

## Wormtastic™ improves soil health

Soil micro-organisms = healthier soil = stronger plants

The photo shown alongside was taken in November 2007 of garlic bulbs grown on the same farm, in adjacent beds, in good quality soil, with no chemical spray treatment; the only difference being that the bulb shown on the left was harvested from a bed that had received fortnightly applications of Wormtastic™ to the soil.

Wormtastic™ is an organic liquid soil conditioner produced as a vermicast leachate at Brown Earth's worm farm on the Central Coast. The composting worms feed on slurried horse manure and fruit and vegetable juicing residues, with supplements of rock phosphate, calcium, gypsum and dolomite to ensure availability of essential minerals.

Wormtastic™ has been used very successfully for the maintenance of turf under production and on golf courses, on council parks and gardens, for restoring soil fertility in vineyards and for nursery plant propagation and care. Users report excellent flower quality, improved soil structure, resilience of turf and increased earthworm activity in the soil. This latest trial is exciting because it provides evidence of what is happening out of sight, in the soil.



*Photo: Roots of garlic plants grown with Wormtastic™ grew about three times longer than those of garlic plants in control beds*

With further trials on garlic and tuber roses, we will be monitoring development and quality of the foliage, flower, bulb and roots, as well as soil conditions. This first set of results demonstrates the efficacy of Wormtastic™ in improving soil biology, demonstrated by the root development.

This difference in root development astounded the farmer, who grows his garlic and flowers for the organic markets in Sydney, and prides himself on the good soil quality he maintains using his own composted chicken litter, no inorganic fertilisers and no chemical spraying. The farmer initially planted, in March 2007, about 2000 bulbs in three 25 m rows that became the experimental beds to which he would apply Wormtastic™. Another three rows of garlic were developed without use of Wormtastic™ as the control beds. Wormtastic™ was applied fortnightly to the soil of the experimental beds at a 1:10 dilution, using a pressurised spray pack.

The farmer reported that the experimental garlic plants initially grew faster and with three to four months of growth, their foliage appeared healthier than the control plants. Then there seemed to be a catch up period to flowering time, with no discernable difference in the flower quality. At harvesting time in November 2007, the bulbs were little different in size, but the experimental garlic bulbs were much harder to harvest, because the roots were so long and strong! The farmer reported that the roots were about three times longer than those of the control plants.

What is the significance of this? Here is a brief explanation précised from texts on biodynamic agriculture, soil science and worm farming.

Plant roots are essential for creating and maintaining soil structure as it is the interactions between roots and soil micro-organisms that maintain the microbial activity in the soil. So good root development is indicative of healthy biological activity in the soil.

Roots growing down break down compacted soil, and old roots that die off are ingested as part of the soil organic matter, leaving new channels of air that maintain oxygen content that worms and soil microbes need to live. Organic matter contains minerals and plant nutrients in insoluble form. Digestion of the organic matter by earthworms and soil microbes converts it into colloidal humus and solubilises these elements, which are contained in the humus in water soluble form. These are then taken up through feeder roots as and to the extent that the plant needs feeding, a process controlled by photosynthesis and transpiration, under the influence of the sun. The colloiddally bound elements do not evaporate under heat or leach out with rain, but remain available to the growing plants at all times.

The aggregate structure of the humus also improves the structure and stability of the soil, which helps to prevent soil compaction and erosion and increases the soil's water adsorption capacity with water held in the pores within the soil aggregates. This soil water is also released more slowly to percolate downwards, so the soil does not dry out so quickly and remains accessible to the water intake roots of the plant.

Aerobic microbial activity also neutralises harmful anaerobic pathogens in rotting organic matter. The result is a sweet smelling, crumb-like soil.

So the roots and soil microbes both have work to do, and are working synergistically, maintaining soil health and plant health. Plants grown in healthy, well structured soil are much more resilient to adverse environmental conditions, such as drought or fungal disease.

In contrast, artificial fertilisation with inorganic products gives the microbes no work to do as nutrients are applied in soluble form to the soil surface. Without microbial activity, the roots become shallower absorbing nutrients from below the surface. There are fewer and fewer roots forming deeper cavities or worms making new passages, and so soil loses its structure and becomes compacted and lifeless below a shallow root zone. Plants grown in such soils are more susceptible to wilt and disease.

While the use of Wormtastic<sup>tm</sup> did not increase the commercial value of the garlic crop for the farmer, the improvement in soil biology will allow a greater variety of crops to be cultivated in the soil without the need for more costly chemical inputs to amend adverse soil conditions. The farmer also stressed the value of this product that has no detrimental effects and is very easy to apply.

In other applications and locations too, where soil biology has been compromised, use of Wormtastic<sup>tm</sup> presents an opportunity to save costs that might otherwise be spent on other inputs for amending soil and for fertilisers.

## **Bibliography**

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