# Competitiveness of Organic Vegetables in International Markets: Analysis of two Costa Rican Cases

**Pedro Cussianovich**
**IICA Representative in Costa Rica**

*Supporting the Diversification of Exports in the Caribbean / Latin American Region through the Development of Organic Horticulture.*

- Background
- Criteria for case selection

# *The case of broccoli*

- Area planted:
  - Organic farm: 2,500 $m^2$
  - Conventional farm: 10,000 $m^2$ (1 Ha.)
- Price:
  - In both cases, it was estimated at US$0.504/kg; however, in the case of conventional broccoli, it fluctuated between US$0.336/ kg and US$0.462/kg
- Social taxes:
  - Estimated at 26% of the cost of labor
- Cost of funding:
  - Cost of funding was estimated at 6% for a three-month production cycle

# *Broccoli:* One Hectare Operation

## Comparative Costs (US$[1/])

| | Organic | Conventional | Org/Conv (%) |
|---|---|---|---|
| Labor Costs | 837.07 | 693.88 | 20.64 |
| Material Costs | 1,077.31 | 583.41 | 84.66 |
| Other Costs | 371.18 | 236.09 | 57.22 |
| **Total Costs** | **2,285.56** | **1,513.38** | **51.02** |
| | | | |
| Cost per Kg. | 0.112 | 0.106 | 5.66 |
| Price per Kg. | 0.504 | 0.504 | |
| Production per Ha (Kg.) | 20,400 | 14,250 | 43.16 |
| | | | |
| Gross earnings | 10,281.60 | 7,182.00 | 43.16 |
| Net earnings (profitability) | 7,996.04 | 5,668.62 | 41.06 |
| | | | |
| Hand-labor costs[/2] | 978.90 | 761.71 | 28.51 |
| Conservation labor costs | 475.73 | 211.68 | 124.74 |
| Pesticide application costs | | 132.30 | |
| Fertilizer application costs | 144.24 | 52.92 | 172.56 |
| Fertilizer costs | 882.30 | 143.69 | 514.03 |
| Other chemicals costs | | 177.22 | |
| | | | |
| Hand-labor costs / Total costs (%) | 42.83 | 50.33 | (14.90) |
| Conservation costs / Total costs (%) | 20.81 | 13.99 | 48.75 |
| Fertilizer costs / Total costs (%) | 44.91 | 12.99 | 245.73 |

**NOTES:**

1/ Exchange rate: 1US$ = ₡238,02.

2/ Includes social taxes..

# *The case of **cassava***

- Area planted:
  - Organic farm: 3,000 $m^2$
  - Conventional farm: 20,000 $m^2$ (2 Ha.)
- Price:
  - In both cases, it was estimated at US$0.228/kg; however, in the case of conventional cassava it was US$0.274/kg
- Social taxes:
  - Estimated at 26% of the cost of labor
- Cost of funding:
  - Estimated cost of funding for a nine-month prdoduction cycle was estimated at 18%.
- In the comparison of labor costs, in the case of organic production the cost of harvesting and packaging was left out.

# *Cassava:* One Hectare Operation

## Comparative Costs (US$/1)

| | Organic | Conventional | Org/Conv (%) |
|---|---|---|---|
| Labor Costs | 722.19 | 322.99 | 123.60 |
| Material Costs | 71.40 | 131.02 | (45.50) |
| Other Costs | 333.18 | 167.28 | 99.18 |
| **Total Costs** | **1,126.77** | **621.29** | **81.36** |
| | | | |
| Cost per Kg. | 0.044 | 0.068 | (35.29) |
| Price per Kg. | 0.228 | 0.228 | |
| Production per Ha (Kg.) | 25,484.0 | 9.200.0 | 177.00 |
| | | | |
| Gross earnings | 5,810.35 | 2,097.60 | 177.00 |
| Net earnings (profitability) | 4,683.58 | 1,476.31 | 217.25 |
| | | | |
| Hand-labor costs/2 | 581.92 | 351.39/3 | 65.61 |
| Conservation labor costs | 169.24 | 84.67 | 99.88 |
| Pesticide application costs | | 41.29 | |
| Fertilizer application costs | 150.70 | 44.45 | 239.03 |
| Fertilizer costs | 71.40 | 73.76 | (3.20) |
| Other chemicals costs | | 57,24 | |
| | | | |
| Hand-labor costs / Total costs (%) | 51.64 | 56.56 | (8.70) |
| Fertilizer costs / Total costs (%) | 19.71 | 19.03 | 3.57 |
| Conservation costs / Total costs (%) | 15.02 | 13.63 | 10.20 |

**NOTES:**

1/ Exchange rate: 1US$ = ₡238,02.

2/ Includes social taxes..

3/ Value of harvest was deducted for comparability.

# *Main conclusions*

- The cases discussed allow us to reach the following conclusions:
  - Organic agricultural practices are more competitive in local markets than conventional agricultural practices, despite higher costs of production.
  - Organic production is more expensive than conventional production, but it is also more profitable.
  - In the cases discussed, there is no reason for organic products to be more expensive than conventional products.

| | COSTS Org/Conv | PROFITABILITY Org/Conv |
|---|---|---|
| Broccoli | 51.02% | 41.06% |
| Cassava | 81.36% | 217.25% |

# *Main conclusions*

- Greater competitiveness of organic products is explained to a large extent by higher levels of productivity in this activity (production/hectare). This productivity manifests itself through greater density of planting (plants/hectare), as in the case of broccoli, or higher yields per plant (weight/plant), as in the case of cassava.

| | **Productivity Org/Conv** |
|---|---|
| Broccoli | 43.16% |
| Cassava | 177.00% |

# *Main conclusions*

- Cost of labor is not necessarily the highest cost in organic production. What is true is that organic production requires more labor than conventional production.

| | Labor force employed | | | Cost of labor/ Total Cost | |
|---|---|---|---|---|---|
| | Organic (m.h.) | Conventional (m.h.) | Org/Conv (%) | Organic (%) | Conventional (%) |
| Broccoli | 746 m.h. | 584 m.h | 27.74% | 42.83% | 50.33% |
| Cassava | 503 m.h | 332 m.h | 51.51% | 51.64% | 56.56% |

**NOTE:** To ensure comparability of labor in cassava production, in the case of organic production harvesting activities are not included.

# *Main conclusions*

- Based on the greater local-market competitiveness of the organic products discussed, we may infer that organically developed products are also more competitive in international markets. However, to make this statement the following assumptions are required:

  - That there is a well-defined international market for those products (broccoli and cassava).

  - That the conventional products discussed show competitiveness in those markets.

# *Main conclusions*

- That post-harvest handling and processing costs are the same for organic and conventional products. This would involve the existence of post-harvest handling and processing techniques which do not lead to those products no longer qualifying as organic, and that their cost is the same or less than for conventional products.

- That transport, shipping, and insurance costs are the same for organic and conventional products.

- Competitiveness of organic products in international markets should increase insofar as there is a well-defined market with differentiated prices.

# *Impact on Employment*

- Workers employed

| Indicator | Persons |
|---|---|
| Labor force (LF) of the Costa Rican agricultural sector 1996 | 259.000 |
| LF*1.277 | 330.743 |
| Additional expected LF | 71.743 |
| Rural unemployment | 39.918 |
| Total unemployment | 75.963 |
| | |

# *Final Remarks*

- Based on the cases discussed and results obtained, evidently it is possible to attain greater competitiveness of organic products vis-a-vis conventional ones. However, these results should be considered reference data. One must take into account that organic agriculture does not apply a "technological package", and therefore specific experiences cannot be replicated overnight. Competitiveness attained in this activity increases gradually as relations with Nature are rediscovered and replicated in productive activities.

# *Final Remarks*

- In light of what has been said, competitiveness shown for cases discussed can be matched or improved upon by other producers. This will depend on farm management levels, and especially those of the soil, as well as resources available to the producer and economies of scale which can be attained.

# ANNEXES

# Annex 1

Broccoli: Operation costs for the production of one organic hectare. Density: 40,000 plants. (US$)

| Concept | Units | Amount | Price | Cost |
|---|---|---|---|---|
| **A. Labor** | | | | |
| Seed bed preparation | | 21 | 1.06 | 22.26 |
| Seed bed attention | L.h. | 31.5 | 1.06 | 33.39 |
| Transplants preparation | L.h. | 8 | 1.06 | 8.48 |
| Transplants carrying | L.h. | 5 | 1.06 | 5.30 |
| Cutting the grass | L.h. | 60 | 1.06 | 63.60 |
| Rasping | L.h. | 80 | 1.06 | 84.80 |
| Fertilizer transportation | L.h. | 28 | 1.06 | 29.68 |
| Fertilizers | L.h. | 80 | 1.06 | 84.80 |
| Shoveling | L.h. | 66 | 1.06 | 69.96 |
| Shoveling (m.e) | L.h. | 7.6 | 7.14 | 54.26 |
| Sowing | L.h. | 125 | 1.06 | 132.50 |
| Hilling around | L.h. | 99 | 1.06 | 104.94 |
| Crops | L.h. | 108 | 1.06 | 114.48 |
| Carrying | L.h. | 27 | 1.06 | 28.62 |
| **Total Labor** | | | | **837.07** |
| | | | | |
| **B. Materials** | | | | |
| Seeds | 1.000Units | 43.01 | 3.57 | 153.55 |
| Seed bed fertilizers | Kg. | 492 | 0.08 | 39.36 |
| Water | Lt. | | | 2.10 |
| Fertilizers | Mt. | 30 | 29.41 | 882.30 |
| **Total Material** | | | | **1,077.31** |
| | | | | |
| **C. Others** | | | | |
| Transplant transportation | | 7 | 0.48 | 3.36 |
| Fertilizers transportation | | 41 | 0.48 | 19.68 |
| Carrying Transportation | | 21 | 0.48 | 10.08 |
| Certification | | | | 12.60 |
| Social Security (26%labor force) | | | | 196.09 |
| Financial Cost (6% operationcost) | | | | 129.37 |
| **Total Others** | | | | **371.18** |
| | | | | |
| **TOTAL** | | | | **2,285.56** |

**Symbols:**
L.h. = Labor hour
Lt. = Liter
Mt. = Metric tons

**Source: Prepared by Author.**

# Annex 2

Broccoli. Costs for the production of one conventional hectare. Density: 25,000 plants. (US$)

**Source: Prepared by Author.**

| Concept | Units | Amount | Price | Cost |
|---|---|---|---|---|
| **A. Labor** | | | | |
| Calcium application | L.h. | 5 | 1.05 | 5.25 |
| Breaking up new ground | T.h. | 4 | 20.17 | 80.68 |
| Shoveling | L.h. | 40 | 1.05 | 42.00 |
| Plants transportation | L.h. | 5 | 1.05 | 5.25 |
| Transplant | L.h. | 60 | 1.05 | 63.00 |
| Fertilization | L.h. | 40 | 1.05 | 42.00 |
| Hilling around | L.h. | 120 | 1.05 | 126.00 |
| Pesticide application | L.h. | 100 | 1.05 | 105.00 |
| Crops | L.h. | 214 | 1.05 | 224.70 |
| **Total Labor** | | | | **693.88** |
| | | | | |
| **B. Materials** | | | | |
| Plants | 1,000 Units | 25 | 10.50 | 262.50 |
| Calcium | qq | 10 | 2.02 | 20.20 |
| Fertilizers | bags | 7 | 13.44 | 94.08 |
| Folifort | GL | 1 | 21.01 | 21.01 |
| Ecoun | GL | 1 | 29.41 | 29.41 |
| Disis 500 cc | Lt. | 1 | 13.28 | 13.28 |
| Tocutión | Lt. | 1 | 20.46 | 20.46 |
| Javelin | packets | 5 | 8.40 | 42.00 |
| Benlate | packets | 3 | 3.87 | 11.61 |
| Kilol | Lt. | 2 | 13.86 | 27.72 |
| Lazo | Lt. | 1.5 | 11.18 | 16.77 |
| Calcium compresal | Lt. | 1.5 | 8.40 | 12.60 |
| Adherent | Lt. | 1 | 8.40 | 8.40 |
| PH controller | Kg. | 0.5 | 6.72 | 3.36 |
| **Total Materials** | | | | **583.41** |
| | | | | |
| **C. Others** | | | | |
| Seed bed | | 4 | 0,48 | 1,92 |
| Social Security (26% labor force) | | | | 148,51 |
| Financial Costs (6% operation costs) | | | | 85,66 |
| **Total Others** | | | | **236.09** |
| | | | | |
| **TOTAL** | | | | **1,513.38** |

**Symbols:**
L.h.= labor hour
T.h.= tractor hour
Lt.= Liter
GL= Gallon
Kg. = Kilogram
qq= Quintal

# Annex 3

Cassava. Operation costs for the production of one organic hectare. Density: 8,500 plants. (US$)

| Concept | Unit | Amount | Price | Cost |
|---|---|---|---|---|
| **A. Labor** | | | | |
| Soil preparation | L.h. | - | - | - |
| Raking | T.h. | 2 | 42.01 | 84.02 |
| Hilling around | T.h. | 1 | 42.01 | 42.01 |
| Seeds preparation | L.h. | 84 | 0.92 | 77.28 |
| Sowing | L.h. | 142 | 0.92 | 130.64 |
| Organic fertilizer preparation | L.h. | 10 | 0.92 | 9.20 |
| Organic fertilizer application | L.h. | 120 | 0.92 | 110.40 |
| Cutting the grass | L.h. | 146 | 0.92 | 134.32 |
| Cropping. packing | L.h. | 146 | 0.92 | 134.32 |
| **Total Labor** | | | | **722.19** |
| | | | | |
| **B. Materials** | | | | |
| Animal blood | bags | 5 | 12.60 | 63.00 |
| Fruits fertilizer | | | | 8.40 |
| **Total Materials** | | | | **71.40** |
| | | | | |
| **C. Others** | | | | |
| Transport | | | | 6.30 |
| Social Security (26%labor force) | | | | 155.00 |
| Financial costs (18% operation costs) | | | | 171.88 |
| **Total Others** | | | | **333.18** |
| | | | | |
| **TOTAL** | | | | **1,126.77** |

**Symbols:**
L.h.= labor hour
T.h.= tractor hour

**Source: Prepared by Author.**

# Annex 4

Cassava. Operation costs for the production of one conventional hectare. Density: 9,500 plants. (US$)

| Concept | Unit | Amount | Price | Cost |
|---|---|---|---|---|
| **A. Labor** | | | | |
| Soil Preparation | L.h. | - | - | - |
| Raking | T.h. | 1.5 | 29.41 | 44.11 |
| Seeds preparation | L.h. | 95 | 0.84 | 79.80 |
| Sowing | L.h. | 62 | 0.84 | 52.08 |
| Fertilizer application | L.h. | 42 | 0.84 | 35.28 |
| Calcium application | L.h. | 9 | 0.84 | 7.56 |
| Pesticide application | L.h. | 27 | 0.84 | 22.68 |
| Fungicide application | L.h. | 12 | 0.84 | 10.08 |
| Leave fertilizer preparation | L.h. | 5 | 0.84 | 4.20 |
| Cropping | L.h. | 72 | 0.84 | 60.48 |
| Manual cutting sprouts | L.h. | 8 | 0.84 | 6.72 |
| **Total Labor** | | | | **322.99** |
| | | | | |
| **B. Materials** | | | | |
| Fusilade | GL | 0.5 | 37.81 | 18.91 |
| Randol | GL | 0.5 | 33.61 | 16.81 |
| Paraquat | GL | 0.5 | 16.39 | 8.20 |
| Danso | Lt. | 1 | 5.46 | 5.46 |
| 10-30-10 | qq | 2.5 | 16.39 | 40.98 |
| 15-3-31 | qq | 2 | 16.39 | 32.78 |
| Poliflor | Kg. | 1 | 2.10 | 2.10 |
| Calcium | qq | 2.5 | 2.31 | 5.78 |
| **Total Materials** | | | | **131.02** |
| | | | | |
| **C. Others** | | | | |
| Social Security (26% labor force) | | | | 72.51 |
| Financial costs (18%) | | | | 94.77 |
| **Total Others** | | | | **167.28** |
| | | | | |
| **TOTAL** | | | | **621.29** |

**Symbols:**
L.h.= Labor hour
T.h.= Tractor hour
Lt.= Liter
GL= Gallon
Kg. = Kilogram
qq= Quintal

**Source: Prepared by Author.**