# COMPOST OF BIOSOLIDS-YARD TRIMMINGS AS POT SUBSTRATE

**R. López[1], M. Fábregas[1], F. Sancho[2], F. Madrid[1]**

1. Instituto de Recursos Naturales y Agrobiología de Sevilla. CSIC. Spain; 2. EGMASA, Sevilla, Spain.
rlnunez@irnase.csic.es

## INTRODUCTION

**The use of composts as container media is increasingly popular: cultivation of non-edible crops is a safe outlet for composts, replacement of peat is advantageous for the environment and composts can be priced at much higher prices (Raviv, 1997). Compost requirements as substrate are much stricter than those for field application.**

**This work deals with the use of a high quality compost (from co-composting of biosolids and trimming residues) as partial substitute of peat in growing medium for *Retama Sphaerocarpa* (shrub).**

## MATERIALS AND METHODS

**Compost (A12) was prepared by windrow composting of biosolids and yard trimmings (maximum size 15 cm) in a 1:3 volume ratio. After 2 months of active composting, compost was screened to <12 mm and let to mature by 6 months. The compost characteristics (see here) →**

**Substrate (A40) was prepared mixing compost A12 and a commercial and fertilized peat based substrate (CONTROL), usually employed at the nursery for *Retama (*a natural shrub in mediterranean countries, fabaceae) seedling.**

**Plants were sown in 400 ml containers. 3920 containers were filled with Control substrate and 8400 containers were filled with A40 substrate and were distributed in two blocks.**

***Retama Sphaerocarpa* Boss, was grown during one year. 30 containers per block were random selected. Plant height and main stem diameter, fresh and dry weight of aerial part and root system were measured. Nutrients and heavy metals were analysed in four plant samples per treatment (two per block).**

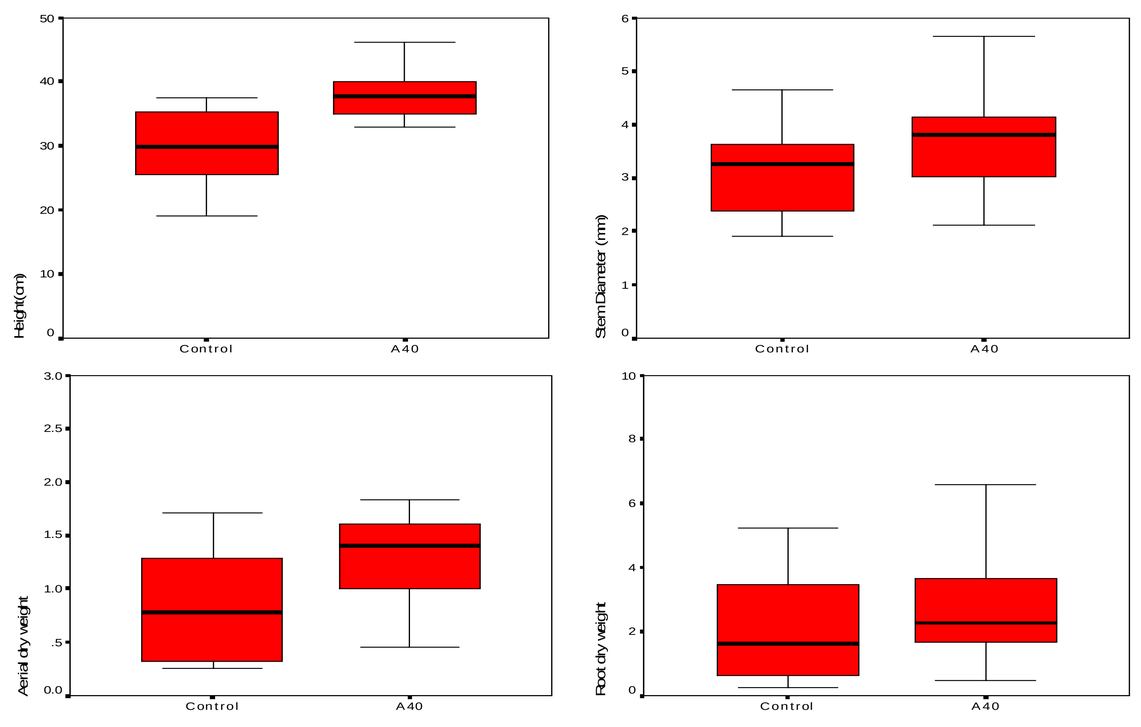

## RESULTS AND DISCUSSION

**Properties of compost and substrates:**

| | | COMPOST A-12 | SUBSTRATE A40 | CONTROL SUBSTRATE | IDEAL (*) or MAXIMUM (**) |
|---|---|---|---|---|---|
| pH (1:5 w/w) | | 7.09 | 6.70 | 6.10 | 5.2-6.3 (*) |
| EC (1:5 w/w) | dS $m^{-1}$ | 3.38 | 2.83 | 1.03 | |
| Org. Mat. | % | 32.6 | 52.8 | 79.8 | |
| Kjeldahl-N | % | 1.37 | 1.31 | 0.86 | |
| C/N ratio | | 11.9 | 20.1 | 46.4 | 20-40 (*) |
| P | % $P_2O_5$ | 2.38 | 1.48 | 0.25 | |
| K | % $K_2O$ | 0.81 | 1.04 | 0.96 | |
| Ca | % CaO | 14.0 | 10.0 | 2.32 | |
| Mg | % MgO | 1.09 | 2.35 | 3.78 | |
| S | % $SO_3$ | 1.46 | 0.94 | 0.49 | |
| Na | % Na | 0.124 | 0.161 | 0.125 | |
| B | mg $kg^{-1}$ | 57.0 | 33.6 | 7.1 | |
| Cu | mg $kg^{-1}$ | 88.0 | 70.7 | 27.4 | <100 (**) |
| Mn | mg $kg^{-1}$ | 282 | 202 | 109 | |
| Zn | mg $kg^{-1}$ | 249 | 182 | 40.3 | <200 (**) |
| Cr | mg $kg^{-1}$ | 62.8 | 52.8 | 61.4 | <100 (**) |
| Ní | mg $kg^{-1}$ | 27.3 | 27.8 | 37.5 | <50 (**) |
| Cd | mg $kg^{-1}$ | 0.50 | 0.23 | 0.10 | <0.7 (**) |
| Pb | mg $kg^{-1}$ | 73.6 | 43.6 | 9.5 | <100 (**) |
| As | mg $kg^{-1}$ | 3.33 | 3.44 | 3.18 | |
| Co | mg $kg^{-1}$ | 5.90 | 6.80 | 11.6 | |
| | | | | | |
| Density | g $cm^{-3}$ | 2.14 | 1.93 | 1.69 | 1.45-2.65 (*) |
| Bulk dens. | g $cm^{-3}$ | 0.503 | 0.188 | 0.104 | <0.4 (*) |
| Porosity | % vol | 76.5 | 90.3 | 93.8 | >85 (*) |
| WHC | % vol | 40.3 | 63.3 | 73.0 | 55-70 (*) |
| Air content | % vol. | 36.2 | 27.0 | 20.9 | 10-30 (*) |

(*) Ideal properties for container media, Ansorena (1994)
(**) Proposal of maximum heavy metal contents for Class 1 Compost (non restricted use), Working document: Biological treatment of biowaste, 2nd draft, European Commission.

**Except pH, compost based substrate shown good chemical and physical properties.**




**Plant development was better in compost based substrate**

**Plant contents of nutrient and heavy metals**

| | SUBSTRATE A40 | CONTROL | | SUBSTRATE A40 | CONTROL |
|---|---|---|---|---|---|
| N (%) | 2.11 | 2.24 | Fe (mg $kg^{-1}$) * | 35.6 | 64.6 |
| P (%) * | 0.111 | 0.030 | Cu (mg $kg^{-1}$) | 5.78 | 4.50 |
| K (%) * | 1.00 | 0.46 | Mn (mg $kg^{-1}$) * | 6.9 | 53.0 |
| Ca (%) * | 0.964 | 0.633 | Zn (mg $kg^{-1}$) | 23.9 | 19.5 |
| Mg (%) * | 0.346 | 0.244 | Cd (mg $kg^{-1}$) | 0.046 | 0.043 |
| S (%) | 0.199 | 0.174 | Co (mg $kg^{-1}$) | 0.415 | 0.416 |
| Na (%) | 0.061 | 0.029 | B (mg $kg^{-1}$) * | 24.2 | 15.5 |

* Significant difference p<0.05

**Better plant performance for plants growing in compost substrate was due to their improved nutrition**

## CONCLUSION

**Growth of *Retama Sphaerocarpa* in a substrate containing biosolids-yard trimmings compost (40% in volume) was better than in peat-based substrate.**

## Acknowledgements

**This research is supported by the EU project LIFE00ENV/E/000543 "Co-composting procedures and its use on afforestation, landscaping, forestry and agricultural crops in the Andalusian region" and by the Consejería de Medio Ambiente de la Junta de Andalucía, Spain.**