

# Labrys portucalensis F11 efficiently degrades Di-(2-ethylhexyl) Phthalate



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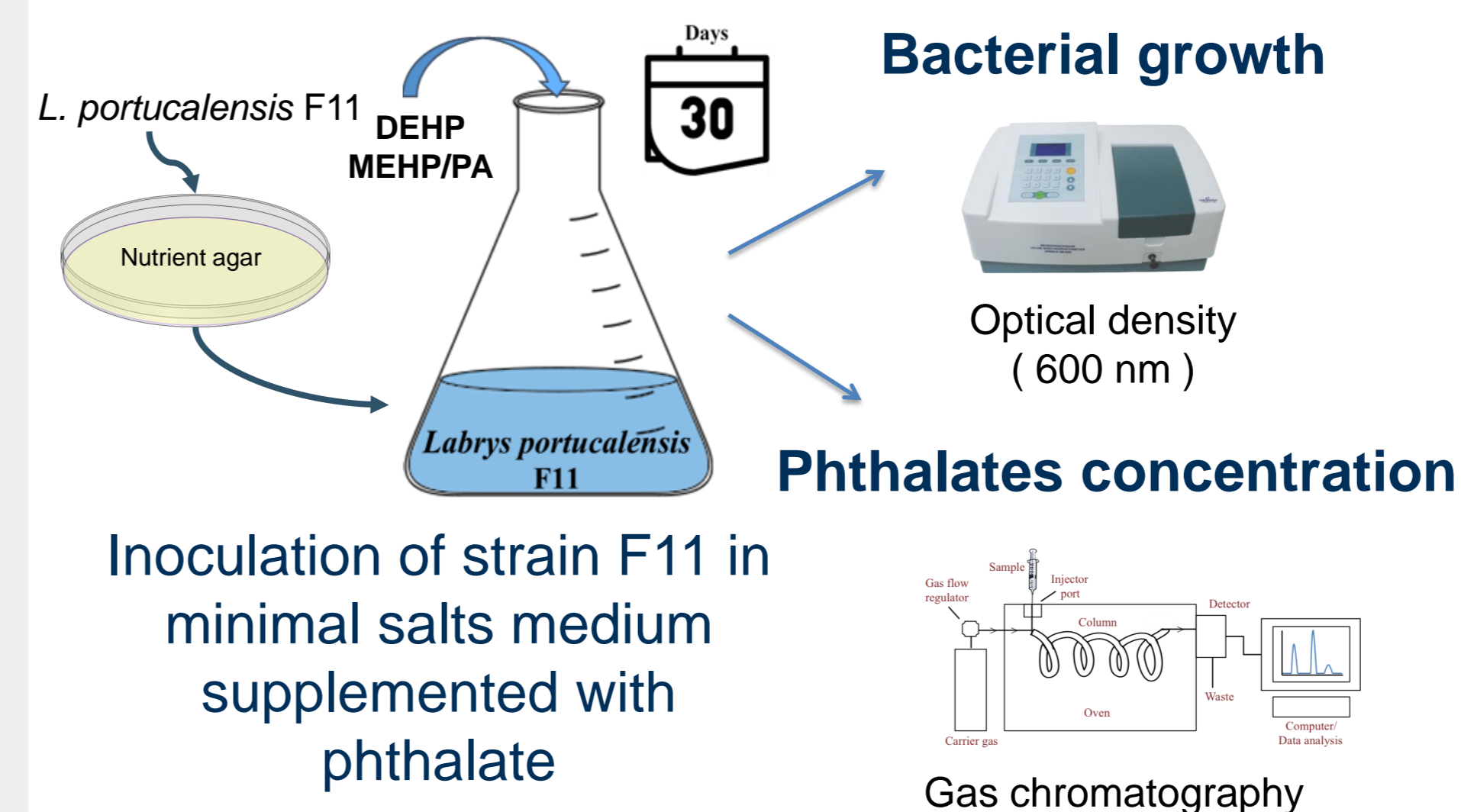
## Introduction

Phthalates, such as Di-(2-ethylhexyl) Phthalate (DEHP), are compounds extensively used as plasticizers, that due to extensive usage can be found in many wastewaters, surface waters and soil. DEHP is quite persistent in the environment and the toxicity of byproducts resulting from its degradation sometimes exacerbates the parent compound noxiousness. They are now becoming contaminants of emerging concern, considered as potential environmental endocrine disruptors, included in priority list of European Union water directive.

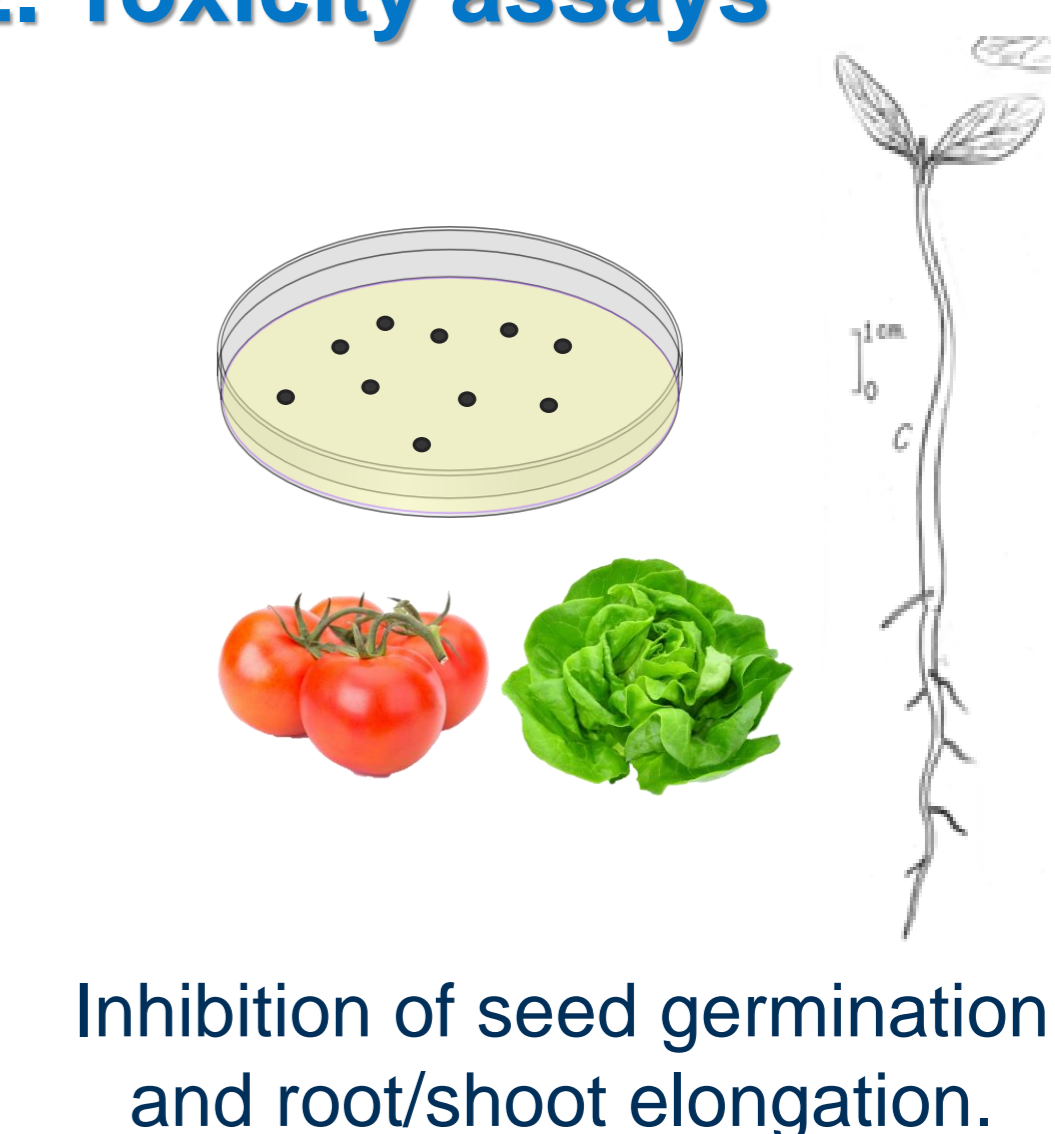
Labrys portucalensis F11 has shown a remarkable ability to degrade several compounds. This investigation was carried out to assess the bacterium biodegradation capacity for DEHP and potential intermediate compounds, such as Mono-(2-ethylhexyl) Phthalate (MEHP) and Phthalic acid (PA).

## Material and Methods

### 1. Biodegradation experiments



### 2. Toxicity assays



## Results and Discussion

### 1. Biodegradation experiments

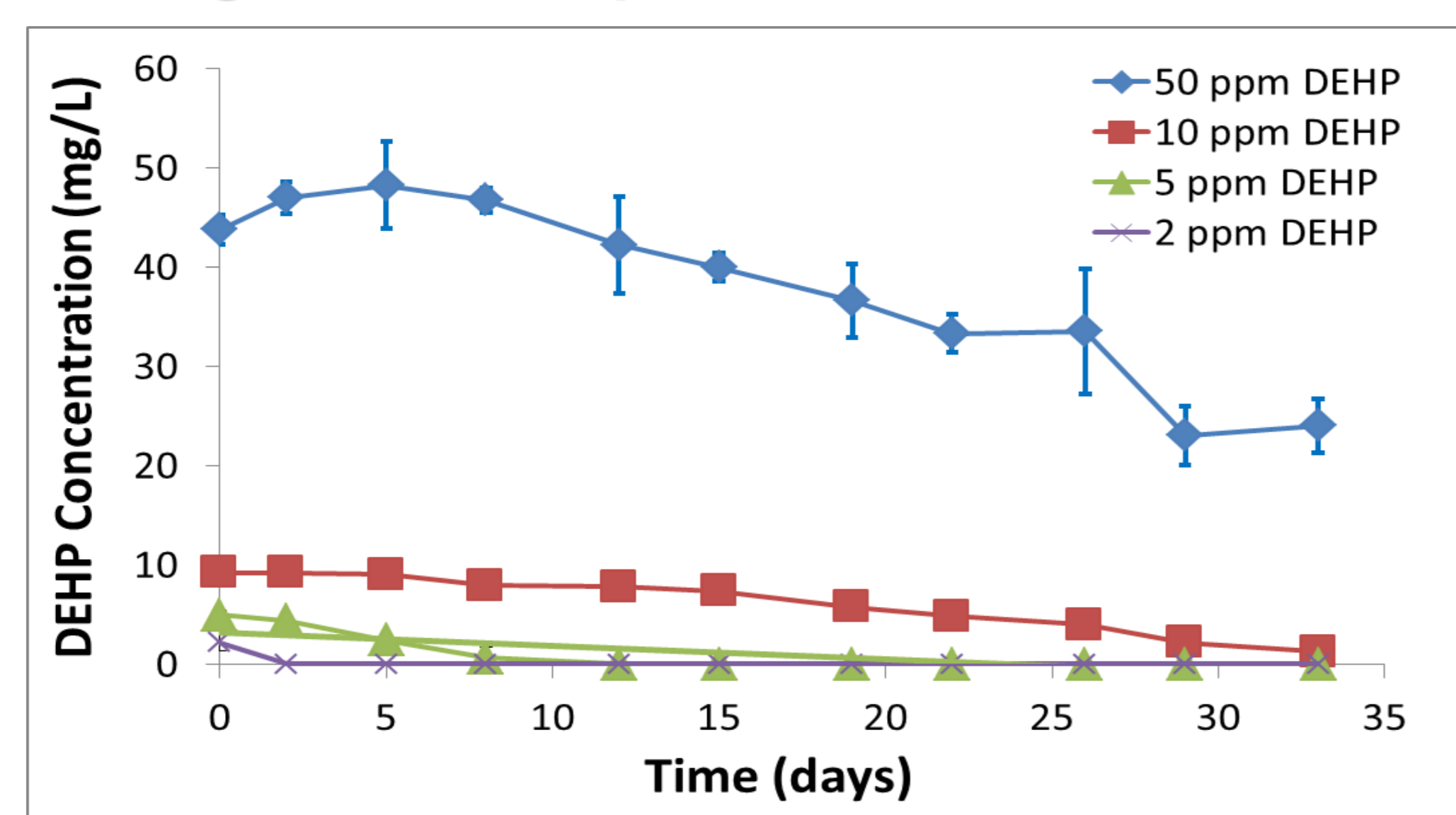


Figure 1- Biodegradation of DEHP by cultures of *L. portucalensis* F11.

- L. portucalensis* F11 was able to degrade DEHP
- Total degradation was achieved for concentrations of 2 and 5 ppm
- 10 and 50 ppm shows a degradation of 86,7% and 60 %, respectively

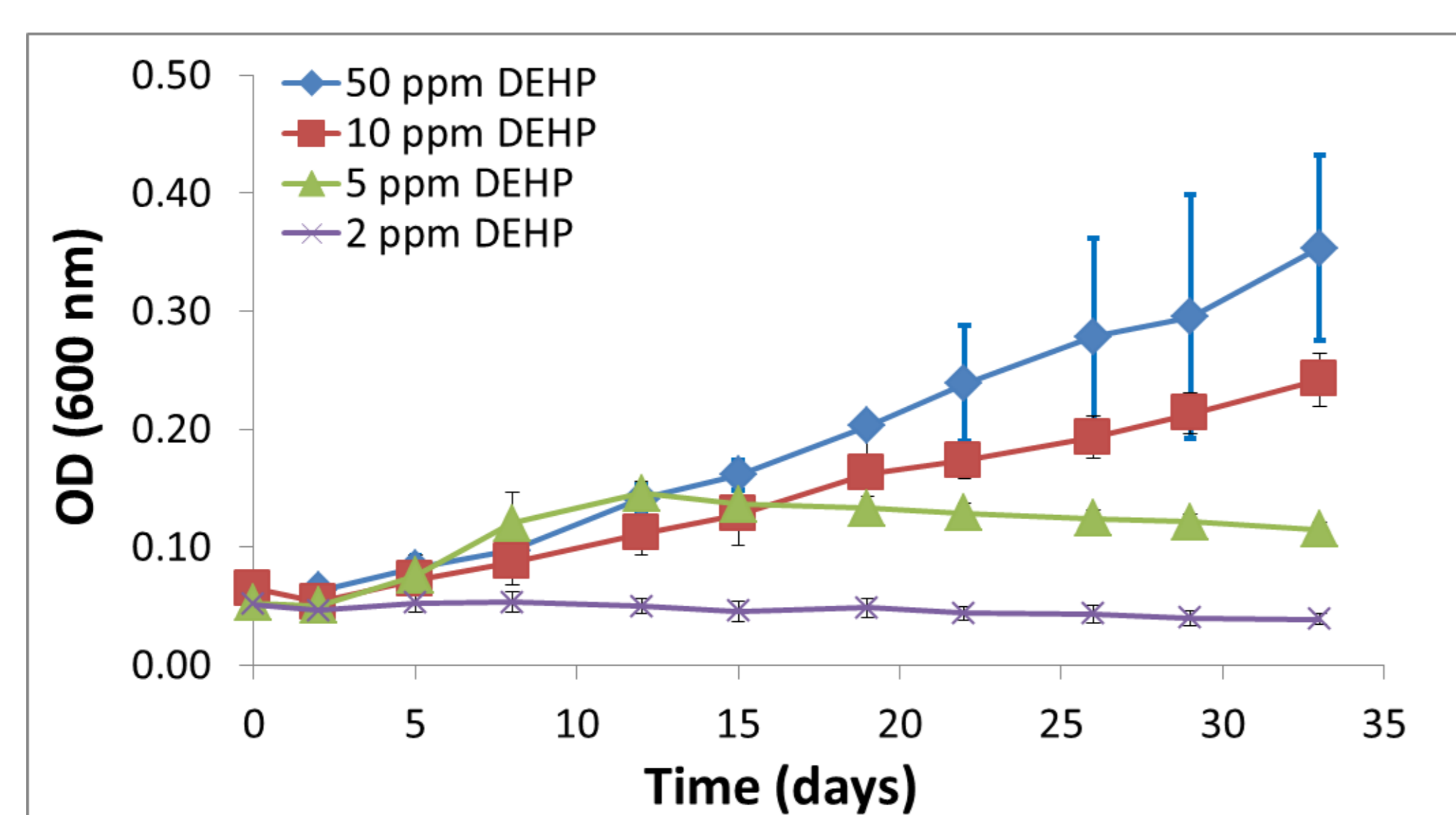


Figure 2- Bacterial growth of *L. portucalensis* F11 during biodegradation of DEHP.

- The degradation was concomitant with bacterial growth suggesting that *L. portucalensis* F11 was able to use DEHP as a source of carbon

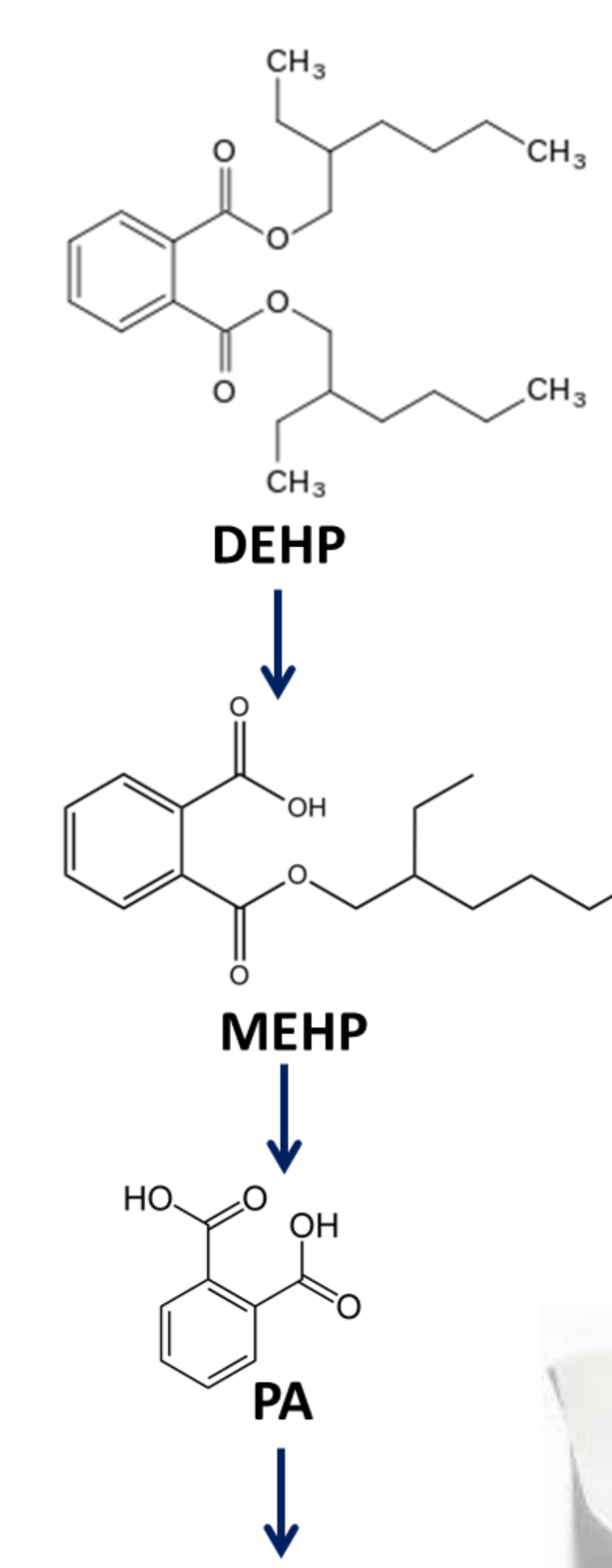
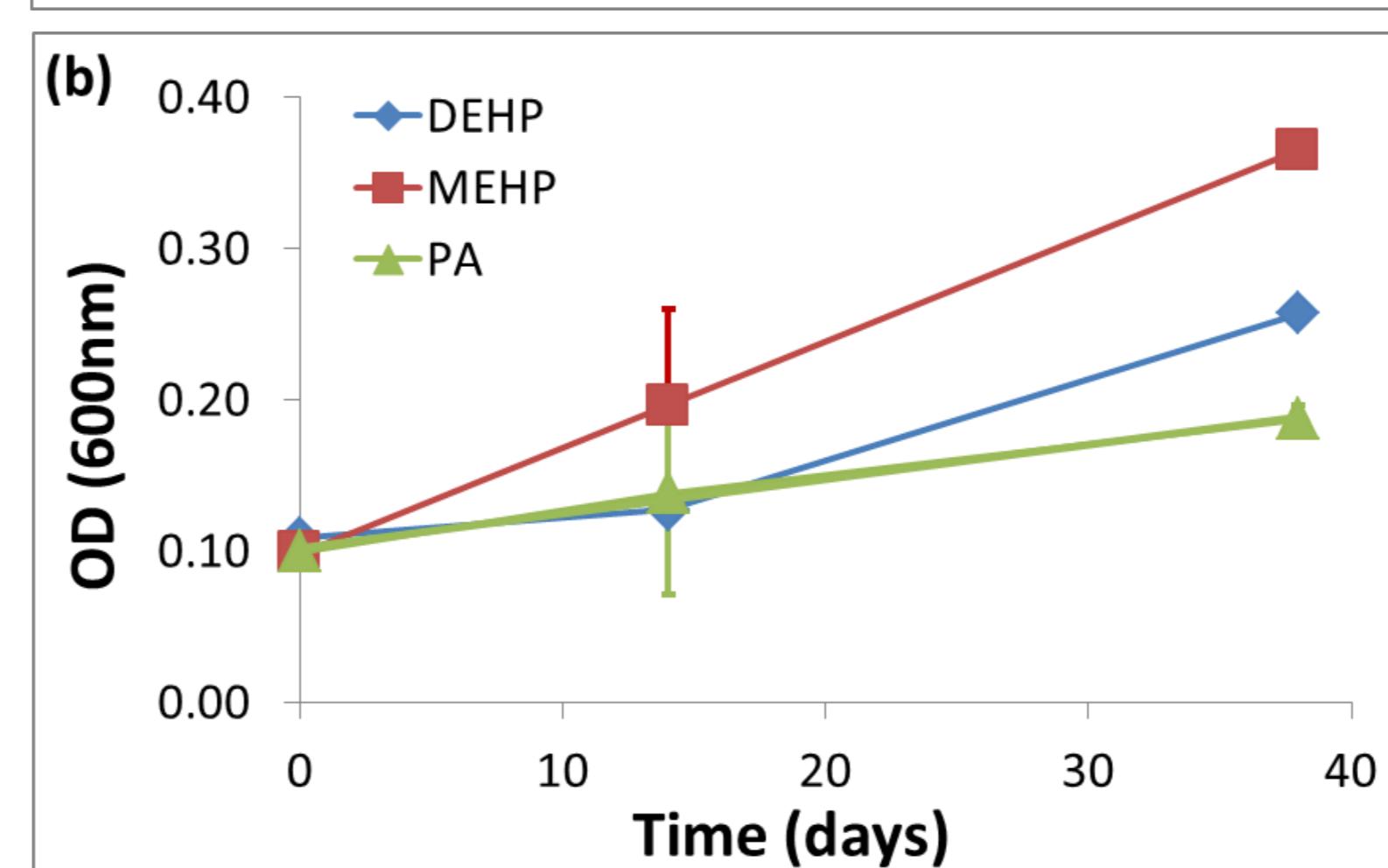
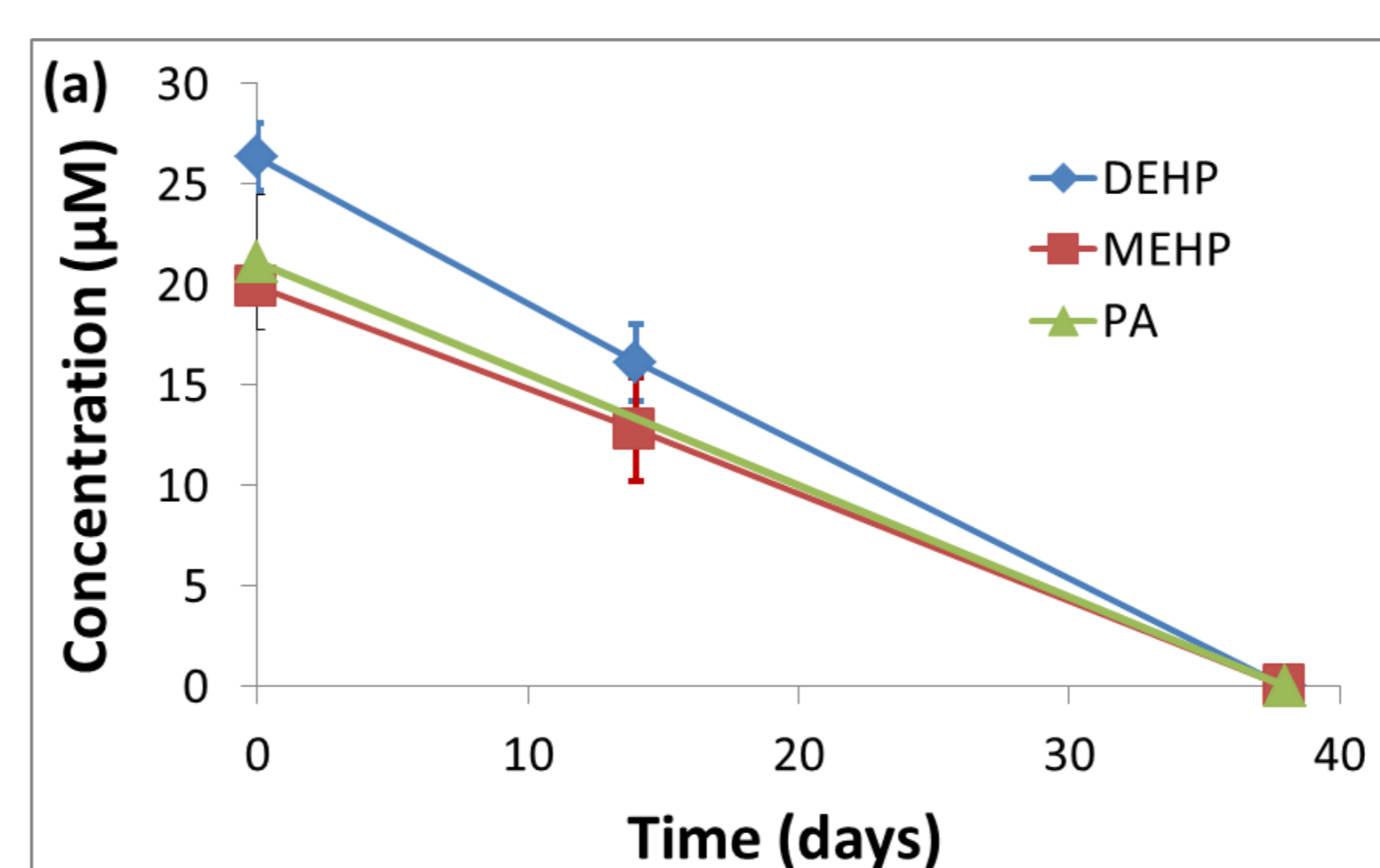


Figure 3- Biodegradation (a) and growth (b) of cultures of *L. portucalensis* F11 on DEHP, MEHP and PA.

Total degradation of 10 ppm MEHP and PA accompanied by significant bacterial growth – possible intermediate metabolites degradation?

### 2. Toxicity assays

Evaluation of whole sample toxicity - experiment with 10 mg/L DEHP  
Inhibition of seed germination

	Tomato		Lettuce	
% Inhibition	Before	After	Before	After
Germination	23.5	11.8	0.0	0.0
Root growth	0.0	0.0	0.0	0.0
Shoot Growth	0.0	0.0	30.6	0.0

- Reduction of whole sample toxicity

## Conclusions

- Labrys portucalensis* F11 has shown to be able to degrade DEHP, supplied as sole carbon source.
- Total degradation was achieved for concentrations up to 10 ppm. For 50 ppm, 60% of the compound was degraded in 30 days, with concomitant bacterial growth.
- Possible intermediates of the parent compound, MEHP and PA, were also completely degraded.
- Whole sample toxicity after degradation of the compound was reduced in the experiments supplemented with 10 ppm of DEHP.

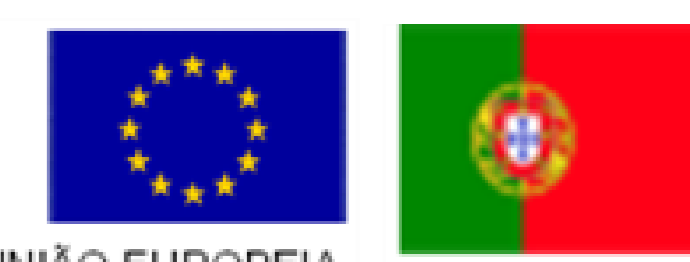
*Labrys portucalensis* F11 stands as a tool to help diminishing the impact of emerging environmental pollutants in the environment.

### Acknowledgements

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