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"Solidarity in a competing world — fair use of resources"

Application of Organic Ameliorant and Biofertilisers to Increase the Induced Systemic Resistance and Rice Productivity in Indonesia

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Abstract

Intensive use of agrochemicals since the green revolution in Indonesia has lead to degradation of soils health severely, levelling off to chemical fertilisers response and the increasing of rice yield losses by and diseases. The major rice diseases (bacterial leaf blight and rice blast) has caused a yield loss up to 20–30 %. The pots and field experiments had been conducted to investigate the effect of organic ameliorant (compost, biochar), decomposer/biocontrol agent and biofertilisers to remediate the health of paddy soils, to promote the induced systemic resistance and to enhance the rice productivity. It has been formulated; (1) Biofertilisers inoculant consortia (*Azotobacter* sp, *Azosprillum* sp, *Pseudomonas* sp and *Bacillus* sp) for improving the nutrient availability and fertiliser efficiency, (2) decomposer and biocontrol agent (consortia of *Streptomyces* sp, *Cytophaga* sp, *Bacillus* sp, and *Trichoderma* sp) or single inoculant of *Trichoderma* sp and used as biocontrol agent agent to produce a high quality of bioaugmented straw compost, (3) organic ameliorant (75–90 % of bioaugmented straw compost + 10–25 % of rice husk biochar) to improve the soil carbon and nutrient status in soils. Summarized experimental results revealed that application of 2–5 ton ha^{-1} of organic ameliorant and 400 – 600 g ha^{-1} of biofertiliser has the ability to (1) reduce the dosage of inorganic fertilisers by 25–50 %, improved the soils health as indicated by soil organic carbon and nutrients status in soils, and increase the rice productivity by 25–50 %, (2) application 400 g ha^{-1} of biofertiliser inoculant consortia and 200–400 g of biocontrol agent and decomposer (*Trichoderma harzianum*) combined with the application 2.5–5.0 bioaugmented composted straw 'has increased the induced systemic resistance or suppressed the diseases intensity caused by *Helminthosporium oryzae*, *Pyricularia oryzae*, *Xanthomonas oryzae* and *Rhizoctonia solani* significantly, (3) application organic ameliorant and biofertiliser can be applied to: (1) remediate the health of paddy soils, (2) promote and improve the induced systemic resistance (ISR), and (3) increase fertiliser efficiency and the rice productivity in sustainable ways

Keywords: Biofertilisers, bacterial blight, biocontrol agent, induced systemic resistance, organic ameliorant, rice blast

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