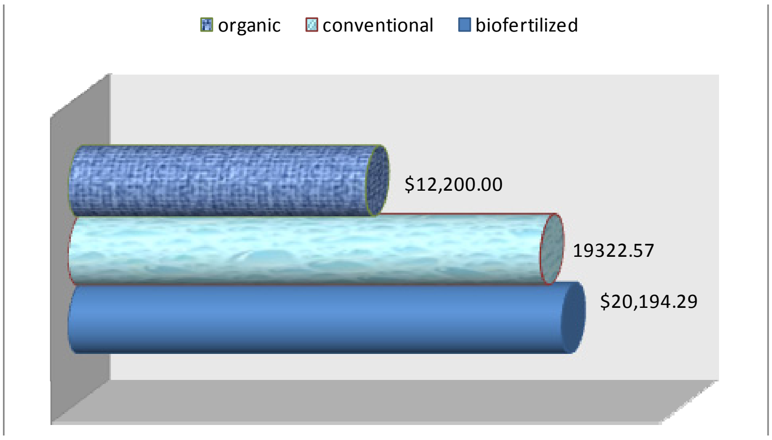

Figure 4. Cost per hectare internal factors by type of crops

Source: Authors´s calculations based on data obtained from questionnaires

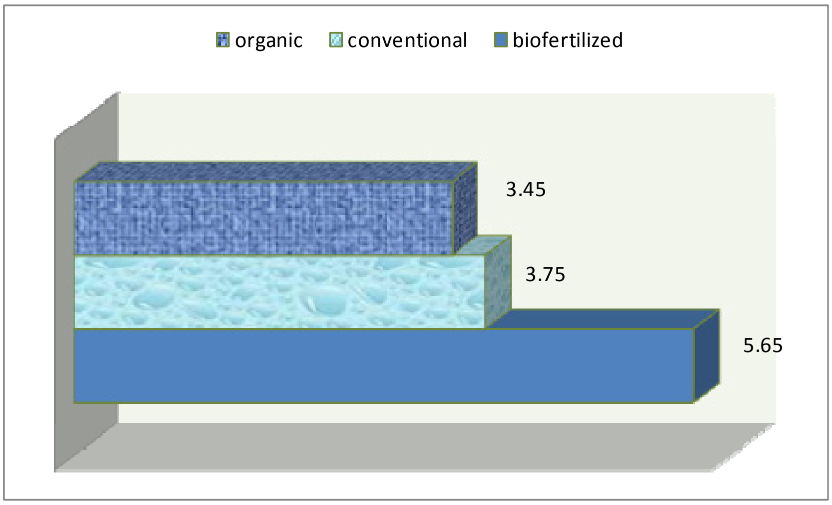

Figure 5. Cost-benefit relation by type of crop

Source: Authors´s calculations based on data obtained from questionnaires