



REPERCURSIÓN MEDIOAMBIENTAL DE LOS FITOSANITARIOS APLICADOS

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Determinación de fungicidas en diferentes matrices: condiciones experimentales



Acción **A3**

- Validación de métodos analíticos para la determinación de fungicidas en diferentes matrices
- Planificación técnica de las condiciones experimentales

Acción **B3**

- Análisis y caracterización de residuos de productos fitosanitarios
- Toxicidad y bio-accesibilidad en muestras reales durante la implementación de cada estrategia de tratamiento

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Determinación de fungicidas en diferentes matrices: condiciones experimentales



sgiker
Ikerkuntzarako
Zerbitzu Orokorrak
Servicios Generales
de Investigación

RECEPCIÓN de muestras

Servicio Central de Análisis
(Alava), SCAA

Aguas



Mostos



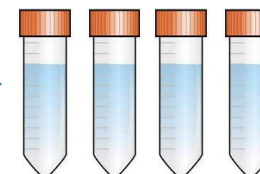
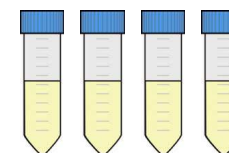
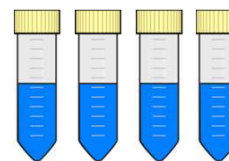
Vinos



Suelos



Uvas



-80 °C

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Determinación de fungicidas en diferentes matrices: condiciones experimentales



🖨️ **Análisis target de 15 fungicidas mediante LC-MS QQQ (Cimoxanilo, Boscalida, Dimetomorf, Quinoxifen, Metalaxil, Folpet, Benalaxil, Ciazofamida, Iprovalicarb, Metrafenona, Penconazol, Meptildinocap, Tebuconazol, Triadimenol y Piraclostrobin)**

🖨️ **Análisis de Fosetyl-Al mediante LC-MS single Q**

🖨️ **Análisis de Mancozeb y Metiram (DTC) mediante GC-MS**

🖨️ **Análisis compuestos inorgánicos (Oxicloruro de Cu y S) mediante ICPMS**

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1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



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1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



LC-ESI-MSMS



- Cimoxanilo
- Boscalida
- Dimetomorph
- Quinoxifen
- Metalaxil
- Folpet
- Benalaxyl
- Cianofamida
- Iprovalicarb
- Metrafenona
- Penconazol
- Meptildinocap
- Tebuconazol
- Triadimenol
- Piraclostribin

Chromatographic conditions

Columna: ZORBAX SB-C18 NB (2.1 x 100 mm, 3.5 µm)



Fase móvil: 96% A (5mM formiato amónico+0.01 % fórmico)
4% B (ACN/agua 5mM form. amon.+0.01% form)

Modo gradiente

QqQ MS conditions

Fuente ionización: **ESI**
Modo ionización: positivo
Modo adquisición dMRM



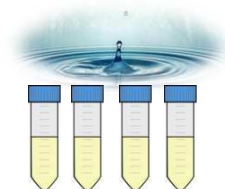
1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



Procedimiento de extracción

Aguas (5 mL)



Adición de P.I

10000 rpm, 5 min

1 mL muestra + 0.5 mL ACN



13000 rpm, 5 min

1 mL



Suelos (5 g)



Adición de P.I

Extracción con 5 mL ACN (x3)

4000 rpm, 5 min

Evaporar a sequedad

Reconstituir
en 1 mL ACN



Volumen inyección 5 μ L



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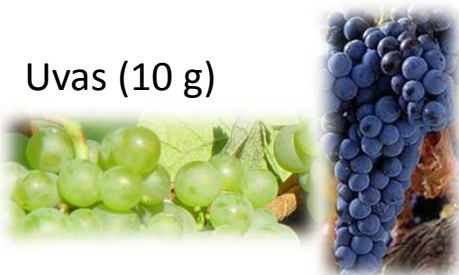
1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



Procedimiento de extracción

Uvas (10 g)



Mostos (10 g)



Vino (10 g)



Adición de P.I (Tebuconazole D₉)

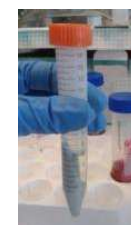
Método QuEChERS (Extracción en Fase Sólida Dispersiva)



ACN
MgSO₄, NaCl
Agitar
8000 rpm, 5 min



PSA
Agitar
8000 rpm, 5 min



1mL sobrenadante Evaporar Reconstituir
en 0.5mL ACN



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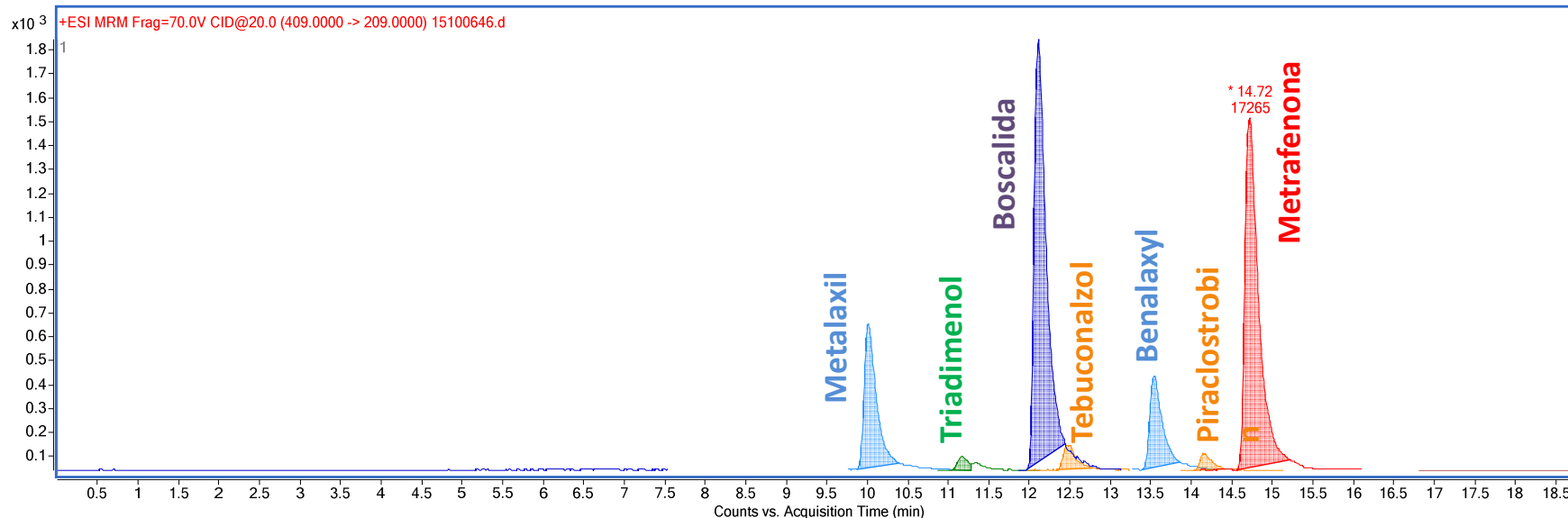


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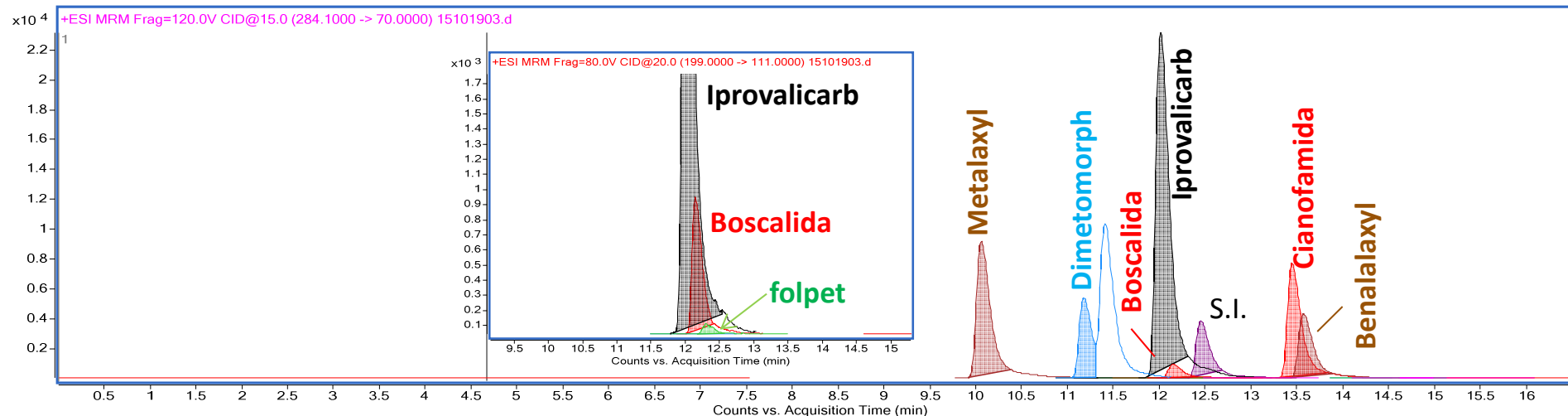
Análisis target de 15 fungicidas mediante LC-MS QqQ



Cromatograma de una muestra de SUELO



Cromatograma de una muestra de MOSTO (A1)



1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



EVALUACIÓN ANALÍTICA del MÉTODO



EUROPEAN COMMISSION

Safety of the Food Chain Pesticides and biocides

SANTE/11945/2015

Sustituye

SANCO/12571/2013

(01/01/2016)

*Guidance document on analytical quality control and **method validation procedures** for **pesticides residues** analysis in food and feed*

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1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



PARÁMETROS DE VALIDACIÓN

- Límite cuantificación (LDC), RSD < 20%
- Rango lineal



AGUAS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)
	0.018-2.27	> 0.99	0.018



SUELOS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)
	0.02-6.0	> 0.99	0.02
Folpet	0.25-6.0		0.25
Meptildinocap	0.05-6.0		0.05



UVAS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)
	0.01-1.5	> 0.99	0.01
Folpet	0.125-2.0		0.125
Meptildinocap	0.75-2.0		0.75



MOSTOS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)
	0.01-1.5	> 0.99	0.01
Folpet	0.125-2.0		0.125
Meptildinocap	0.125-2.0		0.125



VINOS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)
	0.01-1.5	> 0.99	0.01
Folpet	0.125-2.0		0.125
Meptildinocap	0.125-2.0		0.125

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1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



RESULTADOS

SUELOS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	ND	<LOQ	ND	ND	ND	ND	<LOQ	ND	<LOQ	ND	<LOQ	ND	<LOQ	<LOQ	ND	ND	ND	ND
DIMETOMORPH	0.02	0.06	0.02	0.06	<LOQ	0.02	0.05	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRIADIMENOL	ND	ND	ND	ND	ND	ND	ND	ND	<LOQ	<LOQ	0.03	ND	ND	ND	ND	ND	ND	ND
IPROVALICARB	ND	0.03	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BOSCALIDA	0.02	0.02	ND	<LOQ	ND	ND	ND	0.02	0.07	0.12	0.22	0.10	0.06	0.06	0.09	0.09	0.10	0.14
FOLPET	ND	2.02	ND	<LOQ	ND	ND	0.40	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TEBUCONAZOL	0.02	0.05	<LOQ	<LOQ	<LOQ	<LOQ	0.03	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	ND	<LOQ	<LOQ	<LOQ
PENCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CIANOFAMIDA	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENALAXYL	ND	ND	ND	0.16	ND	<LOQ	ND	0.04	<LOQ	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND
PIRACLOSTRIBIN	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND
METRAFENONA	0.02	0.05	0.02	0.04	0.02	0.02	0.05	0.04	<LOQ	0.02	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.02
QUINOXIFEN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Unidades $\mu\text{g/g}$

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1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



RESULTADOS

AGUAS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
DIMETOMORPH	0.02	0.05	ND	ND	ND	<LOQ	<LOQ	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRIADIMENOL	ND	ND	ND	ND	ND	<LOQ	<LOQ	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IPROVALICARB	ND	ND	<LOQ	ND	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BOSCALIDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND
FOLPET	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TEBUCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CIAZOFAMIDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENALAXYL	ND	<LOQ	<LOQ	ND	ND	ND	ND	<LOQ	ND	<LOQ	<LOQ	<LOQ	ND	ND	<LOQ	<LOQ	<LOQ	<LOQ
PIRACLOSTRIBIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METRAFENONA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
QUINOXIFEN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Unidades mg/L

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1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



RESULTADOS

UVAS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	0.01	0.12	0.15	0.04	0.09	0.06	0.09	0.08	0.03	0.12	0.04	0.14
DIMETOMORPH	0.04	0.05	0.10	0.10	0.08	0.05	0.07	0.07	0.07	0.08	0.07	0.12
TRIADIMENOL	ND	ND	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	ND
IProvalicarb	0.02	0.03	0.06	0.05	0.02	0.04	0.03	0.02	0.01	0.03	0.02	0.03
Boscalida	0.02	0.02	0.04	0.05	0.02	0.02	0.05	0.02	0.02	0.02	0.02	0.05
Folpet	0.16	0.39	0.68	0.39	0.20	0.26	0.14	0.14	0.05	0.31	0.12	0.08
TEBUCONAZOL	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
PENCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CIAZOFAMIDA	0.40	0.51	0.68	0.81	0.44	0.56	0.63	0.66	0.32	0.42	0.53	0.75
BENALAXYL	<LOQ	0.01	0.03	0.02	0.01	<LOQ	0.02	0.01	0.01	<LOQ	0.01	0.03
PIRACLOSTRIBIN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METRAFENONA	ND	<LOQ	ND	ND	ND	<LOQ	ND	ND	ND	<LOQ	ND	<LOQ
QUINOXIFEN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

UVAS	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
DIMETOMORPH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRIADIMENOL	<LOQ	<LOQ	<LOQ	0.02	ND	<LOQ	<LOQ	<LOQ	ND	ND	ND	ND	<LOQ	<LOQ	<LOQ
IProvalicarb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boscalida	ND	ND	ND	<LOQ	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	<LOQ
Folpet	ND	ND	ND	ND	ND	ND	0.19	ND	ND	ND	ND	ND	ND	ND	ND
TEBUCONAZOL	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	ND	<LOQ
PENCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CIAZOFAMIDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENALAXYL	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
PIRACLOSTRIBIN	ND	ND	<LOQ	<LOQ	ND	ND	ND	<LOQ	<LOQ	<LOQ	ND	<LOQ	ND	ND	<LOQ
METRAFENONA	ND	ND	ND	<LOQ	ND	ND	ND	ND	<LOQ	ND	ND	<LOQ	ND	ND	<LOQ
QUINOXIFEN	ND	ND	<LOQ	<LOQ	ND	ND	ND	ND	<LOQ	ND	ND	<LOQ	<LOQ	<LOQ	<LOQ
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Unidades µg/g

1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



RESULTADOS

MOSTOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	0.11	0.15	0.16	0.10	0.05	0.06	0.04	0.05	0.06	0.05	0.06	0.06
DIMETOMORPH	0.18	0.08	0.19	0.15	0.09	0.09	0.07	0.10	0.11	0.10	0.09	0.08
TRIADIMENOL	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ
IPROVALICARB	0.14	0.14	0.11	0.12	0.05	0.06	0.03	0.04	0.04	0.04	0.04	0.04
BOSCALIDA	0.17	0.04	0.15	0.10	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03
FOLPET	1.66	0.29	1.13	1.06	0.08	0.26	0.08	0.17	0.09	0.25	0.14	0.09
TEBUCONAZOL	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
PENCONAZOL	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND
CIAZOFAMIDA	1.73	0.47	1.20	1.24	0.42	0.77	0.47	0.70	0.62	0.56	0.43	0.74
BENALAXYL	0.05	0.02	0.08	0.05	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02
PIRACLOSTRIBIN	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND
METRAFENONA	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	ND	<LOQ
QUINOXIFEN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

MOSTOS	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
DIMETOMORPH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRIADIMENOL	<LOQ	<LOQ	ND	0.01	ND	<LOQ	<LOQ	<LOQ	ND	ND	ND	ND	ND	ND	<LOQ
IPROVALICARB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BOSCALIDA	ND	ND	ND	<LOQ	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	<LOQ
FOLPET	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TEBUCONAZOL	<LOQ	<LOQ	ND	<LOQ	ND	<LOQ	<LOQ	<LOQ	ND	ND	ND	ND	ND	ND	<LOQ
PENCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CIAZOFAMIDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENALAXYL	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
PIRACLOSTRIBIN	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	ND	<LOQ	<LOQ	ND	ND	<LOQ	ND	ND	<LOQ
METRAFENONA	<LOQ	<LOQ	<LOQ	<LOQ	ND	ND	ND	<LOQ	<LOQ	ND	ND	<LOQ	<LOQ	ND	<LOQ
QUINOXIFEN	ND	ND	<LOQ	ND	ND	ND	ND	ND	<LOQ	ND	ND	<LOQ	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Unidades µg/g

1.

Análisis target de 15 fungicidas mediante LC-MS QqQ



RESULTADOS

VINOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	0.06	0.10	0.09	0.06	0.07	0.07	0.06	0.06	0.10	0.07	0.06	0.07
DIMETOMORPH	0.08	0.08	0.09	0.09	0.10	0.10	0.06	0.12	0.07	0.11	0.09	0.11
TRIADIMENOL	ND	ND	ND	ND	0.01	0.01	0.01	0.01	<LOQ	ND	ND	0.01
IPROVALICARB	0.05	0.07	0.05	0.05	0.05	0.07	0.04	0.05	0.05	0.05	0.05	0.05
BOSCALIDA	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02
FOLPET	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TEBUCONAZOL	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND
PENCONAZOL	ND	ND	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND
CIACOFAMIDA	ND	ND	ND	ND	ND	0.04	0.02	0.06	ND	0.02	ND	<LOQ
BENALAXYL	0.02	0.02	0.03	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.02	0.03
PIRACLOSTRIBIN	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
METRAFENONA	ND	<LOQ	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	<LOQ
QUINOXIFEN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

VINOS	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CIMOXANILO	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METALAXYL	0.01	<LOQ	<LOQ	0.01	<LOQ	0.01	0.01	0.01	<LOQ	0.01	0.01	<LOQ	0.01	<LOQ	0.01
DIMETOMORPH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRIADIMENOL	ND	ND	ND	0.02	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND
IPROVALICARB	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BOSCALIDA	ND	ND	ND	0.01	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	0.01
FOLPET	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TEBUCONAZOL	0.01	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	0.01	ND	ND
PENCONAZOL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CIACOFAMIDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENALAXYL	ND	ND	ND	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
PIRACLOSTRIBIN	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
METRAFENONA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
QUINOXIFEN	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MEPTILDINOCAP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Unidades µg/mL

2.

Análisis de Fosetyl-Al mediante LC-MS single Q



Chromatographic conditions

Columna: ZORBAX Extend-C18 (3 x 150 mm, 5 μ m)
 Temperatura : 30 °C
 Fase móvil: 95% A (agua)
 5% B (ACN) Modo gradiente
 Flujo: 0.3 mL/min
 Volumen inyec: 2 μ L



Single Quad MS conditions

Fuente ionización: **ESI**
 Modo ionización: negativo
 Modo adquisición SIM
 Iones: 109, 81, 63

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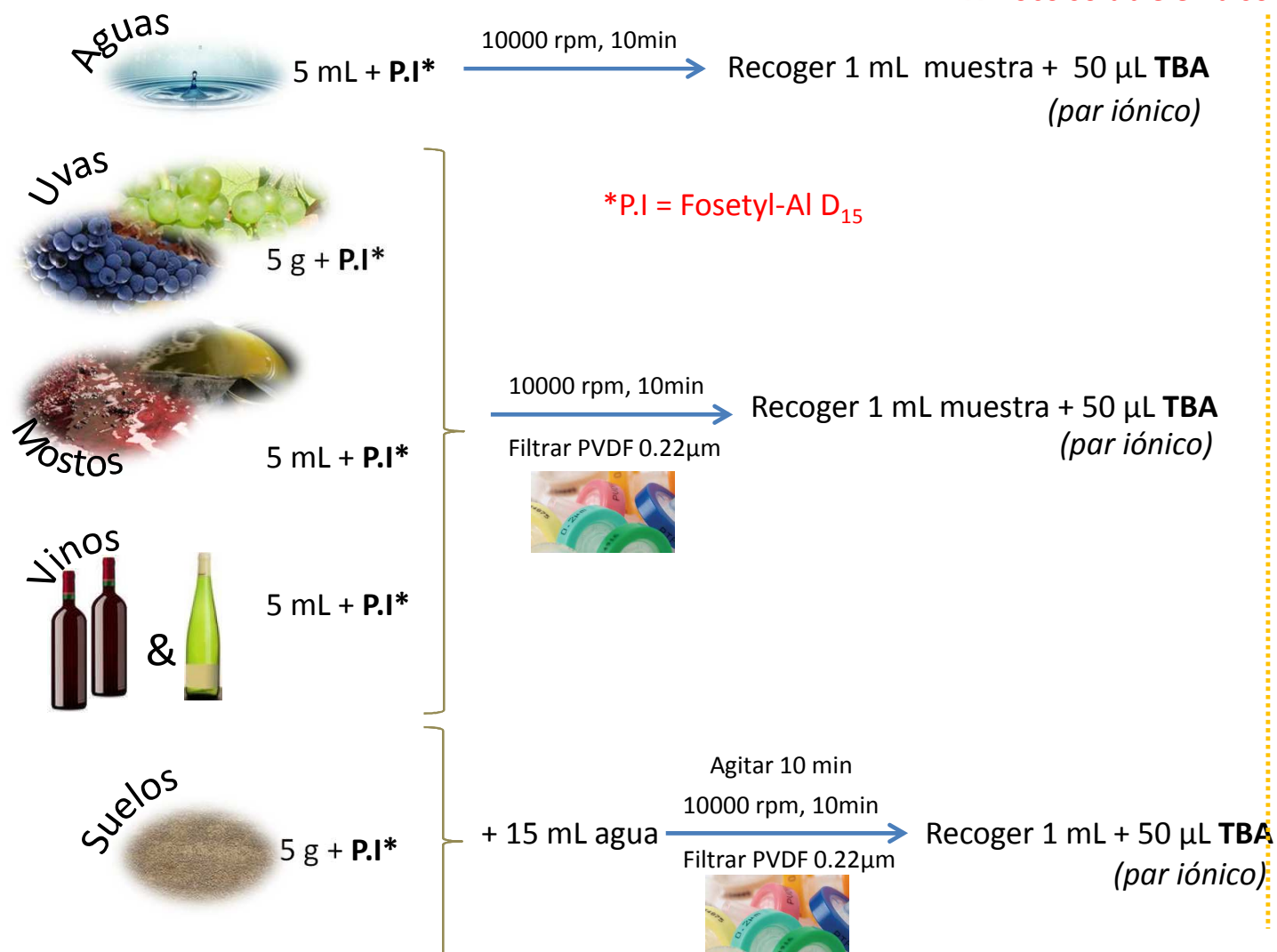
2.

Análisis de Fosetyl-Al mediante LC-MS single Q



Procedimiento de extracción

✗ Poco soluble en disolventes orgánicos



LC-SQ



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2.

Análisis de Fosetyl-Al mediante LC-MS single Q



PARÁMETROS DE VALIDACIÓN

- Límite cuantificación (LDC), RSD < 20%
- Rango lineal
- Precisión del método (repetibilidad)



AGUAS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)	Precision (RSD)
Pool A+L	0.005-2	0.9999	0.005	5.8

Precisión en el día a 0.005 µg/mL



SUELOS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)	Precision (RSD)
Pool A+L	0.1-5.0	0.995	0.1	17.4

Precisión en el día a 0.1 µg/g



UVAS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)	Precision (RSD)
Pool A+L	0.3-4.0	0.997	0.3	13.5

Precisión en el día a 0.5 µg/g



MOSTOS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)	Precision (RSD)
Laguardia	0.1-5.0	0.996	0.1	7.7*
Aia	0.1-5.0	0.996	0.1	10.7**

Precisión en el día a* 0.3 µg/mL y a **0.1 µg/mL



VINOS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)	Precision (RSD)
Laguardia	0.1-4.0	0.9997	0.1	1.8
Aia	0.1-4.0	0.9997	0.1	3.2

Precisión en el día a 0.1 µg/mL

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2.

Análisis de Fosetyl-AI mediante LC-MS single Q



RESULTADOS

AGUAS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Fosetil-AI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

SUELOS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Fosetil-AI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

UVAS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
Fosetil-AI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
	ND	ND	ND	ND	ND	ND	<LOQ	ND	ND	ND	ND	ND	ND	ND	ND
MOSTOSA1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12				
Fosetil-AI	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ				
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
VINOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
Fosetil-AI	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	<LOQ	0.60			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

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3.

Análisis de Mancozeb y Metiram mediante GC-MS



Chromatographic conditions



Columna: CP Sil 5CB (30 m x 0.32 mm, 3 μ m)

Horno: 45 °C (2min) $\xrightarrow{40\text{ }^{\circ}\text{C/min}}$ 250 °C

Flujo He: 2 mL/min

Injector: 220 °C, modo split

MS conditions

Modo adquisición SIM

Iones: 76, 78, 38

MS source: 230 °C

MS Quad: 150 °C

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3.

Análisis de Mancozeb y Metiram mediante GC-MS



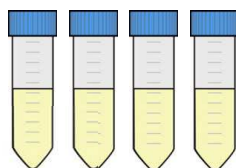
Procedimiento de extracción

• Ditiocarbamatos: Mancozeb y metiram

Suelos (4g)



Aguas (4mL)



Uvas (2 g)



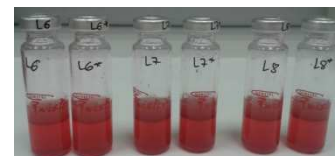
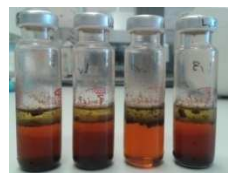
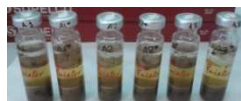
Mostos (2 mL)



Vinos (2 mL)



1º Reducción de DTC en **condiciones ácidas** fuertes en presencia de **SnCl₂** (agente reductor)



2º Extracción con **isooctano**

3º Inyectar 2 µL en el sistema **GC-MS**



Resultados expresados como **CS₂ total**

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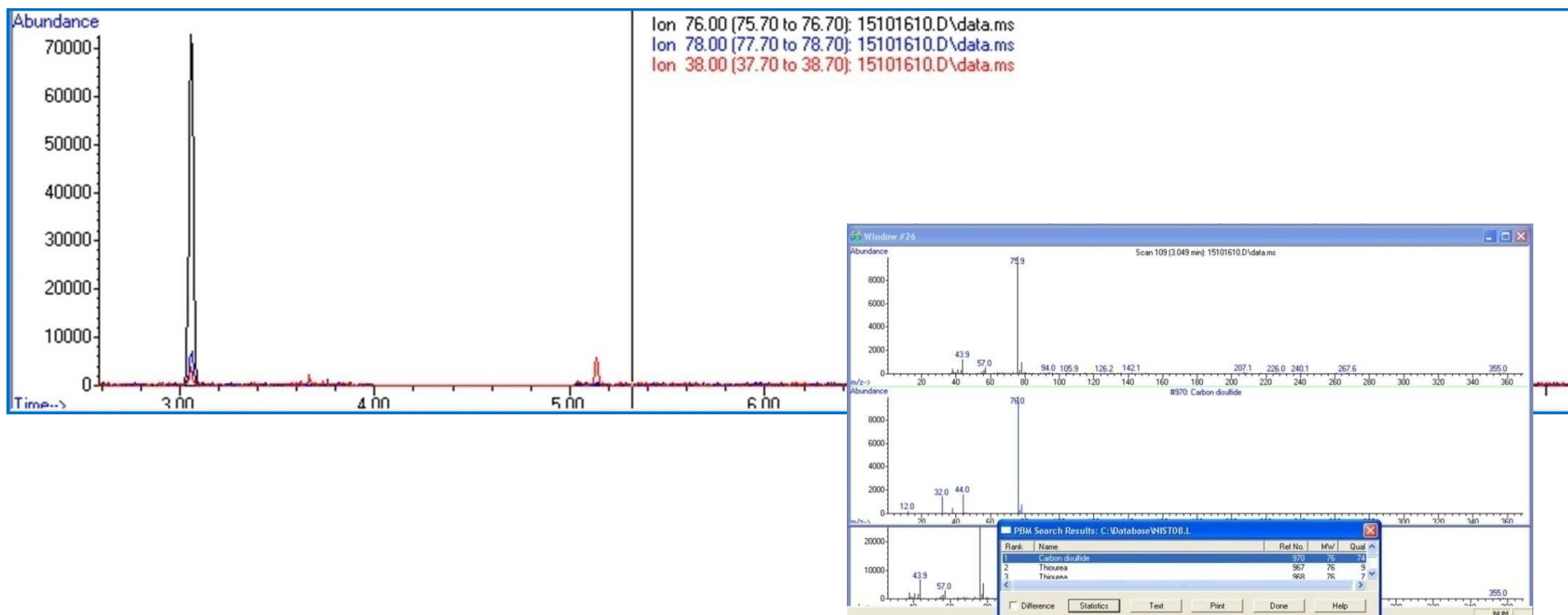


3.

Análisis de Mancozeb y Metiram mediante GC-MS



Extracted Ion Chromatogram (EIC) de una muestra de AGUA dopada a 5ppm con *Tiram* y posteriormente reducido a CS₂



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3.

Análisis de Mancozeb y Metiram mediante GC-MS



PARÁMETROS DE VALIDACIÓN

- Límite cuantificación (LDC), RSD < 20%
- Rango lineal
- Precisión del método (repetibilidad)



AGUAS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)	Precision (RSD)
Pool A+L	0.05-2	0.999	0.05	23.6

Precisión en el día a 0.1 µg/mL



SUELOS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)	Precision (RSD)
Laguardia	0.2-3	0.997	0.2	18.4
Aia	0.1-3	0.999	0.1	8.8

Precisión en el día al LDC µg/g



UVAS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC (µg/g)	Precision (RSD)
Laguardia	0.05-1	1	0.05	11.6
Aia	0.05-1	0.9995	0.05	3.9

Precisión en el día a 0.05 µg/g



MOSTOS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)	Precision (RSD)
Laguardia	0.05-1.5	0.998	0.05	5.0
Aia	0.05-1.5	0.9997	0.05	10.1

Precisión en el día a 0.05 µg/g



VINOS	Rango lineal (µg/mL)	Coefficiente correlacion (r)	LDC (µg/mL)	Precision (RSD)
Laguardia	0.01-0.5	0.9998	0.01	4.2
Aia	0.01-0.5	0.9997	0.01	2.4

Precisión en el día a 0.01 µg/mL

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3.

Análisis de Mancozeb y Metiram mediante GC-MS



RESULTADOS

AGUAS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CS2 total	ND	ND	ND	ND	ND	ND	ND	ND	<LOQ	<LOQ	<LOQ	<LOQ	ND	ND	ND	ND	ND	ND
SUELOS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
CS2 total	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.12	<LOQ	<LOQ	<LOQ	<LOQ	ND	<LOQ	ND	<LOQ	<LOQ	<LOQ	<LOQ

UVAS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
CS2 total	ND	<LOQ	ND	ND	ND	0.05	ND	ND	ND	0.05	ND	ND			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MOSTOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
CS2 total	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.13	<LOQ	<LOQ	<LOQ	0.12	<LOQ	<LOQ			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
	ND	ND	ND	<LOQ	<LOQ	ND	ND	<LOQ	ND	ND	<LOQ	ND	ND	<LOQ	<LOQ
VINOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
CS2 total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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4.

Análisis de compuestos inorgánicos mediante ICPMS



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4.

Análisis de compuestos inorgánicos mediante ICPMS



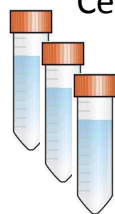
Procedimiento de extracción

• Oxidocloruro de Cobre y Azufre

Aguas (3 mL)



Centrifugación



10000 rpm, 5min

Suelos (0.25 g)



MWAE en 2 ciclos

1º) $\text{HNO}_3 + \text{HF}$

2º) Ac. bórico

Uvas



Mostos



Vinos



MWAE con:

$\text{HNO}_3 + \text{H}_2\text{O}_2$



ICPMS con celda: $\text{He} \rightarrow \text{Cu}$
 $\text{H}_2 \rightarrow \text{S}$

Adición Sm (EFECTO MATRIZ)

Adición P.I. (Y e Ir) en continuo



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4.

Análisis de compuestos inorgánicos mediante ICPMS



PARÁMETROS DE VALIDACIÓN

- Límite cuantificación (LDC), RSD < 20%
- Rango lineal



AGUAS	Rango lineal*	Coefficiente correlacion (r)	LDC
Cu	0.2-50.0	> 0.999	1 ng/mL
S			1 µg/mL

*Cu (ng/mL) y S (µg/mL)



SUELOS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC
Cu	0.2-50.0	> 0.999	0.16 µg/g
S			400 µg/g



UVAS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC
Cu	0.2-50.0	> 0.999	0.2 µg/g
S			200 µg/g



MOSTOS	Rango lineal (µg/g)	Coefficiente correlacion (r)	LDC
Cu	0.2-50.0	> 0.999	0.12 µg/g
S			100 µg/g



VINOS	Rango lineal*	Coefficiente correlacion (r)	LDC
Cu	0.2-50.0	> 0.999	25 ng/mL
S			62 µg/mL

*Cu (ng/mL) y S (µg/mL)

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4.

Análisis de compuestos inorgánicos mediante ICPMS



RESULTADOS

AGUAS

Cu: Unidades ng/mL
Azufre: Unidades µg/mL

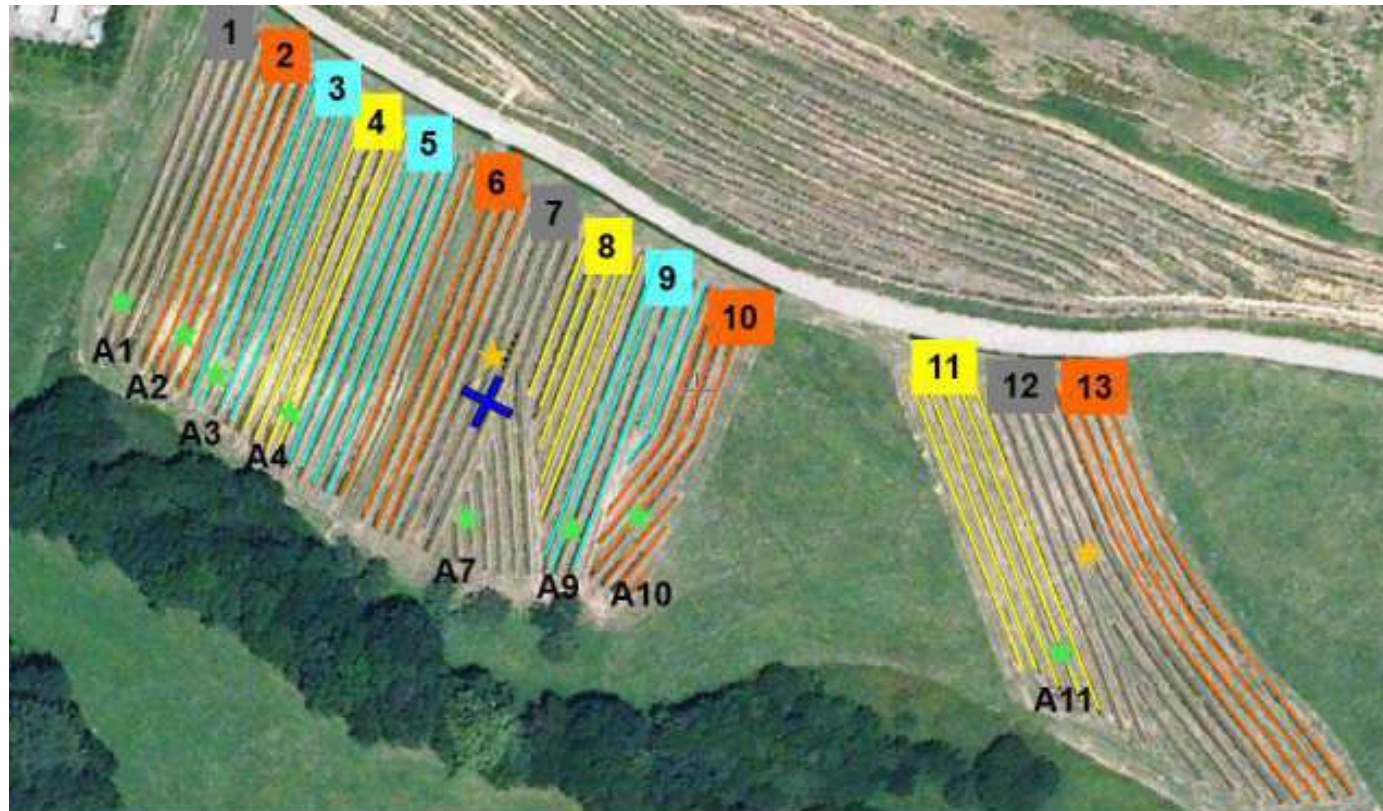
AGUAS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Cu	36.28	24.65	42.91	28.68	41.93	29.29	50.99	40.76	24.59	20.39	17.61	38.76	23.81	24.93	25.50	17.47	29.33	14.78
S	7.97	8.47	10.09	12.68	9.04	10.59	7.17	11.00	30.09	14.63	18.89	17.24	26.53	13.04	15.27	20.73	43.20	19.40
SUELOS	A1	A2	A3	A4	A7	A9	A10	A11	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Cu	73.01	78.45	76.30	63.20	77.86	55.76	37.36	58.52	29.04	38.22	38.99	38.38	37.41	35.22	28.04	34.46	24.78	22.49
S	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

SUELOS Unidades µg/g (para Cu y S)

UVAS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
Cu	3.70	7.63	10.19	9.58	5.34	6.25	10.99	7.90	7.24	6.73	5.56	8.84			
S	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Cu	2.09	1.98	3.59	3.98	1.90	1.30	1.81	1.34	3.18	2.47	1.47	2.51	1.44	2.43	2.47
S	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
MOSTOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
Cu	15.89	14.53	14.04	10.77	12.84	13.97	13.58	19.42	13.74	11.89	16.21	16.26			
S	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Cu	1.11	0.89	0.68	2.63	0.58	0.71	0.66	2.02	0.65	0.67	2.14	0.93	1.06	0.92	2.55
S	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
VINOS	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12			
Cu	0.13	0.61	0.10	0.10	0.37	0.10	0.62	0.05	0.17	0.23	0.46	0.26			
S	0.11	0.09	0.10	0.08	0.12	0.09	0.09	0.10	0.10	0.11	0.09	0.14			
	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15
Cu	0.04	0.04	0.18	0.12	0.09	0.03	0.04	0.03	0.05	0.03	0.04	0.05	0.14	0.06	0.03
S	<LOQ	<LOQ	<LOQ	0.07	0.08	0.07	0.08	0.07	0.08	<LOQ	0.09	0.08	0.09	0.08	0.09



PARCELA AIA



- Goidanich and treatment as cave considers
- residue zero phytochemicals
- treatment when risk emission by weather station
- Control (no treatment)
- (13) Automatic detection
- ✕ weather station

- Oospore traps
- ★ Spore traps
- ★ Ax = Gerlach Box (water)

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RESULTADOS y CONCLUSIONES

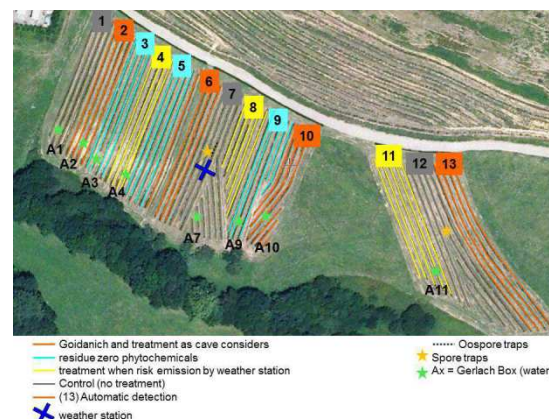


	PARCELAS	METALAX	DIMETOM	TRMN	IPROVALIC	BOSCALID	FOLPET	TEBUCONAZ	CIAZOFAMID	BENALAXYL	METRAFEN	Fosetyl-AI	Cu	S
AGUA Sep-15	A1	<loq	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	36.28	7.97
	A7	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	41.93	9.04
SUELO Sep-15	A1	nd	0.02	nd	nd	0.02	nd	0.02	nd	nd	0.02	nd	73.01	nd
	A7	nd	<loq	nd	nd	nd	nd	<loq	nd	nd	0.02	nd	77.86	nd
UVAS Sep-15	A1	0.01	0.04	nd	0.02	0.02	0.16	<loq	0.40	<loq	nd	nd	3.70	nd
	A7	0.09	0.07	<loq	0.03	0.05	0.14	<loq	0.63	0.02	nd	nd	10.99	nd
	A12	0.14	0.12	nd	0.03	0.05	0.08	<loq	0.75	0.03	<loq	nd	8.84	nd
MOSTO Sep-15	A1	0.11	0.17	<loq	0.14	0.17	1.66	<loq	1.73	0.05	<loq	nd	15.89	nd
	A7	0.04	0.07	<loq	0.03	0.02	0.08	nd	0.47	0.02	<loq	nd	13.58	nd
	A12	0.05	0.08	<loq	0.04	0.03	0.09	<loq	0.74	0.02	<loq	nd	16.26	nd
VINO Oct-15	A1	0.05	0.08	nd	0.05	0.02	nd	nd	nd	0.02	nd	nd	0.13	0.11
	A7	0.06	0.06	0.01	0.04	0.02	nd	0.01	0.02	0.01	nd	nd	0.62	nd
	A12	0.07	0.11	0.01	0.05	0.02	nd	nd	<loq	0.03	<loq	0.6	0.26	0.14

Fecha aplicación

TRATAMIENTOS APLICADOS

- 7/10/2015 Folpet 25% + Fosetil-al 50% + Iprovalicarb 4%
Oxicloruro de cobre 70%
Boscalida 20% + Kresoxim-metil 10%
- 7/17/2015 Folpet 40% + Metalaxil 10%
- 7/24/2015 Benalaxil 4%+ oxicloruro de cobre 33%
- 8/6/2015 Ciazofamida 2,5%
Boscalida 20% + Kresoxim-metil 10%
- 8/20/2015 Dimetomorf 15%



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RESULTADOS y CONCLUSIONES



	PARCELA	METALAX	DIMETOM	TRMN	IPROVALIC	BOSCALID	FOLPET	TEBUCONAZ	CIANOFAMID	BENALAXYL	METRAFEN	CS2	Cu	S
AGUA	A2	<LOQ	0.05	nd	nd	nd	nd	nd	nd	<LOQ	nd	nd	24.65	8.47
	A10	<LOQ	<LOQ	<LOQ	nd	nd	nd	nd	nd	nd	nd	nd	50.99	7.17
SUELO	A2	<loq	0.06	nd	0.03	0.02	2.02	0.05	nd	nd	0.05	nd	78.45	nd
	A10	<loq	0.05	nd	0.06	nd	0.40	0.03	nd	nd	0.05	0.12	37.36	nd
UVAS	A2	0.12	0.05	nd	0.03	0.02	0.39	<loq	0.51	0.01	<loq	nd	7.63	nd
	A6	0.06	0.05	<loq	0.04	0.02	0.26	<loq	0.56	<loq	<loq	0.05	6.25	nd
	A10	0.12	0.08	<loq	0.03	0.02	0.31	<loq	0.42	<loq	<loq	0.05	6.73	nd
MOSTO	A2	0.152	0.083	<loq	0.142	0.043	0.289	<loq	0.471	0.018	<loq	nd	14.53	nd
	A6	0.056	0.091	<loq	0.057	0.017	0.259	<loq	0.769	0.013	<loq	0.13	13.97	nd
	A10	0.051	0.098	<loq	0.041	0.015	0.253	<loq	0.556	0.012	<loq	0.12	11.89	nd
VINO	A2	0.095	0.084	nd	0.072	0.018	nd	nd	nd	0.017	<loq	nd	0.61	0.09
	A6	0.074	0.100	0.011	0.067	0.016	nd	nd	0.040	0.014	<loq	nd	0.10	0.09
	A10	0.070	0.108	nd	0.052	0.018	nd	nd	0.016	0.014	nd	nd	0.23	0.11

TRATAMIENTOS APLICADOS

4% cimoxanilo + 25% folpet - 50% fosetil-Al

Oxicloruro de cobre 70%

Metrafenona 50%

Sulfato Cuprocálcico 20%

Metil Tiofanato 45%

Folpet 40% + Metalaxil 10%

Tebuconazol 25%

Dimetomorf 7.5%+Mancozeb 66,7%

Dimetomorf 15%

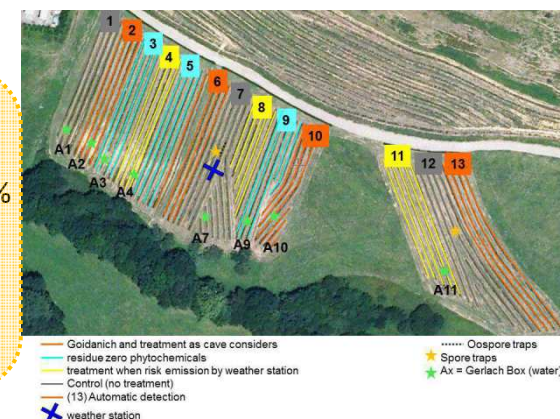
Folpet 25% + fosetil-al 50% + iprovalicarb 4%

Kresoxim-metil 50%

Boscalida 20% + Kresoxim-metil 10%

Benalaxil 4%+ oxiclورو de cobre 33%

Ciazofamida 2,5%



RESULTADOS Y CONCLUSIONES



	PARCELA	METALAX	DIMETOM	TRMIN	IPROVALIC	BOSCALID	FOLPET	CIAZOFAMID	BENALAXYL	METRAFEN	Cu	S
AGUA	A3	<loq	nd	nd	<loq	nd	nd	nd	<loq	nd	42.91	10.09
	A9	<loq	<loq	<loq	nd	nd	nd	nd	nd	nd	29.29	10.59
SUELO	A3	nd	0.02	nd	nd	nd	nd	nd	nd	0.02	76.30	nd
	A9	nd	0.02	nd	nd	nd	nd	nd	<loq	0.02	55.76	nd
UVAS	A3	0.15	0.10	nd	0.06	0.04	0.68	0.68	0.03	nd	10.19	nd
	A5	0.09	0.08	<loq	0.02	0.02	0.20	0.44	0.01	nd	5.34	nd
	A9	0.03	0.07	<loq	0.01	0.02	0.05	0.32	0.01	nd	7.24	nd
MOSTO	A3	0.160	0.187	<loq	0.113	0.145	1.127	1.201	0.078	<loq	14.04	nd
	A5	0.054	0.093	<loq	0.045	0.024	0.083	0.417	0.020	<loq	12.84	nd
	A9	0.055	0.107	<loq	0.035	0.024	0.087	0.624	0.024	<loq	13.74	nd
VINO	A3	0.088	0.094	nd	0.050	0.022	nd	nd	0.031	nd	0.10	0.10
	A5	0.074	0.103	0.012	0.051	0.021	nd	nd	0.025	nd	0.37	0.12
	A9	0.095	0.068	<loq	0.052	0.014	nd	nd	0.014	nd	0.17	0.10

TRATAMIENTOS APLICADOS

75% carbonato cálcico+ 4% carbonato magnésico+ 0.5% hierro+5% sílice+ 0.1% óxido potásico+ 0.015% sodio+0.015% fósforo> 0.01% manganeso

Ext. Mimosa tenuiflora+Quercus robur

Sulfato Cuprocálcico 12,4%

cobre 5%+ác. Glucónico+ac.galacturónico

Dimetomorf 15%

folpet 25% + **fosetil-al 50%** + iprovalicarb 4%

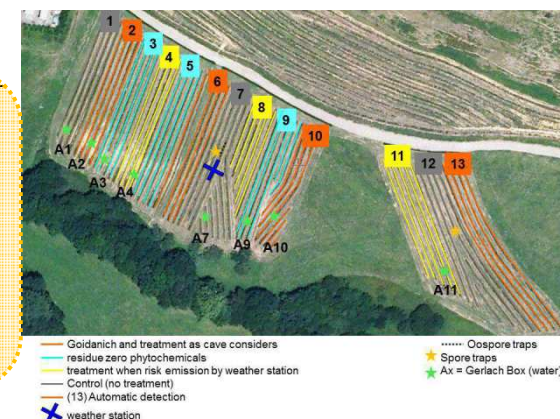
oxicloruro de cobre 70%

Boscalida 20% + Kresoxim-metil 10%

Folpet 40% + Metalaxil 10%

Benalaxil 4%+ oxicloruro de cobre 33%

Ciazofamida 2,5%



RESULTADOS y CONCLUSIONES



	PARCELA	METALAX	DIMETOM	TRMN	IPROVALIC	BOSCALID	FOLPET	CIANOFAMID	BENALAXYL	METRAFEN	Cu	S
AGUA	A4	<loq	nd	nd	nd	nd	nd	nd	nd	nd	28.68	12.68
	A11	<loq	0.02	nd	0.02	nd	nd	nd	<loq	nd	40.76	11.00
SUELO	A4	nd	0.06	nd	nd	<loq	<loq	<loq	0.16	0.04	63.20	nd
	A11	nd	0.03	nd	nd	0.02	0.05	nd	0.04	0.04	58.52	nd
UVAS	A4	0.04	0.10	<loq	0.05	0.05	0.39	0.81	0.02	nd	9.58	nd
	A8	0.08	0.07	<loq	0.02	0.02	0.14	0.66	0.01	nd	7.90	nd
	A11	0.04	0.07	nd	0.02	0.02	0.12	0.53	0.01	nd	5.56	nd
MOSTO	A4	0.095	0.150	<loq	0.118	0.097	1.055	1.237	0.048	<loq	10.77	nd
	A8	0.045	0.102	<loq	0.042	0.024	0.166	0.701	0.016	nd	19.42	nd
	A11	0.057	0.085	nd	0.041	0.023	0.140	0.434	0.018	nd	16.21	nd
VINO	A4	0.061	0.088	nd	0.054	0.021	nd	nd	0.023	nd	0.10	0.08
	A8	0.062	0.115	0.011	0.051	0.021	nd	0.059	0.019	nd	0.05	0.10
	A11	0.063	0.090	nd	0.045	0.022	nd	nd	0.019	nd	0.46	0.09

TRATAMIENTOS APLICADOS

Folpet 40% + METALAXIL 10%

Fosetil-Al 50%+Cimoxanilo 4%+Folpet 25%

Benalaxil 4% + oxiclورو de cobre 33%

folpet 25% + fosetil-al 50% + iprovalicarb 4%

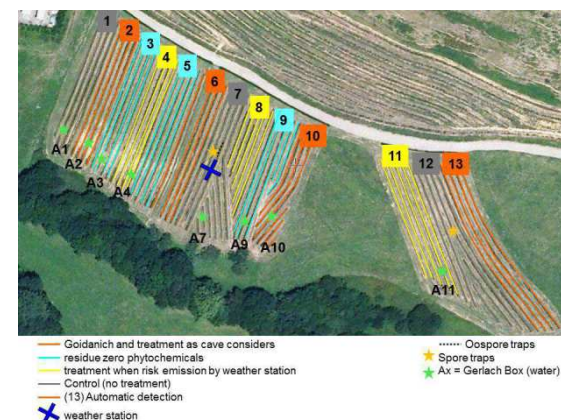
Folpet 30%+oxiclورو de cobre 16%

Dimetomorf 15%

oxiclورو de cobre 70%

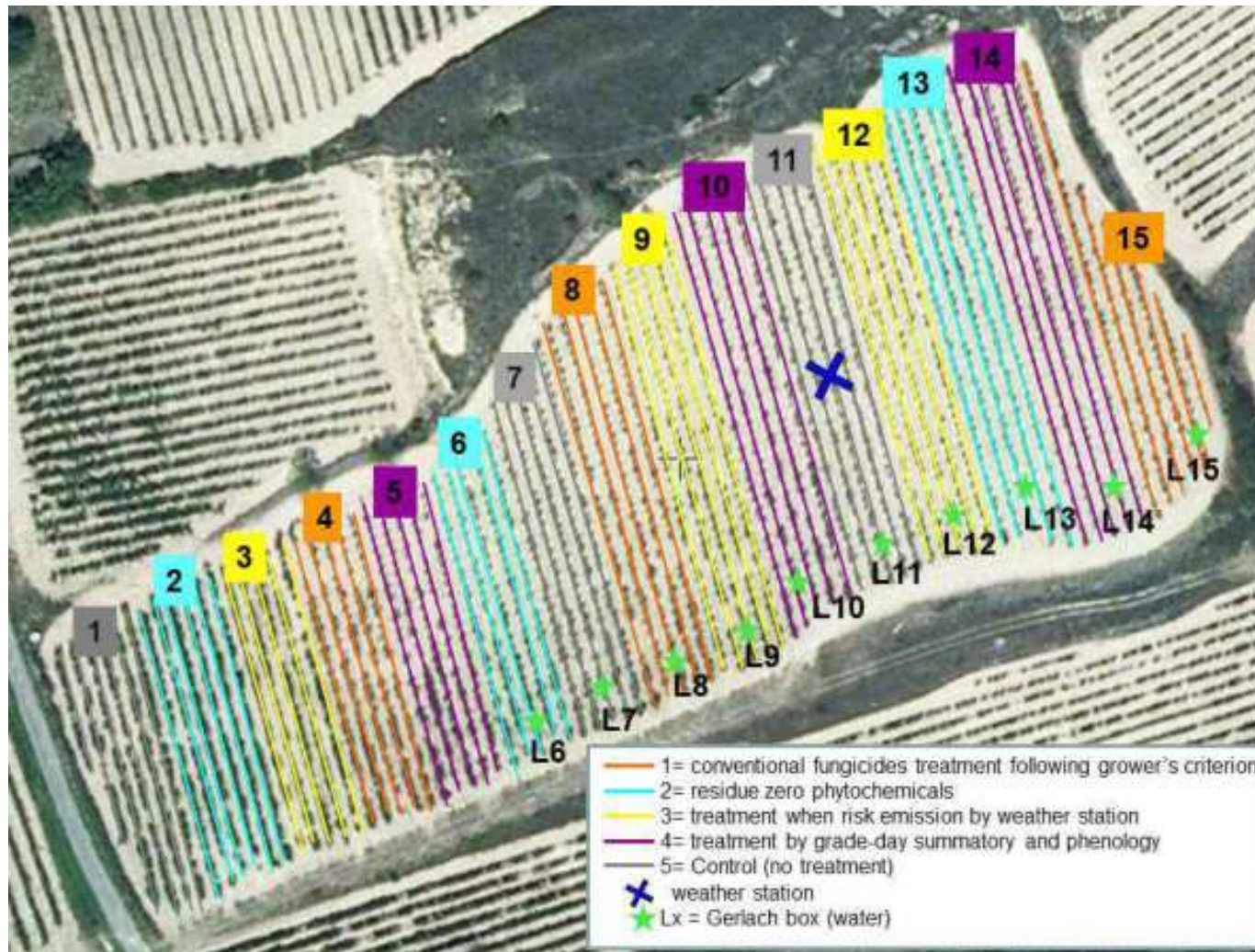
Boscalida 20% + Kresoxim-metil 10%

Ciazofamida 2,5%





PARCELA LAGUARDIA



eman ta zabal zazu



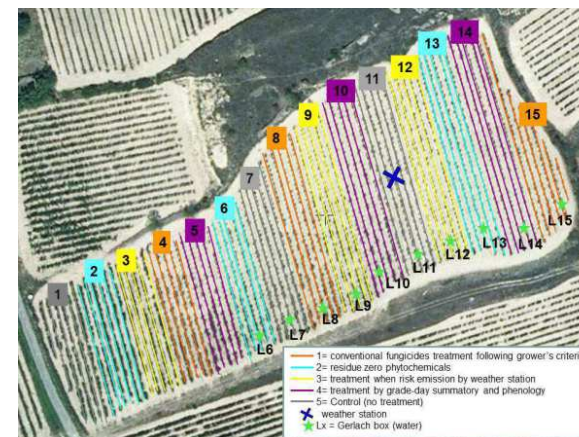
RESULTADOS y CONCLUSIONES



	PARCELA	METALAX	BOSCALID	FOLPET	TEBUCONAZ	METRAFEN	Cu	S
AGUA	L7	<loq	nd	nd	nd	nd	20.39	14.63
	L11	<loq	nd	nd	nd	nd	24.93	13.04
SUELO	L7	nd	0.12	nd	<loq	0.02	38.22	nd
	L11	<loq	0.06	nd	<loq	<loq	35.22	nd
UVAS	L1	<loq	nd	nd	<loq	nd	2.09	nd
	L7	<loq	nd	0.194	<loq	nd	1.81	nd
	L11	<loq	nd	nd	<loq	nd	1.47	nd
MOSTO	L1	<loq	nd	nd	<loq	<loq	1.11	nd
	L7	<loq	nd	nd	<loq	nd	0.66	nd
	L11	<loq	nd	nd	nd	nd	2.14	nd
VINO	L1	0.010	nd	nd	0.012	nd	0.04	nd
	L7	0.010	nd	nd	nd	nd	0.04	0.08
	L11	0.010	nd	nd	nd	nd	0.04	0.09

TRATAMIENTOS APLICADOS

Benalaxil 6% +Cimoxanilo 3,2%+ Folpet 35%



RESULTADOS y CONCLUSIONES

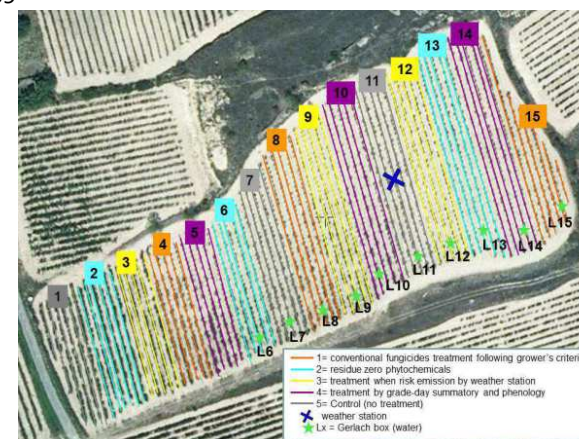


	PARCELA	METALAX	BOSCALID	TEBUCONAZ	Cu	S
AGUA	L6	nd	nd	nd	24.59	30.09
	L13	<loq	nd	nd	17.47	20.73
SUELO	L6	<loq	0.07	<loq	29.04	nd
	L13	nd	0.09	<loq	34.46	nd
UVAS	L2	<loq	nd	<loq	1.98	nd
	L6	<loq	nd	<loq	1.30	nd
	L13	<loq	nd	<loq	1.44	nd
MOSTO	L2	<loq	nd	<loq	0.89	nd
	L6	<loq	nd	<loq	0.71	nd
	L13	<loq	nd	nd	1.06	nd
VINO	L2	<loq	nd	nd	0.04	nd
	L6	0.010	nd	nd	0.03	0.07
	L13	0.010	nd	0.012	0.14	0.09

TRATAMIENTOS APLICADOS

Azufre 98,5%

Ext. Veg.



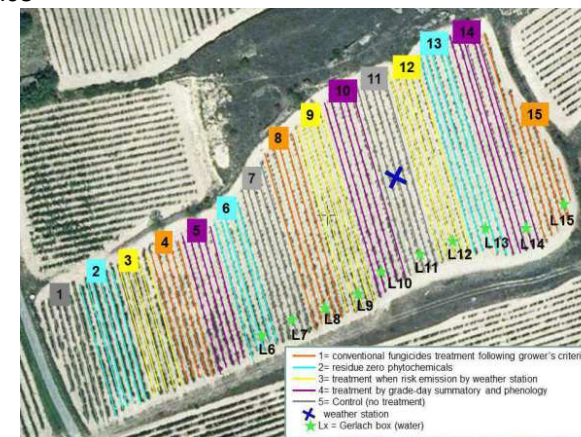
RESULTADOS y CONCLUSIONES



	PARCELA	BOSCALID	METRAFEN	Cu	S
AGUA	L9	nd	nd	38.76	17.24
	L12	nd	nd	25.50	15.27
SUELO	L9	0.10	<loq	38.38	nd
	L12	0.09	0.01	28.04	nd
UVAS	L3	nd	nd	3.59	nd
	L9	nd	<loq	3.18	nd
	L12	nd	<loq	2.51	nd
MOSTO	L3	nd	<loq	0.68	nd
	L9	nd	<loq	0.65	nd
	L12	nd	<loq	0.93	nd
VINO	L3	nd	nd	0.18	nd
	L9	nd	nd	0.05	0.08
	L12	nd	nd	0.05	0.08

TRATAMIENTOS APLICADOS

Metildinocap 35%
 Metiram 55% + Piraclostrobin 5%
 Penconazol 10 %
 Quinoxifen 25 %
 Azufre 98,5%



RESULTADOS y CONCLUSIONES



	PARCELA	METALAX	TRMN	BOSCALID	METRAFEN	Cu	S
AGUA	L8	<loq	nd	<loq	nd	17.61	18.89
	L15	<loq	nd	nd	nd	14.78	19.40
SUELO	L8	<loq	0.03	0.22	<loq	38.99	nd
	L15	nd	nd	0.14	0.02	22.49	nd
UVAS	L4	<loq	0.018	<loq	<loq	3.98	nd
	L8	<loq	<loq	<loq	nd	1.34	nd
	L15	<loq	<loq	<loq	<loq	2.47	nd
MOSTO	L4	<loq	0.012	<loq	<loq	2.63	nd
	L8	<loq	<loq	<loq	<loq	2.02	nd
	L15	<loq	<loq	<loq	<loq	2.55	nd
VINO	L4	0.010	0.015	<loq	nd	0.12	0.07
	L8	0.010	0.013	0.012	nd	0.03	0.07
	L15	0.010	nd	0.010	nd	0.03	0.09

TRATAMIENTOS APLICADOS

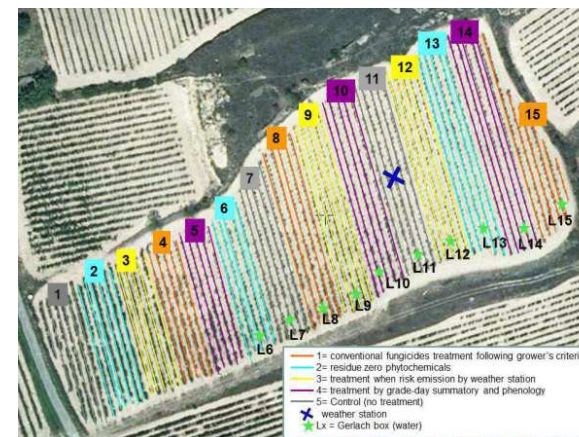
Azufre 98,5%

Miclobutanil 12,5%

kresoxim-metil 10%

Tetraconazol 12,5% p/v

Metiram 55% + Piraclostrobin 5%



RESULTADOS y CONCLUSIONES

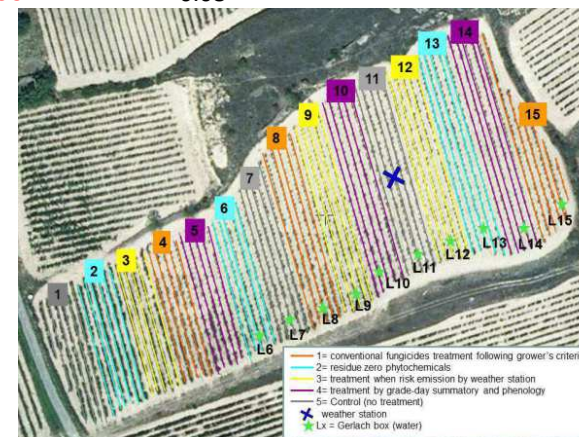


	PARCELA	METALAX	BOSCALID	TEBUCONAZ	Cu	S
AGUA	L10	nd	nd	nd	23.81	26.53
	L14	<loq	nd	nd	29.33	43.20
SUELO	L10	<loq	0.06	nd	37.41	nd
	L14	nd	0.10	<loq	24.78	nd
UVAS	L5	<loq	nd	<loq	1.90	nd
	L10	<loq	nd	<loq	2.47	nd
	L14	<loq	nd	nd	2.43	nd
MOSTO	L5	<loq	nd	nd	0.58	nd
	L10	<loq	nd	nd	0.67	nd
	L14	<loq	nd	nd	0.92	nd
VINO	L5	<loq	nd	nd	0.09	0.08
	L10	0.010	nd	0.011	0.03	nd
	L14	<loq	nd	nd	0.06	0.08

TRATAMIENTOS APLICADOS

Azufre 98,5%

Benalaxil 6% +Cimoxanilo 3,2%+ Folpet 35%



Resumen de muestras procesadas



Primer Semestre

Muestras recepcionadas en Abril 2015

- Aguas: A1, A2, A3, A4, A7, A9, A10 y A11
L6, L7, L8, L9, L10, L11, L12, L13, L14 y L15
- Suelos: A1, A2, A3, A4, A7, A9, A10 y A11
L6, L7, L8, L9, L10, L11, L12, L13, L14 y L15
(por duplicado)

4 metodologías
analíticas distintas

TOTAL de muestras:
288

Segundo Semestre

Muestras recepcionadas en Septiembre-octubre 2015

- Aguas: A1, A2, A3, A4, A7, A9, A10 y A11
L6, L7, L8, L9, L10, L11, L12, L13, L14 y L15
 - Suelos: A1, A2, A3, A4, A7, A9, A10 y A11
L6, L7, L8, L9, L10, L11, L12, L13, L14 y L15
 - Uvas: A1-A12 (12 muestras)
L1-L15 (15 muestras)
 - Mostos: A1-A12 (12 muestras)
L1-L15 (15 muestras)
 - Vinos: A1-A12 (12 muestras)
L1-L15 (15 muestras)
- (por duplicado)

TOTAL de muestras:
936

eman ta zabal zazu





thank you!

emane ta zabal zazu



Universidad del País Vasco
Euskal Herriko Unibertsitatea
The University of the Basque Country