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Innovative biocatalytic production of peat alternative composts from green wastes

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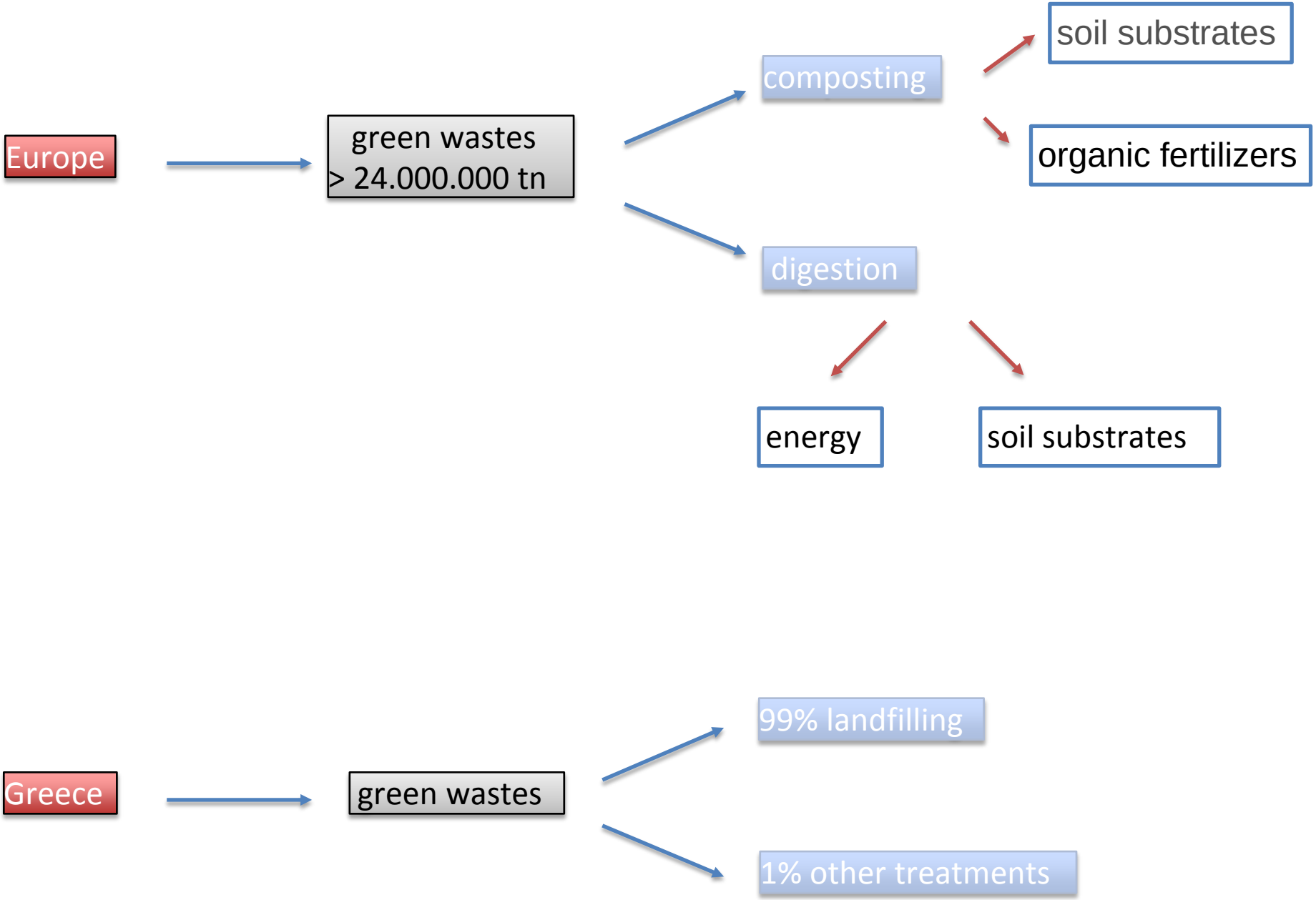
Aim of this work

- A new method for the biotechnological treatment of green waste
- The production of an environmentally safe soil substrate on a large scale with low cost

The product → first class soil conditioner

The product → peat alternative


Europe
green wastes
> 24.000.000 tn
composting
soil substrates
organic fertilizers
digestion
energy
soil substrates
Greece
green wastes
99% landfilling
1% other treatments

The main subject of our research activity in our laboratory is

the study of chemistry and technology of mineral resources and applications of organic waste

(coal, lignite and peat, perlite , zeolites , dolomite , green waste and generally biodegradable)

Materials and Method

Raw materials:

- Green wastes (horticultural and agricultural wastes)
- Biocatalyst
- Zeolite
- Dolomite

Method:

- Microaerobical biotransformation

Biocatalyst is an innovative product prepared from:

- **peaty lignite**
- **soil microorganisms**
- **urea**
- **nutrients**

Composting process

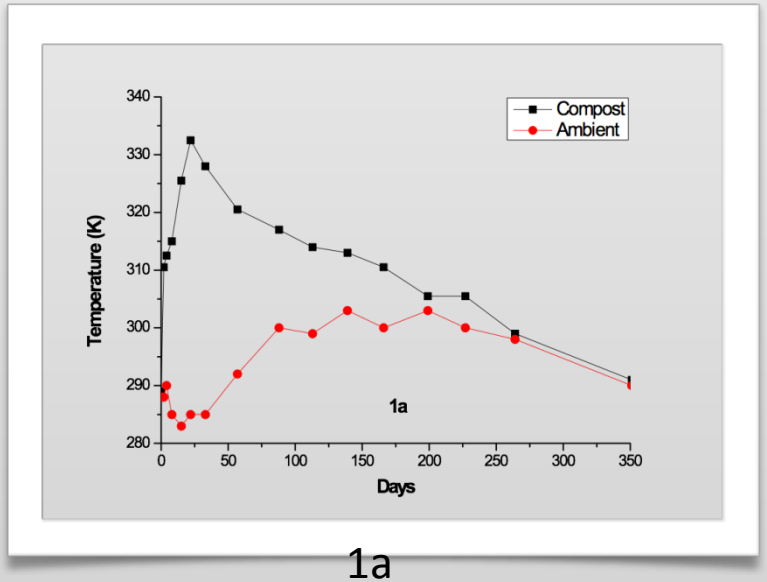
- green wastes
- biocatalyst (25 kg/m^3)
- zeolite (4 kg/m^3)

all are permitted for use in biological cultivation

Physicochemical parameters of the green wastes employed for composting.

Parameter	Value
Moisture %	20-40
Electrical conductivity (mS cm^{-1})	0.5-2.0
pH	6-8
Specific weight (g mL^{-1})	0.1-0.3
Ash (% w/w)	5-15
Organic matter (% w/w)	70-95
Total organic carbon (% w/w)	45-55
Total Kjeldahl nitrogen (% w/w)	1.5-3.0
C/N	25-30

Figures



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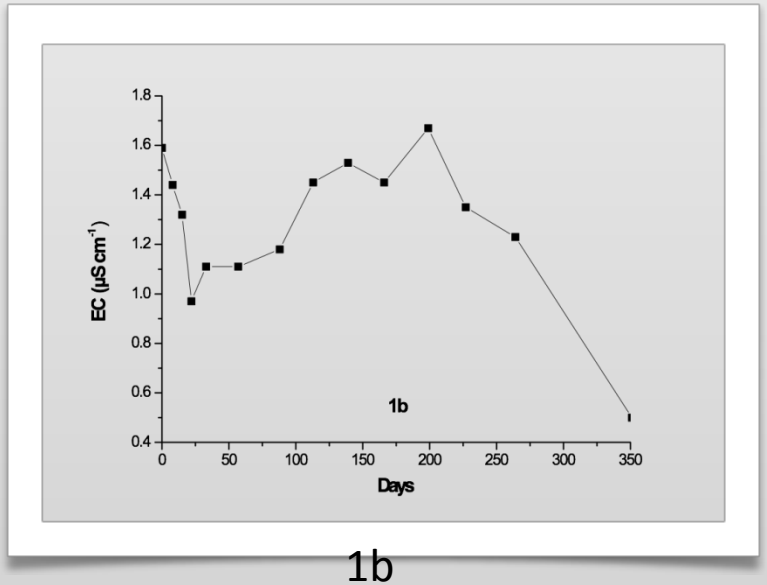

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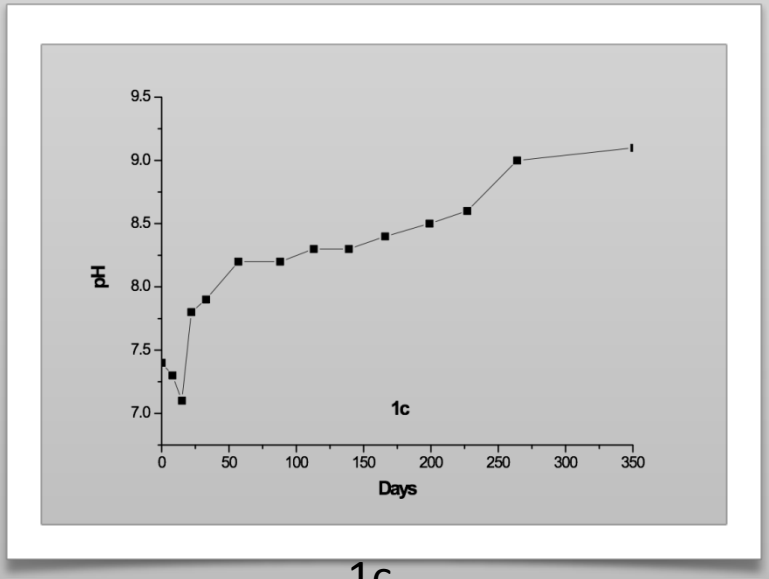

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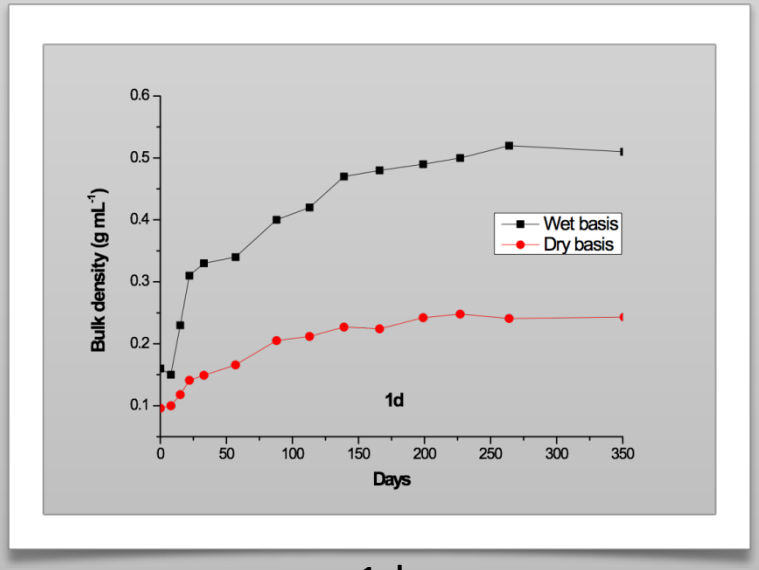

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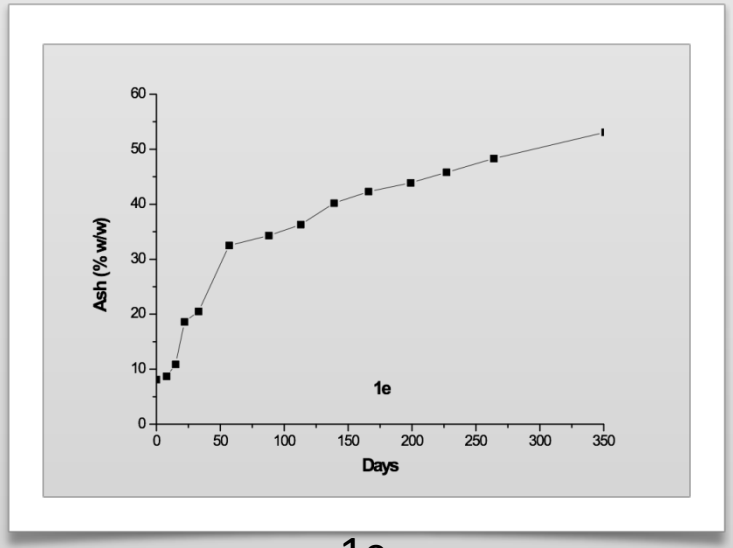
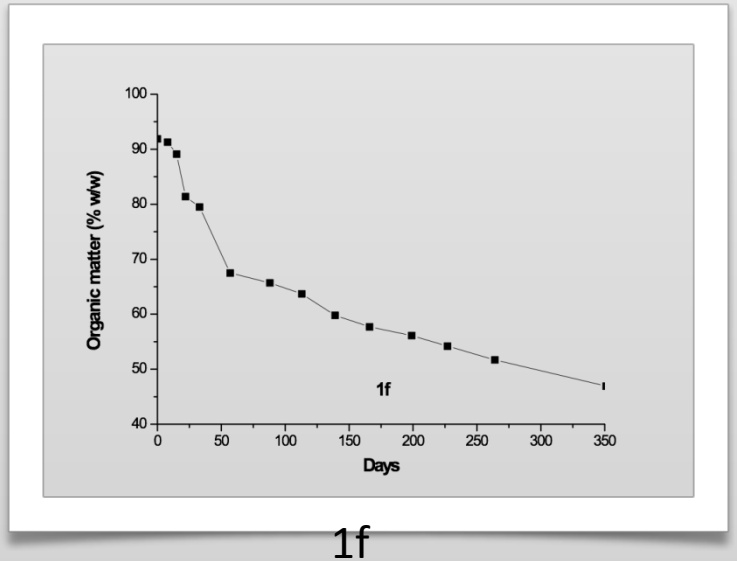
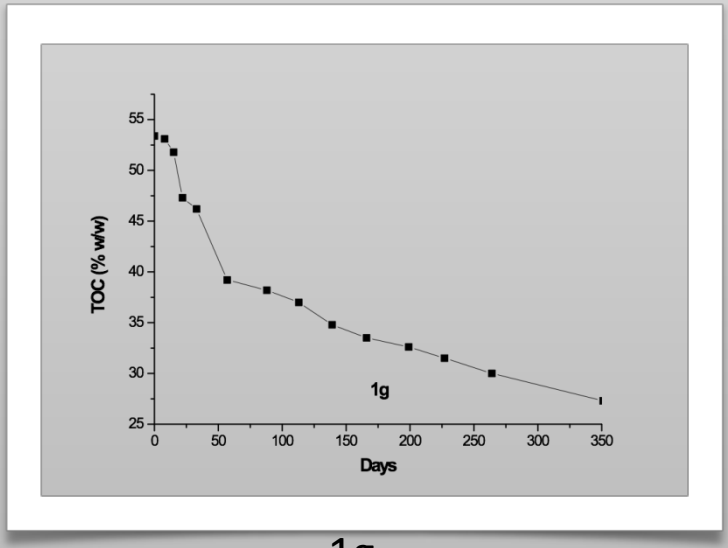

Ash (% w/w)
Days
1e

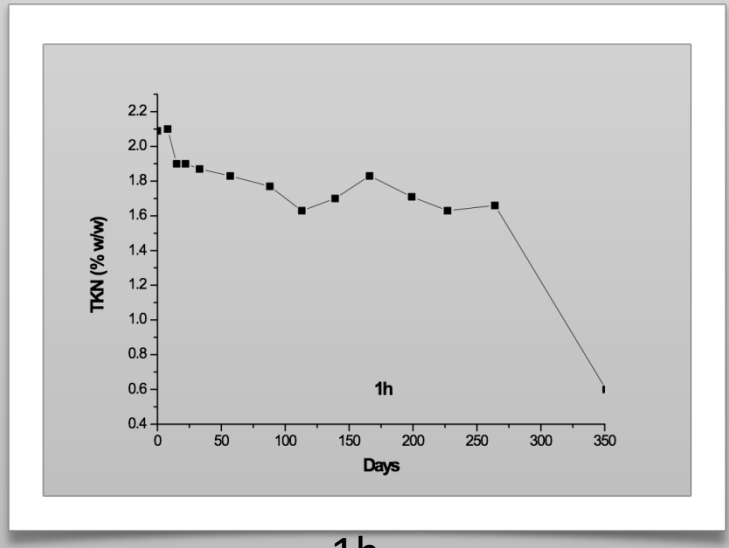
1e


Organic matter (% w/w)
Days
1f

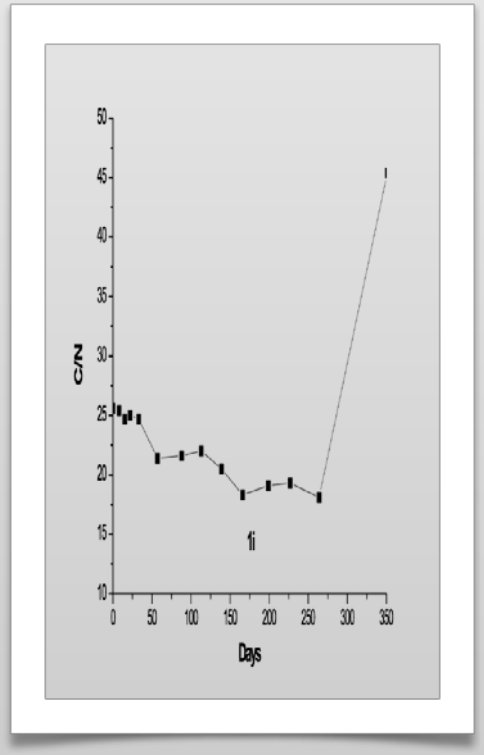
1f


TOC (% w/w)
Days
1g

1g


TKN (% w/w)
Days
1h

1h



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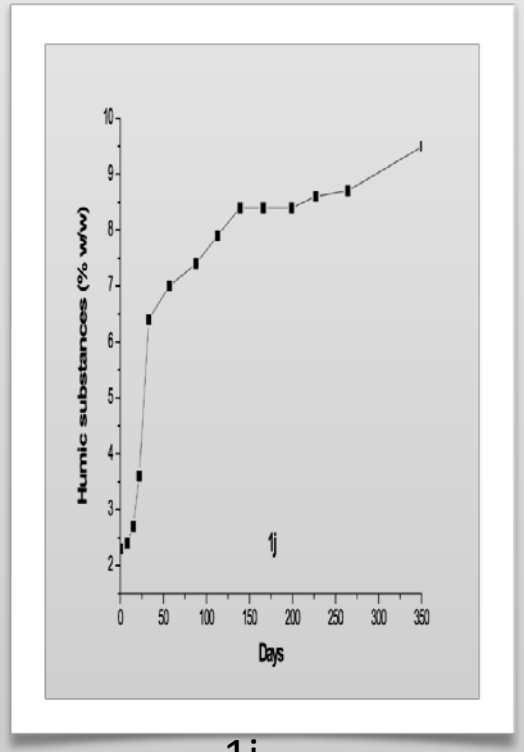

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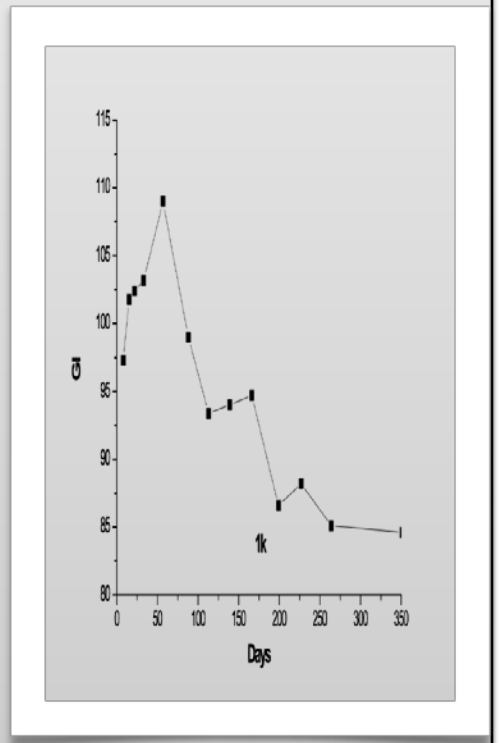

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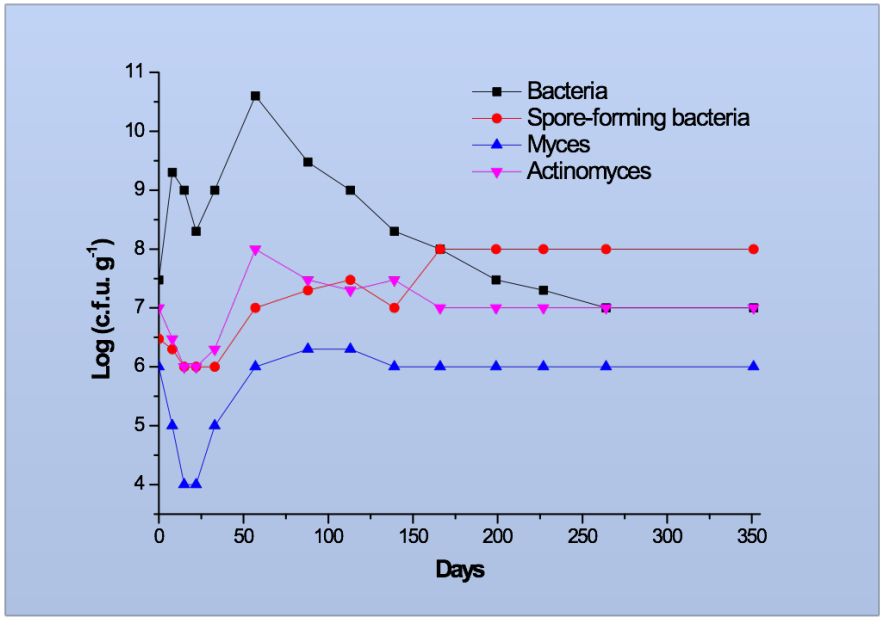
Figure 2:Total aerobic mesophilic bacteria



Heavy metal concentrations of the compost as compared with the governments regulations (KYA 114218/17-11-1997).

Metal	Concentration (ppm)	KYA 114218/17-11-1997
Pb	17.8	500
Cd	0.213	10
Cr	13.5	510
Cu	39.2	500
Ni	25.0	200
Zn	125.0	2000
Hg	0.208	5
As	0.83	15

Comparison of the most important physicochemical properties of 60-d compost and peat humus.

Property	Compost	Peat humus
pH	8.2	8.2
EC (mS cm^{-1})	1.2	1.7
Organic matter (% w/w)	67.5	82.5
Humic substances (% w/w)	7.1	7.4

Conclusions

- An innovative biocatalytic production of soil conditioner - biofertilizer with higher added value
- Decrease composting time significantly
- The humic substances content and the germination index during the process indicate maturation of the final product
- The product obtained can be classified as a first class soil conditioner according to the direction of biological cultivation and the codes of best agricultural practices.
- Production cost <35€/m^3 and humus peat price >60€/m^3
- The product can meet the requirements for the EU ecolabel