



DiveCropS:
Diversifying Cropping Systems - Traditional knowledge and Innovative approaches
Diversificación de sistemas de cultivos - Conocimientos tradicionales y enfoques innovadores

PRIMER TALLER DE TRABAJO CONJUNTO


"Biodiversidad en sistemas agrícolas y forestales de Ecuador: experiencias para la sostenibilidad"


BIOL as substitute of fungicides
in the management of a
technified farm of cacao CCN-
51 in the Coast of Ecuador.

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Puyo, 05.11.19





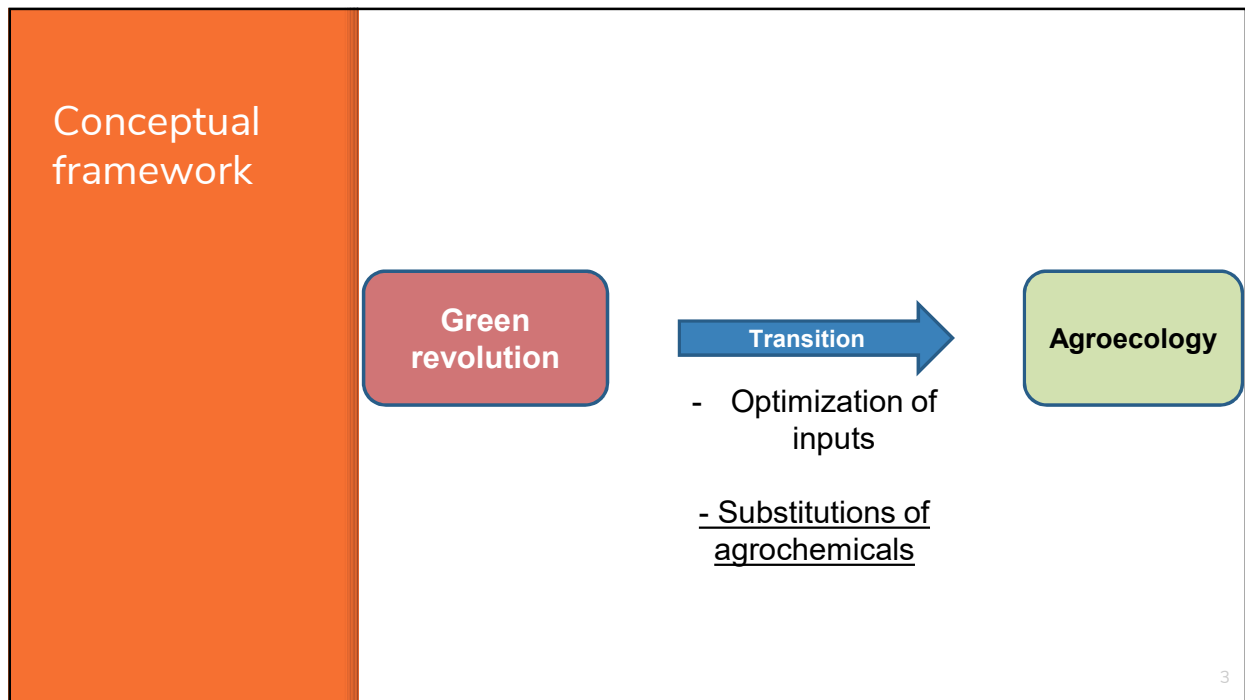


UNEMI, funded in 2001

- A small and regional Univ. at the Coast
- 10.000 students, classroom & on-line
- 29 undergraduate programm

SCIENCE & ENGINEERING FACULTY

- Biotechnology, Environmental, Eng., Food Eng.,
- Software Eng. & Industrial Eng.



Biogeographical areas of Ecuador

A map of Ecuador divided into three biogeographical regions: the Pacific Coastal Region (blue), the Andes Region (orange), and the Amazon Region (green). The map includes labels for neighboring countries, Colombia to the north and Peru to the east, and the equator (0°) passing through the center. A north arrow is located in the bottom right corner.

Site of experiments at Hacienda San Rafael (HSR)

A satellite map from Google Earth showing the location of Hacienda San Rafael (HSR) and Universidad Ecuatoriana (UEA). A yellow arrow points to HSR and a red arrow points to UEA. The map includes a scale bar and data source information at the bottom left.

Google Earth

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Cacao CCN-51 vs. Cacao Nacional

- Highly productivity.
- Less flavor.
- Diseases “resistant”.
- Thriving in full-sun.
- Monoculture.



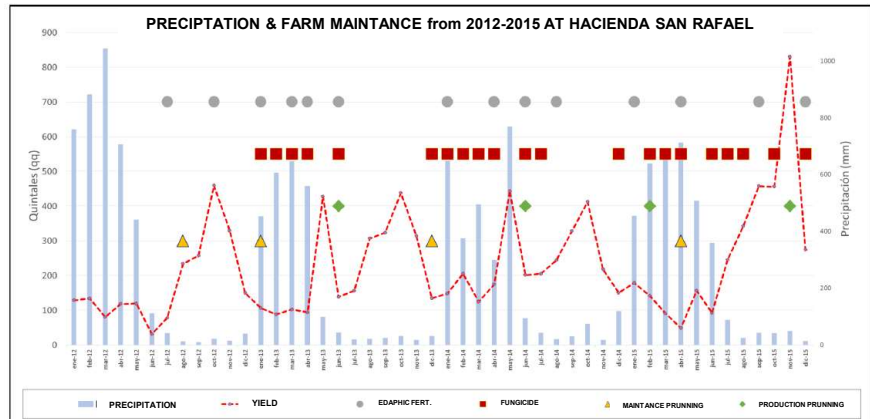
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Hacienda San Rafael Farm



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Technified farm



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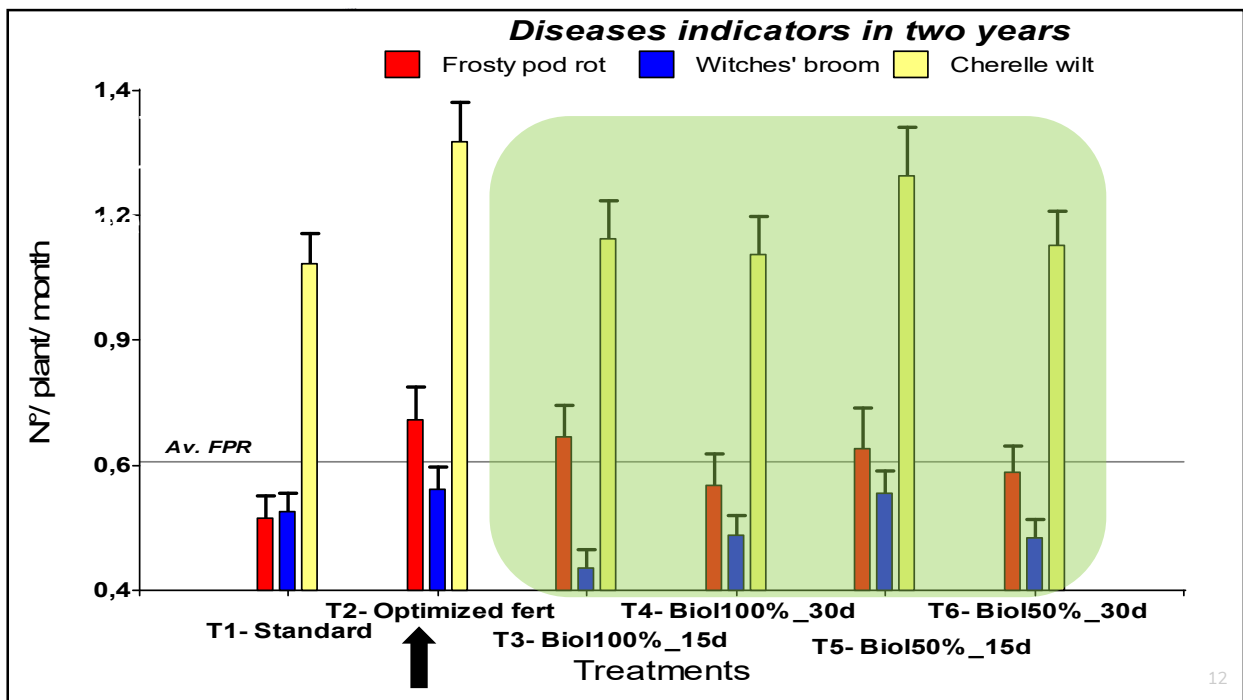
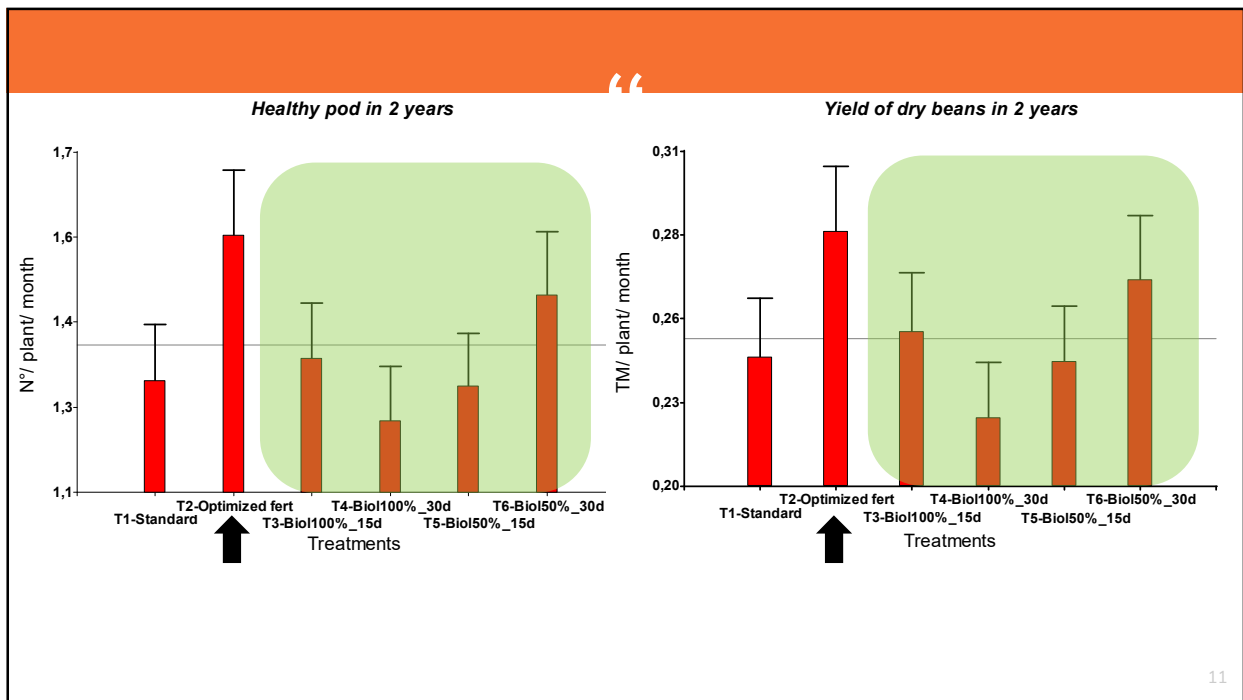
TREATMENTS

Names	N° Agrochemicals & N° applications/ y			BIOL
	Edafic fertilization	Foliar fertilization	Foliar fungicide	Dosis/ N° applications
T1, Conventional	7/4	8/22	7/ 8	--
T2, Convent.-reduced	5/4	8/22	7/ 8	--
T3, Biol100/ 15d	7/4	8/22	--	100%/ 15
T4, Biol100/ 30d	7/4	8/22	--	100%/ 30
T5, Biol50/ 15d	7/4	8/22	--	50%/ 15
T6, Biol50/ 30d	7/4	8/22	--	50%/ 30

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Treatments			
N ^o	Name	Some Details	Total
1	Biol (Nutrabiol)	100%=184.54 l/ha, 50%=92.27 l/ha, N° applications 1-2/ month	1
2	Full edafic fertilization (Ecuadorian comercial names):	Urea, Muriate of Potash (KCl), Sulpomag (MgSO4+K2SO4), Microessencial, Nutrimentos (microelements), (NH4)2SO4, Ferticacao (20-6-17-3-4-1).	7
3	Reduced edafic fertilization:	Urea, Muriate of Potash (KCl), Sulpomag (MgSO4+K2SO4), NH4NO3, diammonium phosphate (NH4)2HPO4.	5
4	Fungicides (active principles):	azoxystrobin, cloronitrilo, fosetil aluminio, ditiocarbamato, propiconazol, mandipropamid, CuSO4.5H2O.	7





Agrochemicals & USD/ ha for 2015

PRODUCTO	TIPO	UNIDAD	DOSIS / Ha	CICLOS	CANTIDAD	PRECIO UNIT	TOTAL \$	Total \$/área productiva
Aminocrop	FERT FOLIAR	L	1.00	2.00	2.00	13.30	26.60	
Foska	FERT FOLIAR	L	1.00	3.00	3.00	13.30	39.90	
Fullbionic 622	FERT FOLIAR	L	1.50	2.00	3.00	9.45	28.35	
Fullbionic Boro	FERT FOLIAR	L	1.00	2.00	3.00	8.40	25.20	
Humitec Cu	FERT FOLIAR	L	1.00	1.00	1.00	9.89	9.89	
Humitec Mn	FERT FOLIAR	L	1.00	2.00	2.00	8.90	17.80	
Cohesion Zn	FERT FOLIAR	L	1.00	2.00	2.00	10.90	21.80	
Nitrato Potasio	FERT FOLIAR	Kg	1.00	8.00	8.00	1.60	12.80	
					TOTAL	24.00	182.34	23,970.42
Axozitrubin	FUNGICIDA	L	0.30	2.00	0.60	52.00	31.20	
Clorotalonil 72	FUNGICIDA	L	0.75	1.00	0.75	13.64	10.23	
Fosetil aluminio	FUNGICIDA	Kg	0.30	1.00	0.30	13.58	4.07	
Metalaxil + Mancozeb	FUNGICIDA	L	0.50	1.00	0.50	29.50	14.75	
Propiconazole	FUNGICIDA	L	0.30	1.00	0.30	18.75	5.63	
Revus	FUNGICIDA	L	0.30	1.00	0.30	67.76	20.33	
Sulf. COBRE Pentahidratado	FUNGICIDA	L	0.50	1.00	0.50	40.67	20.34	
					TOTAL	3.25	106.54	14,006.01
FERTILIZANTE EDAFICO								
Urea	FERT EDAFICO	Kg	-	-	213.61	0.41	88.61	
Muriato Potasio granulado	FERT EDAFICO	Kg	-	-	206.00	0.43	88.58	
Microessencial	FERT EDAFICO	Kg	-	-	123.85	1.07	133.09	
K Mag o Sulpomag	FERT EDAFICO	Kg	-	-	127.06	0.53	67.34	
Nutrimenores (microelementos)	FERT EDAFICO	Kg	-	-	52.24	0.64	33.43	
Sulfato de amonio	FERT EDAFICO	Kg	-	-	98.85	0.38	37.56	
Ferticacao 20-6-17-3-4-1	FERT EDAFICO	Kg	-	-	200.00	0.60	120.00	
					TOTAL	1,021.61	568.61	74,749.87
BIOL-CIBE								
Biol preparación CIBE	FUNGICIDA	L	92	12	1104	0.06	64.58	8,490.21

* Fuente: Ing. Aquilez Boborquez y Datos CIBE.

Results

1. Two treatments with BIOL were better than T1 (Standard) in yield and healthy pods.
2. T1 (Standard) was better than BIOL in controlling Frosty pod rot.
3. Three treatment with BIOL controlled Witches's broom better than T1.
4. BIOL is cheaper (at least 4,5 times) then T1

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In 2017, the administration of the HSR changed, and the results were not convincing enough to apply BIOL.

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Searching for
useful fungal
endophytes

as Biological
control agent

ACTA BIOLÓGICA COLOMBIANA

<http://www.revistas.unal.edu.co/index.php/actabiol>

Facultad de Ciencias
Departamento de Biología
Sede Bogotá



UNIVERSIDAD
NACIONAL
DE COLOMBIA

ARTÍCULO DE INVESTIGACIÓN/ RESERACH ARTICLE

BIOTECNOLOGÍA

**FOLIAR ENDOPHYTE FUNGI AS CANDIDATE FOR BIOCONTROL
AGAINST *Moniliophthora* spp. Of *Theobroma cacao* (Malvaceae)
IN ECUADOR**

**Hongos endófitos foliares como candidatos a biocontroladores contra
Moniliophthora spp. de *Theobroma cacao* (Malvaceae) en Ecuador**