# Low cost compost production technology: Beneficial uses of compost and its product fulvic acid

There are growing global concerns regarding the excessive use of chemical fertilizers, atmospheric pollution, soil health, and biodiversity, resulting in an increased interest in organic recycling practices. The transformation of on-farm green waste (planting materials/organic waste) through microbial decomposition into a farm resource is called composting and the final product is "compost". To meet growing global population, there is a dire need to increase agricultural production The use of compost (organic matter) in agriculture fields offers many benefits such as enhanced soil fertility and subsequent increased agricultural productivity (Leifeld et al., 2001), improved soil biodiversity and reduced ecological risks by reducing landfill sites, $NH_4$ volatilization and $NO_3$ leaching to ground water. Not only the composts, but their components like humic acid and fulvic acid can have important bearing on improving plant growth at different developmental stages including seed germination and seedling vigor.

In addition to agricultural farming, the creation of green landscapes in urban planning projects is a prerequisite as they provide aesthetic and eye-catching views, create platform for healthy exercises, conserve biodiversity and sequester carbon. A healthy landscape requires soil without pollutants and with a mix of organic material, thus the use of the compost is one of the options to improve the quality of the landscape base. Usually 3-5 kg/$m^2$ or variable quantities (based on soil type and plants) of compost is mixed manually or mechanically for sustainable landscaper sites. The maintenance of these landscapes generates huge quantities of green waste which can be recycled to compost, thus provides environmentally friendly way of waste handling.

The main objective of this study is to provide an on-farm low cost compost production technology to aid the farmers and landscape developers to transform the green waste to a valuable resource.

Considering the beneficial uses of compost and of recycling green wastes, scientists at ICBA initiated a study that aimed to establish a low cost on-farm compost production technology and evaluate the benefits of the


***Figure 1:*** *Low cost compost production technology at ICBA*

***Table 1:*** *Effect of various concentrations of fulvic acid (0.5 to 1%) on seed germination and traits**

| Treatment* | % germination (mean±SD) | Speed of germination (mean±SD) | Accumulated speed of germination (AS) (mean±SD) | Coefficient of rate of germination (mean±SD) |
|---|---|---|---|---|
| *Prosopis cineraria* | | | | |
| Control | 73.33±11.54 | 0.53±0.24 | 1.1±0.09 | 30.15±2.7 |
| Fulvic acid 0.5% | 93.33±11.55 | 0.56±0.17 | 1.61±0.19 | 33.82±3.8 |
| Fulvic acid 1% | 100±0.00 | 1.19±0.26 | 3.00±0.44 | 52.65±8.8 |
| *Acacia tortilis* | | | | |
| Control | 73.33±11.5 | 5.8±0.08 | 1.61±0.37 | 35.20±3.8 |
| Fulvic acid 0.5% | 83.33±0.00 | 0.81±0.17 | 2.25±0.38 | 40.92±4.9 |
| Fulvic acid 1% | 93.33±11.55 | 1.06±0.12 | 2.72±0.34 | 51.85±3.2 |

*the mean and standard deviation is for three replicates

compost product 'fulvic acid' in improving seed germination. Therefore, a low cost on-farm compost production system was set up at the experimental station (Figure1) using the feedstock derived from plants clippings (grasses, shrubs, ground cover and trees, etc). At ICBA the green waste is available once a week in summer (March - September) and fortnightly in winter (October - February). Among the three composting methods (windrows composting piles, static piles, bins) static pile composting method was used, where green waste material was piled, moistened (50-60%) and covered with polyethylene sheet to reduce moisture loss. During the first week the temperature ranged between (30-40°C), after fortnight it increased to (50- 60°C) for a week and then maintained at (30-40°C). The material was manually aerated (turning every alternate day). The microbial inoculation hastens the composting (Nair and Okamitsu, 2010; Ghaffari et al., 2011), therefore, we inoculated the material with a consortium of microorganism (fungi, actinomycetes, mycorrhiza, trichoderma and bacteria), resulting into (aggregation-adhesion polysaccharides) stable and mature compost consisting of organic matter (38.2%), C/N 36:1, P (0.27%), K (0.75%), pH (7.7) and moisture (<10%).

**Priming of Seeds with Fulvic Acid** The *Prosopis cinerarium* and *Acacia tortilis* are important native trees of UAE and the seeds are poorly germinated. In an attempt to increase seed germination, the seeds were primed with fulvic acid (0.5 and 1%) extracted (Asing et al 2014) from compost prepared at ICBA, and seed germination trial in the green house was conducted.

Present study concludes that it is possible to establish a low cost compost production facility at the farm scale level using the green wastes which otherwise goes to landfills. Such an establishment leads to beneficial uses of compost to enhance soil fertility, soil structure development and biological population essential for plant growth. Further to the direct beneficial uses of compost, its product, such as fulvic acid extracted from the compost can significantly improve seed germination and traits of native plant species (*Prosopis cineraria* and *Acacia tortilis*) that usually take long time to germinate (Table 1). This has consequences on the faster establishment of nurseries and rapid rehabilitation of desert lands with the native trees.

### References

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## Announcement

### New ICBA members

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