Hivos

people unlimited

High Sequestration, Low Emission Organic Agriculture

Evidence from Costa Rica (CEDECO) and Cuba (INCA)

INCA
Instituto Nacional de Capacitación Agrícola

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AGRICULTURA ORGÁNICA:
RECUPERANDO EL FUTURO

This presentation

- Data comparing organic and conventional production as too greenhouse emissions (from CEDECO Costa Rica and INCA, Cuba)
  - Emissions from the soil
  - Energy efficiency
  - Carbon sequestration in the soil
- If you can measure it, can you also capitalise on it?

Greenhouse gases from cultivated Soils.

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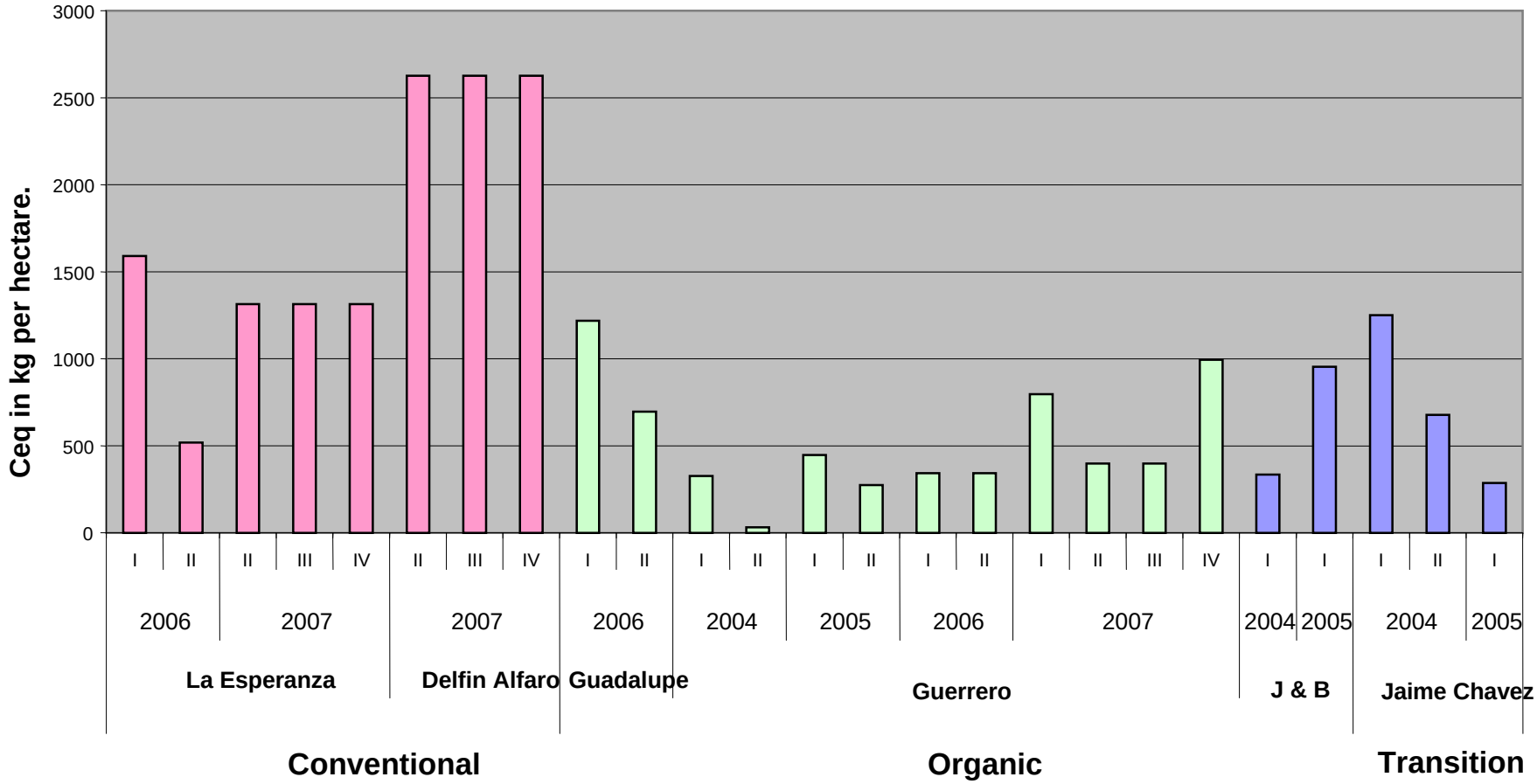
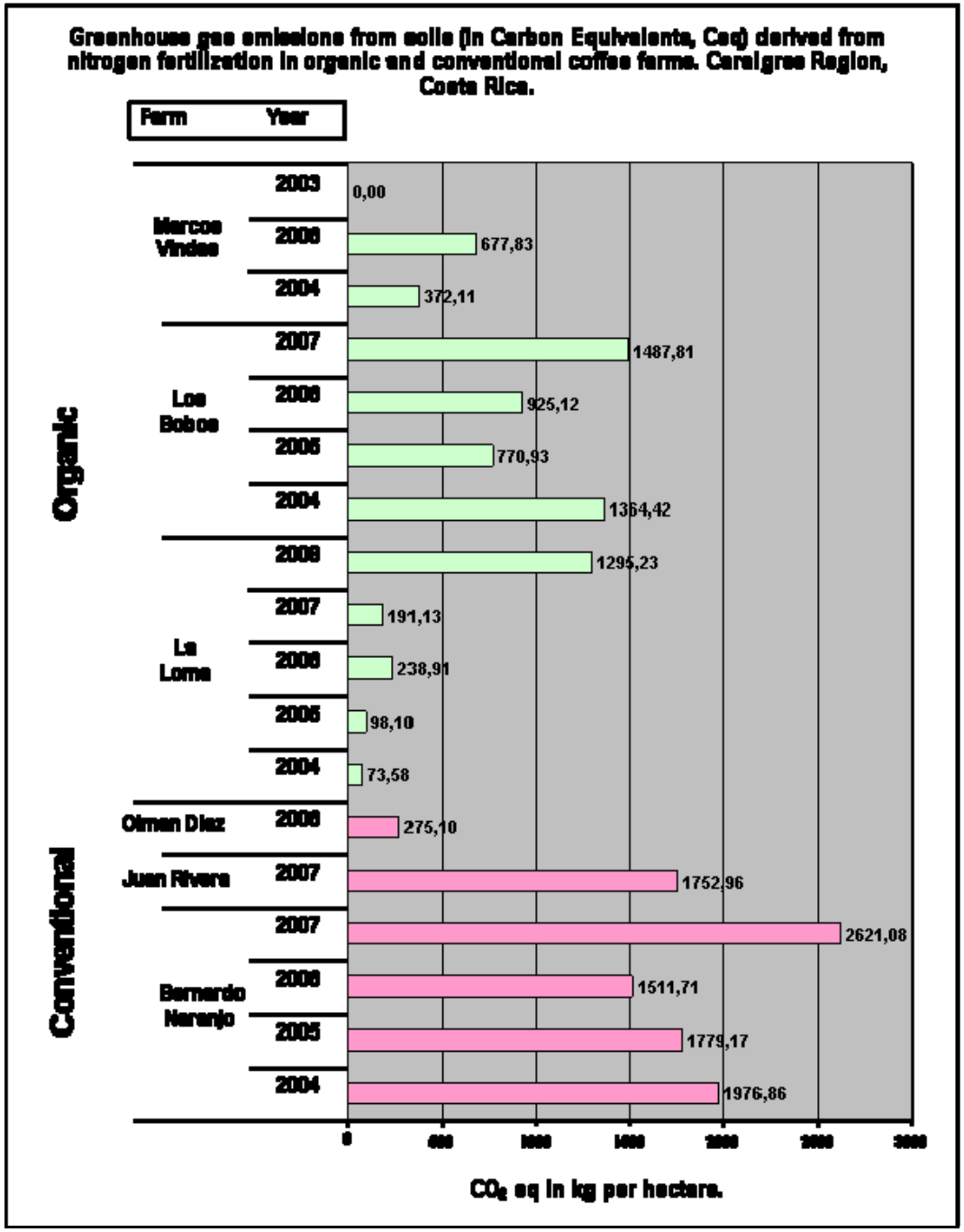
Greenhouse gas emissions from soils (in Carbon Equivalents, Ceq) derived from nitrogen fertilization in organic and conventional horticulture farms. Zarcero Region, Costa Rica.



Greenhouse gases from cultivated Soils.

Crop	Farm type	Mean of N2O / ha in kilograms	Mean of CO2 / ha in kilograms
Coffee	Organic	**2,42 a**	**716.14 a**
	conventional	**5,58 b**	**1652.81 b**



Averages emissions from the soil among 108 farms with varied product combinations in 8 provinces in Cuba

- Conventional farms emited on average 0,54 tCO2e/ha/year
- This is 6 times more than the average emissions from organic farms, basically related to chemical fertilising

Source INCA - PIAL

Energy Efficiency

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Statistic analysis of energy use variables to organic and conventional horticulture (Lettuce and Coriander) in Zarcero Region, Costa Rica.

Crop	Farm type	Total Production (Ton /ha)	Energy Production (Mcal / ha)	Protein's Productions (Kg. /ha)	Energetic cost of protein (Mcal / Kg.)	Energetic inversion (Mcal / ha)	Energetic Radio
Coriander	Transition	11.80 a	2714.00 a	2513.41 a	0.41 a	1026.18 a	**4.08 a**
	Organic	13.79 a	3175.54 a	3071.27 a	1.45 ab	5202.68 a	**2.50 b**
	Conventional	27.74 b	6379.74 b	5908.19 b	2.39 b	14794.59 b	**0.60 c**
Lettuce	Transition	68.54 a	11651.80 a	822.48 a	7.58 a	6560.27 ab	**4.09 ab**
	Organic	41.15 a	6995.16 a	493.78 a	8.01 a	3636.34 a	**4.93 a**
	Conventional	63.11 a	10729.16 a	757.35 a	26.42 a	20548.08 b	**1.10 b**

CEDEDCO 2008.

Energy Efficiency

Statistic analysis of energy use variables to organic and conventional coffee farms in Caraigres Region, Costa Rica.

Crop	Progress towards Organic Farming	Total production (Ton/ha)	Energy (Mcal/ ha)	Protein (kg /ha)	Protein energy costs (Mcal/kg)	Energy investment per ha (Mcal/ha)
Coffee	Organic	2.60 a	5.19 a	303.87 a	2.80 a	627.50 a
	Conventional	9.96 b	19.92 b	1165.54 b	11.10 b	12280.38 b

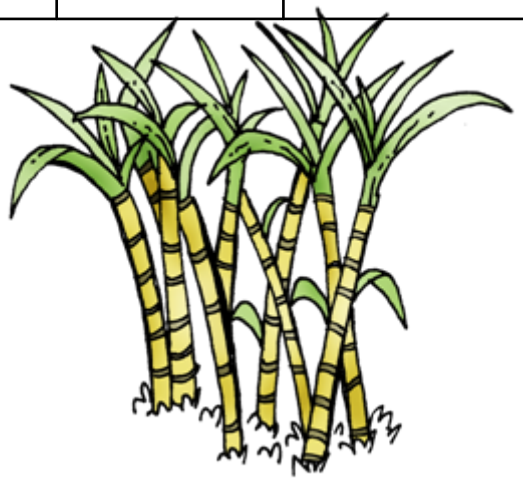
Production is 3.8 times higher, but the energy investment is almost 20 times higher

Energy Efficiency

Statistic analysis of energy use variables to organic and conventional sugar cane farms in San Ramon Region, Costa Rica.

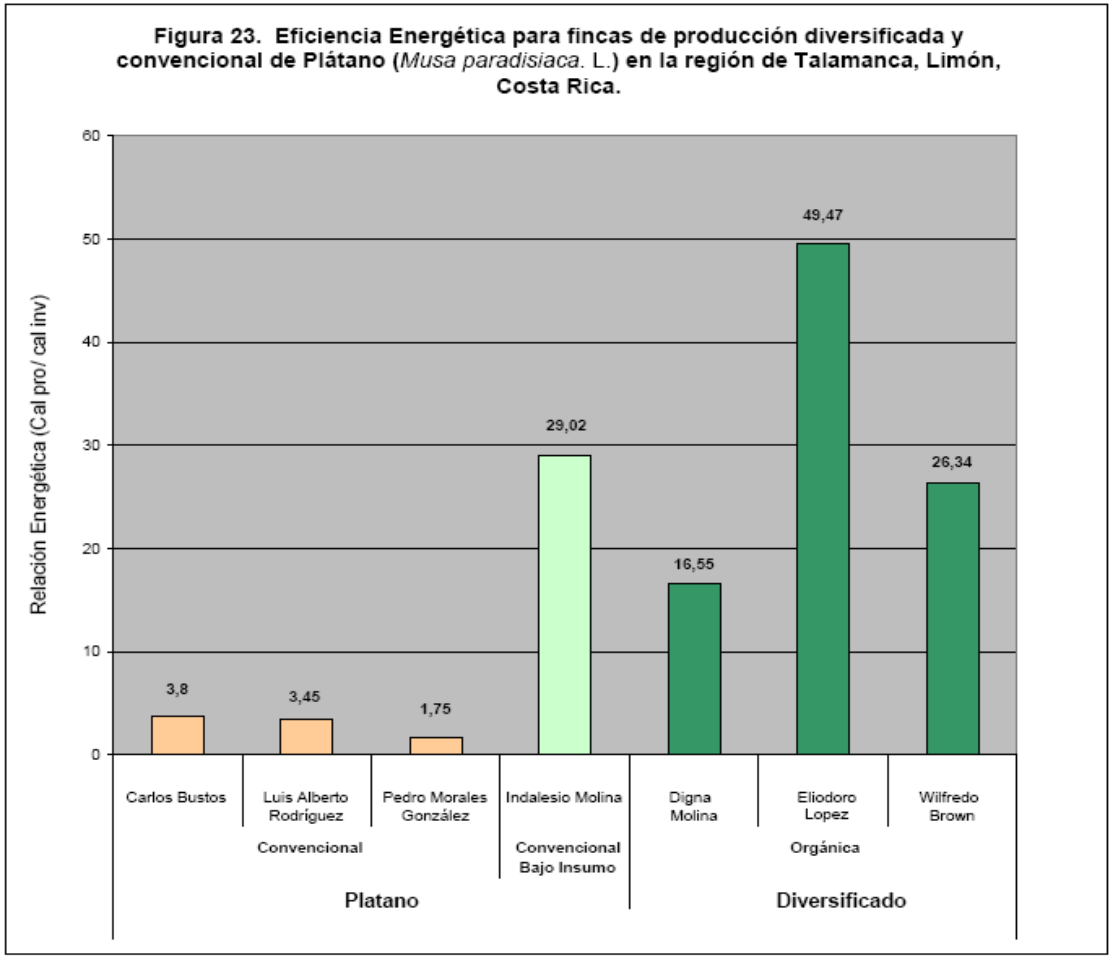
Crop	Progress towards Organic Farming	Total production (Ton/ha)	Energy (Mcal/ ha)	Protein (kg /ha)	Protein energy costs (Mcal/kg)	Energy investment per ha (Mcal/ha)	Energy relation
Sugar Cane	Organic	**26.44 a**	7562.4 a	1216.3 a	0.79 a	**1387.19 a**	**2.79 a**
	Conventional	**40.01 a**	11442.4 a	1840.4 a	2.72 b	**3497.24 a**	**10.10 b**

Production is 1.5 times higher, but the energy investment is 3.6 times higher



Bananas

Figura 23. Eficiencia Energética para fincas de producción diversificada y convencional de Plátano (*Musa paradisiaca*. L.) en la región de Talamanca, Limón, Costa Rica.



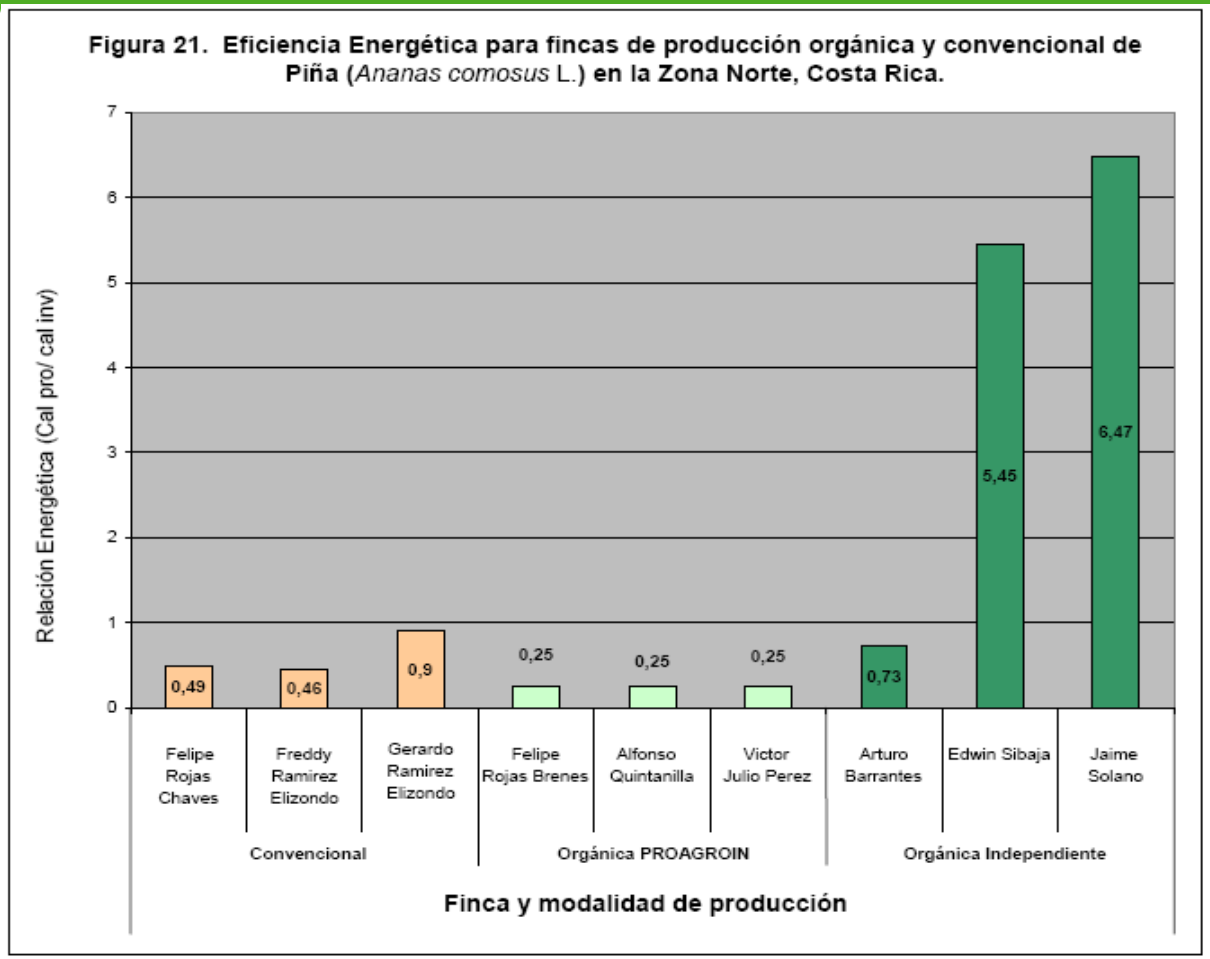
Emissions from the soil and Energy Efficiency averages among 108 farms with varied product combinations in 8 provinces in Cuba

	Average Emissions (tCO2e/ha/year)	Energy produced (Mcal/ha)	Energy efficiency
Organic	0,09	1391,8	4,4
Transition	0,19	4032,8	1,6
Conventional	0,54	3749,0	1,8

Production is 2.7 times higher, but the energy investment is 6.7 times higher

Source INCA – PIAL 2008

Energy Efficiency in Pineapple production Costa Rica



Energy Efficiency Discussion

As the last slide shows:

Energy efficiency is not only related to producing with or without chemical fertilisers

There is also a direct relation to mechanisation grade

Carbon fixation in soils.

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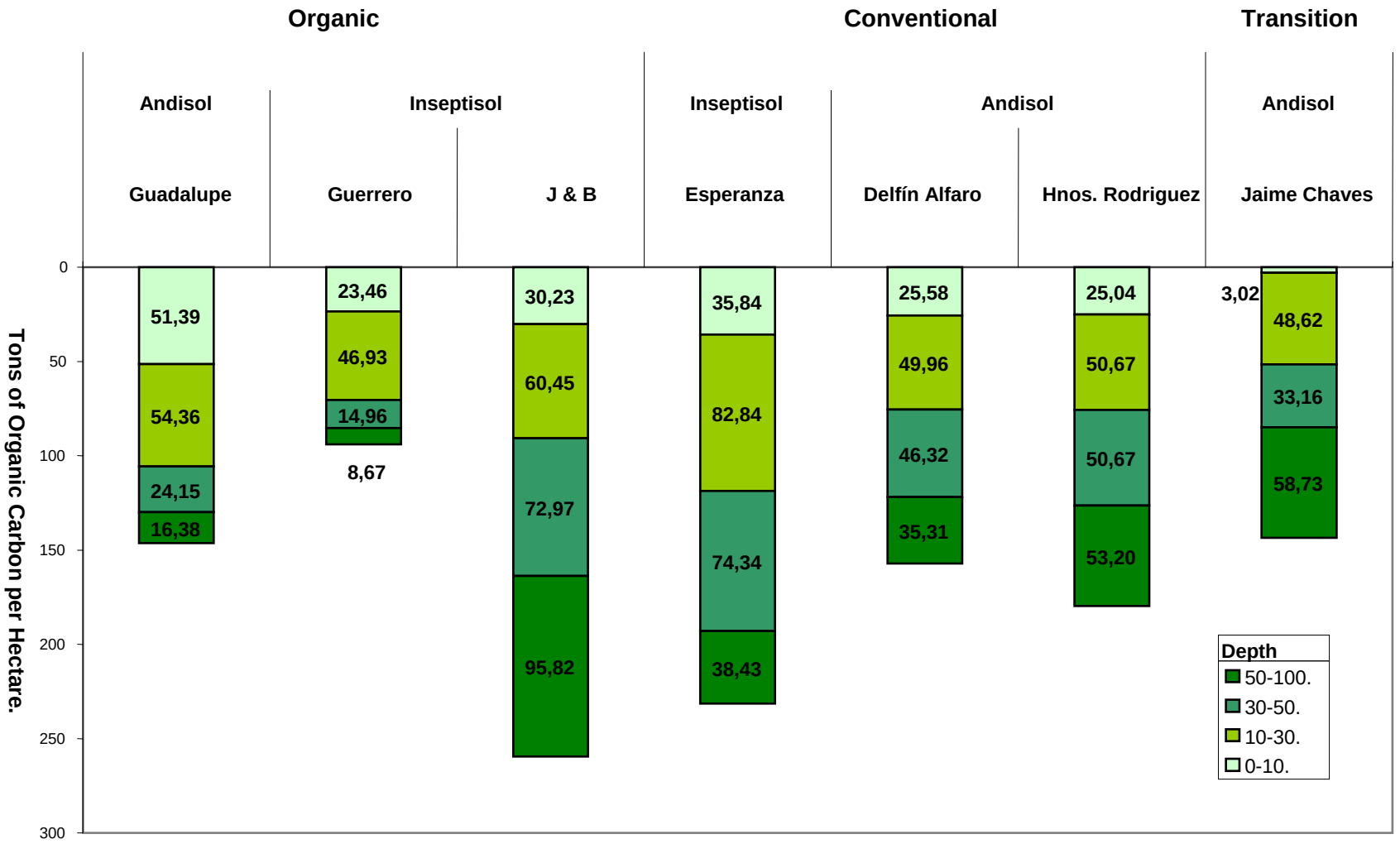
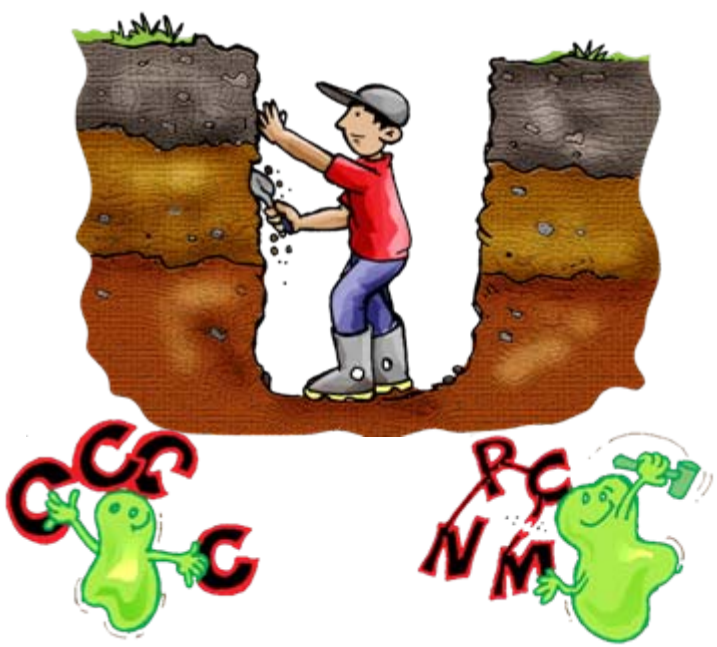
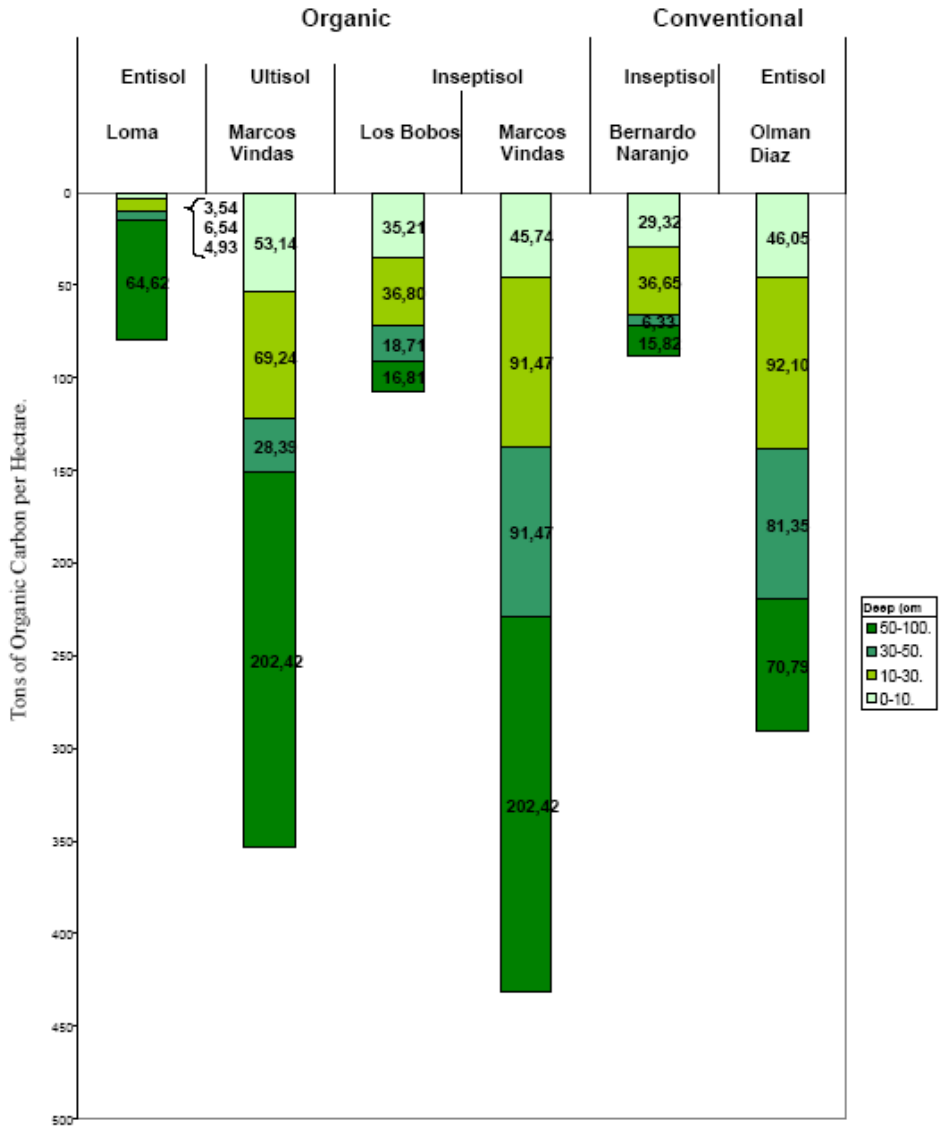
Distribution of organic carbon at four different depths for soils on farms producing organic, conventional, and transitional vegetables in the Zarcero region, Costa Rica. They are grouped by soil types.



Carbon fixation in soils.

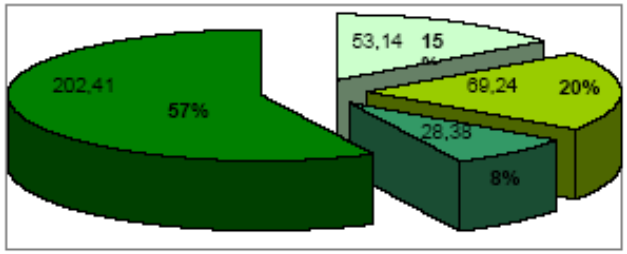


Distribution of organic carbon at four different depths for soils on farms producing organic and conventional coffee farms in the Caraigres region, Costa Rica. They are grouped by soil types.

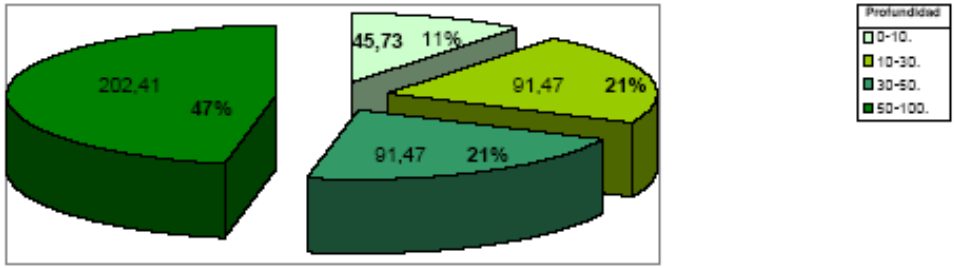


Distribution of organic carbon at four different depths for soils on farms producing organic and conventional coffee farms in the Caraigres region, Costa Rica.

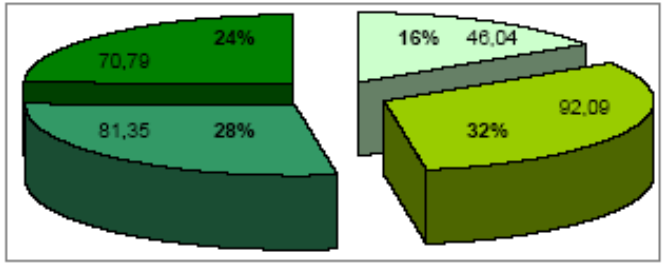
Farm Marcos Vindas. Organic coffee production. Sample point 22



Farm Marcos Vindas. Organic coffee production. Sample point 23



Farm Olman Diaz. Conventional coffee production. Sample point 21.



Interesting is that organic production gives higher volumes of carbon sequestration at higher dephts, where it is likely to remain longer

Carbon fixation in Soils Discussion

- Note that carbon fixation in soils is highly variable. It depends a lot on the type of soil
- Organic matter % in the soil rapidly decreases when it is not maintained with organic fertilising. In other words, it is not at all permanent

Can you make money out of this?

- There are no recognised methodologies at the UNFCCC for land use
- Could only qualify for voluntary market, but also there, the major certification schemes have no validated methodologies
- CEDECO developed such a methodology
- Problem is that soil emissions and sequestration are highly variable and to be sure, would have to be measured, which is very costly
- CEDECO decided to go for Payments for Environmental Services, doing conservative estimates, but based on carbon accounting

What does CEDECO propose?

For two farmers' groups energy efficiency, carbon fixed in the soil and yearly avoided emissions were calculated, arriving at

	APPTA	ASOPRODULCE
Avoided emissions (Energy Efficiency)	29,35	121,42
Avoided emissions (soil)	39,40	11,00
Carbon fixed	14.412	6.495

Based on such data a "Mitigation Unit" will be defined, which will be offered for sale for payments for environmental services.

It is a way to mobilise financial support towards organic agriculture

Thank you