



FACULTAD DE
CIENCIAS

UDELAR fcien.edu.uy

“USO DE BIOMARCADORES PARA EL RELEVAMIENTO DE LA EXPOSICIÓN A PESTICIDAS EN CURSO DE AGUAS NACIONALES”

BIOMARKER

TALLER

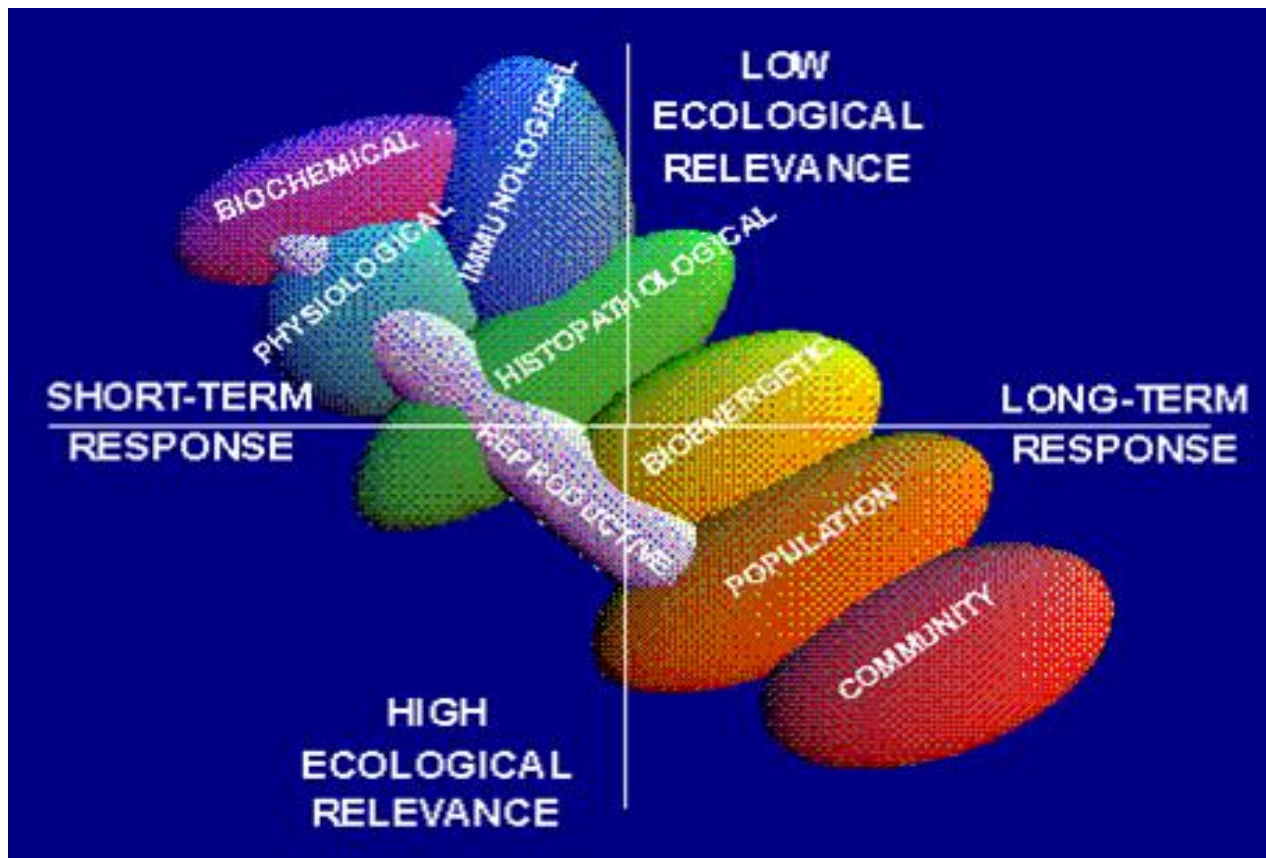
PERSPECTIVAS DE LA INVESTIGACIÓN NACIONAL HACIA UNA
GESTIÓN AMBIENTALMENTE ADECUADA DE PLAGUICIDAS
31 DE AGOSTO – 1° SETIEMBRE 2016

INIA

URUGUAY

BIOMARCADOR

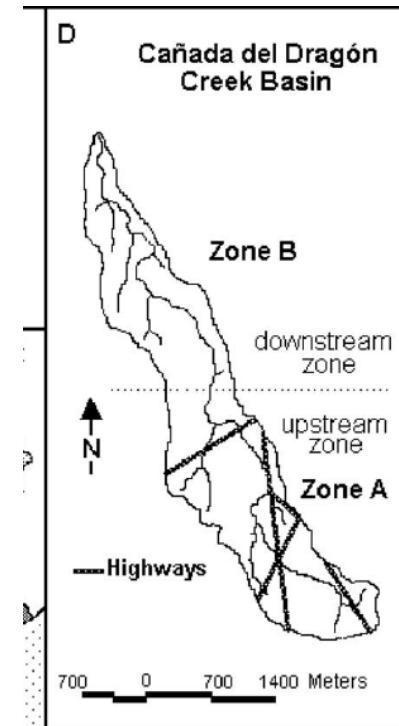
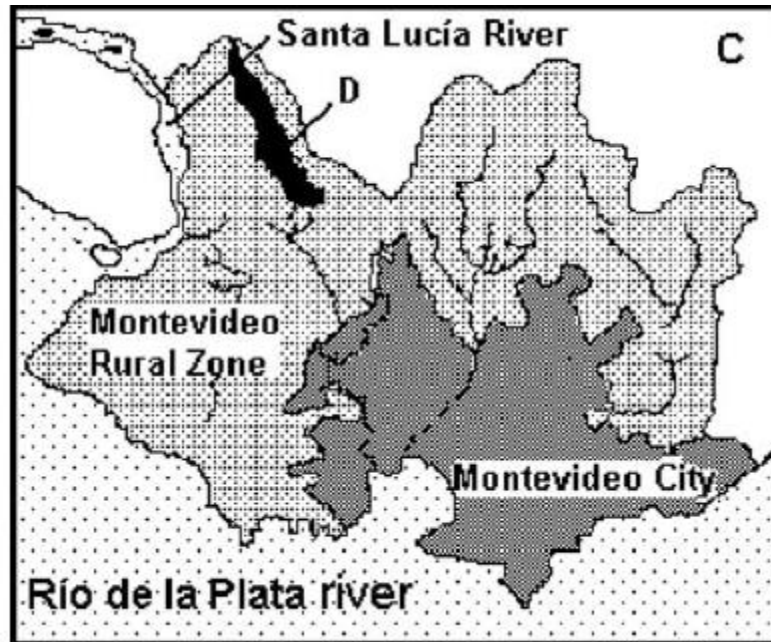
“respuesta biológica a un compuesto químico o grupo de compuestos químicos que da una medida de la exposición y en algunos casos del efecto tóxico”.



Relevancia
Relación de causalidad
Mecanismo de acción



Preliminary field study of hepatic porphyrin profiles of *Astyanax fasciatus* (Teleostei, Characiformes) to define anthropogenic pollution

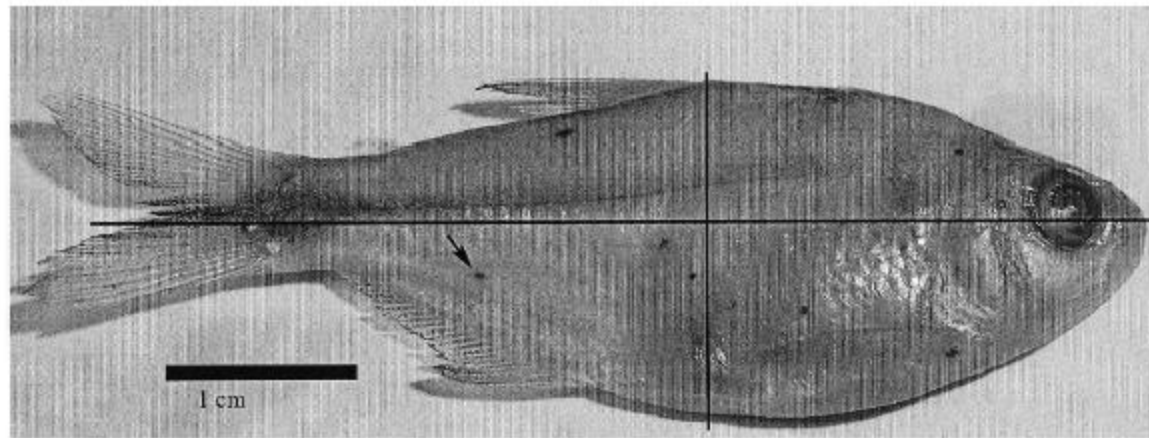


Mean concentration of hepatic characteristics of *Astyanax fasciatus* sampled in zones A and B of Cañada del Dragón creek

Hepatic porphyrins concentrations	Zone A Mean ± SE (n)	Zone B Mean ± SE (n)	P-values of differences	
Liver mass	53.63 ± 23.20 (7)	94.79 ± 38.62 (10)	NS	
Coproporphyrin	239.18 ± 49.93 (7)	188.53 ± 29.87 (10)	0.034	As, Hg, Pb
Uroporphyrin	257.33 ± 57.32 (7)	196.22 ± 28.91 (10)	0.018	PAH
Protoporphyrin	634.72 ± 122.64 (7)	476.27 ± 74.72 (10)	0.010	Hcidas, Pb

Porphyrin concentrations (±SE) are expressed in nmols per gram of hepatic tissue, and liver mass in milligrams.

Prevalence and intensity of black-spot disease in fish community from a subtropical stream (Santa Lucía river basin, Uruguay)

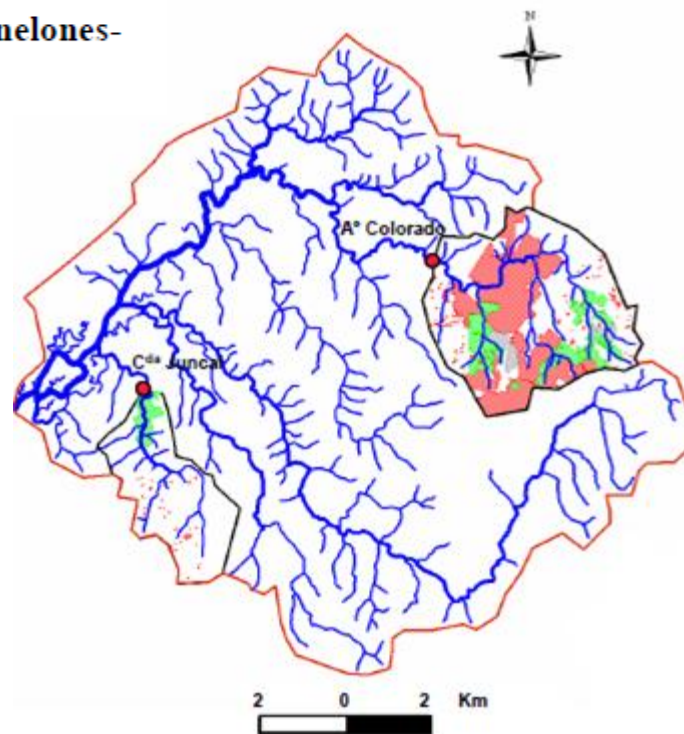
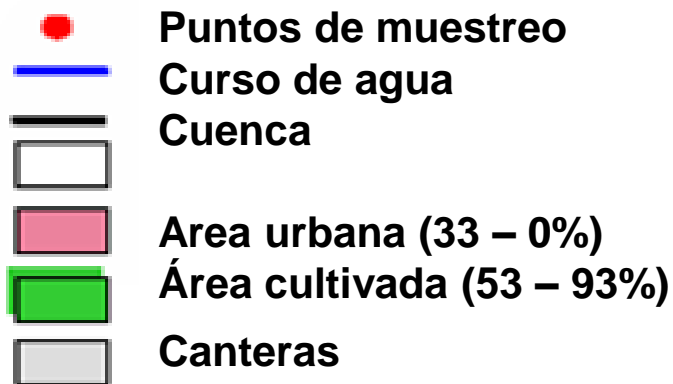


Sampling Date	Prevalence	Abundance	Range	Intensity	Range
	% infected fish (n)	Mean ± SD		Mean ± SD	
July	66.6 (9)	6.1 ± 8.4	0-23	9.8 ± 8.9	1-23
September	66.6 (18)	1.8 ± 2.7	0-8	2.8 ± 2.2	1-8
November	63.1 (65)	3.6 ± 6.7	0-33	5.8 ± 7.7	1-33
February	60.4 (48)	3.9 ± 8.3	0-52	6.6 ± 9.8	1-52
April	77.8 (18)	10.5 ± 14.7	0-51	13.7 ± 15.5	1-51
June	83.3 (6)	7.3 ± 8.1	0-21	8.8 ± 8.1	1-21

“Análisis de los perfiles de porfirinas de cuatro especies de peces
nativas expuestas a descargas urbano-industrial y agrícola (Canelones-
Uruguay)”

Lucía Matteo Mosca

Orientador: Dra. Gabriela Eguren

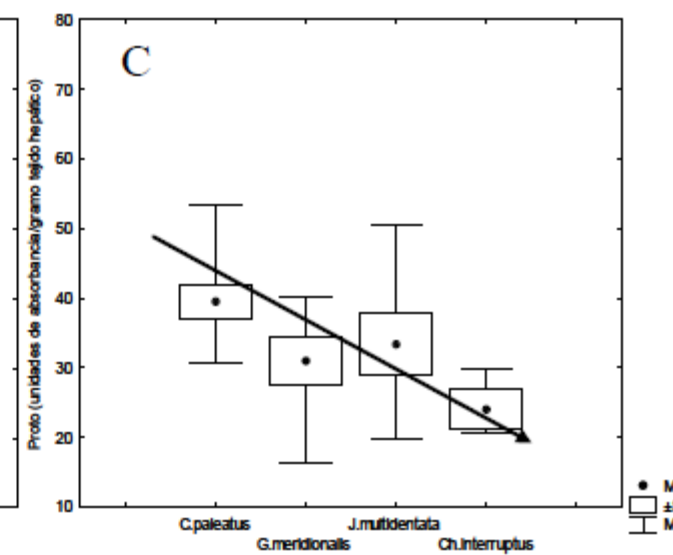
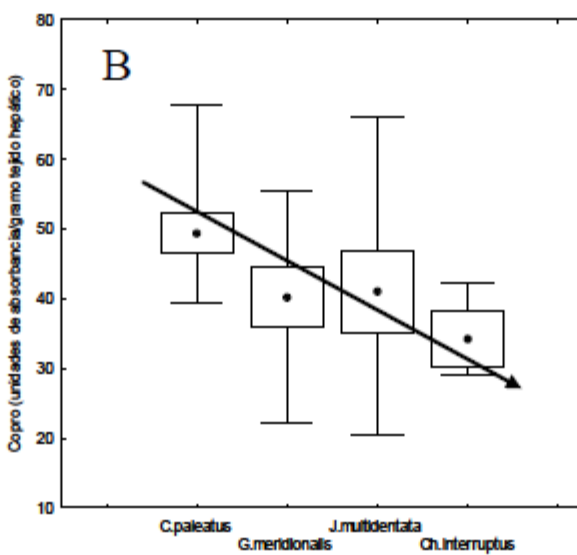
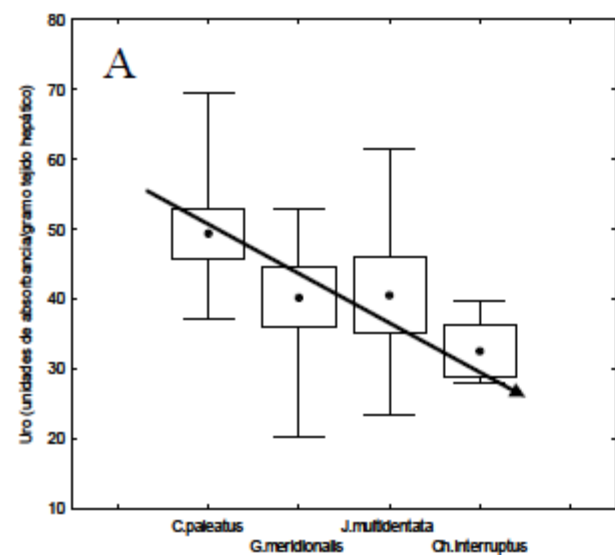
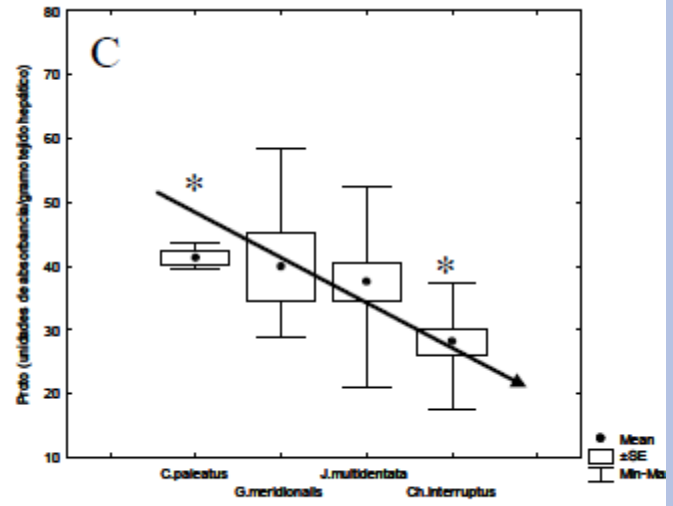
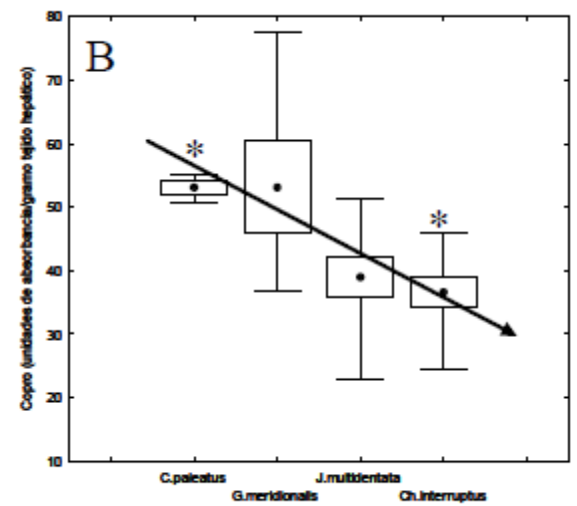
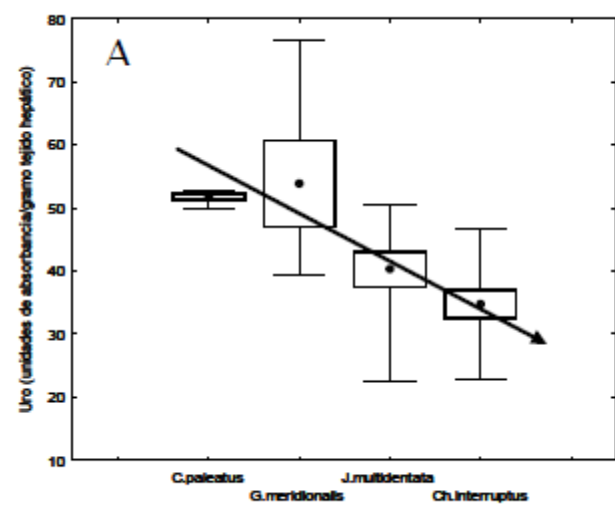


Orden	Familia	Especie	Nombre común	N° indiv.	
				J	C
Siluriformes	Callichthyidae	<i>Corydoras paleatus</i>	Limpia fondo	8	7
Perciformes	Cichlidae	<i>Gymnogeophagus meridionalis</i>	Castañeta	3	11
Cyprinodontiformes	Anablepidae	<i>Jenynsia multidentata</i>	Overito	9	10
Characiformes	Characidae	<i>Cheirodon interruptus</i>	Mojarra	10	9

“Análisis de los perfiles de porfirinas de cuatro especies de peces nativas expuestas a descargas urbano-industrial y agrícola (Canelones-Uruguay)”

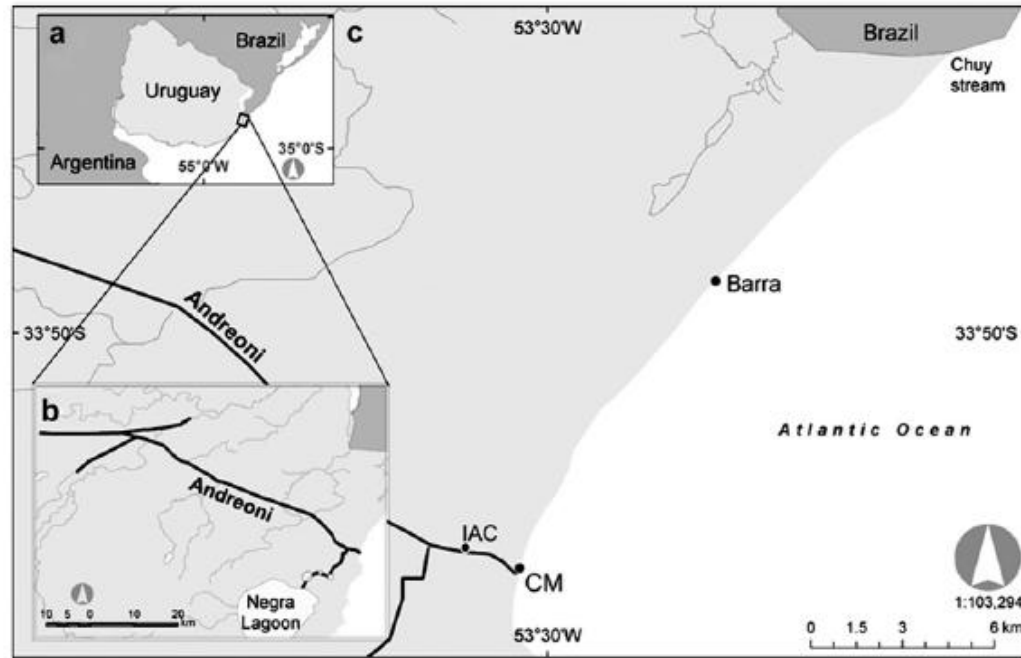
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Effects of herbicides and freshwater discharge on water chemistry, toxicity and benthos in a Uruguayan sandy beach

Sebastián Saucó^a, Gabriela Eguren^b, Horacio Heinzen^c, Omar Defeo^{a,*}



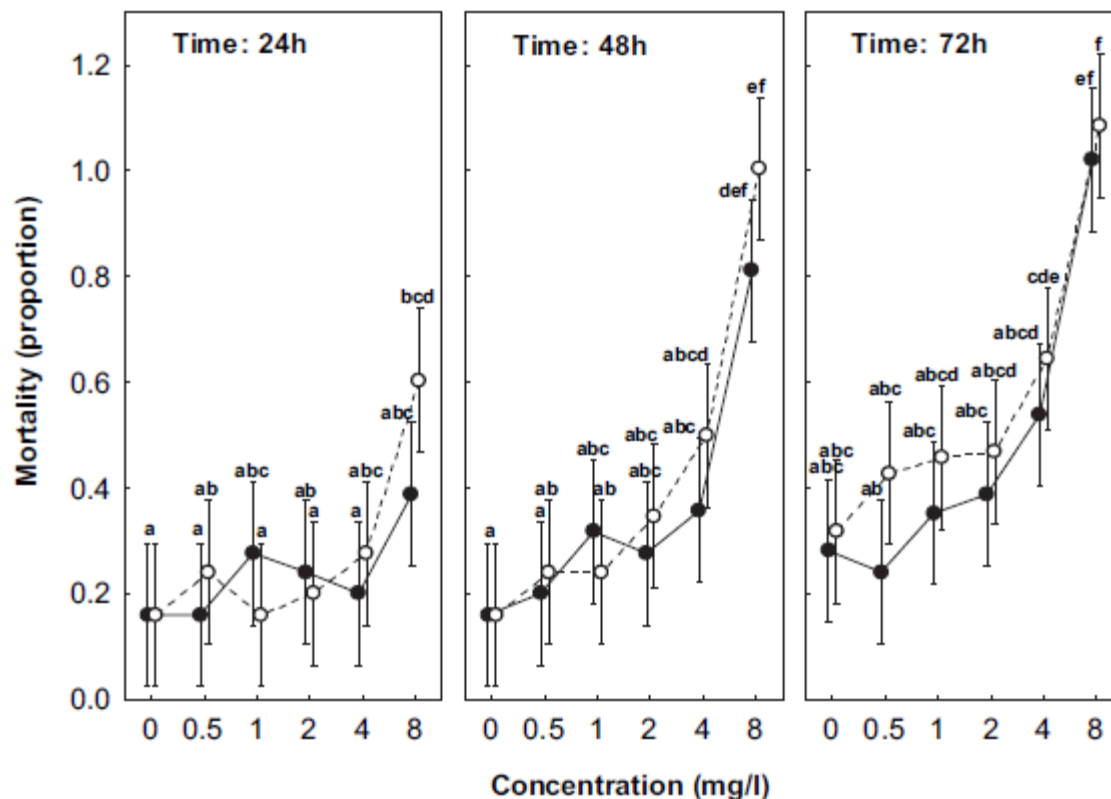
	IAC	CM	Barra	F_{ratio}	Multiple comparisons
Propanil	0.25 (±0.020)	N.D.	N.D.	577.72***	IAC > CM = Barra
Clomazone	0.37 (±0.009)	0.23 (±0.020)	N.D.	468.91***	IAC > CM > Barra
Quinclorac	0.52 (±0.014)	0.27 (±0.004)	N.D.	577.72***	IAC > CM = Barra
Salinity	0.5	12.4	32.5		



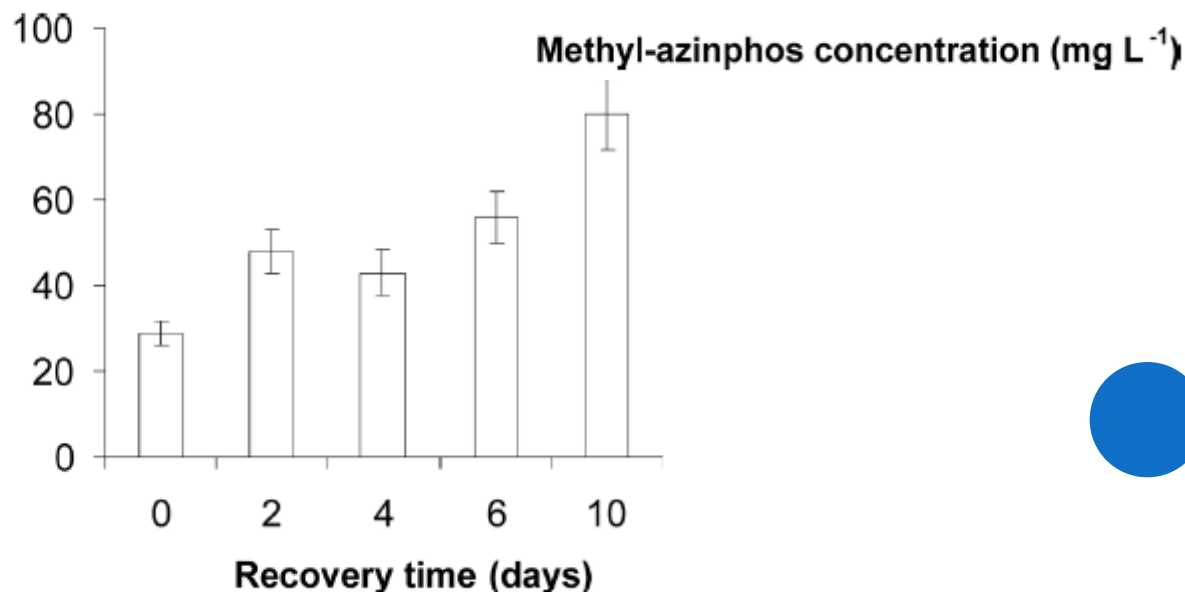
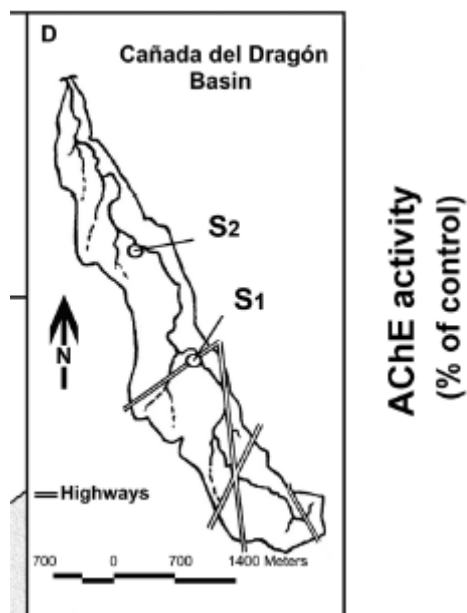
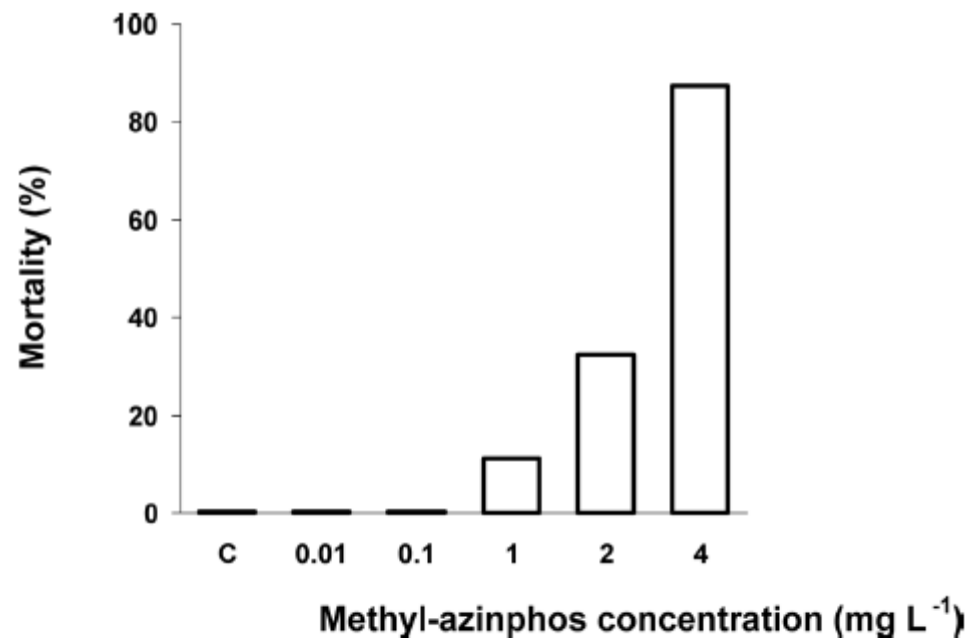
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LC ₅₀ (95% confidence limits)			
MTB	24 h	48 h	72 h
Size class I	N.C.	5.88 (6.87–5.03)	5.64 (7.20–4.20)
Size class II	N.C.	7.66 (9.90–5.93)	6.05 (7.67–4.82)



Inhibition, recovery and field responses of *Astyanax jasciatus* (Cuvier, 1819) brain cholinesterases upon exposure to azinphos-methyl



Inhibition, recovery and field responses of *Astyanax fasciatus* (Cuvier, 1819) brain cholinesterases upon exposure to azinphos-methyl

Table 1 - Brain AChE specific activity (mean \pm S.D.) in groups of *A. fasciatus* exposed to different concentrations of azinphos-methyl for 48 h. Column N shows total number of individuals per treatment condition (19-20); groups marked with different superindex letters in the right-hand column were found significantly different to each other, while those denoted with the same letter were not, according to Tukey's Test ($p < 0.05$).

Azinphos-methyl (mg L ⁻¹)	N	AChE specific activity (Units.mg ⁻¹ protein)	Inhibition (% of control)
Control	19	60.38 \pm 5.53	0 ^a
0.01	20	44.49 \pm 3.68	26 ^b
0.10	20	27.07 \pm 5.06	55 ^c
1.00	19	9.45 \pm 2.63	84 ^d
2.00	20	9.02 \pm 2.10	85 ^d
4.00	19	8.28 \pm 1.45	87 ^d

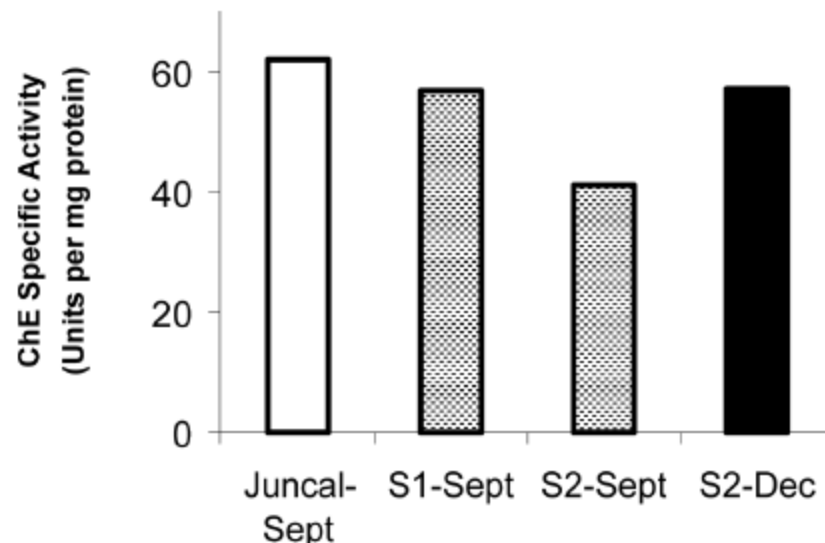
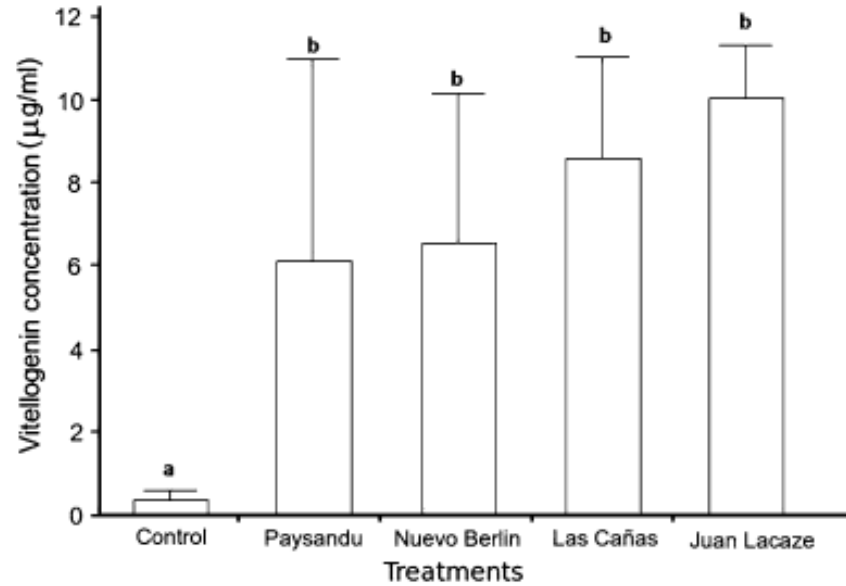
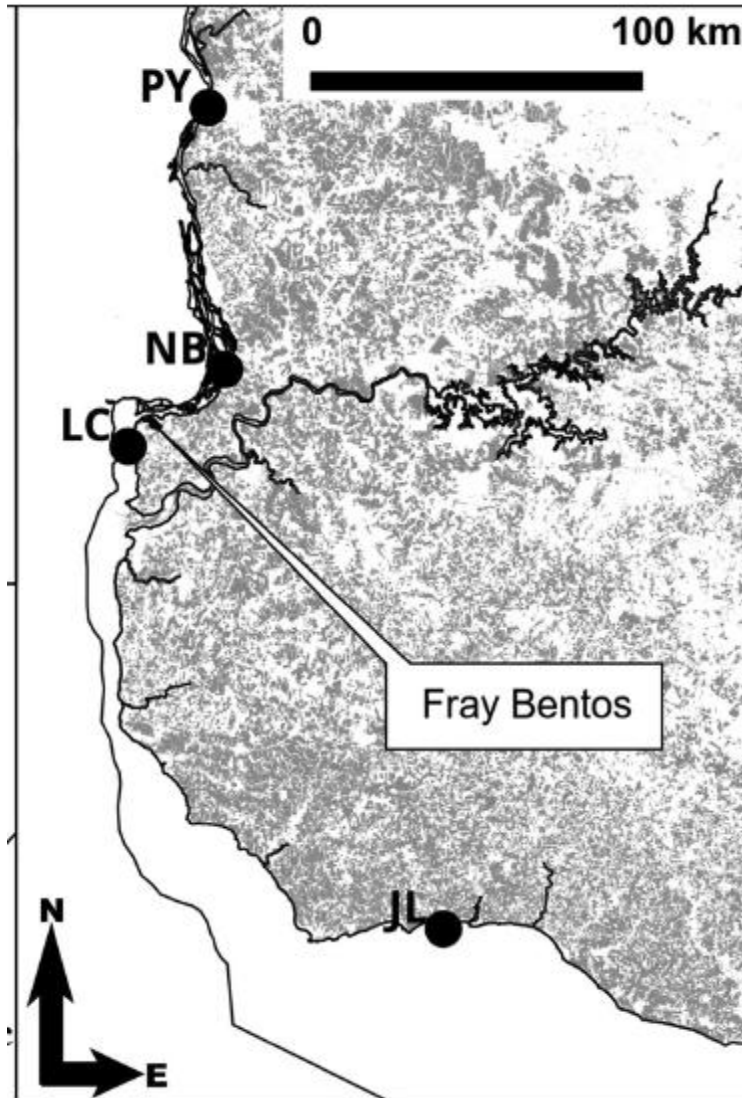


Table 2 - Frequency of erythrocyte micronuclei in *A. fasciatus* exposed for 48 hours to either azinphos-methyl or cyclophosphamide. N, number of animals per experimental group; MNF, micronuclei frequency (mean \pm standard deviation); different letters (MNF^a, MNF^b) indicate significant differences between groups ($p < 0.05$).

Toxicant used	Final toxicant concentration (mg L ⁻¹)	N	MNF
Cyclo-phosphamide	5.0	6	5.33 \pm 1.0 ^a
	0.0	10	0.10 \pm 0.3 ^b
Azinphos-methyl	1.0	8	0.40 \pm 0.5 ^b
	2.0	10	0.10 \pm 0.3 ^b
	4.0	10	0.20 \pm 0.4 ^b

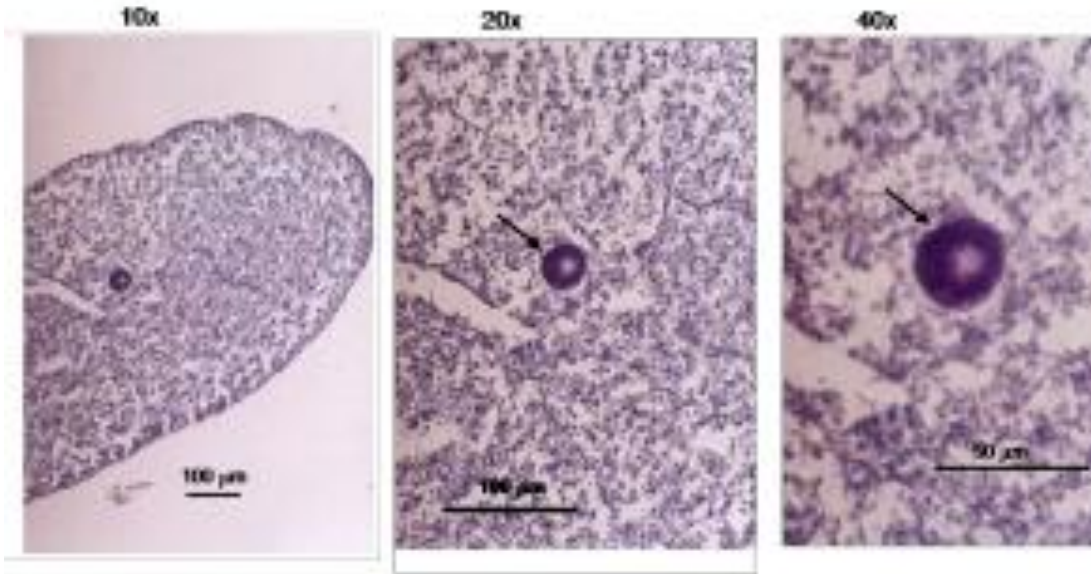
Screening of endocrine disruption activity in sediments from the Uruguay River

Noelia Rivas-Rivera · Gabriela Eguren ·
Leonidas Carrasco-Letelier · Kelly R. Munkittrick

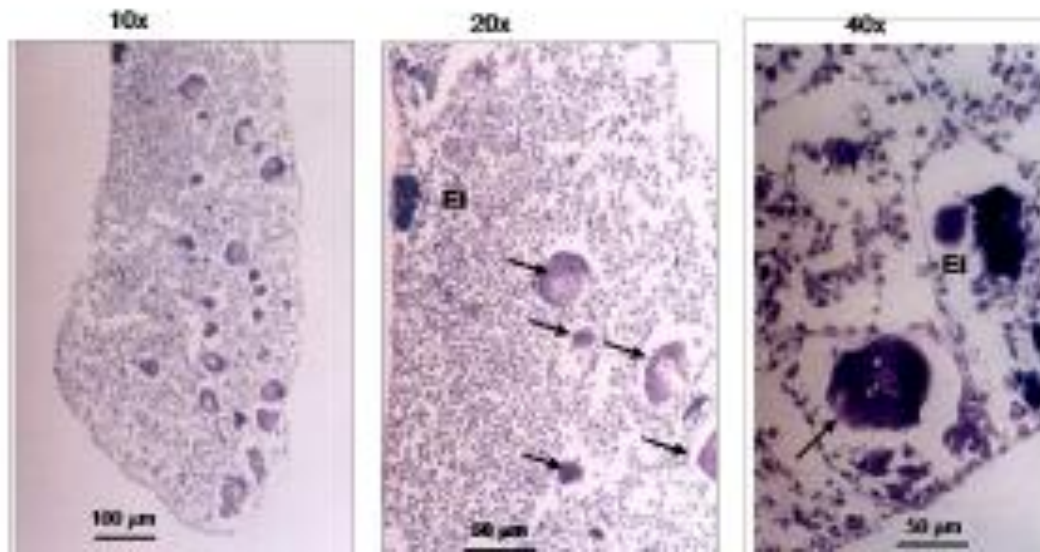


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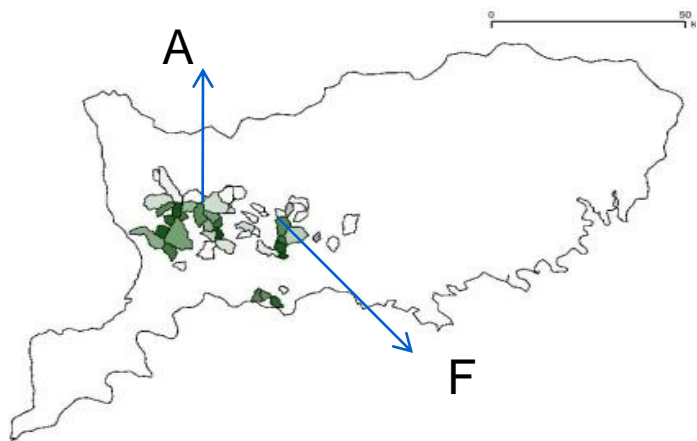
PY



JL



Disrupción endócrina en cuencas agrícolas y forestales del litoral Oeste (Uruguay). Canedo, L.; Eguren, G.; Carrasco-Letelier, L. & N. Rivas.



		TRATAMIENTOS						
		C	WP	SP	WP-SP	WF	SF	WF-SF
T I E M P O	0 días	n=6	n=6	n=6	n=6	n=6	n=6	n=6
	7 días	n=6	n=6	n=6	n=6	n=6	n=6	n=6
	14 días	n=6	n=6	n=6	n=6	n=6	n=6	n=6
	30 días	n=6	n=6	n=6	n=6	n=6	n=6	n=6

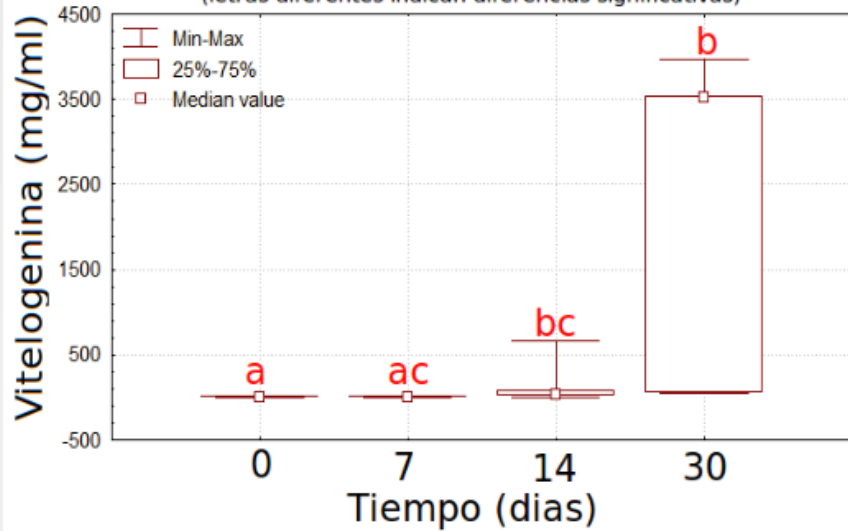
WP: agua del curso principal de la cuenca agrícola;
 WF: agua del curso principal de la cuenca forestal;
 SP: sedimento del curso principal de la cuenca agrícola;
 SF: sedimento del curso principal de la cuenca forestal

	ANCOVA F.Condición	ANCOVA I.Gonadosomático	ANCOVA-30d I.Hepatosomático
WP	ns	ns	ns
WF	ns	ns	ns
WP-SP	ns	ns	ns
WF-SF	ns	nd	P=0.083



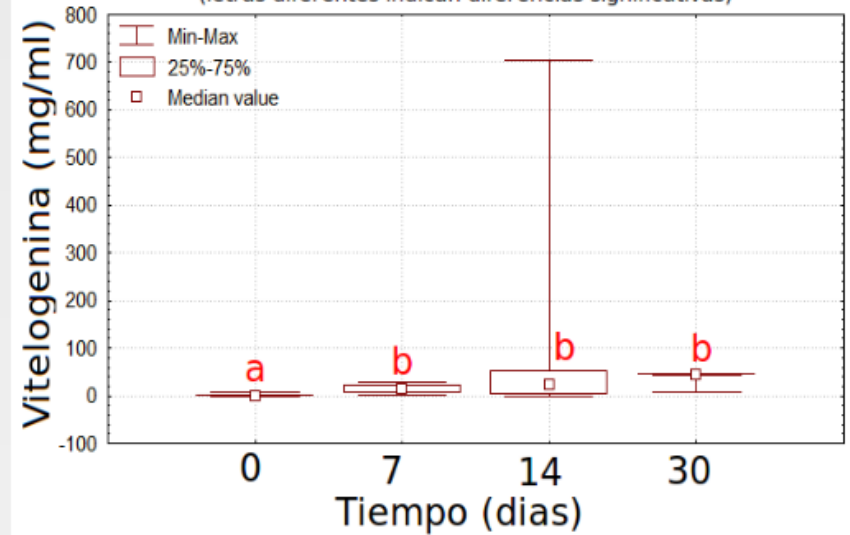
Síntesis de Vitelogenina por WP

(letras diferentes indican diferencias significativas)



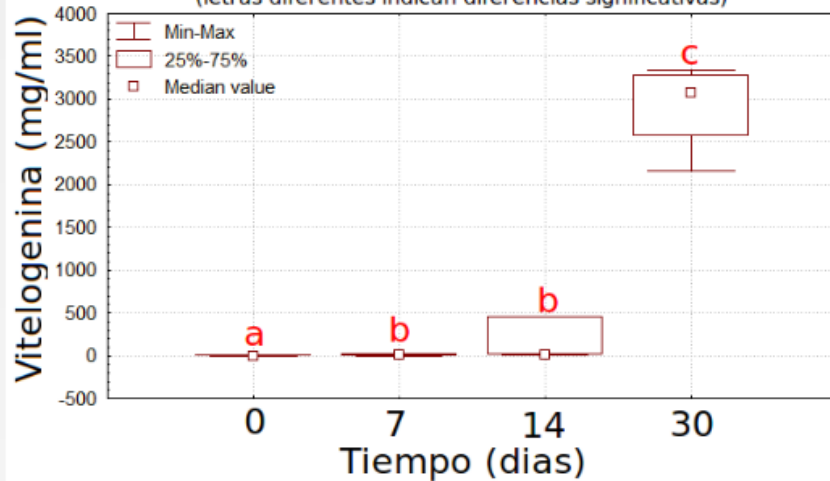
Síntesis de Vitelogenina por WF

(letras diferentes indican diferencias significativas)



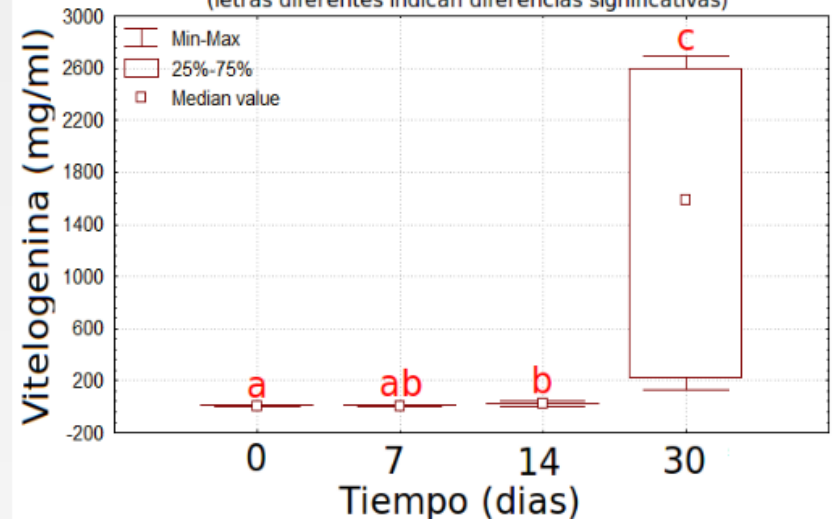
Síntesis de Vitelogenina por WP-SP

(letras diferentes indican diferencias significativas)



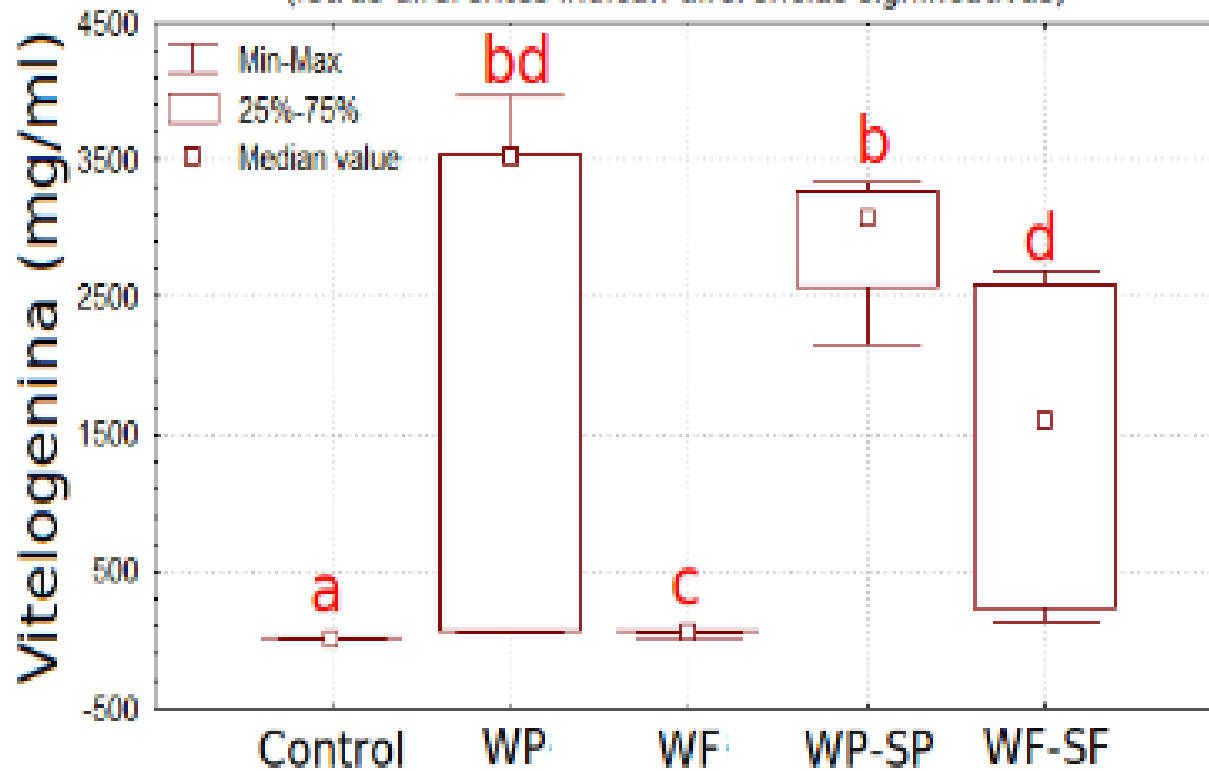
Síntesis de Vitelogenina por WF-SF

(letras diferentes indican diferencias significativas)



vitelogenina plasmatica en el dia 30

(letras diferentes indican diferencias significativas)



USO DE BIOMARCADORES PARA EVALUACIÓN DEL RIESGO A PESTICIDAS

- **Identificación del compuesto químico o grupo de compuestos químicos**
- **Identificación de mecanismo de acción**
- **Establecimiento de relación de causalidad: Exposición-Efecto**



OPORTUNIDADES DE MEJORA EN EL USO DE BIOMARCADORES

- ✓ **Selección de especies representativas de diferentes ambientes y evaluación de sensibilidad (tóxicos de referencia)**
- ✓ **Desarrollo, validación y estandarización de protocolos**
- ✓ **Selección de una batería de biomarcadores para screening**
- ✓ **Evaluación de formulados comerciales vs ingrediente activo**
- ✓ **Evaluación de mezclas en condiciones naturales, efectos de intensificación o manejo integrado**



eskerrik asko!

Gracias!

Grazie!

Merci!

Merci!

Thank you!

Thank you!

Thank you!

Thank you!

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Grazie!

感謝

Gracias!
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Merci!
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