

# Micro-organism interaction in the root zone.

If you were to ask most people to imagine their favourite plant, they will more often than not forget to include the image with the roots.

This is not surprising when we consider that the roots are not seen as the part of the plant responsible for the income. Many growers even think that the root system of a plant is just a stabilising adjustment to keep the plant “fixed”. Today many even think we can feed the plant by the leaves, so why bother about roots any longer?

To become more aware of the importance of the root system of a plant we need some knowledge concerning chemistry, physics and micro-biology. Incidentally, these are the topics which are less and less taught in agricultural schools.

A green plant has the possibility to make from sunlight, carbon dioxide and water which produce sugars. These sugars are the basis of all organic structures. I was taught that the leaves were providing energy for the roots elements by taking elements in and transporting them up to the leaves. I also learnt that most of the elements were taken in by osmosis or active exchange of elements. This is an enormous abbreviation for a most remarkable complex system which is hardly understandable in its complete whole extent.

I will try to share a bit of my knowledge with you during the next half an hour. The root system is contradictory and is most commonly known as a closed system but is in fact a leaking system. A root leaks an enormous amount of foliar-built energy. The energy rich compounds which are leaking into the soil serves an most important goal. These energy rich compounds are feeding the micro-flora and micro-fauna in the soil. Don't think that the plant is a philanthropic creature, oh no. What actually happens in the soil is pure symbiosis. If I help you, you help me. The micro-flora and fauna are fed by the debris and leakage of the plant and by consuming these 'nutrients' they produce excreted. A lot of these excreted are chemical active compounds like enzymes and vitamins. Organic acids are also formed in the form of volatile fatty and humic acids. These excreted do not only have a direct effect on the plant but also an in-direct effect which is of greater importance. From this perspective one should think about phosphate intake of the plant in a calcium rich soil.

The balance of the above mentioned symbiosis is normally a very firm one. But as soon as humans try to interfere, the system can become out of balance. Normally this balance can be restored by the diversity of microbes in the soil but when distortion continues and the soil lacks micro-organisms the balance can swap to an imbalance which will flow to a new total different balance. Usually the symbiosis in this “new” balance is totally disturbed. A plant does not live in total symbiosis anymore with the soil we encounter problems with our crops due to lack of elements leading to bad growth and diseases.

To improve this situation we need knowledge of the total plant and also a good understanding of soil-borne micro-life. And, as if this is not enough, elementary knowledge of soil is necessary.

Most growers are forced by economic laws to boost production. A high production of good quality ensures a profitable income. We use all types of production and quality improving skills to achieve this goal. Production is easy to measure. This is numbers or weight, but how do we measure quality? Our quality parameters are often very subjective. Is a nice green collar quality? I can create quality with a little bit of urea ! Are a lot of big leaves quality? I can create quality with ammonium-nitrate! Is an insect free plant quality? I can create quality insecticides. Etc.

And how should we encounter quantity and weight on a longer run, for the product as well as for the nursery?

We are looking for results on a short term level but are we aware of the effects of these products on the long term. Tillage, fertilizers, pesticides, mixing soils etc all have an influence on the micro flora/ fauna and thus on the symbiosis in your root system. If one doesn't manage this balance he will create a diseased soil instead of a normal disease-suppressing soil. And please don't believe in some particular microbe or fungus art which promises to restore your soil in no-time. As soon as the balance is disturbed it will cost time to restore it. Nature is not easy when out of balance but when this happens it will take quite some time to restore (if possible).

What can disturb the symbiosis in the soil?

Symbiotic life in the soil is not only a symbiosis between micro-life and plant but there is also a balance between all other soil creatures. The differences in population are mostly pH dependent. If you are changing pH rapidly be aware of the enormous turbulence this provokes in the soil balance. pH regulators and fertilizers can have big influences on the pH level and ultimately damage the balance.

A symbiotic life is very sensitive for conductivity. Conductivity is influenced by salts in liquid. Most of our fertilizers are salts. By applying these fertilizers you should be aware that you are disturbing the balance. Not only are the microbes sensitive but the root hairs can be totally destroyed by high conductivity levels. (For leaves an E.C. of 2 can easily cause damage)

Pesticides, especially fungicides and insecticides are most of the time effective against a broad range of micro-organisms. Be aware that not all known species of i.e. phytophthora, rhizoctonia and pithium are harmful. By using pesticides, you should be aware that not only the "pest" is killed but you run the risk of wiping out important microbe species which are essential for the root symbiosis.

By mixing turf and peat to make a potting soil, you are putting a root system in a very new "environment". Every type of soil will have its own typical microbial flora and fauna. You will find a total different population in a peaty soil than in a loam or sandy soil. The plant will take time to adjust when you change the type of soil you are propagating in.

Clay minerals are a perfect housing for micro-life. So clay minerals can easily improve your microbial housing system.

The effects of a disturbed balance can be various. If the balance is disturbed the plant does not stop photosynthesis nor leaking nutrients into the soil. Due to the disturbed balance some micro organisms can become dominant and take over. As long as these micro organisms are harmless for plants you won't notice a lot. Probably some grow retaining less 'collar' on the leaves and other plants will not noticeably be different. But what if a pathogenic bacteria or a micro-organism which produces poisoning components becomes dominant? Such a soil will become a decreasingly more generative and your plant will suffer. The cost will be high to make our plants sound again and in so doing we are pushing the balance of the soil further away.

How can EM-1® (Effective Micro-organisms ) help ??

As I mentioned above, do not believe in a magic microbe that can change a total environment in all type of soils. How can it be that EM will give effect?

EM is a group of micro organisms which can be found in free nature. This combination of micro organisms acts in the soil as a initiator/catalyser for those microbes which are living in the soil and known as pro-biotic micro-organisms. The EM microbes are the initiators for a healthy plant/soil balance. A positive symbiosis.

This is also the reason you can use EM in different types of soils. As I mentioned before every type of soil has its own type of micro flora/fauna. EM stimulates that flora and fauna which is favourable for a healthy root soil interaction unrestricted of the type of soil. EM is not the magic potion which makes a healthy disease suppressing soil it is the initiator to achieve such a soil.

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