

## Information Sheet No. 6-6

### Use of recycled organics products – Importance of electrical conductivity

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#### What is electrical conductivity?

*Electrical conductivity* (EC) is a technical term used to indicate how salty a material is. The EC of *recycled organics* (RO) products is an important quality parameter, as the excessive application of products high in soluble salts can cause damage to plants and soils.

As with other fertiliser types, RO products with a high EC cannot be applied in unlimited amounts to soil. Maximum application rates are defined in Australian Standard AS 4454, (2002) and are summarised in this Information Sheet.

EC levels are usually expressed in deci-Siemens per metre (dS/m) (Charman and Murphy, 1991).

#### Effects of electrical conductivity on plant growth

The saltiness of an RO product is important, as this characteristic can affect soil quality and plant growth.

For example, a high EC soil conditioner applied to the root zone of plants can cause water stress, as

the salts attract water – making it more difficult for a plant to absorb water for growth. Plants under water (or *osmotic*) stress often show signs of leaf “drooping”, and leaf loss, possibly leading to a reduction in growth and/or plant death.

#### Effects of electrical conductivity on soil

Electrical conductivity is an important attribute influencing soil stability, structure and water availability to plants. Soluble salts can have either beneficial or detrimental effects on soil condition and plant growth.

Soils very low in soluble salts (e.g. EC < 0.1 dS/m) may be susceptible to soil structural problems. By contrast, soils high in soluble salts (e.g. EC > 1 dS/m) may cause water stress in plants – possibly leading to the dehydration and death of plants. Therefore a balance in EC levels (0.1-1 dS/m) in a soil is important to help stabilise soil properties and to allow plants to access water.

The electrical conductivity of RO products may impact upon that of soil, which in turn affects plant

**Plate 1.** Mulched garden beds.



**Table 1.** Maximum application rate (L/m<sup>2</sup>) of product with different salinities for plants of different sensitivities to salinity (Standards Australia AS 4454, 2002).

EC range (dS/m)	Sensitive plants	Tolerant plants
0-1	Unlimited	Unlimited
1-2	<15	<60
2-4	<8	<32
4-8	<4	<16
8-12	<2.5	<10
>12	<2	<8

growth. For example, the application of a high EC RO product to a high EC soil may increase osmotic pressures in the soil – causing water stress to plants.

In some instances, however, the application of a high EC RO product may not have detrimental effects upon plant growth. For example, when a high EC RO product is applied to a low EC soil, EC levels in soil may remain below plant-water limiting levels, and may in fact improve soil structural properties.

### Recommended application rates of RO with a certain electrical conductivity

Australian Standard AS 4454 (2002) specifies application rate limitations for composts, soil conditioners and mulches for sensitive and tolerant plants (Table 1). If an RO product has an electrical conductivity in excess of 1 dS/m, then application rates need to be restricted, depending upon the sensitivity of the plant(s) to

salt.

Application rates identified in the table are for surface (e.g. mulch) or for sub-surface (e.g. soil conditioner) incorporation of a product into a soil to a depth of 5 cm. It should be noted that application rates in Table 1 can be doubled if a product is to be incorporated to a depth of at least 10 cm. This is because the salts in the product are distributed into a larger volume of soil, which reduces the overall impact of the product on soil salt levels.

## Definitions\*

### Electrical conductivity

Is a measure of the conduction of electricity through water or a material-water mix. It can be used to determine the extent of soluble salts in a product and hence salinity (Charman and Murphy, 1991).

### Recycled organics

The term Recycled Organics has been adopted by Resource NSW as a generic term for a range of products manufactured from compostable organic materials (garden organics, food organics, residual wood and timber, biosolids and agricultural organics).

### Osmosis

Is a process by which a solution is drawn from a less salty medium to a more salty medium.

\* Recycled Organics Unit (2002).

### Important references

- Charman, P.E.V. and Murphy, B.W. (1991). Soils: their properties and management. Sydney University Press, Sydney.
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