EXPERIENCIAS DE BIOFUMIGACIÓN Y BIOSOLARIZACIÓN PARA LA PRODUCCIÓN DE CULTIVOS INTENSIVOS EN ARGENTINA

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Biofumigation (B) and biosolarization (BS) in Argentina are mainly applied in under protected cultivation crops where high populations of nematodes and soil pathogens originate.

B y BS experiences have been carried out in several provinces: Jujuy, Salta, Corrientes, Entre Ríos, Tucumán, Mendoza, Córdoba, Río Negro, Neuquén, La Pampa, etc.

IV Seminario internacional de sanidad agropecuaria 2023
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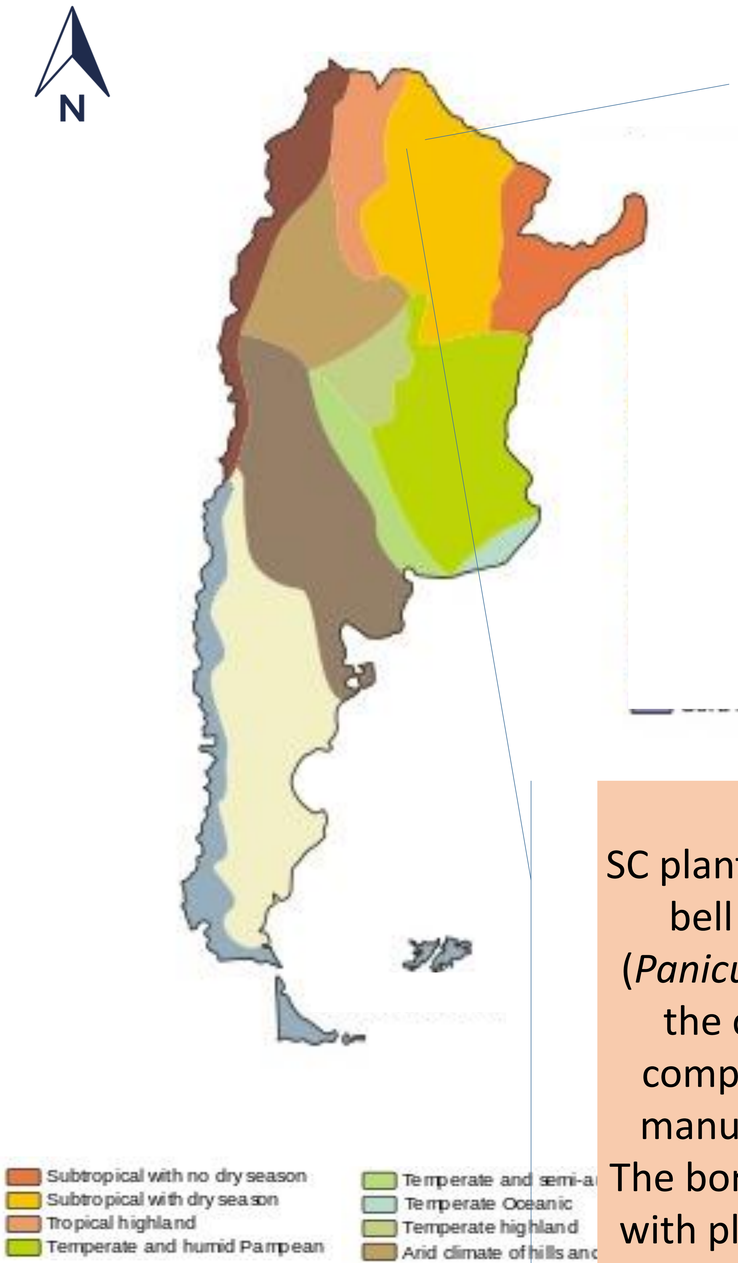
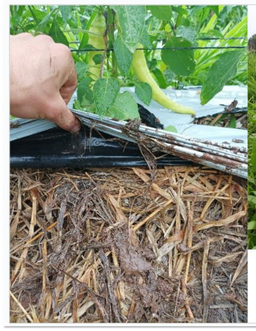
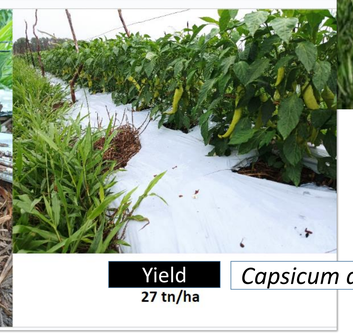
CENTRO DE CONVENCIONES PLAZA AMÉRICA, VARADERO
del 8 al 12 de mayo



Salta Winter service crops SC were planted: vicia + barley + Brassica. In December, the CS were cut again, chicken manure was applied and soil was covered with plastic mulching. A high activity of pollinators on legume flowers and natural enemies were also observed. Tillage reduction was achieved

García *et al*., 2022





Yield
27 tn/ha

Capsicum annum

Yield
34 tn/ha

Cucurbita pepo

SC planted one month before the end of the bell pepper cycle (November)= millet (*Panicum miliaceum*) + goat manure. Once the crop was finished, pepper residue compost was made between-row + goat manure and the straw of millet first cut. The borders were reassembled and covered with plastic mulching for the new planting.

Checa y Medina, 2022

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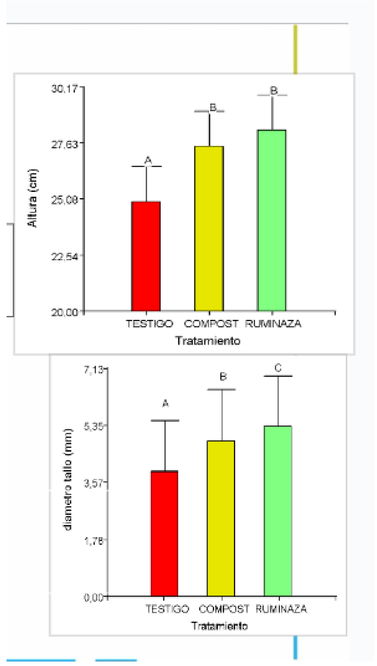


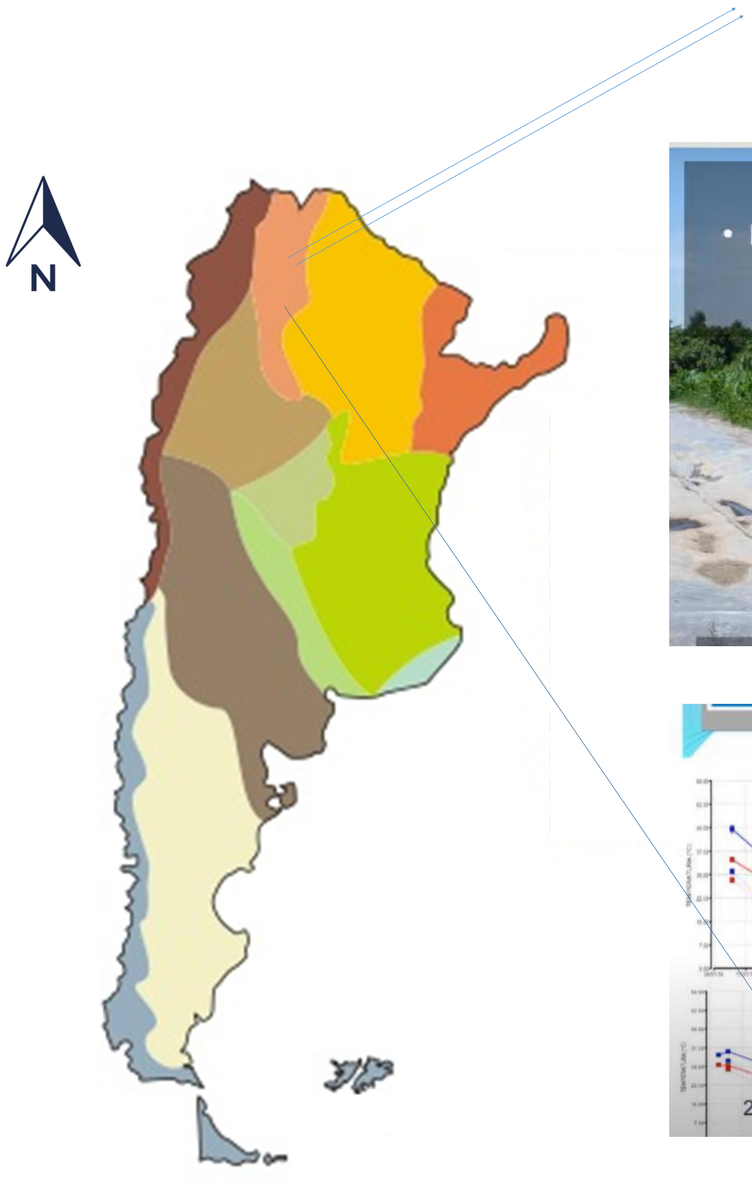
Fernández *et al*., 2022

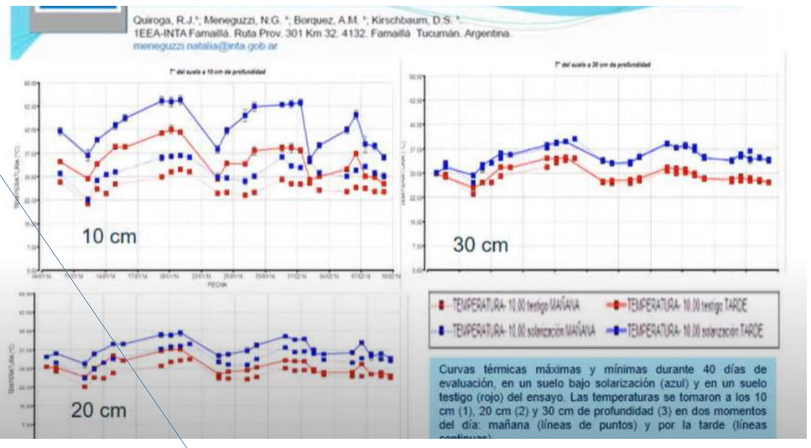
Salta Effect of compost and bovine rumen content on soil quality and tomato plant growth and yield.

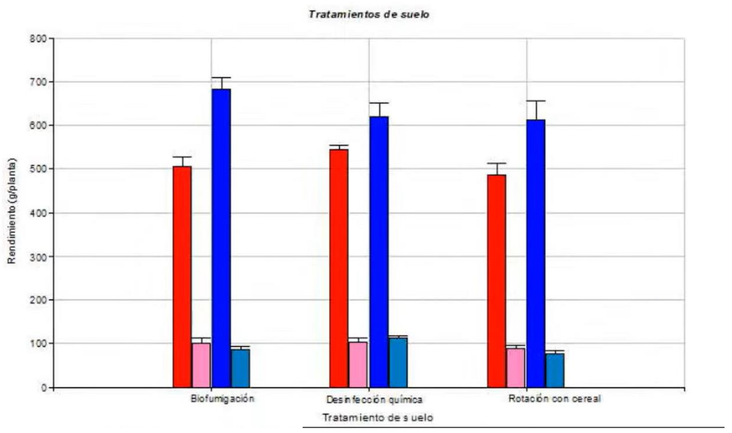
Resultados para V. de crecimiento y desarrollo

	Altura	Diámetro	Numero de flores por tratamiento/fecha 2021			kg/jaula cosechera 2021	kg/jaula cosechera 2022
			1	2	3	X:23,340 kg/J	X:23,340 kg/J
F	9,30	29,64	10,50	7,98	7,15	17,80	8,32
p	0,0002	0,0001	0,0001	0,0001	0,0002	0,0001	0,0013
R^2	0,14	0,34	0,20	0,16	0,15	0,18	0,36
DS	3,53	0,82	2,48	3,01	4,15	76,39	77,89
Media general	26,91	4,70	8,28	11,34	16,80	119,85	123,14
Tratamiento							
Ruminaza	28,26	5,32	9,78	12,75	18,98	149,19	192,51
Compost	27,51	4,87	8,35	11,63	16,55	145,81	119,74
Testigo	24,96	3,92	6,70	9,65	14,88	64,55	57,17

Tucumán Biosolarization and cover crops for strawberry soil borne pathogens control.



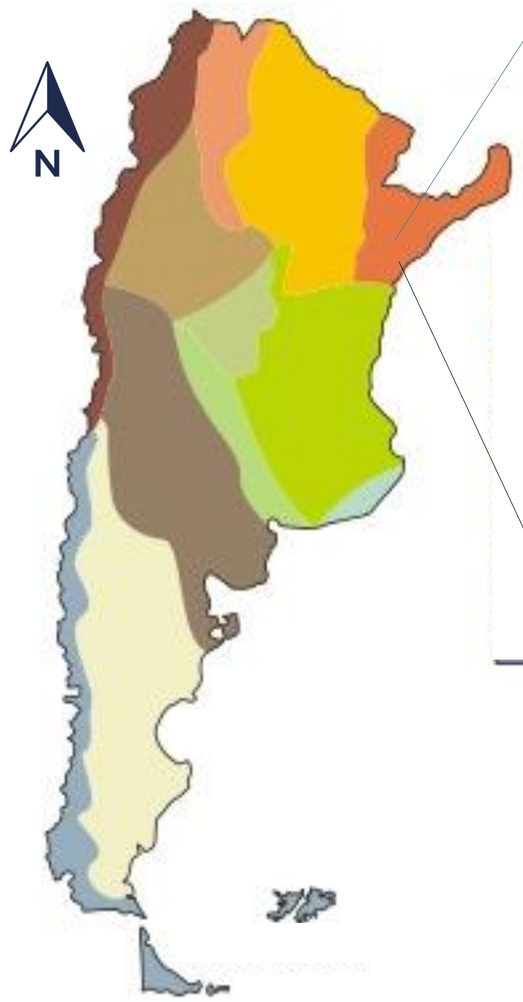




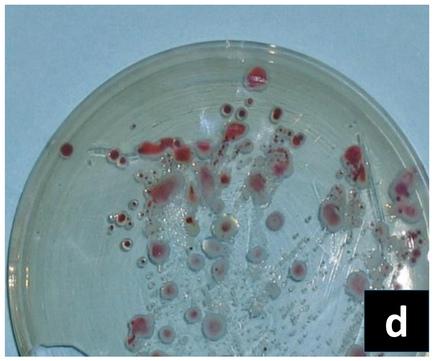
Biosolarization plots showed low level of dead plants

Meneguzzi *et al*., 2022

In Corrientes, a subtropical province with more than 1700 ha of greenhouses, incorporation of chicken and cattle manure, pine leaves, grass, cabbage and sorghum in the greenhouse soil before Solarization was effective against *Ralstonia solanacearum*, *Pythium aphanidermatum*, *Rhizoctonia solani* and *Sclerotium rolfsii* (Obregón, 2019).



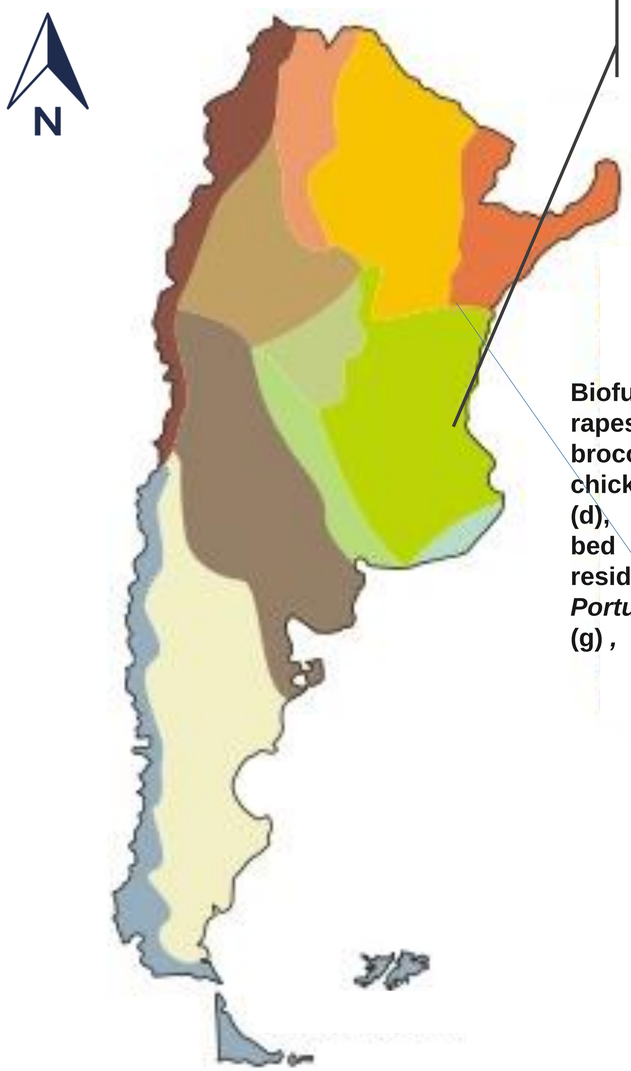
Chicken manure distribution (a), irrigation (b), biosolarization treatment (c), and *Ralstonia solanacearum* colonies (d)



Gauna *et al.*, 2022

Coronda: Biofumigation with sorgum leafs for strawberry soil borne diseases control (Sordo, 2,19)

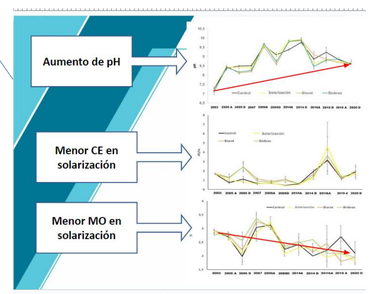
In the center of the country, crops are grown under a temperate climate in more than 6000 ha of greenhouses near the city of Buenos Aires. Summer Biosolarizarion has been evaluated with good results for the control of weeds, tomato soil pathogens and Nacobbus aberrans, with application of Broccoli, chicken manure, cabbage and tomato residues. At INTA San Pedro, an experience has been carried out for 20 years. Biosolarization was tested with two strategies: a succession of organic amendments (chicken manure, broccoli, tomato, bell pepper, Eruca crop residues and mustard) and another based only on brassicas (rape, broccoli, mustard, *B. campestris*, *B. carinata*

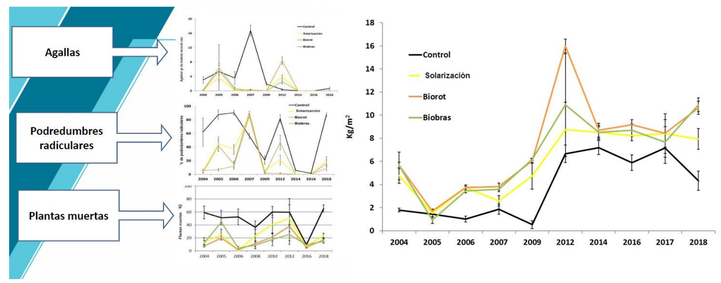


Biosolarization was effective controlling *Pyrenochaeta lycopersici*, *Fusarium solani*, *Sclerotium rolfsii* and *Sclerotinia sclerotiorum*, weeds and damping off pathogens, as well as nematodes like *Nacobbus aberrans*, *Helycotylenchus* and *Criconemella*. (Mitidieri *et al*., 2019; Cuellas *et al.* , 2019; Martinez *et al*, 2022).

Biofumigants: rapeseed (a), brocoli (b-c), chicken manure (d), champignon bed (e), tomato residue (f), *Portula oleracea* (g) ,

***Brassica campestris* (h-i), incorporation of organic matter (j-k), taking off the plastic after treatment (l).**





***Santa Catalina UNLP. Biofumigant cv of Brassica juncea. 2.6 kg/m2 achieved weed and pathogen control without affecting Trichoderma or beneficial nematodes* (Perniola *et al., 2022).**

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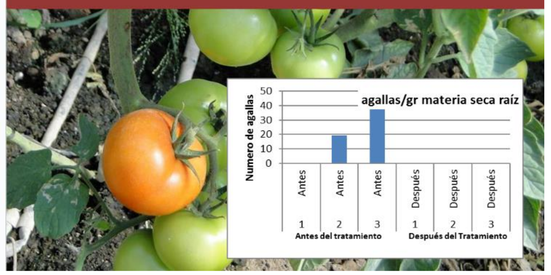
Experiencia en Zárate: Nestor Paolinelli

8 de noviembre al 9 de diciembre de 2014. El trasplante:13 de diciembre del mismo año. Híbrido Elpida.
1,5 kg de cama de pollo compostada por m²

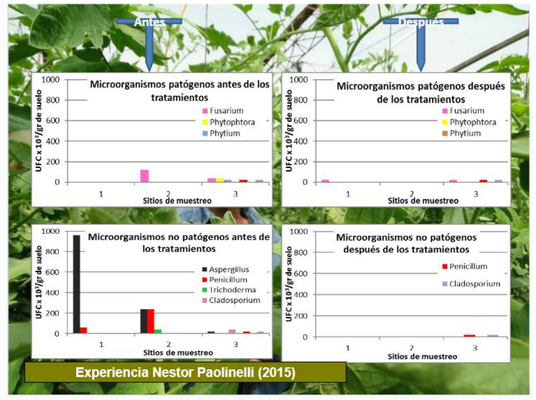


Subtropical with no dry season
Subtropical with dry season
Tropical highland
Temperate and humid Pampean
Temperate and semi-arid Pampean
Temperate Oceanic
Temperate highland
Arid climate of hills and fields
Semi-arid climate
Patagonian cold arid
Arid climate in Puna
Cold and humid
Cold Polar

Tabla 1. Análisis de suelo después de aplicar la enmienda orgánica, Antes y después del tratamiento de biosolarización.

Muestreo	M.O	C.O	N	P	Ph	C.E	C.I.C	Ca	Mg	K	Na	Rel	PSI
	%			ppm	1/2,5		Meq/100g						%
Antes	2.31	1.34	0.14	111.33	7.41	1.08	40	18.27	8.77	1.48	0.59	9.39	1.48
Después	1.56	0.91	0.15	147	7.54	0.36	17.33	12.27	4.26	1.65	0.21	6.04	1.17

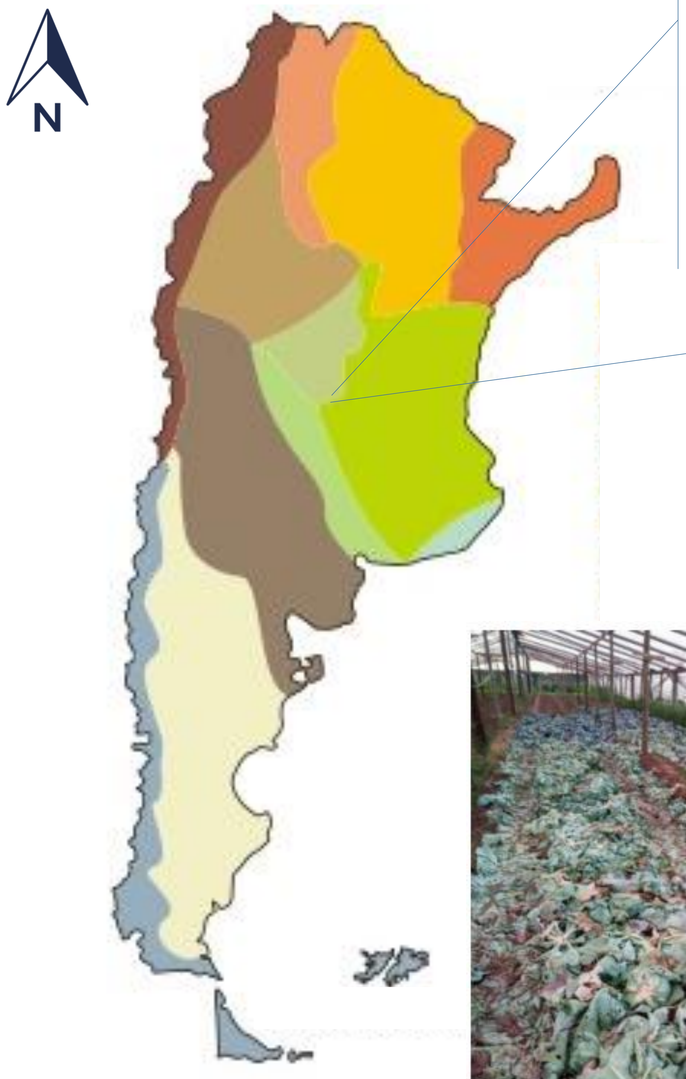
Fuente: Elaboración propia a partir de datos de laboratorio.



Pagliaricci *et al.*,
2015.
https://repositoriosdigitales.mincyt.gob.ar/vufind/Record/INTADig_4cad3aefc5fd32c0bc9a4b196db0bbe8

Mar del Plata: Brocoli crop (a), biosolarization treatment (b) . Lettuce crop in control (c) and treated plot (d) (Adlercreutz, 2019).

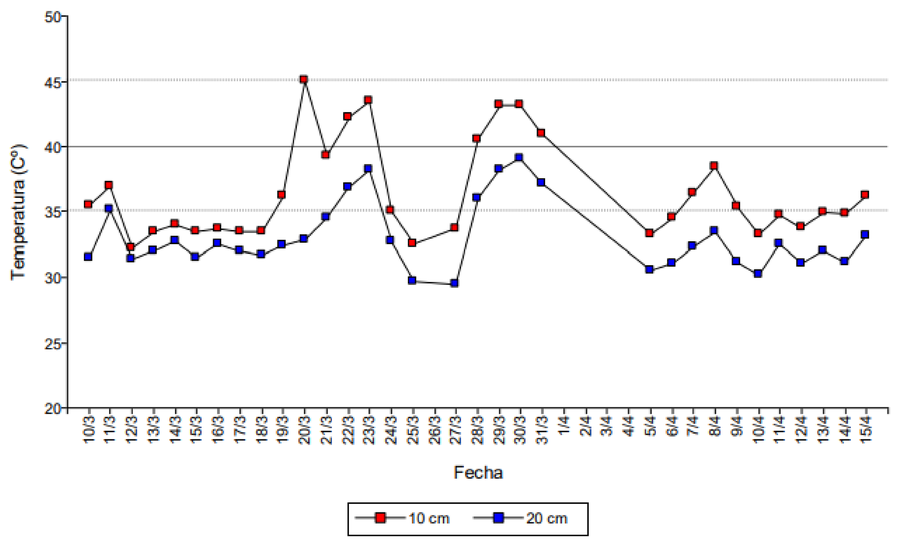
In Bahía Blanca, a city with a colder weather *Meloidogyne hapla* was controlled using cattle manure and cauliflower in spring and summer in the greenhouse. Nematodes of the same genus were controlled in winter using *Melia azedarach* seeds as fumigant. (Rodriguez *et a*l., 2010 , 2014)



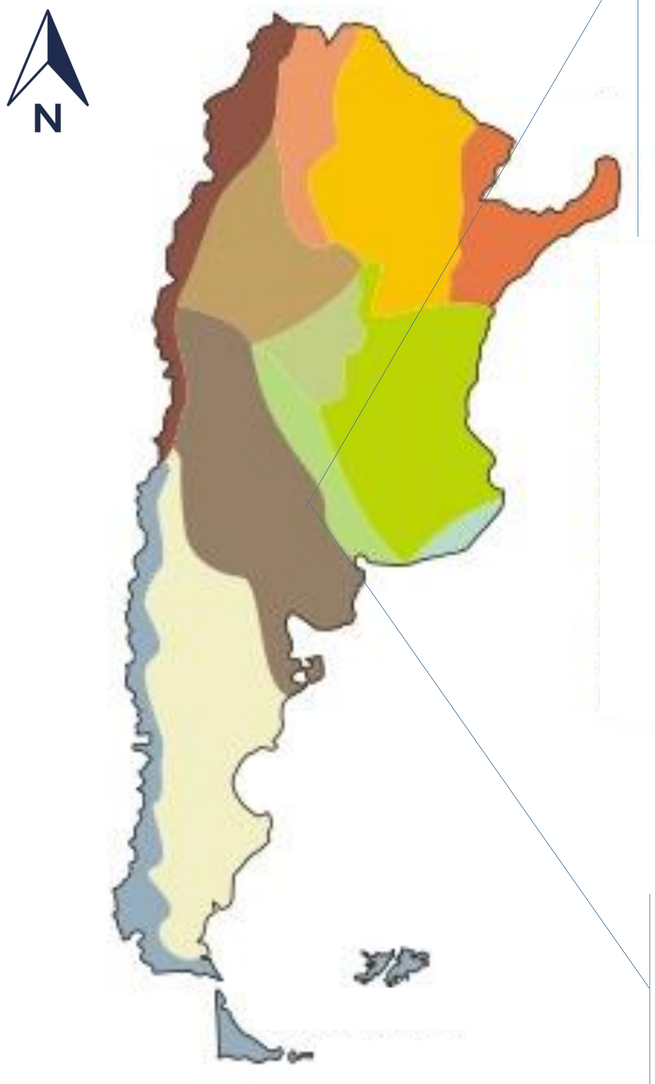
In Cordoba, a province in central Argentina, biosolarization using chicken manure, sorghum and Brassica was effective against weeds and damping-off pathogens affecting protected crop nurseries.

Biosolarization in early fall (March 10 to April 15) using broccoli, tomato and bell pepper residues. Weed control was reached. Subsequently, a *Cucumis sativus* crop was planted with good yield and health results.

Soil temperatures during biosolarization



Yosviak *et al.*, 2022



Winter biofumigation using cabbage (C) and *Eruca vesicaria* (E) residues was evaluated in La Pampa.

Tomato crop roots at the end of the cycle. From left to right: control, biofumigation with cabbage and biofumigation with *E. vesicaria*.

For yield (E: 11.4; C: 11.6; Control: 11.3 kg m-2) and average fruit weight (R the results showed no statistical differences among treatments. For the gill index variable, C differed from E and control ($p<0.005$) where C obtained a "slight" average value (1.6), while C and Control obtained "medium" values. The nematode population presented high values before the beginning of the crop (June winter) and at the end of it (March automn), only low values were presented in the measurement 70 days after biofumigation in the treatments C and E, the predominant nematode was Meloidogyne spp.

Grasso *et al.*, 2021

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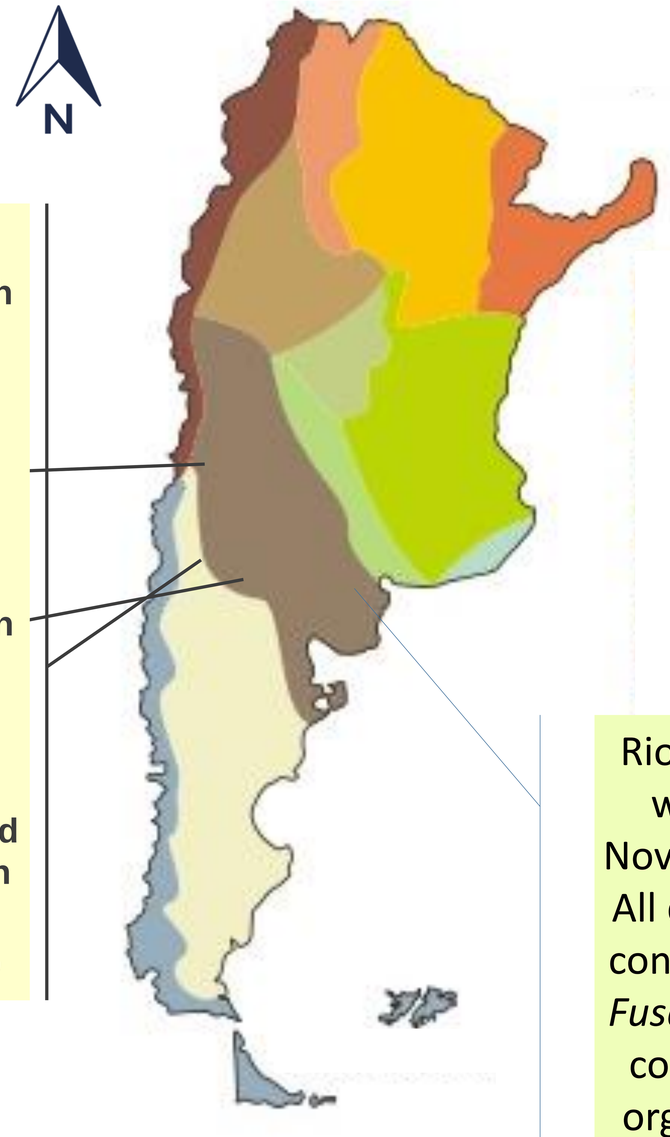
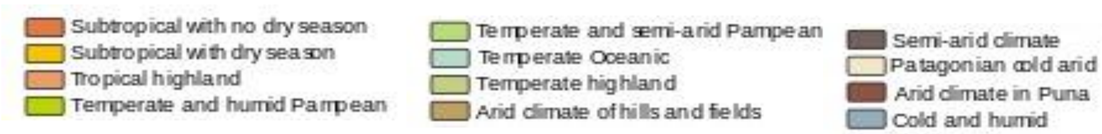
Mendoza: continental weather near Los andes mountains, summer is hot, control of strawberry diseases as *Phytophthora, Rhizoctonia, Pythium, Verticilium, Macrophomina*, and nematodes as *Meloidogyne, Ditylenchus* has been achieved using rapeseed as fumigant in the greenhouse (Gabriel, 2014)

Rio Negro: weeds control using cabbage in spring for open field tomato crops. In the same province *Fusarium oxysporum* in onion was controlled using cabbage in autumn and summer (Bustamante *et al*., 2008).

Neuquén: semiarid region with hot summers but very cold winters. Weed control in onion open field nurseries using chicken manure and cabbage in summer (Vasquez, 2013).



Rio Negro: 3 biosolarization dates were evaluated (October 29th, November 29th and December 16th, All dates were effective for *S. rolfsii* control. The most suitable dates for *Fusarium oxysporum* wilt of tomato control showed a decrease in soil organic matter content (Baffoni *et al.*, 2022)



Biosolarization has been adopted mainly by farmers in the north of the country, where high summer temperatures do not allow cultivation.

Biofumigation and Biosolarization are viable alternatives for integrated management of soil pathogens in Argentina.

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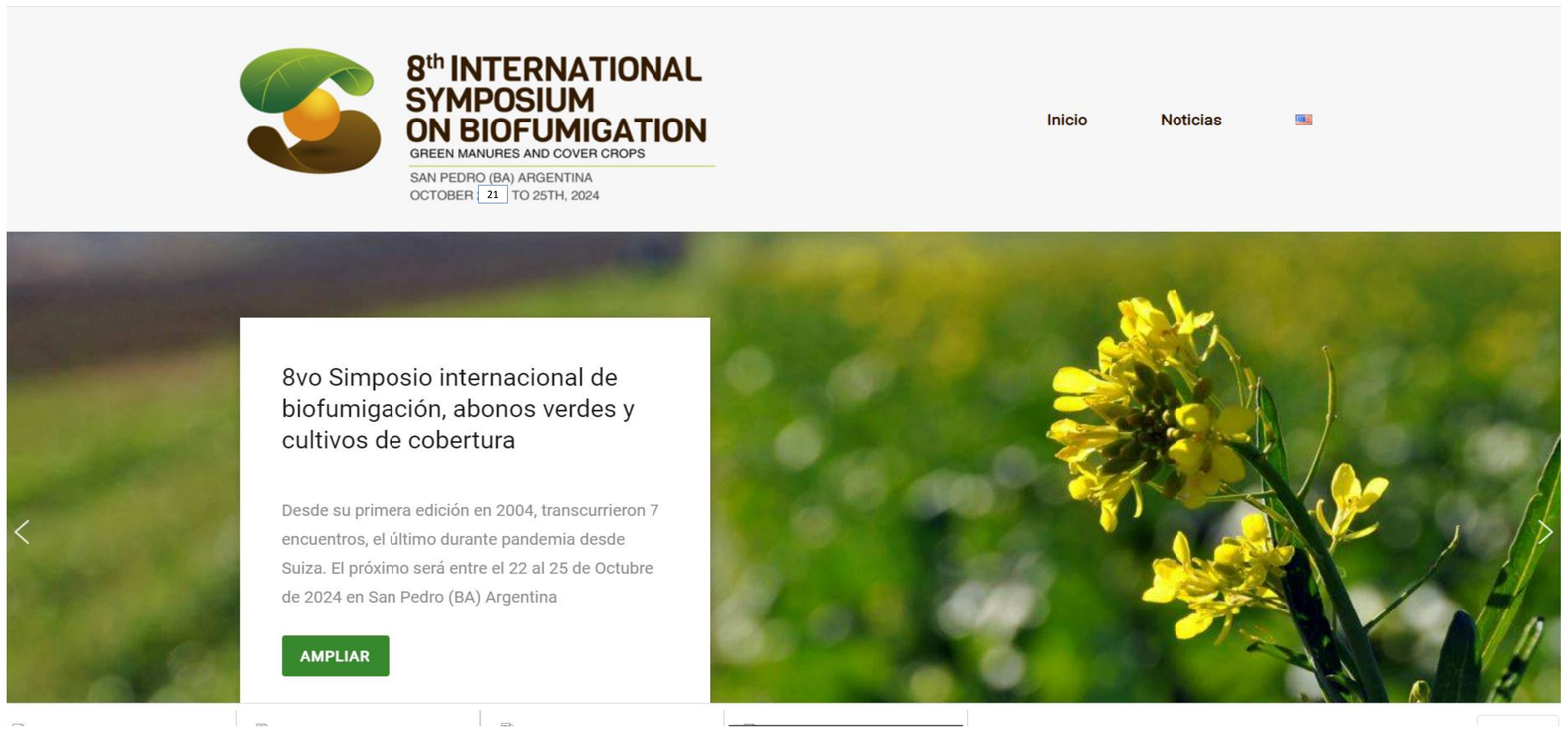
¡Gracias!



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