Provision of Chicken Manure and Urea Fertilizer on the Chemical Characteristics of Ultisol Soil in Bilah Barat District

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Abstract
Ultisol soils are agricultural lands in Indonesia, which are widely distributed, but have a problem, namely the element of N in the soil is relatively low, so it is necessary to do proper cultivation techniques, one of which is through the provision of balanced fertilizers, namely the application of organic fertilizers that aim to improve soil fertility and reduce soil fertility. use of NPK fertilizers. This study aims to determine the effect of giving various kinds of organic fertilizers, namely sometimes chicken and urea fertilizer on the chemical properties of Ultisol from Pangkatan. This research was carried out at the Agrotechnology Practice Field, Faculty of Science and Technology, Labuhanbatu Rantau Prapat University, with an altitude of 25 meters above sea level. The study began in February 2021 to June 2021. This study used a factorial Randomized Block Design (RAK) with 2 treatment factors. namely: Urea fertilizer factor with four levels and Chicken manure factor with three levels. Soil analysis parameters which include , pH H2O by electrometric method, determination of N-total soil by Kjehldal method, C-organic soil using Wakley and Black method. The results showed that the application of chicken manure was able to increase soil N-toatal in the Ultisol Rank soil, at a dose of U1K3 (Urea: 0.25g and Chicken Manure: 75g) while the interaction of urea and chicken manure application increased the N-total soil of Ultisol Rank with dose of U1K3 (Urea: 0.25g and Chicken Manure: 75g).

Keywords: *Ultisol, West Blade District, Chicken Manure, Uera and Nutrients.*

I. INTRODUCTION

Increasing the efficiency of fertilization can be done by giving organic matter. One source of organic matter that is widely available around farmers is manure (Oktabriana, 2018). Provision of manure can reduce the use and increase the efficiency of chemical fertilizer use. It will also contribute nutrients to plants and increase nutrient uptake by plants (Walida et al. , 2020)

Besides that, the application of manure can also improve the physical properties of the soil, namely the capacity of the soil to hold water, soil mass density, and total porosity (Sufardi, I.S., 2012), improve the stability of soil aggregates (Swanda Adi et al., 2015) and increase the humus content. soil (Priambodo et al., 2019) a condition desired by plants. (Oktabriana, 2018), that the application of urea fertilizer can reduce soil pH and vice versa according to Sudirja et al., (2017), found that the application of manure can increase soil pH while Triyanto et al., (2020), that the application of N fertilizer in The form of NH4NO3 can reduce soil pH significantly, but the decrease in pH decreases with increasing doses of manure given.

Ultisol is the main agricultural land in Indonesia with a fairly wide distribution, which is around 70.52 million ha (37.5%) so that it has the potential for cultivating food crops, especially rice, corn and soybeans if managed properly and appropriately (Wiwik Hartatik, Husnain, 2018) The obstacles faced in Ultisols are the chemical properties of the soil which are not good as seen from the C-organic and low N of the soil (Nazimah Nilahayati; Safrizal, Safrizal; Jeffri, Ary, 2020), Ultisols generally have less fertile soil

properties, including: The soil pH is slightly acidic, the C-organic content is moderate, and the NPK nutrients are low (Yuniarti et al., 2020).

In Ultisol soil it is necessary to provide organic matter so that this soil can be used for plant cultivation and maintain nutrient balance through fertilization (Fadhlina et al., 2017). In general, the management carried out is the use of high inorganic fertilizers, but it is not balanced with the provision of organic matter (Subiksa, 2018).

Based on the Minister of Agriculture No. 40 of 2007 states that the return of organic matter or the application of organic fertilizers combined with inorganic fertilizers with the aim of improving soil conditions and fertility. According to (Syofiani et al., 2020) showed that the poor chemical properties of Ultisols were seen from the low amount of C-organic soil (1.88%) and low N-total soil (0.15%) which could not guarantee the sustainability of the soil. optimum seedling growth (Triadiawarman et al., 2020)

In general, fertility and chemical properties of Ultisols are relatively low, but efforts can still be made to improve with appropriate handling and technology, namely by applying balanced fertilization (Murdhiani, 2020) while according to Solfianti et al., (2021), Efforts to increase the content C-organic, total N, and alkaline cations in Ultisol soil can be done by providing soil ameliorants such as application of organic matter (compost, green manure and others). Based on data from Farrasati et al., (2018), Ultisol soil has a low to high potential P content, an acidic to slightly acidic soil pH (pH 4.6-5.5) and a low to moderate organic matter content. Therefore, Ultisol soil has several obstacles to be developed in agricultural cultivation in Indonesia. Research results Arabia et al., (2018), application of chicken manure and 150 kg/ha of SP-36 fertilizer and can increase the available P-available Ultisol soil and can increase the P-uptake of maize and maize plant growth. The use of chicken manure can reduce the use of SP-36 fertilizer on corn plants in Ultisol soil. This is important because nutrients are one of the factors that can determine plant productivity (Harahap et al., 2021).

The purpose of this study was to obtain a combination of doses of chicken manure and urea on the chemical properties of Ultisol from Pangkatan.

II. RESEARCH METHODS

This research was carried out at the Agrotechnology Practice Area, Faculty of Science and Technology, Labuhanbatu Rantau Prapat University, with an altitude of 18 meters above sea level and soil analysis was carried out in the PT Socfindo Kebun Bangun Bandar laboratory, Dolok Masihul District, the research began in February 2021 to June 2021. The materials used in this study were Ultisol soil material from Pangkatan District as a planting medium, urea (45% N) as a treatment material, chicken manure as a treatment material, labels as ingredients to indicate each treatment and chemicals for purposes of treatment. analysis. The tools used are a hoe to take soil samples from the field, a scale to weigh the soil, polybags with a capacity of 5 kg for containers for corn plants, plastic sacks, a meter to measure plant height, a sieve to sift the soil, Each treatment was carried out with 3 replications to obtain 48 experimental units. So that obtained 16 treatment combinations with an additive linear model as follows: $Yij = + i + j + k + (\alpha\beta)jk + ijk$, Yij: The data obtained were analyzed statistically based on analysis of variance on each observed variable that was measured and tested continued for the real treatment using the Duncan Multiple Range Test (DMRT) difference test at the 5% level. Parameters observed were soil analysis which included , pH H2O by electrometric method, determination of N-total soil by Kjehldal method, C-organic soil by using Wakley and Black method.

III. RESULTS AND DISCUSSION

Soil pH

The results of the variance showed that the application of urea fertilizer and the application of chicken manure, as presented in Table 1, had a significant effect on soil pH, while the interaction of urea with chicken manure had no significant effect on soil pH. The results of the average difference test of the single effect of urea fertilizer application, chicken manure on soil pH are presented in Table 1.

Table 1. The effect of application of chicken manure and urea fertilizer on the chemical characteristics of Ultisol soil on soil pH at the end of the vegetative period of the plant.

Treatment	pH Soil	Treatment	pH Soil
U_0	4,75 a	K_0	4,64 b
U_1	4,64 a	K_1	4,83 a
U_2	4,70 a	K_2	4,87 a
U_3	4,78 a	K_3	4,88 a

Note: The numbers followed by the same letter mean that they are not significantly different (5%) according to the DMRT test

From the results of the mean difference test in Table 1, it is known that the application of Urea fertilizer at the level of U1 (0.25 g Urea) significantly increased soil pH compared to U2 (0.50 g Urea) which increased from (4.64) to (4 ,70) but when compared with U0 (0 g Urea) it was not significantly different. The results of the analysis of diversity in Table 1 show that the application of urea fertilizer and chicken manure did not significantly affect the pH acidity of the Ultisol soil, this was due to the urea fertilizer reacting acidly on Ultisol soil so that the application of chicken manure which would increase the pH did not react to Ultisol soil because the Ultisol soil is also slightly acidic this is in accordance with (Istiqomah et al., 2020), which is clayey, the reaction of the soil is slightly acidic to slightly alkaline, the nutrient content and reserves are relatively moderate, and the cation exchange capacity of the soil is moderate to high, according to Sebayang research. et al., (2021) which stated that in the treatment of tillage, chicken manure and N fertilizer and their interactions had no significant effect on pH H2O. This is because even though chicken manure is added which can increase soil pH, the dose has not been able to balance the dose of N fertilizer given according to the treatment, namely urea 50 kg/ha, considering that urea is a fertilizer that reacts acidly so that it can increase the acidity of the soil that is given fertilizer. the urea. The increase that occurred due to the application of urea and chicken manure on Ultisol soil pH was still in the acid criteria according to the soil characteristics criteria of the Agricultural Research and Development Agency of the Ministry of Agriculture. (2012).

C-Organic Soil

The results of variance showed that the application of urea fertilizer and the application of chicken manure presented in Table 2 showed that the application of urea fertilizer and the interaction of urea with chicken manure did not significantly affect the C-Organic of the soil while the application of chicken manure had a significant effect on the C-Organic of the Soil. . The results of the average difference test of the single effect of chicken manure application on soil organic C are presented in Table 2

Table 2. Effect of Application of Chicken Manure and Urea Fertilizer on Ultisol Soil Chemical Characteristics on C-Organic Soil

Treatment	C-Organik (%)
K_0	4,64 b
K_1	4,83 a
K_2	4,87 a
K_3	4,88 a

Note: the numbers followed by the same letter mean that they are not significantly different (5%) according to the DMRT test

From the results of the mean difference test in Table 2, it is known that the application of chicken manure significantly increased soil C-Organic at each level where the highest C-Organic was found in K2 (1.59%) and the lowest was in K0 (1.03%). The application of chicken manure significantly increased soil C-Organic at the end of the vegetative period as shown in the results of the variance in Table 2 where the lowest Organic C-Organic in the application of chicken manure was at K0 (1.03%) and the highest was at the

K2 level (1.59%) but this increase is still in the low criteria according to the soil characteristics criteria of the Agricultural Research and Development Agency of the Ministry of Agriculture (2012).

The increase in C-organic content in Ultisol soil is caused by Chicken manure which is a fertilizer made from organic which has a high C-Organic content so that it can provide C-organic content for Ultisol soil so that the activity of microorganisms in Ultisol soil increases. This is in accordance with Rauf and Harahap, (2019) which states that in the tropics the rate of weathering of organic matter is very high so that the turnover of C-organic in the soil is short, resulting in low levels of soil organic matter. Given its large role in improving the physical, chemical, and biological soils, organic matter (manure and/or green manure) needs to be added in large quantities.

N-Total Land

The results of the variance show that the application of urea fertilizer and the application of chicken manure presented in Table 3 shows that the application of chicken manure has a significant effect on total soil N, while the interaction of urea with chicken manure has no significant effect on total soil N. The results of the average difference test of the single effect of chicken manure application on total soil N are presented in Table 3.

Table 3. Effect of Application of Chicken Manure and Urea Fertilizer on Ultisol Soil Chemical Characteristics on N-total soil at the end of the vegetative period.

Treatment	N-Total (%)
K_0	0,165 b
K_1	0,175 b
K_2	0,192 a
K_3	0,190 a

Note: the numbers followed by the same letter mean that they are not significantly different (5%) according to the DMRT test

From the results of the average difference test in Table 3, it is known that the effect of application of chicken manure has a significant effect on the increase in total soil N at each level where the highest soil N is at the K2 level (0.192 ppm) and the lowest at K0 (0.165 ppm). From the results of variance in Table 3, it shows that the application of chicken manure has a significant effect on increasing total soil N until the end of the vegetative period of the plant because chicken manure has high N nutrients. This is in accordance with (Ariyanti et al., 2018), which states that Chicken Manure which has a high content of total N, organic matter, available Ca, available S, and available K, so it is hoped that the addition of chicken manure can increase soil fertility and sufficient nutrients are available to plants. Chicken manure in addition to containing important nutrients can also improve the physical properties of the soil. The application of urea fertilizer was not significantly different from the total N of Ultisol soil. This was due to the fact that the N nutrients in urea were quickly available to plants but were quickly lost because the N nutrients were immobilized. This is in accordance with Faqih et al., (2019) which states that Urea is more quickly available to plants and can also be quickly lost due to evaporation and washing, while N itself is mobile.

IV. CONCLUSION

1. Application of chicken manure was able to increase soil N-total, N uptake, on Ultisol grade soil, at a dose of U1K3 (Urea: 0.25g and Chicken manure: 75g).
2. Interaction of urea application and chicken manure to increase the N-total soil Ultisol dose of U1K3 (Urea: 0.25g and Chicken manure: 75g).

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