EFFECTIVENESS WASTE WATER OF RICE INOCULANT ON JASMINE (*Jasminum sambac*)

Elfarisna*, Rita Tri Puspitasari, Yati Suryati dan Nosa Tirtajaya Pradana
Faculty of Agriculture, University of Muhammadiyah Jakarta
Jl.KH.A. Dahlan Cireundeu Ciputat South-Jakarta Tlp / Fax : 021-7430689
e-mail: elfa.risna@yahoo.com

Abstract

Waste water of rice is one of the waste that can be used as a useful fertilizer for plant growth. It is potentially useful because much availability and easy in processing. The study aims to know the effectiveness of waste water of rice inoculant as organic fertilizer on jasmine. The study was conducted from February to August 2015 in the experimental field of the Faculty of Agriculture, University of Muhammadiyah Jakarta. Materials used are *Jasminum sambac* generative phase, polybag, cow manure, rice husk, waste water of rice, brown sugar, isolates MOL, Hyponex (25-5-20), Gandasil B, and vitamin B6. Research using randomized complete block design with treatments: M1= inoculant I (three bacteria and two yeast), M2= inoculant II (two bacteria and two yeast), M3= 50% (inoculant I + inorganic fertilizer), M4= 50% (inoculant II + inorganic fertilizer), and M5= 100 % inorganic fertilizer, with five replication. Fertilization were done 2 times a week with a dose of 50 mL plant^{-1}. Inorganic fertilizer (control) is givenbythe sequence is Hyponex - Gandasil - vitamin B6. The results showed not significantly different between the fertilizer waste water of rice inoculant than inorganic fertilizers for all parameters. Inoculant tends to give better than others.

Keywords: Effectiveness, inoculant, waste water of rice

INTRODUCTION

The population is growing much lead is quite alarming environmental problems due to waste disposal, ranging from industrial waste to household waste. The use of waste water of rice is an alternative organic fertilizer.

The use of organic fertilizer to enrich the soil is one way to increase agri-cultural production and improve the quality of the environment. Waste water of rice is an alternative organic fertilizer. Puspitasari research (2003) waste water of rice that has been fermented for 2 weeks as much as 33.3 mL pot^{-1} given to plants *Dendrobium* sp. in the vegetative phase to yield significant results. The results of the nutrient analysis done, the waste water of rice contains nutrients 14.09 ppm NH4, 194.18 ppm NO3, 114.6 ppm P, 60 ppm K, 13.4 ppm Ca, 40.9 ppm Mg, 0.07 ppm Fe, 0.27 ppm Al and 0.23 ppm Mn. Mucharam (2003) analyzed the nutrient content of the waste water of rice obtaine: 47.30 ppm N, 87.00

ppm P, 112.00 ppm K, 1.14 ppm Fe and pH 4.6.

Organic fertilizers also can replace inorganic fertilizers on the generative phase *Dendrobium* sp. (Elfarisna, 2003). Also, it can replace urea fertilizer on lettuce plants (*Lactuca sativa*) (Mucharam, 2004). Other studies, suggests that this organic fertilizer can also replace Urea, TSP and KCl needs on spinach (Irwansyah, 2004). Abidin researchs (2005) waste water of rice is best as fertilizer for leeks with dose 75 mL plant^{-1} because at this dose leeks showed the best results, 121.69 g plant^{-1} (7.67 ton / ha). Elfarisna *et al.* researchs (2013) on Edamame soybean, they gave waste water of rice 50 mL plant^{-1} was the highest yield but not significantly different from the other dose (100 mL and 150 mL plant^{-1}).

Waste water of rice fermented for 2 weeks caused quite a disturbing smell, but Suryati researchs (2003) that waste water of rice added EM4 5 mL L^{-1} waste water of rice in shorten the fermentation time, it also eliminate annoying odors. The smell of the waste water of rice is mostly caused by the presence of yeast in the fermentation process that produces acid and lowering the pH to 4.5 (Puspitasari, 2003). The yeast will form substances that are anti- bacterial and beneficial to plant growth from amino acids and sugars released by bacteria, organic matter and plant roots. Bioactive substances such as hormones and enzymes produced by yeasts increase the number of active cell and root development. Secretion of yeast is a good substrate for microorganisms such as lactic acid bacteria effectively and Actinomycetes.

Local Microorganisms (MOL) is a microorganism that is used as a starter in the make of solid organic fertilizer and organic liquid. Suryati (2008) in her research using *Phalaenopsis* sp. orchid can eliminate the smell of fermentation factor rice water with EM4 and reduce fermentation time. However EM4 is a product from outside, while in Indonesia a lot of potential local microorganisms that are potential to be developed. So further research needs to be directed to obtain the local microbial isolates (MOL) is better suited to the local environment, Indonesia.

Jasmine is one of horticultural products can increase the income of farmers. As anatiation puspa flower, jasmine quality and utilization needs to be improved, both as an ornamental plant pots, plant a garden, as well asfor purposes offlower production. Jasmine plant has uses diverse and have potential use in the development of this agroindustri. Now jasmine still very limited, as a fragrance of tea, fresh flowers for decoration bun, decora-tions, and flowers sow. As the flowers are fragrant, jasmine potential for raw materials jasmine oil. In addition to the natural perfume, jasmine oil are also useful for treatment as aroma therapy. Jasmine needs industry tea for about 2 – 6 tons day^{-1}, depending on amount of

tea producting. Jasmine needs about 1 kg to produce 5 kg of tea. Type of Jasmine used are white jasmine (*Jasminum sambac* (L.) Ait.) and Jasmine gambir (*J. officinale*) (Satuhu, 2004). The study aims to know the effectiveness of waste water of rice inoculant as organic fertilizer on jasmine.

MATERIALS AND METHODS

The study was conducted from February to August 2015 in the experimental field of the Faculty of Agriculture, University of Muhammadiyah Jakarta. Materials used are *Jasminum sambac* generative phase, polybag, cow manure, rice husk, waste water of rice, brown sugar, isolates MOL, Hyponex (25-5-20), Gandasil B, and vitamin B6. Research using randomized complete block design with five treatments, namely: M1 = inoculant I (three bacteria and two yeast), M2 = inoculant II (two bacteria and two yeast), M3 = inoculant I 50% + inorganic fertilizer 50%, M4 = inoculant II 50% + inorganic fertilizer 50%, and M5 = inorganic fertilizer 100%, with five replication. There are 2 types of combinations of isolates that are used to ferment waste water of rice made fertilizer in this study (Elfarisna *et al.* 2014). The combination is mixed with the composition of 5% isolates waste water of rice diluted with plus 2% brown sugar. Fertilizer solution incubated for 4days to ferment. Fertilization is done 2 times a week with a dose of 50 mL plant^{-1}. Inorganic fertilizer application is done with the watering sequence is Hyponex – Gandasil - vitamin B6. Each treatment consists of five plants and repeated five times so that there are 125 plant experiments. The parameters observed were flowering time, amount of flower stalks, number of flowers, weight flower^{-1} and the weight of flowers.

RESULT

Observation of the jasmine plant gave waste waterof rice inoculant can be seen in the following Table 1. The results of analysis of variance showed that fertilization treatment not significantly different effect on all parameters. The results showed on te Tabel 1 that inorganic fertilizer 100% is faster for flowering time than other, which is 52.04 days and Inoculant I 50% + Inorganic fertilizer 50% is 67.52 days.

Amount of flower stalks showed that inorganic fertilizer 100% produce 12.80 amount of stalks and not significantly different than others. Nutrients in inorganic fertilizer sufficient for plant growth, so it is better than treatment waste water of rice inoculant, so plant can grow well. Cell division in the meristem increase the potential for growth, however, was the one cell expansion, especially cell elongation, which is responsible for the increase in size (Campbell and Reece, 2008).

Similarly, observation for number of flowers, weight flower-1 and weight of flowers, inorganic fertilizers 100% treatment tends to be better. The

number of flower for inorganic fertilizer 100% is 7.28 and weight of flowers 1.75 g, because Jasmine bloom only twice. For the inoculant treatment, inoculant is still better than others waste water of rice inoculant.

Tabel 1. Effectiveness of waste water of rice inoculant for flowering time, amount of flower stalks, amount of flowers, weight per flowers, and weight flowers per plants.

Treatment	Flowering time (day)	Amount of flower stalks	Number of flowers	Weight per flower (g)	Weight flowers per plant (g)
Inoculant I	67.52a	9.56a	6.44a	0.22a	1.42a
Inoculant II	71.20a	6.80a	5.24a	0.20a	1.05a
Inoculant I 50% + inorganic Fertilizer 50%	66.84a	8.56a	5.68a	0.20a	1.14a
Inoculant II 50% + Inorganic Fertilizer 50%	74.04a	6.04a	4.56a	0.20a	0.91a
Inorganic Fertilizer 100%	52.04a	12.80a	7.28a	0.24a	1.75a

Description: The numbers followed by the same letter in the same column are not significantly different by HSD test (Tukey) at 5%.

DISCUSSION

Observations on flowering time, amount of flower stalks, number of flowers, and the weight of flowers showed the results are not significantly different. The Result inorganic fertilizer seen trend to be higher than waste water of rice inoculant. Inoculant containing bacteria and yeasts and inorganic fertilizers are more complete nutrient than waste water of rice inoculant. However, this study indicating that the organic fertilizer waste water of rice can the same effect with inorganic fertilizers. Organic fertilizer applied to the soil will be more profitable in terms of physical, chemical and biological. In accordance opinions Munawar (2011), effect of organic fertilizer on soil physical properties is that it can improve soil structure, increases water holding capacity, improve soil aerase and can stimulate root growth. Organic fertilizers also can affect the chemical properties of the soil, in that it can enhance the nutrient content of both macro and micro, and can improve the solubility of P as organic fertilizer can form acids, humic and acids are others that can bind Fe and Al, so P being free. Against the biological properties of the soil, organic fertilizers also have an effect in terms of enhancing the activity of soil microorganisms as organicfertilizers canprovide a food source for the microorganisms. Thus the organic fertilizer is very beneficial for plant growth.

Among the organic fertilizer treatment of waste waterof rice, inoculant provision also tend to be better for faster flowering time, amount of flower stalks more, more amount of flowers, and flowers more than other inoculant treatments. Inoculant containing three bacteria and two yeast, microorganisms in the soil can help nutrient availability to plants. Organic fertilizers can replace inorganic fertilizers on jasmine.

Soil microorganisms and soil fauna have an important role in carrying out the various metabolic activities that take place in the ground sub system. Soil organisms play a role affects soil fertility and productivity by improving soil physical properties, increase nutrient availability, conservation of soil organic matter and nutrients, and can act as a soil borne pests or as predators. In the cycling of nutrients and energy in the soil, soil fauna (herbifora, carnifora, and detritifora) has an important role in destroying the physical (fargmentasi) organic material, then by soil microbes (decomposers) organic materialis decomposed and released as inorganic compounds (nutrient) that can be absorbed by plants. Soil fauna in soil sub system, plays a role in maintaining the cycling of nutrients and energy, maximizing the value of the function of organic matter, improve soil nutrient and soil organisms and decelerate loss of organic material (Subowo, 2014).

CONCLUSION

The results showed not significantly different between the fertilizer waste water of rice inoculantthan inorganic fertilizers for all parameters. Inoculant I tends to give better than others.

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