BIOPESTICIDE MADE FROM RICE STRAW

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Abstract

Rice straw is found abundantly in rice fields because the average straw produced from rice field area is 1.4 times the amount of its harvest. If the straw is composted, the yield of compost is 60%. This compost was made as a biopestisida after added with bacterium *Pseudomonas putida* H10. Beside of this, it also acted as biofertilizer because it was rich in nutrient content. When rice crops were sprayed three times with this biopesticide, the plants were resistance to rice blast and neck rot disease (*Piricularia oryzae*) and brown planthopper that attacked the area at that time, and increased the growth. This was indicated by the more number of tillers, more greener leaves, panicles were grown earlier, so that were harvested five days earlier than that plants not sprayed wih biopesticide. This biopestiside was also tested on tomato plants in order to control *Fusarium* wilt disease. It was sprayed in the earlier growth, the flowering and fruiting periods. It was turn out that this tomatoes were resistance to Fusarium wilt, thrips and leaf-eating pheasants (*Spodoptera litura*), also growing much better and more dense fruits.

Keywords: rice straw, compost, biopesticide, biofertilizer

BACKGROUND

Rice straw is found abundantly in rice fields because the average straw produced from rice field area is 1.4 times the amount of its harvest. If the straw is composted, the yield of compost is 60%. This compost content a lot of microbes, that can induce systemic acquired resistance to plant disease when spray on the plant. In example, rice become resistance to blast and neck rot disease and brown planthopper (Wahyuni et al, 2013).

Beside of this, it also acted as biofertilizer because it was rich in nutrient content. It has C/N Rasio 21, C-Organik 35,11%, Nitrogen (N) 1,86%, Fosfor (P_2O_5) 0,21%, Kalium (K_2O) 5,35%, Kalsium (Ca) 4,2%, Magnesium (Mg) 0,5%, copper (Cu). 20 ppm, Mangan (Mn) 684 ppm, Zeng (Zn) 144 ppm. Each ton of straw compost has nutrient content which equal to 41 kg urea, 6 kg SP36, and 89 kg KCl or equal to a total of 136 kg NPK. For compost produced from one hectare of land (5.04 tons) equivalent to 206.64 kg of urea, 30.24 kg SP36, and 448.56 kg of KCL (*http://jabar.litbang.pertanian.go.id*). This amount is enough to be returned to the paddy fields as fertilizer and can save the cost of purchasing fertilizer.

Penggunaan biopestisida di Rambipuji masih terus bertahan sampai saat ini karena produksi padi makin meningkat dan tahan terhadap

METHODS

Biopesticide production

Rice straw was cut into small pieces, added with ½ v/v water and one cup EM4, mixed then composted to one –one and half months. The mature compost was indicated with a brown-black color, fine particle grains, crumbs (Fig.1). This compost was extracted with 2/3 v/v water, stirred until well mixed, then extracted with centrifuge at 1000-2000 rpm for one-two minutes to separate the coarse part with the smooth one. The extract was strained again with a fine strainer in order to get smoother particles, so it would not clog the sprayer nozzle(Fig. 2A, B). The strained water compost was put into the mixer tank after added with Pseudomonas putida H10. The mixer was rotated for 30-60 minutes /day, for about one week, and it was ready to use as biopesticide (Fig. 2 C).

Rice straw was cut into small pieces

Figure 1. The small rice straw pieces was added with 1/2x v/v water and one cup EM4, mixed together then composted for about 1 to 1,5 month. The mature compost indicated by a brown-black color, fine particle grains, crumbs (Wahyuni et al, 2013, Wahyuni and Hoesain, 2016a).

Figure 2. The mature compost was extracted with water then A. The mixture of composts was extracted with water then was centrifuged at 1000-2000 rpm to separate the coarse compost with the smooth particles, and B. Filtrate was strained with fine strain cloth to produce very fine particles of compost, so it will not clog the nozzle sprayer (Wahyuni *et al*. 2016b). C. The strained water compost was put into the mixer tank after added with *Pseudomoas putida* H10. The mixer was rotated for 30-60 minutes / day , for one week then ready to use as biopesticide (Wahyuni *et al.* 2013).

Application on plants

Before used, the water compost extract was diluted 15-20x with water. It sprayed three times on plants, at the erlier growth, at the flowering period and the last in the early period of fruit formation. On rice field was observed the attack of brown planthopper, and blast and neckrot disease which at that time attacked many rice fields. For tomato plant was observed whether or not the infected Fusarium wilt disease.

RESULTS AND DISCUSSION

After spraying with the biopesticide, the growth of rice plants was appearantly different from that which is not sprayed (Fig. 3). Rice leaves was more greener, the number of saplings becomes more, panicles are formed earlier, and rice production is also increased and harvested 5 days early. Rice crops are more resistant to brown plant hopper attack and blast disease. On the eve of the harvest arrived, there are rice fields that attacked by planthopper because the plants around that do not want to use biopesticide is already under attack first. However, it is still possible to harvest 1/3 of the normal harvest.

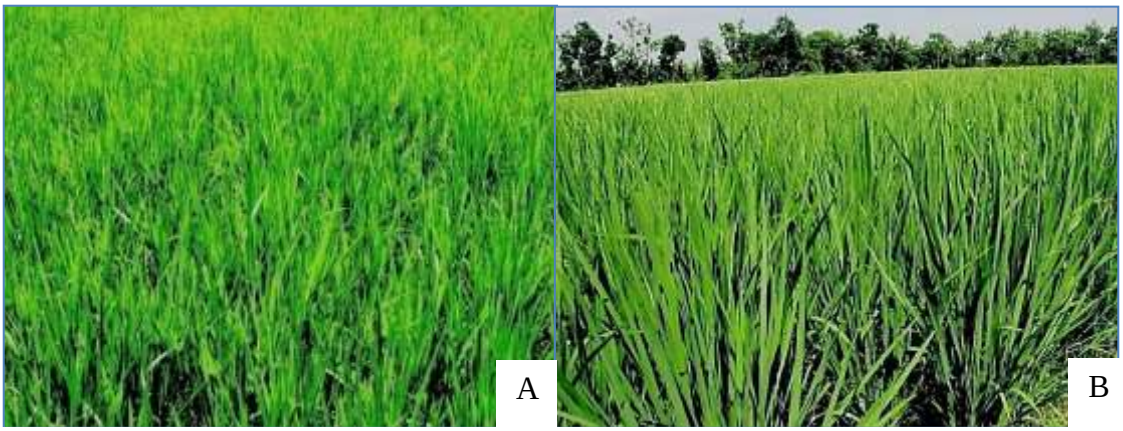

Figure 3. Rice fild with the same cultivar and the same plant ages. A. No sprayed and B. Sprayed with biopesticide showed a better growh and more resistance to brown and blast and neckrot (Wahyuni et al, 2013).

For tomato plants field, the soil was infested with Fusarium wilt disease. After the soil and plants were sprayed with biopesticides, the plants became resistant to infection. The growth was much better, flowers (Fig. 4) and fruits more dense, because this biopesticide also act as biofertilizer.

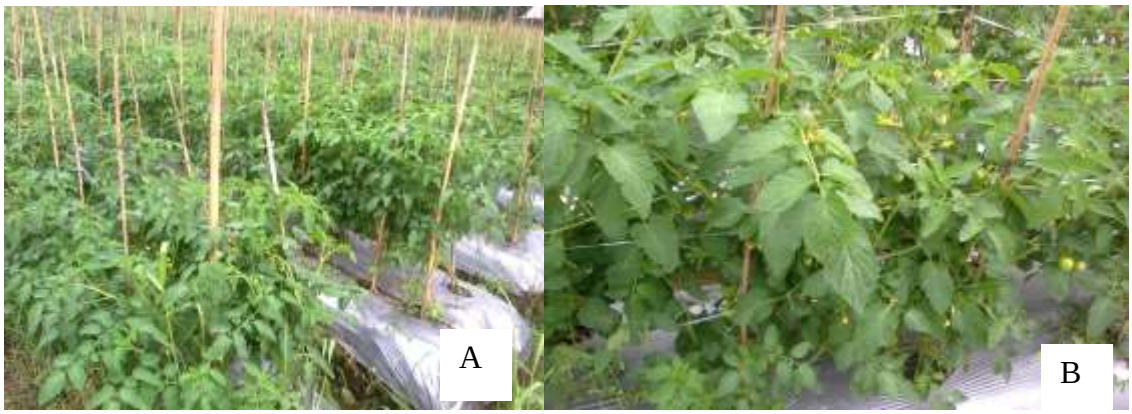

Figure 4. Tomatoes were sprayed 3x became more resistant to Fusarium wilt disease, thrips and leaf-eaters (*Spodoptera litura)*, and B. Better growth and more dense fruits.

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