APPLICATION OF ORGANIC AMELIORANT AND BIOFERTLIZERS TO INCREASE THE INDUCED SYSTEMIC RESISTANCE AND RICE PRODUCTIVITY IN INDONESIA

Tualar Simarmata[1], Betty N Fitriatin[1], Benny Joy[1], Emma Trinurani[1], Purwanto Iskak[1],Hersanti[2], Tien Turmuktini[3], and Brylian Sujana[4]

[1]Padjadjaran University Bandung, Dept. of Soil Sciences and Land Resources, Indonesia
[2]Padjadjaran University Bandung, Dept. of Plant Protection, Indonesia
[3]University of Winaya Mukti Bandung, Dept. of Agronomy, Indonesia
[4]University of Singaperbangsa Karawang, Dept of Agronomy, Indonesia

ABSTRACT

Intensive use of agrochemicals since the green revolution in Indonesia has lead to degradation of soils health severely, levelling off to chemical fertilizers 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 biofertilizers 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 fertilizer 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 biofertilizer has the ability to (1) reduce the dosage of inorganic fertilizers 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 biofertilizer 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 biofertilizer can be applied to: (1) remediate the health of paddy soils, (2) promote and improve the induced systemic resistance (ISR), and (3) increase fertilizer efficiency and the rice productivity in sustainable ways

Key words: biofertilizers, biocontrol agent, induced systemic resistance, organic ameliorant, bacterial blight, rice blast