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Can Beneficial Microbes Protect Oil Palm from *Ganoderma boninense*?*

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*The soil has a complex, diverse, microbial ecosystem that existed long before agriculture became industrialised. When the diverse above-ground ecosystem is destroyed and monoculture is put in its place, a radical change will also take place in the below-ground microbial ecosystem. It is made worse (farther depletion) by the indiscriminate use of agricultural chemicals, be it the inorganic fertilisers, pesticides, herbicides, fungicides etc. When more soil microorganisms which were beneficial to plants are wiped out by the over use of agricultural chemicals, plant pathogens such as *Ganoderma boninense* [the causal agent of oil palm basal stem rot (BSR)] start to occupy the space that was once occupied by the beneficial microorganisms, making the soil 'toxic' to the plants. One strategy that should be adapted to overcome this is by restoring the soil microbial ecosystem. The plant's first line of defence to suppress soil-borne pathogens is the beneficial microbes that live symbiotically in the rhizosphere (root-area). Studies have shown that complex microbial networks in the soil have prevented weak pathogens from breaching this space and moving up to infect the oil palm roots. The primary functions of these beneficial microbes is to solubilise, mobilise nutrients and biologically fix atmospheric nitrogen ensuring good growth that will enable the palms to better withstand diseases. Unlike many plants, the oil palm rely on mycorrhizae fungi to increase the surface area for nutrient absorption. Although studies have also shown that artificial inoculation for Mycorrhizae has not stopped the progress of *G. boninense*, the infection was delayed significantly when compared to untreated palms. This will provide another proactive barrier to the palms against *G. boninense*, whilst the use of chitin products directly attack potential invasion from *G. boninense*. One of the many defence-related enzymes produced by plants is chitinase. Chitinolytic microbes, a component of complex microbial ecosystem, in the presence of chitin will secrete chitinase that will convert chitin to chitosan. Fungi (including *G. boninense*) have a coating of chitin that gives them their shape. Chitinase will puncture this coating. Individually, an introduced complex-diverse microbial ecosystem, mycorrhizae and chitin (chitinase) may not be able to withstand *G. boninense* in depleted, infertile soils. Used together they are a very good holistic strategy to combat *G. boninense*.*

*Keywords: Holistic solution to *Ganoderma*, complex microbial ecosystem, chitin, chitinase, mycorrhizae.*