Supply Liquid Organic Fertilizer NASA and Rice Husk Ash To The Chemical Properties Of The Soil On The Tomato Plant

Fitra Syawal Harahap[1], Rahmaniah[2], Roswita Oesman[2], Iman Arman[3]
[1]Agrotechnology Study Program, Faculty Of Science And Technology, Labuhanbatu University
[2]Agrotechnology Study Program, Faculty Of Agriculture, Indonesia Community Development University
[3]Plantation Study Program, Medan Agricultural Development Polytechnic (Polbangtan)

*corresponding author:
Email : fitrasyawalharahap@gmail.com

Abstract

Effort to improve tomato production can be done with the use of organic fertilizers derived from agricultural waste, manure, green manure, manure-human waste, and compost as a substitute source of nutrients. This study aims To determine the determine the best combination between provision of organic fertilizer POC and Rice Husk Ash On the Chemical Properties of the Soil On the Tomato Plant. This research used randomized block design factorial consisting of 2 treatment factors, namely : the Concentration of POC NASA (N) consists of 4 levels, namely: N_0 = 0% (control), N_1 = 1 cc/ liter of water, N_2 = 2 cc/ liter of water, N_3 = 3 cc/ liters of water. Organic fertilizer Rice Husk Ash (A) which consists of 3 levels, namely :A_0 = 0 tons/ ha, A_1 = 15 tons/ha (158 g/polybag), A_2 = 30 ton/ha (316 g/polybag). The test map used is the Duncan Multiple Range Test (DMRT). As for the observed parameters, namely soil chemical properties include soil pH Methods Elektrometri, C-organic (%) Method of Walkley and Black, P-Available (%) Method of Bray II.The results showed that the Provision of Liquid Organic Fertilizer NASA and as much as 2 cc/ liter of water is able to increase the soil pH and C-organic. Provision of 30 ton/ha or equivalent to 316 g/polybag Rice Husk Ash is able to increase P-available and C-organic.

Keywords : Liquid Organic Fertilizer, Rice Husk Ash, Soil Chemical Properties, Tomato

I. INTRODUCTION

To increase the productivity of agricultural land cultivation of tomato plants businesses that do not differ with the cultivation of agricultural crops other, namely by way of fertilizing using organic fertilizers and inorganic fertilizers[1]. Fertilizing in the cultivation of the plant is important with the aim of improving the quality and health of soil [2]. Application of organic fertilizer can enrich the content of organic material, micro-macro nutrient so that it can increase production [3]. In the cultivation of vegetables use of fertilizer, both inorganic and organic in the process of fertilization have been carried out. Considering the price of chemical fertilizers are increasingly expensive, the use of organic fertilizers can be used as a better choice [4].

Organic fertilizers contain a complete nutrient, although the amount is little (the amount of nutrient depends on the material the maker of organic fertilizer), organic fertilizers also help the process of weathering of mineral materials, such as member availability of food material for microbes, decrease the activity of harmful microorganisms, and neutralizes the pH of the soil [5].

The use of organic fertilizers also can increase soil microorganisms that are very beneficial in providing soil nutrients and improve the environment [6]. This effort at once to reduce the use of inorganic fertilizers due to the use of inorganic fertilizers in excess can cause a negative impact to the environment and to save costs because the price of inorganic fertilizers tends to be expensive [7]. Organic fertilizer has several beneficial properties, among others, improve the structure of the clay so

that it becomes light, enlarge the holding capacity of the sandy soil so that the soil is not loose, add water holding capacity to the soil, improve drainage and air in the soil, improve the connective power of the soil to nutrients[8].

NASA is a pure liquid organic material from the waste of livestock and poultry, waste of nature and plants, some specific types of plants in the process naturally. NASA multipurpose function is primarily used in addition to all kinds of food plants (rice, crops) horticulture (Vegetables, fruit, flowers) and perennial crops (Cocoa, palm oil) as well as for cattle/poultry and fish/shrimp. [8]. The content of micronutrients in 1 liter of POC NASA has a function equivalent to the micronutrient content of 1 ton of manure. Content owned by NASA POC will gradually improve the consistency of (friability) hard ground and dissolves quickly SP-36 [9]. The results of the Research [10], the Use of doses of liquid organic fertilizer NASA gives a different influence significantly to the net weight of the plants pokcay. POC with a dose of 2 cc/ltr already gives the results of the production of the best with a net weight per plot by 262.92 grams while the Results of the research [11], stating that the administration of rice husk ash 20 t/ha no apparent effect in improving the uptake of N plants but no significant effect in increasing plant height, dry weight of plants and plant P uptake. The application of organic fertilizers can enhance nutrient uptake, especially N, by reducing the leaching of minerals. This study aims To determine the best combination between the provision of organic fertilizer POC and Rice Husk Ash On the Chemical Properties of the Soil On the Tomato Plant

II. METHODS

This research was conducted on the practice of agrotechnology, Faculty of Science and Technology, University of labuhan batu District labuhan batu in March – September 2020. The research material used is the seed of the tomato plant, POC NASA, Polybag color black size 30 cm x 35 cm, rice husk Ash. The tool used in this research is Hoe, rake, machete, tripe(used for land preparation), scales fanfare, hand sprayer, keg/bucket, Board treatment, board the title of the study, peg standards (to put a mark on each plot treatment) stationery, calculators and so forth (to write the data that has been measured and weighed). Analysis of soil chemical properties was conducted in the Laboratory of Chemistry and Soil Fertility, Faculty of Agriculture, University of Sumatera Utara, as well as Socfindo Seed Production and Laboratories (SSPL) the Garden Wake up the Port of PT. Socfin Indonesia. This research used randomized block design factorial consisting of 2 treatment factors, namely : the Concentration of POC NASA (N) consists of 4 levels, namely: N0 = 0% (control), N1 = 1 cc/ liter of water, N2 = 2 cc/ liter of water, N3 = 3 cc/ liters of water. Organic fertilizer Rice Husk Ash (A) which consists of 3 levels, namely :A0 = 0 tons/ ha, A1 = 15 tons/ha (158 g/polybag), A2 = 30 ton/ha (316 g/polybag). The test map used is the Duncan Multiple Range Test (DMRT) [12]. As for the observed parameters, namely soil chemical properties include soil pH Methods Elektrometri, C-organic (%) Method of Walkley and Black, P-Available (%) Method of Bray II.

III. RESULTS AND DISCUSSION

1. pH Soil

The effect of the Concentration of POC NASAdan rice husk ash against the pH of the soil can be seen in Table 1. Rice husk ash as well as the interaction of the Concentration of POC NASA did not significantly affect soil pH, while the Concentration of POC NASA significantly affects soil pH (Table 1).

Table 1. pH of the soil with the provision of the Concentration of POC NASA and rice husk Ash

Rice Husk Ash	NASA POC concentration				Average
	N_0	N_1	N_2	N_3	
A_0	4,24	4,27	4,59	5,08	4,55
A_1	4,57	4,29	4,60	5,11	4,64
A_2	5,08	5,11	5,18	5,22	5,15
Average	4,63 c	4,56 c	4,79 b	5,14 a	

Description: numbers followed by the same letter in the rows and columns of same are not significantly different based on the test DMRT at level 5%

Based on the results of different test average in Table 1 shows that the application Concentration of POC NASA N0 = (control) significantly different from all the standard of the other (N_1, N_2, and N_3). The level of N0 differs markedly with the level N_2 and N_3, while the level of S_2 (2cc/liter of water) is not significantly different from the level of N_3 (3 ccs/liter of water). On the provision of Rice Husk Ash, pH was highest at the level of A_0 (5,15) and the lowest at the level of A_2 (4,15). It is suspected that the rice husk ash and the Concentration of POC NASA contain organic materials that make the pH of the soil becoming sour. This result is supported by the opinion of [13] which states that the provision of organic matter in acidic soil such as ultisol soil, can increase soil pH. In general, soil organic matter has an important role in the cycle of carbon and nutrients and changes the pH of the soil [14]. Rice husk ash on the soil also helps the availability of K and increasing uptake of P, Ca, and Mg by plants. The content of the element such as the replacement of lime can raise the pH of the soil, so the nutrients can be available for plants [15].

2. C - Organic (%)

The effect of the Concentration of POC NASAdan rice husk ash to the C-organic can be seen in Table 2. The interaction of the Concentration of POC NASA and rice husk ash did not significantly affect C-organic. The provision of rice husk ash significantly affects the C-organic, while the Concentration of POC NASA significantly affects the C-organic (Table 2).

Table 2. C-organic (%) of land with the provision of the Concentration of POC NASA and rice husk Ash

Rice Husk Ash	NASA POC concentration				Average
	N_0	N_1	N_2	N_3	
A_0	1,03	1,08	1,10	1,21	1,11 b
A_1	1,12	1,13	1,20	1,32	1,19 b
A_2	1,22	1,30	1,44	1,52	1,37a
Average	1,12 c	1,17 c	1,25 b	1,35a	

Description: numbers followed by the same letter in the rows and columns of same are not significantly different based on the test DMRT at level 5%

C-organic soil highest on the interaction of the Concentration of POC NASA and rice husk ash the level of N_2A_2 (1,35 %) and the lowest at the level of A_0P_0 (1,12 %). Increase C-organic content contained in the Ultisol soil due to the Concentration of POC NASA is a fertilizer made from organic and has a C-organic content is high. Provision of organic material in the form of the Concentration of POC NASA, the Concentration of POC NASA, and the combination of both for 12 weeks incubation period increase the levels of C-organic soil when compared with the condition before beginning treatment. This is the following [16] which states that the decomposition of the organic material will be disturbed in acid soils the process, so that will inhibit the release of carbon from organic material as well. The activity of microorganisms will increase when the addition of organic material and also increasing the process of decomposing organic materials produce carbon [17]

3. P-Available (ppm)

The effect of the Concentration of POC NASA and rice husk ash to P-Available (ppm) can be seen in Table 3. The application Concentration of POC NASA and its interaction with rice husk ash did not significantly affect P-available, whereas the application Concentration of POC NASA Effect real to P-available. Application of rice husk ash on the level of A_0 (control) significantly different from A_1 and A_2 (Table 3).

Table 3. P-Available (ppm) of land with the provision of the Concentration of POC NASA and rice husk Ash

Rice Husk Ash	NASA POC concentration				Average
	N_0	N_1	N_2	N_3	
A_0	1,54	2,11	2,16	2,24	2,01
A_1	2,10	2,47	2,57	2,48	2,41
A_2	2,16	2,24	2,67	2,77	2,46
Average	1,93 c	2,27 b	2,47 a	2,50 a	

Description: numbers followed by the same letter in the rows and columns of same are not significantly different based on the test DMRT at level 5%

P-the highest available on the interaction of the Concentration of POC NASA and rice husk ash, namely N3A2 (2.50 ppm) and the lowest in N0A0 (at 1.93 ppm). From these results, it is seen that the provision of compost the Concentration of POC NASA and Rice husk ash can donate nutrient P into the soil. This causes the nutrient elements P to become available in the soil and an increase of at 1.93 ppm to 2.50 ppm. This is in accordance with the opinion of [18], which states that with the provision of compost and the Concentration of POC NASA can donate nutrient P into the soil. This is in line with the opinion of [19], which states that the elements of P available in the soil can be caused due to the presence of organic material in the soil, either directly or with the process of mineralization, or with treatment that is given so that it can release the P that is fixed.

IV. CONCLUSION

Provision of Liquid Organic Fertilizer NASA and as much as 2 cc/ liter of water can increase the soil pH and C-organic. Provision of 30 ton/ha or equivalent to 316 g/polybag Rice Husk Ash can increase P-available and C-organic.

REFERENCES

[1] Suprapto, A., Astiningrum, M. and Rianto, H., 2018. Optimalisasi dosis pupuk NPK dan pupuk organik cair untuk produksi bawang merah di lahan pasca erupsi merapi. **Proceeding of The URECOL, pp.286-294.**

[2] Nuro, F., Priadi, D. and Mulyaningsih, E.S., 2016. Efek Pupuk Organik Terhadap Sifat Kimia Tanah Dan Produksi Kangkung Darat (Ipomoea reptans Poir.). **In Prosiding Seminar Nasional Hasil-hasil PPM IPB 2016 (pp. 29-39).**

[3] Zhou H, Peng X, Perfect E, Xiao T, Peng G. 2013. *Effects of organic and inorganic fertilization on soil aggregation in an ultisol as characterized by synchrotron Based X-Ray Micro-Computed Tomography.* Geoderma. 195–196(March):23–30. Doi:10.1016/**J.Geoderma.2012.11.003.**

[4] Lim AH, Vimala P. 2012. *Growth and yield responses of four leafy vegetables to organic fertilizer.* **J Trop Agric Food Sci. 40(1):1–11**. http://jtafs.mardi.gov.my/jtafs/40-1/Four%20leafy%20vegetables.pdf.

[5] Harahap, F.S., Walida, H., Rahmaniah, R., Rauf, A., Hasibuan, R. and Nasution,S A.P.2020. *Effect of Application of Oil Palm Empty Bunches and Rice Husk Charcoal on Several Soil Chemical Properties of Tomatoes.* **Agrotechnology Research Journal, 4(1), pp.1-5.**

[4] Harahap, F. S. ., Rauf, A., Hidayat, B., Walida, H. ., Jamidi, & Lisdyani. 2018. *Availibility of P, K in paddy Land Under Organic application*. **Jurnal Pertanian Tropik , 5(3), 434-440. https://doi.org/10.32734/jpt.v5i3.3117**

[6] Luta, D.A., Siregar, M., Sabrina, T. and Harahap, F.S., 2020. *The Role of Soil Improvement Applications on Soil Chemical Properties of Onion Plants*. **Jurnal Tanah dan Sumberdaya Lahan, 7(1), pp.121-125.**

[7] Harahap, F.S.H., Walida, H., Harahap, D.A., Oesman, R. and Fadhillah, W., 2019. *Response of Growth and Production of Corn (Zea Mays L) with Liquid Fertilizer in Labuhan Batu Regency*. **Jurnal Pertanian Tropik, 6(3), pp.363-370.**

[8] Harahap, F.S., Walida, H., Oesman, R., Rahmaniah, R., Arman, I., Wicaksono, M., Harahap, D.A. and Hasibuan, R., 2020. *The Effect of Giving Rice Husk Ash and Rice Straw Compost on the Chemical Properties of Ultisol Soil in Sweet Corn Plants.* **Jurnal Tanah dan Sumberdaya Lahan, 7(2), pp.315-320.**

[9] Fadhillah, W. and Harahap, F.S., 2020. *Effect of Giving Solid (Empty Fruit Bunches) and Rice Husk Charcoal on Tomato Production.* **Jurnal Tanah dan Sumberdaya Lahan, 7(2), pp.299-304.**

[10] Harahap, F.S. and Sari, P.M., 2019. *Growth and production response of plant pakcoy (brassica rapa l) on use of nasa light organic fertilizer.* ***Jurnal Pertanian Tropik*, *6*(2), pp.222-226.** https://doi.org/10.32734/jpt.v6i2.3157

[11] Walida, H., Surahman, E., Harahap, F.S. and Mahardika, W.A., 2019. *Response of giving local microorganism solutions from bamboo shoot to growth and production of red chili plant (Capsicum annum L) jenggo F1*. **Jurnal Pertanian Tropik, 6(3), pp.424-429.**

[12] Gomes, Khanchai A., and Arturo A. Gomes. 1995. *Statistical procedures for agricultural research Second Edition*. **Universitas Indonesia Prees**

[13] Harahap, F.S., Walida, H., Dalimunthe, B.A., Rauf, A., Sidabuke, S.H. and Hasibuan, R., 2020. *The Use of Municipal Solid Waste Composition in Degradated Waste Soil Effectiveness in Aras Kabu Village, Beringin Subdistrict, Deli Serdang District*. **Agrinula, 3(1), pp.19-27.**

[14] Oesman, R., Harahap, F.S., Rauf, A. and Rahmaniah, R., *2020The Effect of Organic Fertilizer and Inorganic Fertilizer on N, P, K Uptake by Corn Plants on Ultisol Tambunan Langkat*. **Jurnal Tanah dan Sumberdaya Lahan, 7(2), pp.393-397.**

[15] Rahmawaty, R., Frastika, S., Rauf, A., Batubara, R. And Harahap, F.S., 2020. *Land suitability assessment for Lansium domesticum cultivation on agroforestry land using matching method and geographic information system*. **Biodiversitas Journal of Biological Diversity, 21(8).**

[16] Pasaribu, M.S., Barus, W.A. and Kurnianto, H., 2015. *Effect of concentration and time interval of organic liquid fertilizer (POC) on the growth and production of sweet corn (Zea mays Saccharata Sturt)*. **AGRIUM: Jurnal Ilmu Pertanian, 17(1).**

[17] Surya, E., Hanum, H., Hanum, C., Rauf, A., Hidayat, B. and Harahap, F.S., 2019. *Effects of Composting on Growth and Uptake of Plant Nutrients and Soil Chemical Properties After Composting with Various Comparison of POME.* **International Journal of Environment, Agriculture and Biotechnology, 5(6).**

[18] Haitami A, Wahyudi W. 2019. *Effect of various doses of oil palm empty bunches compost plus in improving the chemical properties of ultisol soil.* **J Ilm Pertan. 16(1):56–63. Doi:10.31849/Jip.V16i1.2351.**

[19] Syawal F, Rauf A, Rahmawaty. 2017. *Rehabilitation of Degraded Rice Fields Using Municipal Solid Waste Compost in Serdang Village, Beringin District, Deli Serdang Regency*.**J Pertan Trop. 4(3):183–189**. **Doi: 10.32734/jpt.v4i3.3089.**