

Gardening Articles for week ending 21st FEBRUARY 2009
Written by Wally Richards. [Photo]

THE MAGIC OF EARTHWORMS

Earthworms are vital to the soil food web and healthy gardens.

If your gardens lack in good worm populations you will not have happy, healthy plants, instead you will have plants that are attacked by numerous diseases and pests.

The main reasons for not having good worm populations are as a result of using man made fertilisers, chemical sprays including herbicides, watering with chlorinated water. Soil that is too dry or too wet are also reasons for lack of worms.

Worm populations can be increased by keeping the soil evenly moist with non-chlorinated water, placing sheets of wet newspaper over areas of bare soil between plants and covering the paper with animal manures and compost.

Weeds that appear should be cut off with a sharp knife just below soil level and the foliage left laying on top of the soil/compost to decompose.

What is the value of worms in your gardens? The following comes from a recent email I received from a worm expert in America.

□ The growth promoting properties of worm casts have been clearly shown to be independent of the plant-nutrient levels in the castings. By providing test plants with all their nutritional requirements - in the form of standard inorganic fertilizers - researchers have demonstrated that the additional growth of the plants treated with castings was due to other factors.

Precisely WHAT these factors are has been the big question.

In a 1998 BioCycle report by Subler et al., the authors speculated that the increased growth was "perhaps related to enhanced micro-nutrient availability, the presence of plant growth regulators, or the activity of beneficial micro-organisms in the castings".

The presence of elevated levels of various plant growth regulators - such as auxins, gibberellins and cytokinins in earthworm-worked material has in fact been observed and reported by researchers well before 1998 (eg. Tomati et al., 1983), thus making this a promising possibility.

Some significant progress in this field was reported by Atiyeh et al. in 2002.

For the first time, a group of researchers (not surprisingly, a team from Ohio State University) was able to pinpoint an exact mechanism responsible for at least some of the additional growth promotion in plants (while others HAVE found plant growth regulators in castings, they've never provided conclusive evidence that these substances were indeed directly responsible for the additional growth).

The study involved plant growth trials testing the addition of varying levels of humic acids - extracted from worm castings (made from pig manure and food waste) - to determine if they had any effect on plant growth. The set-up of the experiment was very similar to previous work by OSU researchers testing the growth promoting ability of the castings themselves. As such, all plants were provided with full complement of required nutrients, so as to ensure that any and all additional growth observed was independent of improvements in plant nutrition.

The team found that not only did the humic acids stimulate significant plant growth, but the effectiveness at varying concentrations followed a similar pattern to that reported in the castings studies.

That is to say that a significant growth response was observed at relatively low concentrations of humic acids, and this growth response increased as the concentration of the humates increased - up to a certain point (which varied, depending on the starting material, the plant species being tested, and the potting mix being used).

Treatments with higher concentrations of these humic acids often brought about a decline in plant growth. The authors concluded that the growth response was specifically due to either the hormone-like properties of the humic substances themselves and/or actual plant growth hormones adsorbed onto the surface of the humates.

For those of you unfamiliar with 'humic' substances, these are large, highly complex, and highly stabilized compounds which offer a wide variety of beneficial properties when present in

soils. I'm sure most people have heard of 'humus' - which is basically the dark, rich earthy material you find in a good compost or at the bottom of a well rotted pile of leaves.

In a more recent OSU study (Arancon et al. 2006), humic acids extracted from worm castings were once again found to positively (and significantly) impact the growth of various plants species.

Beyond the positive impact of the humates, and the likelihood that plant growth regulators are somehow involved (both discussed in the 2002 article) there doesn't appear to have been any further developments in this area.

Given the fact that we at least know (with a pretty high degree of certainty) that humic substances play an important role in the beneficial properties of worm castings, one might wonder why similar properties haven't be reported for 'regular' composts, which certainly contain plenty of humic compounds as well. It likely once again comes down to the considerable differences in the way castings and normal composts are produced.

According to Dominguez et al. (1997), vermicomposting not only accelerates the humification process, but it results in a more thoroughly humified end product. This is likely attributable to the fragmentation and extremely high microbial activity occurring within the earthworm digestive tract.

Considering how small the body of vermicomposting literature in general is in comparison to mainstream compost science, however, I am also reminded of the fact that there is a serious need for

further research in this field. Hopefully with growing public awareness of, and interest in vermicomposting (what can I say -I'm an optimist at heart), we'll see this come to pass.

It is fact that garden soils that contain good populations of earthworms will produce; great healthy plants. While you are working on building up your earthworm populations you can also obtain the benefits of the humate aspects by occasional soil drenches of Magic Botanic Liquid (MBL) including two weekly sprays of the plant's foliage with the same.

You will certainly see the difference in your garden plants.

Problems ring me at 0800 466464 (Palmerston North 3570606)