



Vermicomposts as components of biomixtures to prevent the punctual contamination of pesticides.

Persistence and enzyme activities

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Objective

**Development of low cost BPS using vermicomposts
from wastes of winery, olive –oil production and
greenhouse crop systems as peat substitutes**

Winery activities



Olive-oil production



Green-house crop systems



WASTES SELECTED TO OBTAIN THE VERMICOMPOSTS



Vine-shoots 4:1
Biosolid vinasse



Vermicompost
V



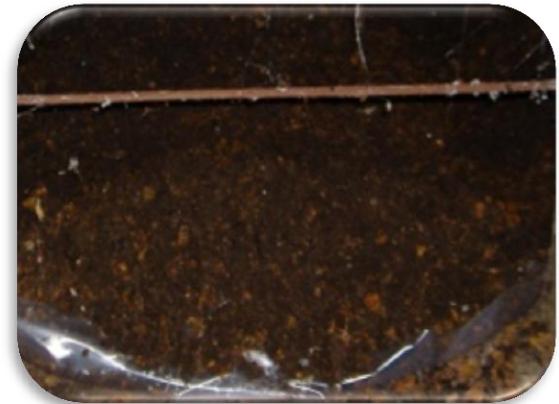
Wet Olive cake 4:1
Sheep manure



Vermicompost
V



Refused Tomato Fruit
Sheep manure



Vermicompost
V

BIOBED REFERENCE: Barley straw

Peat from Padul – Granada

CE 3

pH 4,3

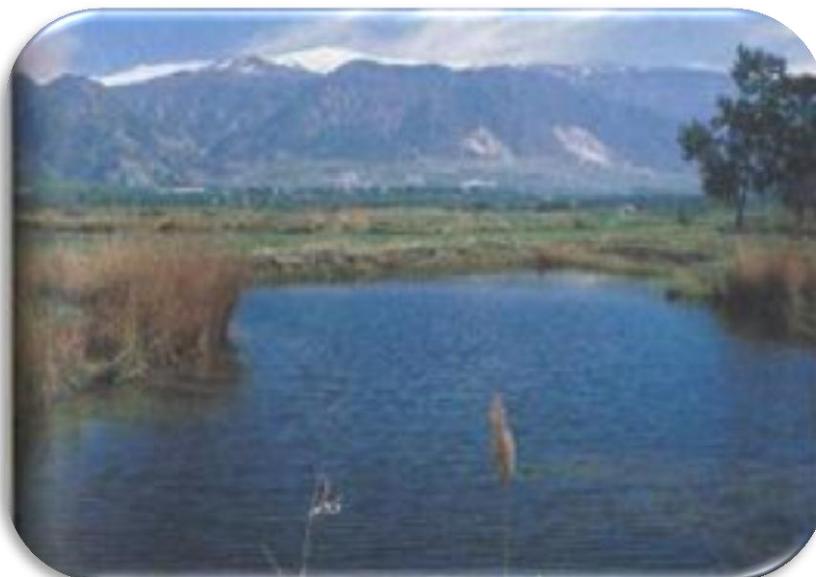
O.M. 47-52% (O.C. 301 g kg⁻¹)

CEC 80-110 Meq 100g

AH/AF 9/1



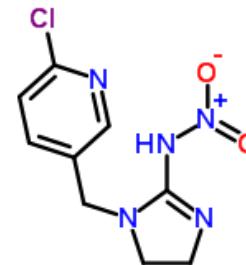
Von Post scale of humification (1-36): H = 7 - 9



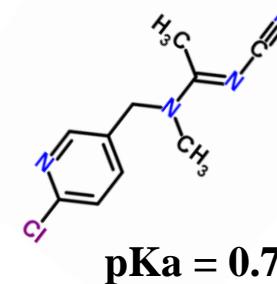
Greenhouse crop system



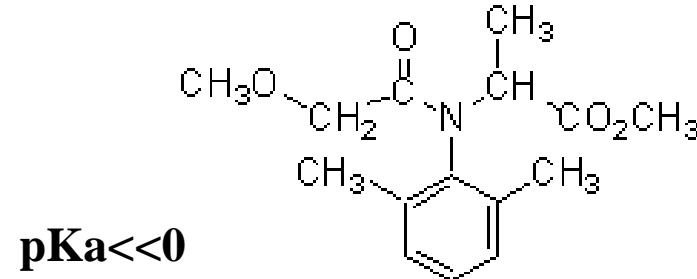
Insecticides: **Imidacloprid**
Neonicotinoids



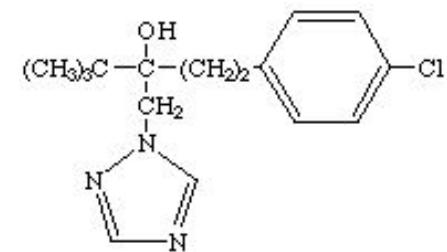
Acetamiprid



Fungicides: **Metalaxyl**
Phenylamide, acylalanine
Interferent of ARNr
protein synthesis inhibitor in fungi



Tebuconazole



Triazole
Inhibitor of ergosterol synthesis

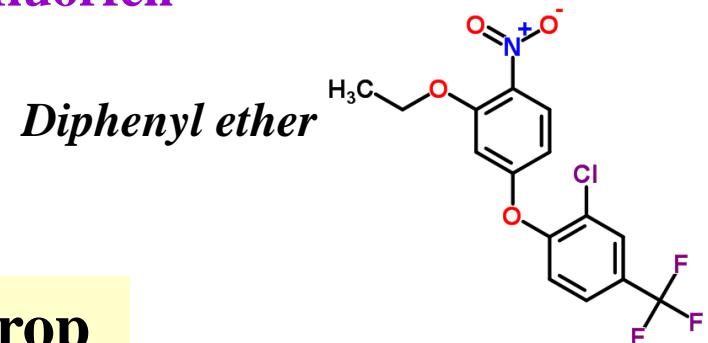


Vineyard

Insecticide: **Imidacloprid**

Fungicide : **Tebuconazol , Metalaxyl**

Herbicide: **Oxyfluorfen**

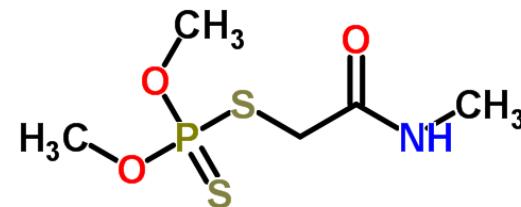
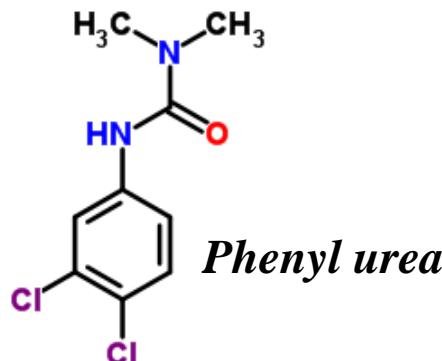


Olive trees crop

Insecticide: **Imidacloprid, Dimethoate**

Fungicide: **Tebuconazol**

Herbicide: **Oxyfluorfen, Diuron**



BIOMIXTURES STUDIED

Biomixture composition (80 g)

(25/75) (25/50/25)



Soil + V

Soil + V + vine-shoot
(< 4 mm)



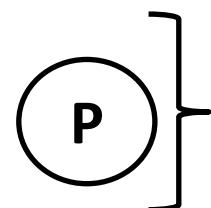
Soil + V

Soil + V + olive-tree pruning
(< 4 mm)



Soil + V

Soil + V + plant residues
(< 4 mm)



Soil + P + barley straw
(25/50/25)

Pesticide

(100 µg g⁻¹)

Vineyard pesticides

(800 µg g⁻¹) x 4

Olive yard pesticides

(800 µg g⁻¹) x 5

Greenhouse pesticides

(800 µg g⁻¹) x 4

- Vineyard pesticides
- Olive yard pesticides
- Greenhouse pesticides

Biomixtures -Controls Names

WV WVC

WM WMC

OV OVC

OM OMC

GV GVC

GM GMC

WP

OP

GP

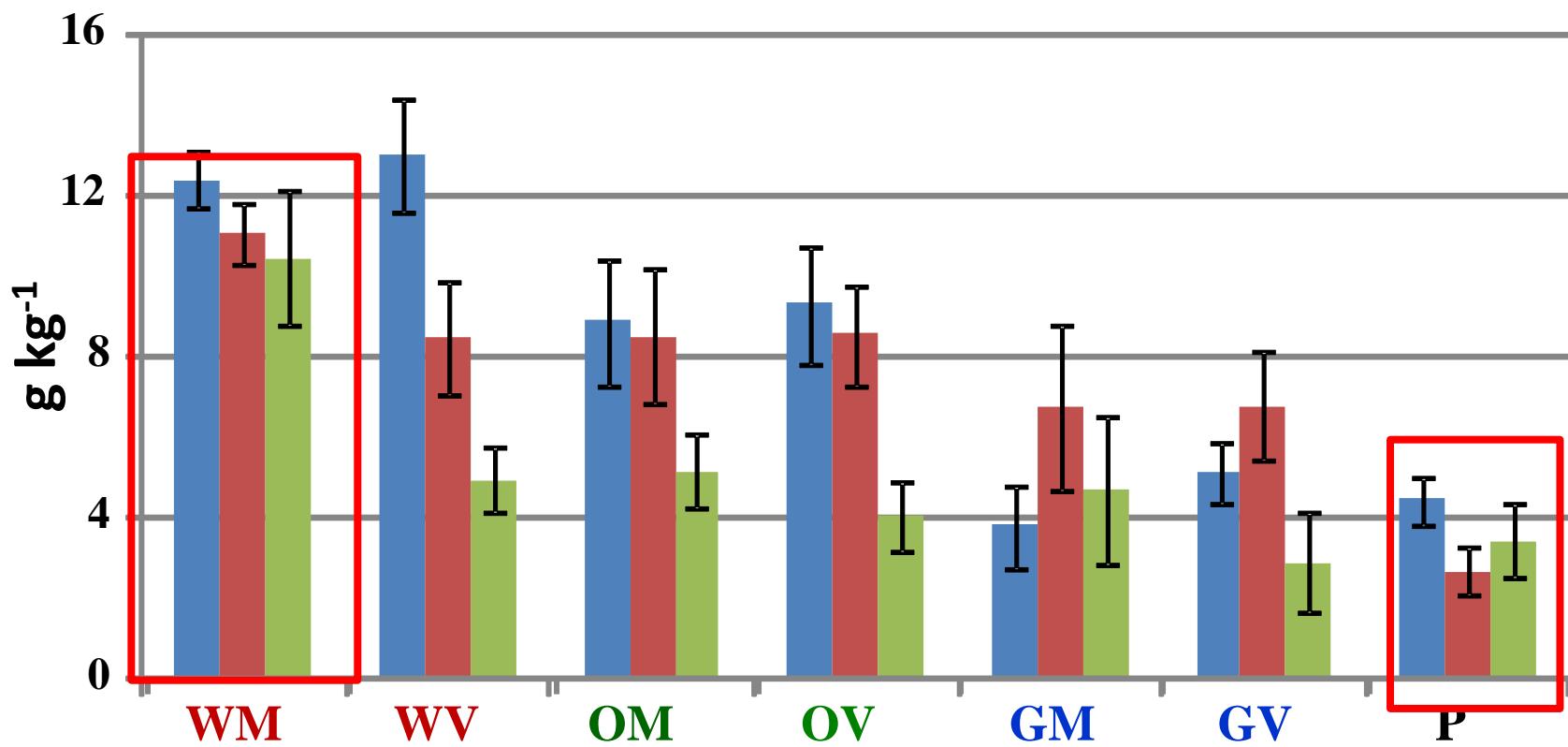
PC

Total Biomixtures

16

LIGNOCELLULOSE CONTENTS IN THE BIOMIXTURES

■ Lignine ■ Hemicellulose ■ Cellulose

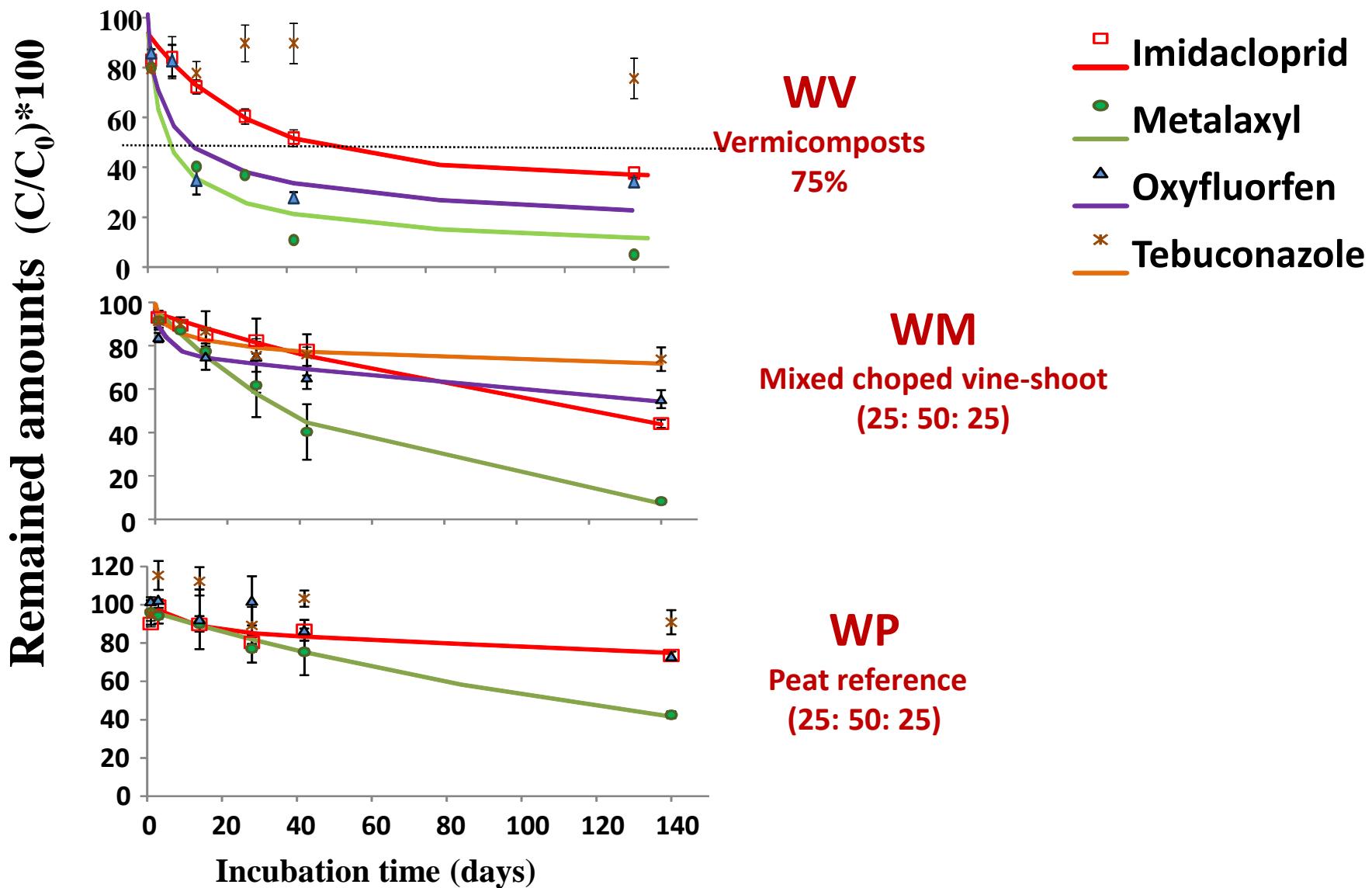




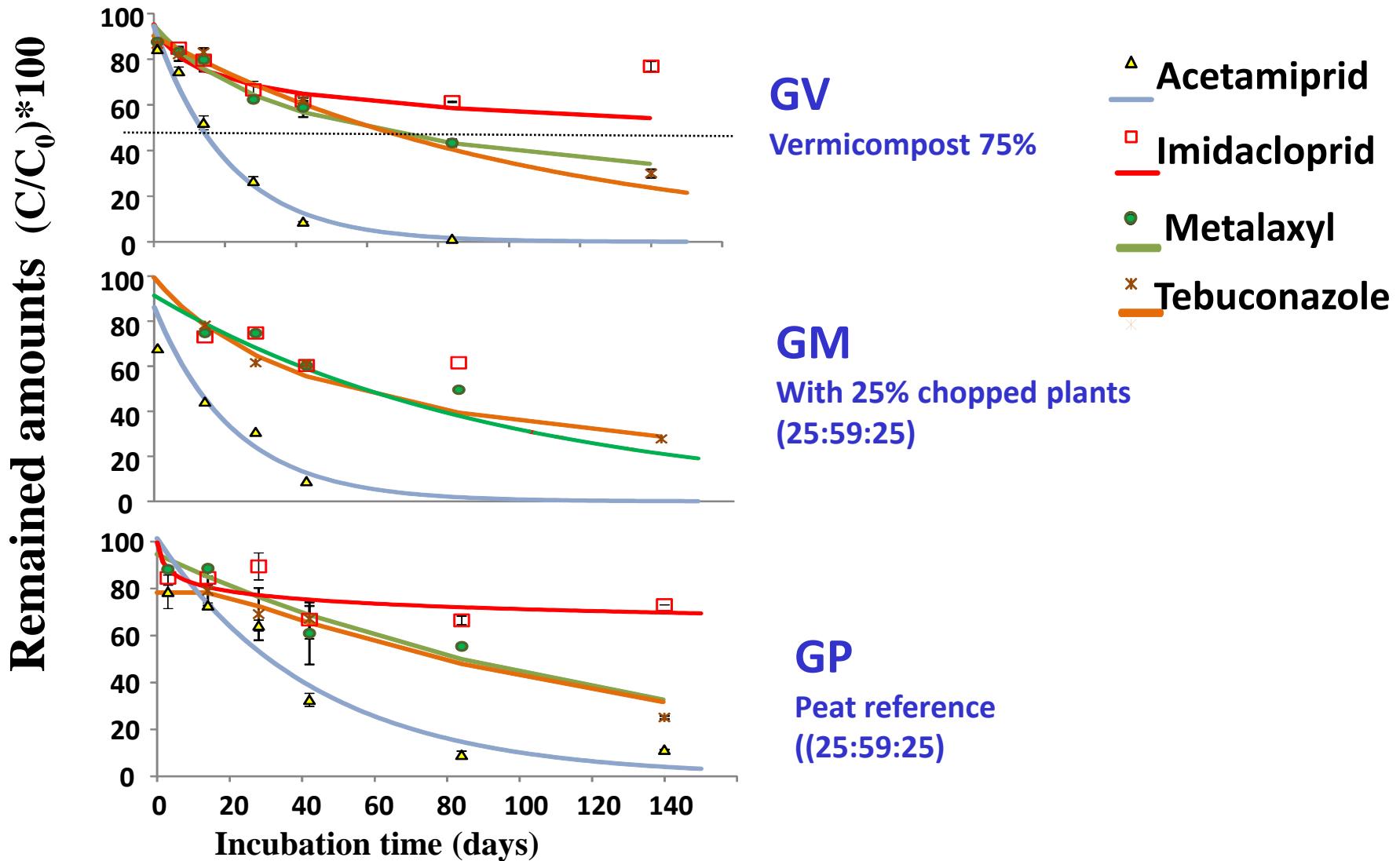
RESULTS

REILBI (Pucon, Chile, 2012)

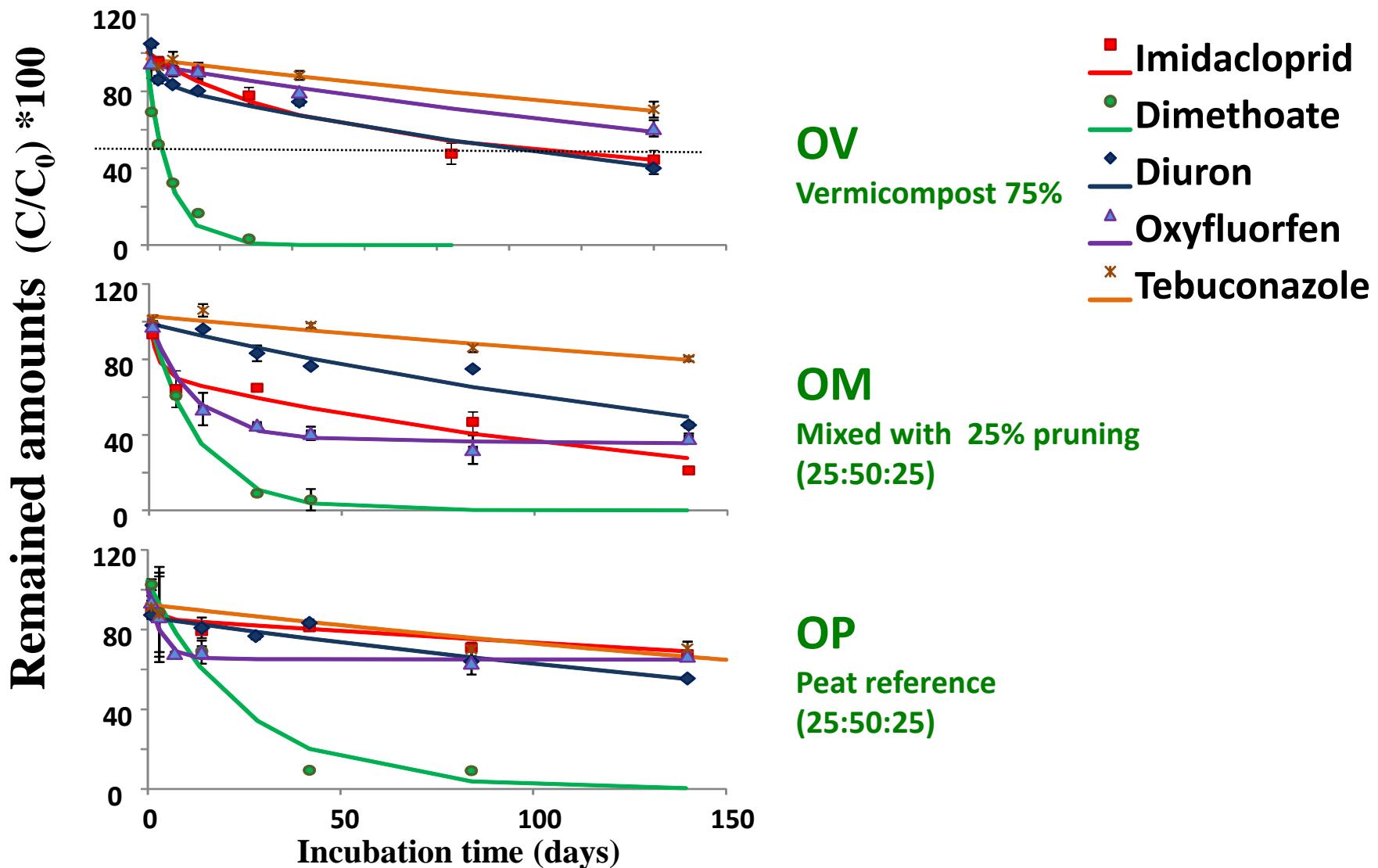
Degradation kinetics in biomixtures of vermicomposts from winery waste and peat



Degradation kinetics in biomixtures of vermicomposts from greenhouse wastes and peat



Degradation kinetics in biomixtures of vermicomposts from olive-oil wastes and peat

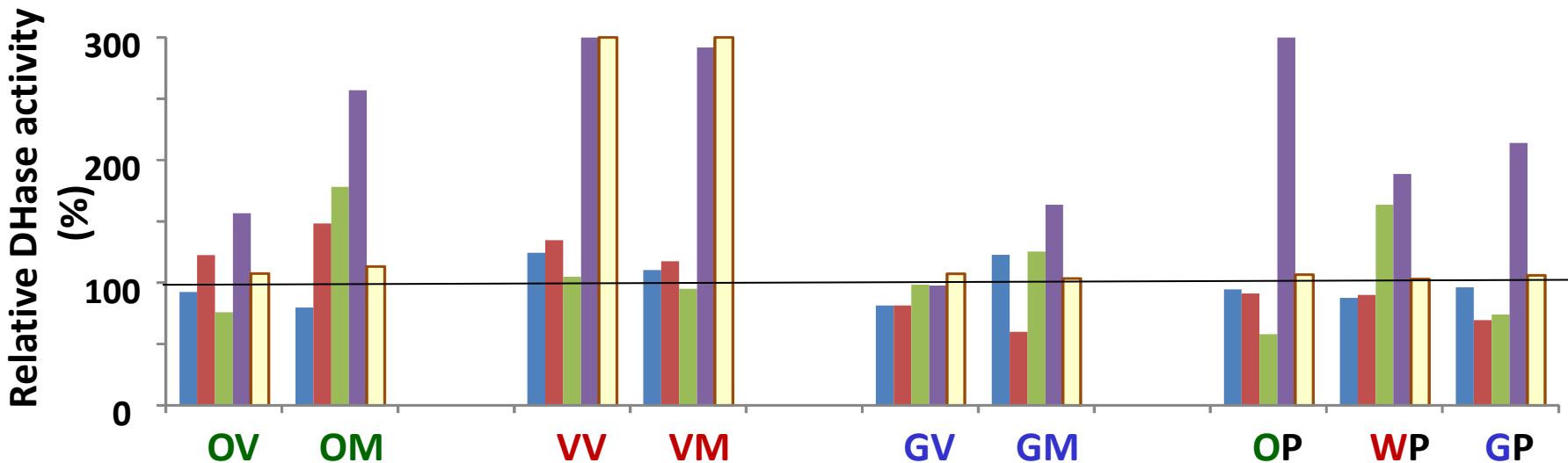
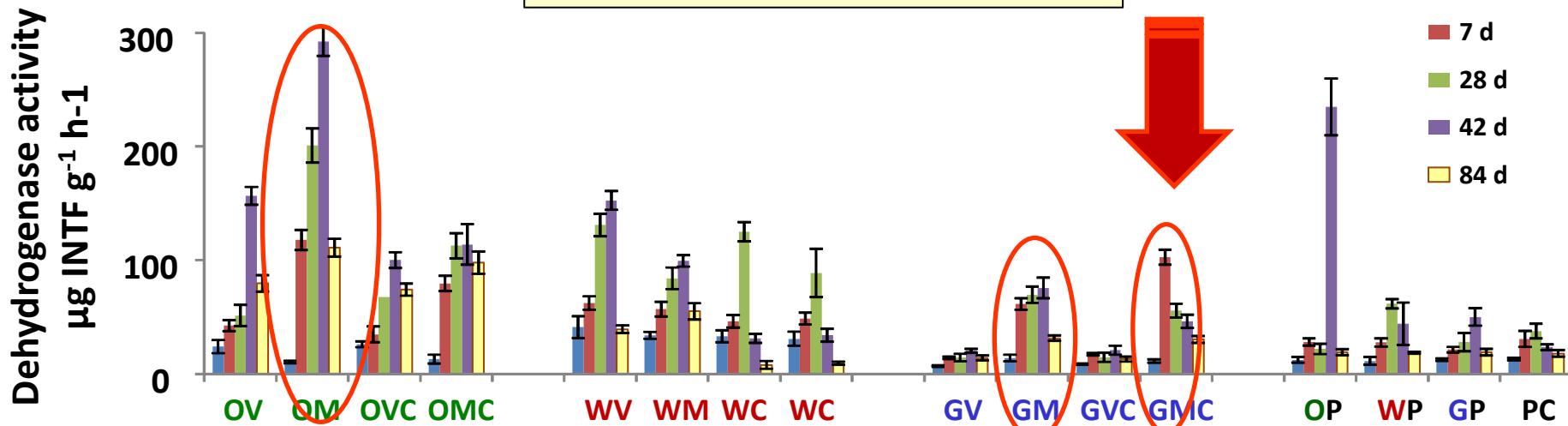


PERSISTENCE

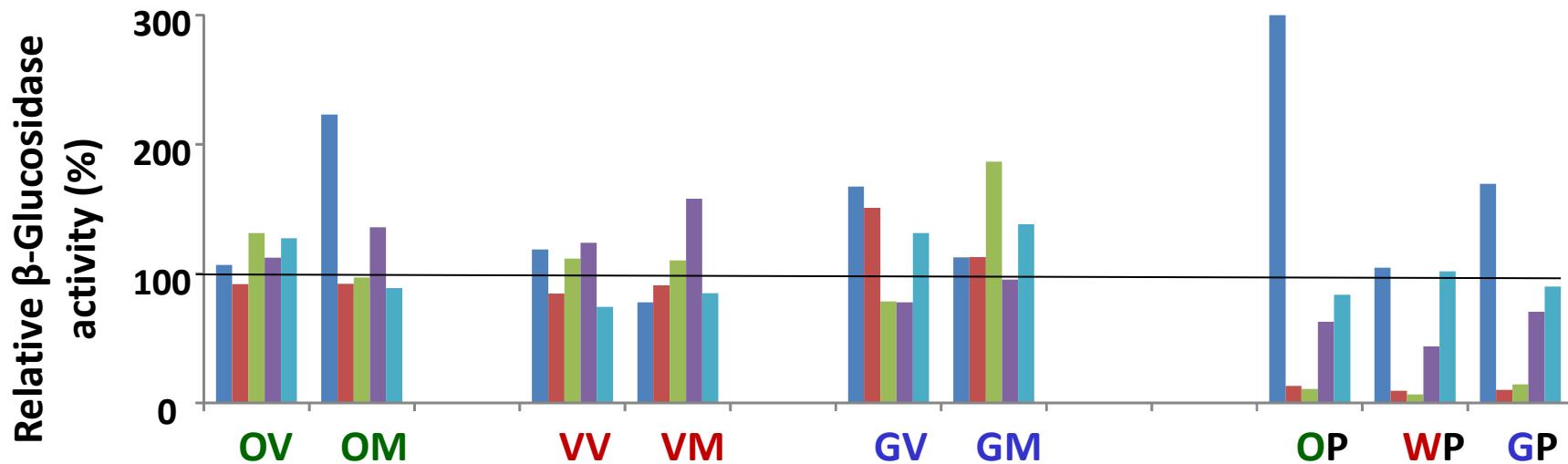
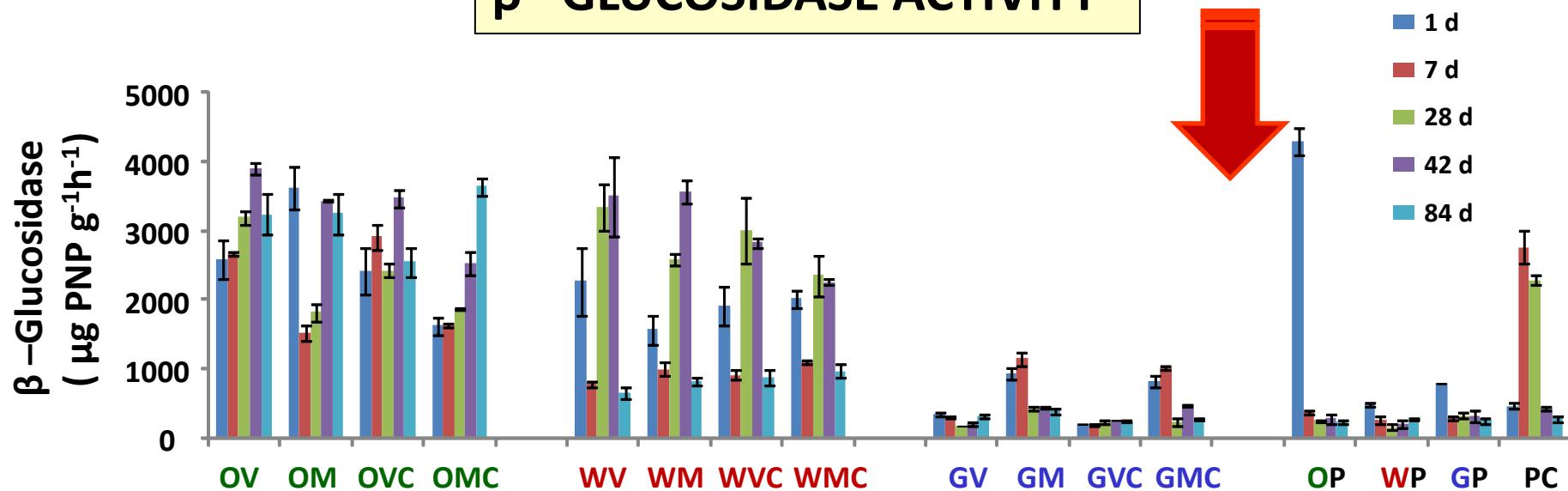
Model	SFO		SFO		SFO		DFOP		FOMC /SFO		DFOP /SFO *	
	Metalaxyll		Acetamiprid		Dimethoate		Oxyfluorfen		Tebuconazol		Diuron	
	DT ₅₀	DT ₉₀										
WV	15	50							-	-		
WM	37	128							.	-		
WP	114	378							-	-		
GV	66	220	14	48					73	241		
GM	78	260	15	50					53	586		
GP	91	302	30	100					94	311		
OV			4	14	207	689	296	985	90	370		
OM			9	29	15	>1000	378	1258	139*	464*		
OP			17	58	>1000	>1000	291	968	150	600		

Solubility	8400	4250	23300	0,116	36	36,4
mg l ⁻¹						

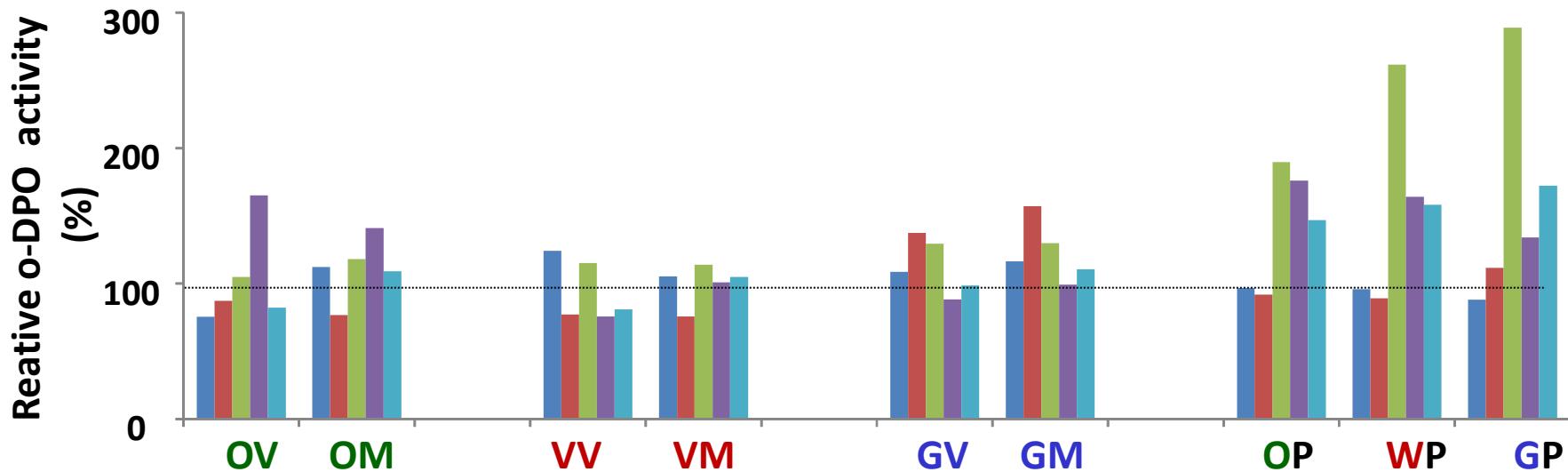
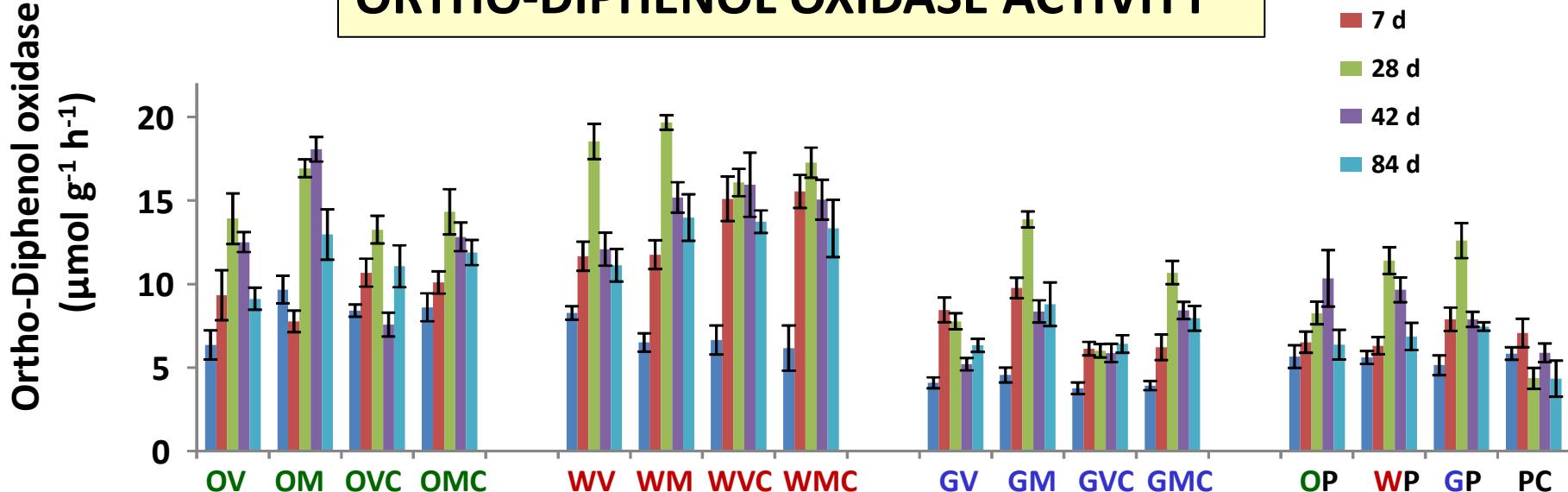
MICROBIAL ACTIVITY



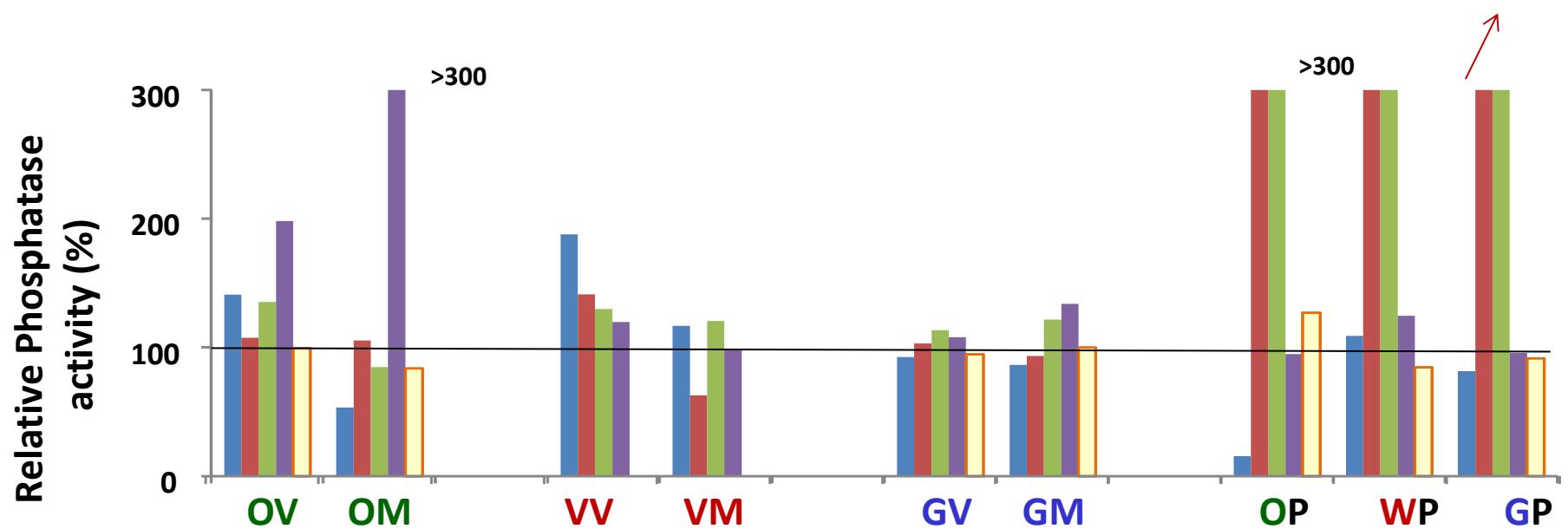
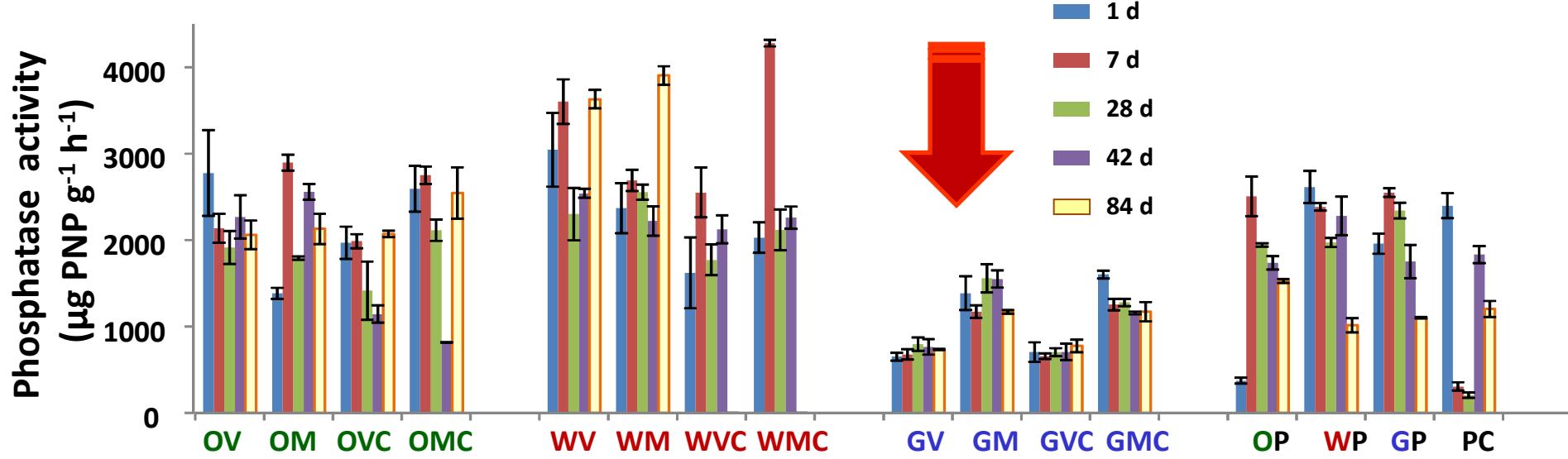
β -GLUCOSIDASE ACTIVITY



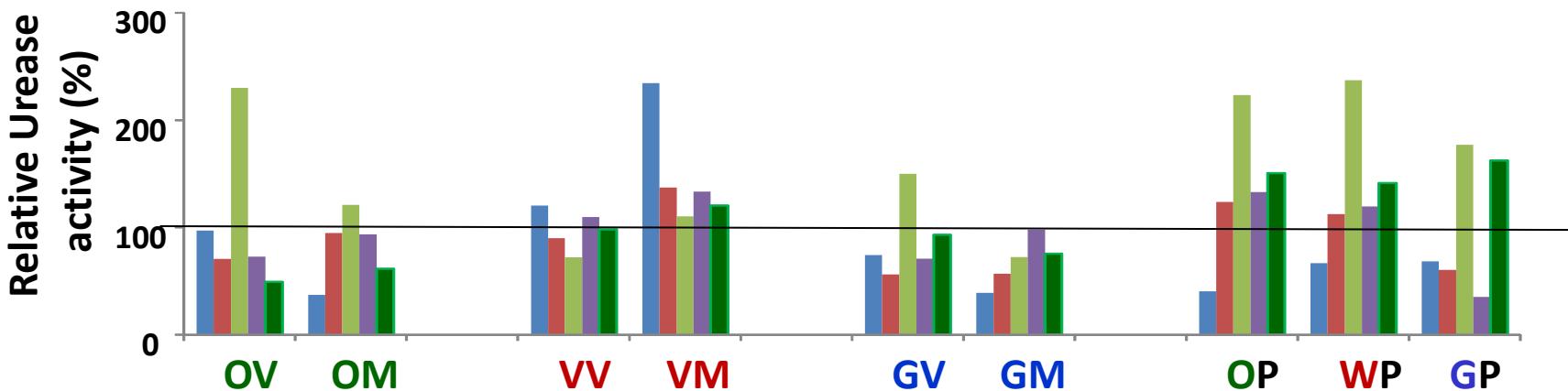
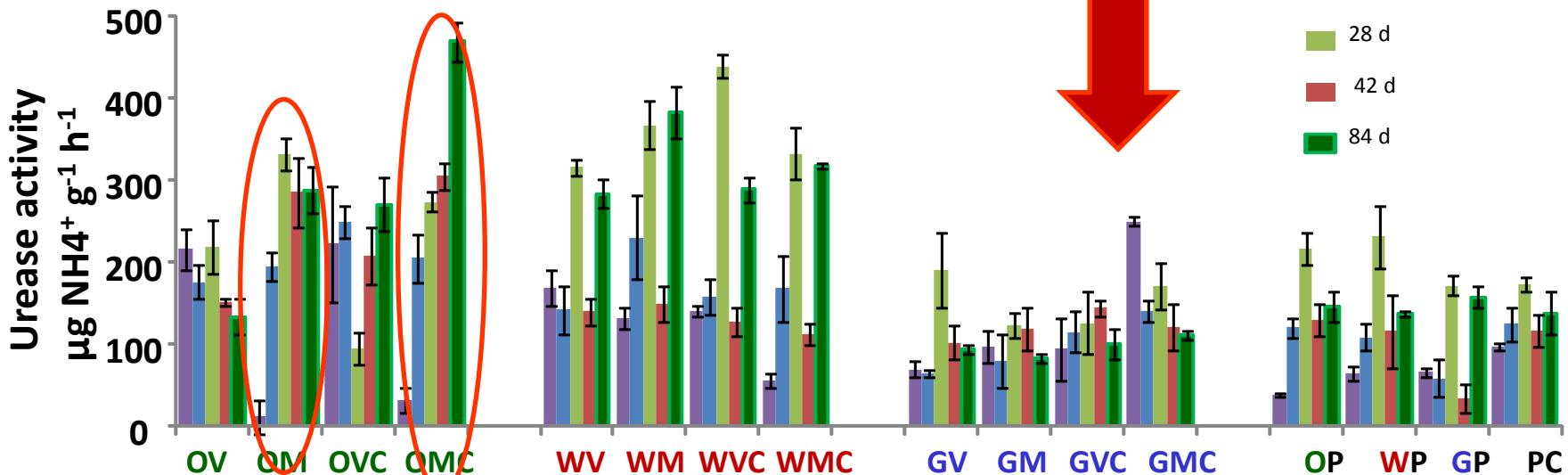
ORTHO-DIPHENOL OXIDASE ACTIVITY



PHOSPHATASE ACTIVITY



UREASE ACTIVITY



CONCLUSIONS

- 1** The pesticide degradation was affected by the pesticide properties and by the biomixtures compositions
- 2** Pesticides were more persistent in the peat biomixtures (WP, OP, GP)
- 3** The lowest persistence was obtained in the biomixtures with vermicompost alone
- 4** Despite the high amount of pesticide applied ($3200\text{-}4000 \text{ g g}^{-1}$), the microbial activity in the biomixtures with vermicompost shown a slight reduction but in some case some functions are greater than in the controls.



Thanks for your attention