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Influence of soil type on the biodegradation of pesticides by rhizobacteria: case of Glyphosate and paraquat

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Root support

Water reservoir

Nutrient reservoir

Organo-mineral environment

80% of the living mass

Biological reservoir

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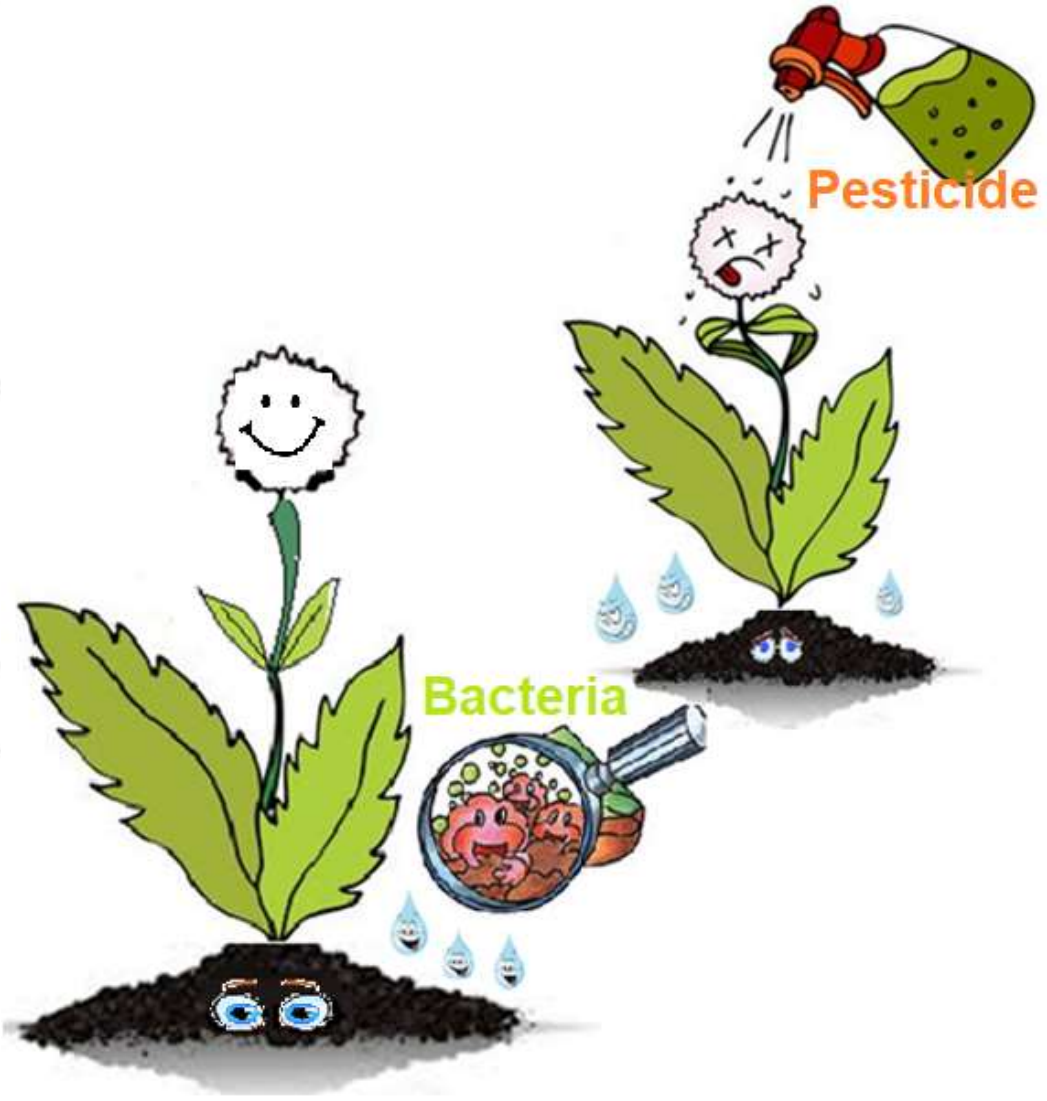

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Evaluation of the influence of soil type on the degradation of two herbicides: glyphosate and paraquat by bacteria using the basic soil respiration method

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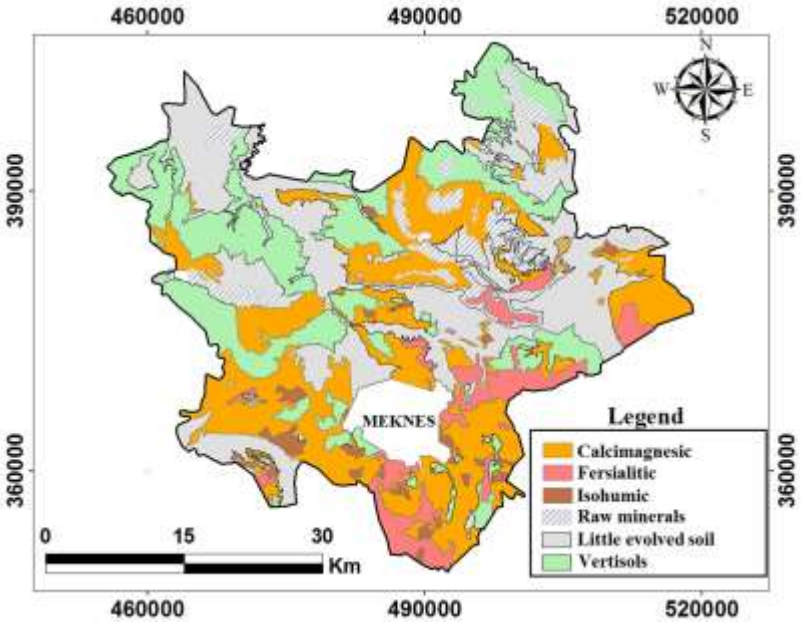
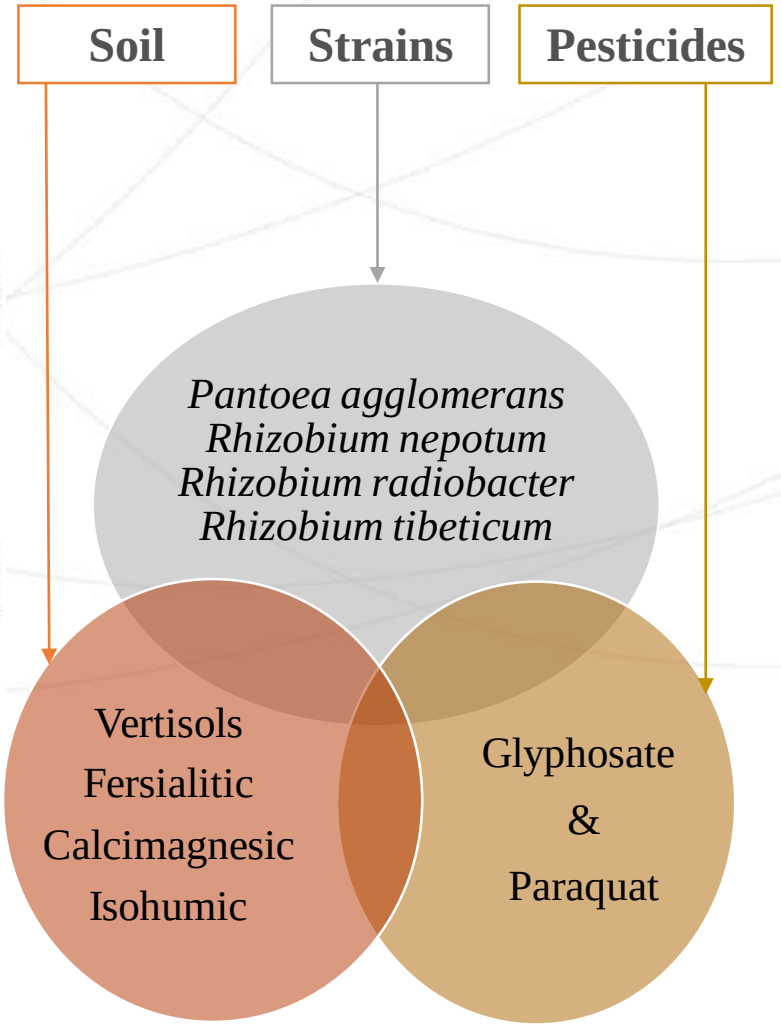
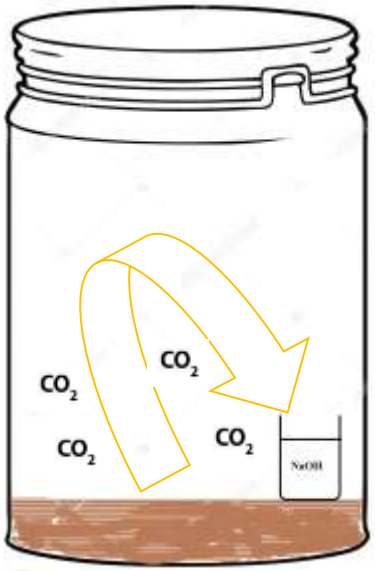




100 g of each soil type sterilized
+
1.8 g/l of glyphosate or 1 g/l of paraquat
+
Inoculated with 2 mL of the inoculum
1.5×10^8 CFU/mL

2, 4, 8, 16, 24, 32 days
Incubation



Amount of carbon dioxide
mg of CO2-C / 100 g of soil

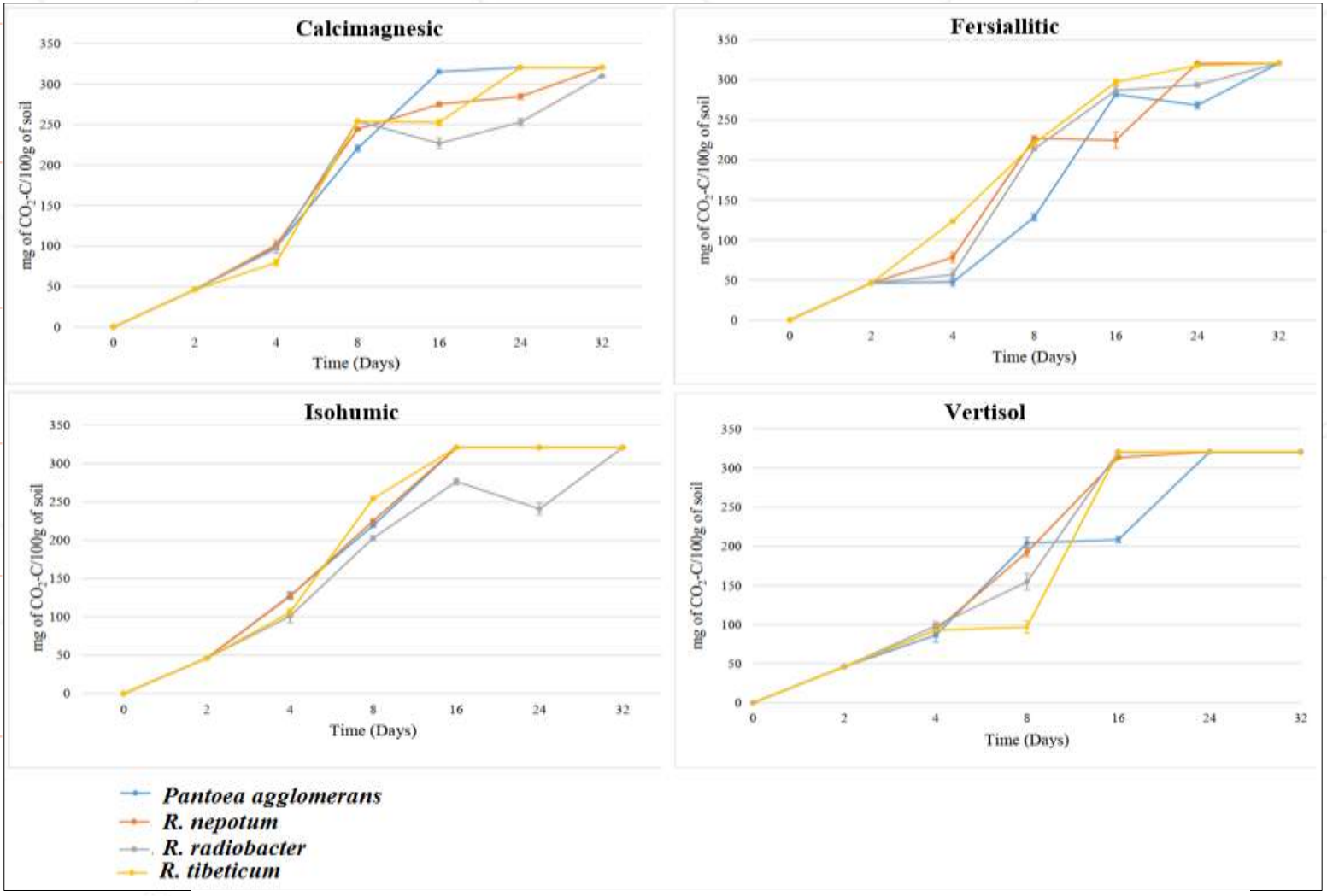
The carbon dioxide evoluted by the method described by **Freijer and Bouten 1991**

Physico-chemical characteristics of the studied soils

Soils	Texture (%) (Pipette Robinson)			Echangeable cations (meq $100g^{-1}$)					Organic matter (%)
	Clay	Silt	Sand	Ca^{2+}	Mg^{2+}	Na^{2+}	K^{+}	CEC	
Vertisols	43.35^{a}	23.67^{a}	27.13^{a}	5.1^{ac}	2^{a}	0.52^{a}	0.96^{a}	49.13^{a}	**5.8^{a}**
Calcimagnesic	**55.73^{b}**	29.68^{b}	**12.27^{b}**	**44.75^{b}**	2.8^{b}	1.43^{b}	0.6^{b}	**53.47^{b}**	4^{bc}
Fersialitic	**6.95^{c}**	**5.45^{c}**	**85.06^{c}**	5.4^{a}	0.53^{c}	0.7^{c}	0.32^{b}	**3.95^{c}**	4.5^{c}
Isohumic	30.57^{d}	**46.34^{d}**	20.03^{d}	**4.18^{c}**	4.65^{d}	1.09^{d}	2.48^{c}	31.73^{d}	**3.25^{b}**

A significant difference ($p < 0.05$) was found between the soils concerning texture, exchangeable cations, and organic matter content.

Carbon dioxide evolution from four soil types with glyphosate inoculeted with *Pantoea agglomerans*, *R. nepotum*, *R. radiobacter*, and R. *tibeticum*.



The data obtained show a significant difference ($p < 0.05$)

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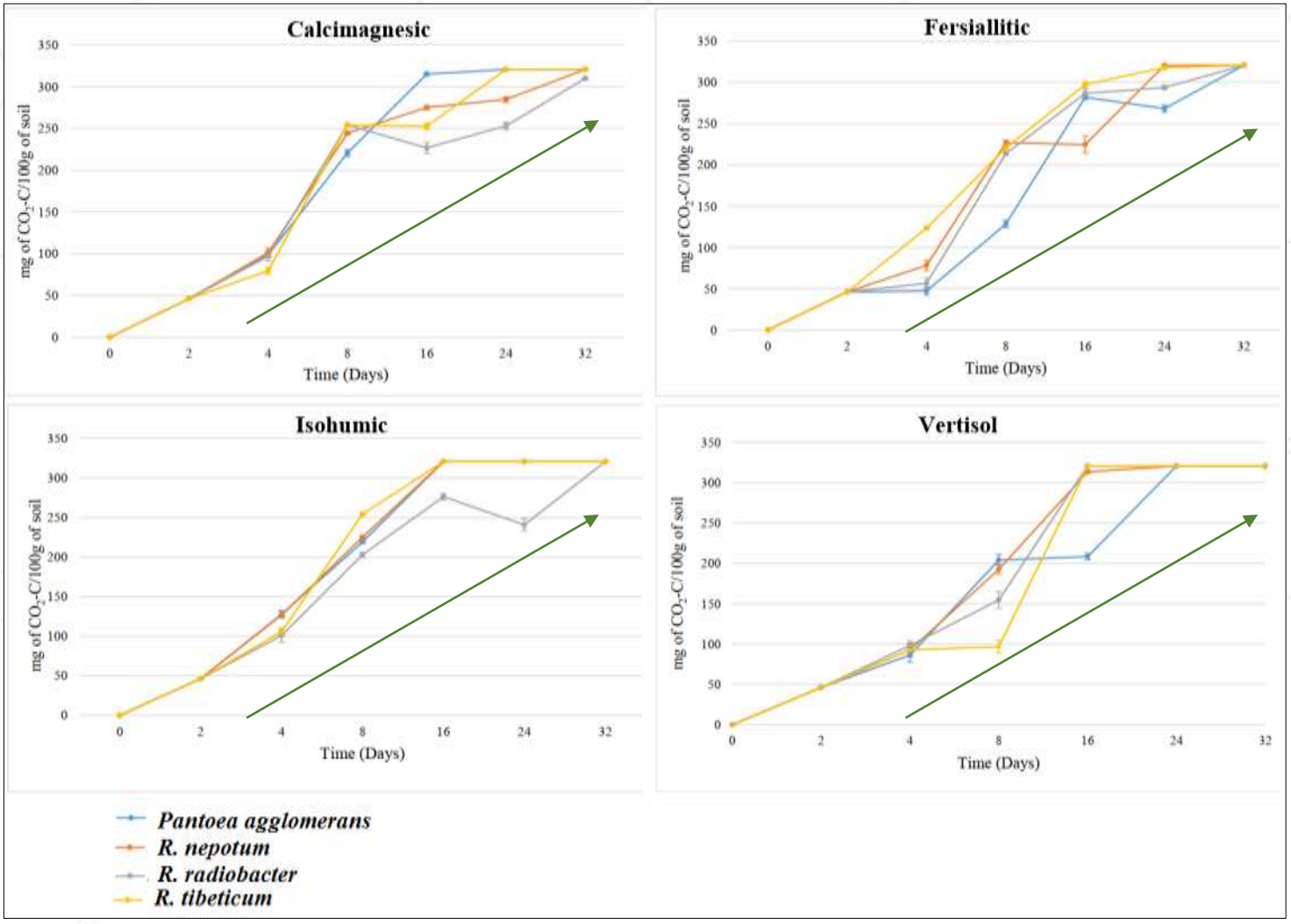

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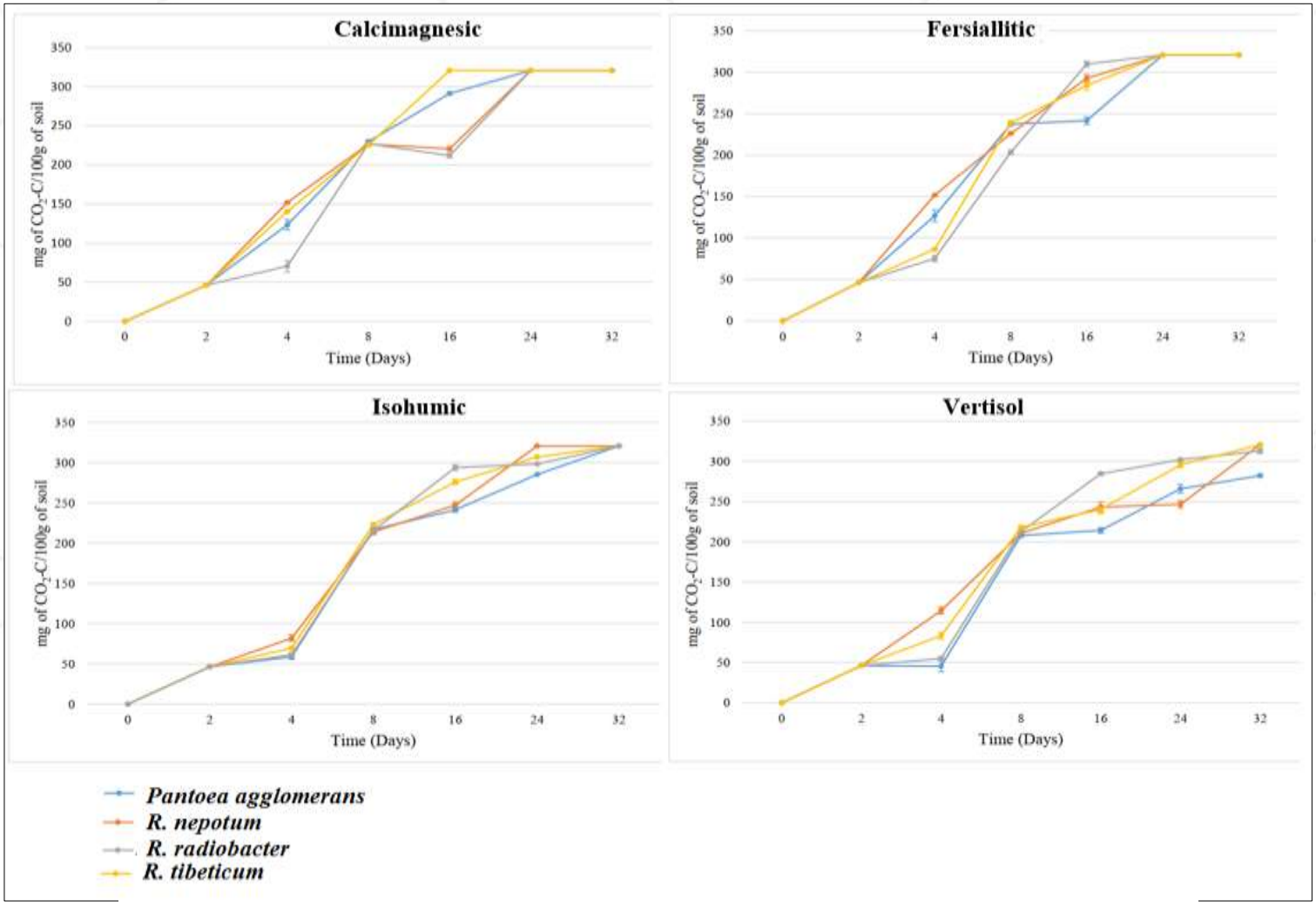
Carbon dioxide evolution from four soil types with paraquat inoculeted with *Pantoea agglomerans*, *R. nepotum*, *R. radiobacter*, and *R. tibeticum*.



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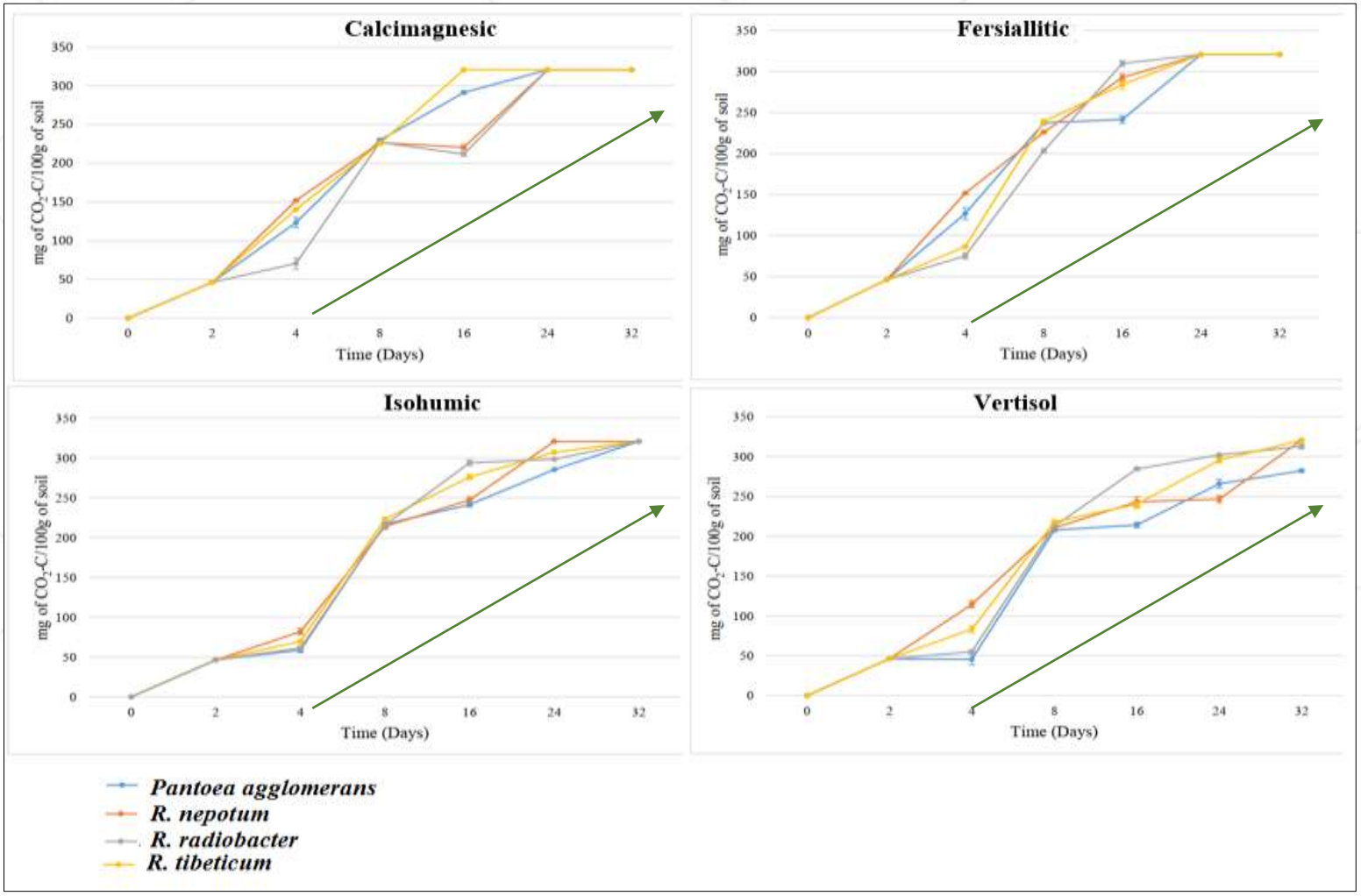

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The Results indicate that the application of glyphosate and paraquat stimulated soil microbial activity and suggested that glyphosate and paraquat was the direct source of increased microbial activity

Proved by Arujo et al., (2003) in their studies, they have shown that the soils with high microbial activity promote the rapid glyphosate mineralization as well.

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Paraquat is strongly adsorbed by soil particles, particularly in clay soils.

(Amondham et al. 2006)

Glyphosate is degraded very rapidly in soil surface (0-20) which is rich in clay and organic matter content than in the deep (20-35), which is poor in clay

(Veiga et al. 2001)

When soil is rich in organic matter content, and poor in nutrients elements enhance glyphosate sorption, and facilitate its degradation, reducing the risk of pesticides despite its adsorption on soil components.

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The data confirm that soil parameters such as organic matter content, clay content, soil texture influence the biodegradation of glyphosate and paraquat.

Thank you for your attention