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RESEARCH ARTICLE OPEN ACCESS

The Effect of Chicken Manure on Soil Properties and Available N.P.K of Wheat under Sandy Soils in the Sirte City

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ABSTRACT:
This study aims to using of chicken Manure on soil properties and Available N.P.K of wheat under sandy soils in the Sirte city The research was carried out A field experiment was carried out at the Experiment Station, Faculty of Agriculture, Sirte University During the year 2021. From each treatment bed as follows: The dose factor of chicken manure. 5 tons per hectare (P1), 10 tons per hectare (P2), 15 tons per hectare (P3). NPK dose factor of 100 kg of NPK fertilizer per hectare (D1), 150 kg of NPK fertilizer per hectare (D2), 200 kg of NPK fertilizer per hectare (D3) and Control (P0D0) 20 tons per hectare of cow manure + urea 50 kg per hectare .
KEYWORDS:- Chiken Manure NPK fertilizer, Wheat plant, Sirte

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I. INTRODUCTION

Wheat (Triticumaestivum L.) is a cereal plant whose seeds are used. The need for wheat is increasing along with the increasing need for wheat flour. Wheat production is still very dependent on altitude. One of the problems in sandy soil is low soil fertility (Alloway, 2008). Therefore, efforts are needed to increase wheat production by biofortification. The provision of organic matter functions as chelators of micro elements (Barunawati, 2012).

In addition, organic matter also plays a role in improving the physical, chemical and biological properties of the soil. The addition of organic matter in the long term can also increase the content of macro and micro elements (Ruthkowska et al., 2014). Zn is one of the important micronutrients that plants need in small amounts. Therefore, it is necessary to study the effect of organic matter and ZnSO4 fertilizer on the growth and yield of wheat plants.

In addition to the problem of degradation of nutrients in the soil due to rainwater, other problems that arise are damage to soil ecosystems, and degraded soil structure. Fertilization is an effort made to overcome nutrient deficiencies, especially nitrogen (N), phosphorus (P), and potassium (K) which are macro nutrients that play an important role in plant growth and production. The availability of N, P, and K in the soil is the most limiting factor to obtain maximum growth and yield of cultivated plants.

Then chicken manure was applied in this study which has a higher N content than cow and goat manure to overcome this problem. Currently, farmers are also faced with the problem of low organic C in the soil due to the continuous use of chemical fertilizers that damage the physical, chemical and biological properties of the soil so that chicken manure is expected to be able to provide organic matter in the soil (Yuniarti et al., 2016).

Chicken manure can improve the physical, chemical and biological properties of the soil, increase the availability of soil nutrients, bind water and can reduce the toxic nature of Al contained in ultisol soil. Chicken manure showed a pH of 6.8, C-organic 12.23%, N-total 1.77%, P2O5 27.45 (mg/100 g) and K2O 3.21 (mg/100 g). Giving several doses of chicken manure can increase N in the soil because organic matter from chicken manure is food for soil microorganisms, some of which contain N-binding microorganisms.

The application of chicken manure on acidic soil can reduce P fixation by acidic cations in the soil, so that the availability of P in the soil increases (Tufaila et al., 2014).

The use of organic chicken manure alone cannot provide nutrients directly for plants because of its slow release nature so that the application of organic chicken manure in this study must be accompanied by the application of inorganic fertilizer, namely NPK fertilizer (Nafi'ah and Vitalaya, 2017). Thus, the application of NPK fertilizer and organic chicken manure is one of the important components in an effort to increase the growth and yield of wheat plants. This study aims to determine the effect of the dose of chicken manure and the dose of NPK fertilizer on the growth and yield of wheat on sandy soil.

II. LITERATURE REVIEW

Chicken Manure

Manure is a fertilizer derived from livestock manure, such as cows, horses, goats, chickens, and sheep which have functions, including adding plant nutrients, increasing the content of humus and soil organic matter, improving soil structure and improving soil microorganisms (Sutedjo, 2010). Manure consists of a mixture of solid manure, urine, and food waste (plants). Manure has several advantages compared to inorganic fertilizers, namely it can improve soil structure, add nutrients, increase humus and organic matter content, improve the life of microorganisms that live in the soil (Samadi and Cahyono, 2005).

Chicken manure has the advantage of having a higher content of nutrients and organic matter. Chicken manure compared to other manure has a higher nutrient content, especially N, P and organic matter (Gunawan, 1998 in Firdaus, 2011). In addition, the availability of a large amount of chicken manure is due to the rapid development of animal husbandry in the poultry sector, especially broilers and laying hens, therefore chicken manure is very suitable to be processed into organic compost.

NPK Fertilizer

NPK fertilizers are organic fertilizers that contain high levels of Nitrogen (N). The element nitrogen is a nutrient that is needed by plants. NPK fertilizer is in the form of brown grains, with a mixture of various other types of fertilizers. Because it contains nitrogen and potassium, npk fertilizer is also a fertilizer that is easily soluble in water and is very easy to absorb water (hygroscopic), therefore it should be stored in a dry and tightly closed place (Trisyulianti, et al. 2003).

Nitrogen nutrients contained in npk fertilizers have uses for plants, namely, making leaves contain more green leaf grains (chlorophyll), phosphate elements are useful for strengthening stems and killing fungi on plant skins and potassium elements are useful for accelerating plant growth, can increase protein content. plants and npk fertilizers can also be used for all types of plants, both food crops, horticulture, and especially plantation crops (Marsono. 2001: 203).

III. METHODOLOGY

The research was carried out at the Experiment Station, Faculty of Agriculture, Sirte University During the year 2021. The materials used in this study were wheat plant seeds and chicken manure, NPK fertilizer namely NPK Mutiara 16-16-16 with a content of 16% N, 16% P2O5, 16% K20, and urea fertilizer.

The tools used are hoe, trowel, oven, electric scale, ruler, rake, meter, sickle, rope, mica, wood, documentation tools (camera) and stationery. This study was arranged in a Completely Randomized Block Design (RAKL). Land preparation to be carried out is to form beds with a height of 20 cm.

From each treatment bed as follows: The dose factor of chicken manure. 5 tons per hectare (P1), 10 tons per hectare (P2), 15 tons per hectare (P3). NPK dose factor of 100 kg of NPK fertilizer per hectare (D1), 150 kg of NPK fertilizer per hectare (D2), 200 kg of NPK fertilizer per hectare (D3) and Control (P0D0) 20 tons per hectare of cow manure + urea 50 kg per hectare . Thus, a combination of treatments (3 x 3) + 1 treatment will be obtained. Each treatment was repeated 3 times and the number of plant beds was 20 plants, so the total plants with that treatment were 10 x 3 x 20 = 600 plants.

This research consists of 3 blocks. Each block consists of 10 plots so the total is 30 experimental plots. Observations in the vegetative phase, destructively one sample plant at the age of 45 days. Consisting of variables of plant height, number of leaves, leaf weight, plant fresh weight, dry plant weight, observations in the generative phase consisted of variables of flower emergence age, fruit ripening age, number of pods per plant, and pod weight per plant.

IV. RESULTS

Plant Height (cm)

The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 1 below.

Table 1. The results of the average difference test on the height of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	Plant Height (cm)	Treatment	Plant Height (cm)
5 ton/ha	33,5	100 kg/ha	33,2
10 ton/ha	33,1	150 kg/ha	34,9
15 ton/ha	36,4	200 kg/ha	36,2

Number Of Leaves

The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 2 below.

Table 2. The results of the average difference test on the number of leaves of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	number of leaves	Treatment	number of leaves
5 ton/ha	30,9	100 kg/ha	28,5
10 ton/ha	25,4	150 kg/ha	31,7
15 ton/ha	34,8	200 kg/ha	33,9

Leaf Weight

The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 3 below.

Table 3. The results of the average difference test on the leaf weight of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	leaf weight	Treatment	leaf weight
5 ton/ha	19,76	100 kg/ha	16,12
10 ton/ha	14,21	150 kg/ha	19,56
15 ton/ha	22,87	200 kg/ha	21,65

Plant Fresh Weight

The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 4 below.

Table 4. The results of the average difference test on the plant fresh weight of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	plant fresh weight	Treatment	plant fresh weight,
5 ton/ha	55,01	100 kg/ha	44,87
10 ton/ha	42,87	150 kg/ha	52,54
15 ton/ha	62,44	200 kg/ha	58,99

Dry Plant Weight
The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 5 below.

Table 5. The results of the average difference test on the dry plant weight of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	dry plant weight	Treatment	dry plant weight
5 ton/ha	11,27	100 kg/ha	11,76
10 ton/ha	13,52	150 kg/ha	13,13
15 ton/ha	17,01	200 kg/ha	16,98

Flower Emergence Age
The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 6 below.

Table 6. The results of the average difference test on the flower emergence age of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	flower emergence age	Treatment	flower emergence age
5 ton/ha	32,32	100 kg/ha	31,77
10 ton/ha	31,55	150 kg/ha	31,66
15 ton/ha	29,9	200 kg/ha	30,99

Fruit Ripening Age
The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 7 below.

Table 7. The results of the average difference test on the fruit ripening age of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	fruit ripening age	Treatment	fruit ripening age
5 ton/ha	37,22	100 kg/ha	38,54
10 ton/ha	27,34	150 kg/ha	37,81
15 ton/ha	35,22	200 kg/ha	34,12

Number Of Pods Per Plant
The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 8 below.

Table 8. The results of the average difference test on the number of pods per plant of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	number of pods per plant	Treatment	number of pods per plant
5 ton/ha	40,78	100 kg/ha	39,98
10 ton/ha	45,65	150 kg/ha	42,75
15 ton/ha	48,01	200 kg/ha	52,85

Pod Weight Per Plant

The results of the average difference test of the effect of chicken manure and NPK fertilizers on barley plant height can be seen in Table 9 below.

Table 9. The results of the average difference test on the pod weight per plant of wheat plants.

Chicken Manure		NPK fertilizer	
Treatment	pod weight per plant	Treatment	pod weight per plant
5 ton/ha	98,87	100 kg/ha	96,98
10 ton/ha	104,78	150 kg/ha	104,24
15 ton/ha	116,99	200 kg/ha	126,76

V. DISCUSSION

The results showed that the treatment of chicken manure and NPK fertilizer showed no interaction with plant height. Plant height was not significantly different from the dose of manure given. The highest average was found at a dose of 15 tons/ha followed by a dose of 5 tons/ha, a dose of 10 tons/ha and control. The treatment of NPK fertilizer was not significantly different between treatments at a dose of 200 kg/ha, with a dose of 150 kg/ha, a dose of 100 kg/ha and controls.

The treatment of chicken manure and NPK fertilizer at different doses and doses did not show a significant difference, presumably caused by light, temperature and high rainfall so that the chicken manure given was less effective in changing soil texture and providing nutrients, it also caused fertilizer NPK is less effective to stimulate the formation of active root nodules to bind nitrogen which will affect the height of wheat plants.

According to Nurlisan et al (2014), his research said that apart from the nature of fertilizers, plant height is also influenced by temperature and weather and environmental conditions, where plants that grow on soils that have high fertility or availability of nutrients are high so that the dose of fertilizer given does not show a significant difference in height. plants, thus plants are strongly influenced by environmental factors such as temperature and availability of nutrients, where these factors play an important role in the production and transportation of foodstuffs.

Nitrogen (N) is one of the limiting factors for plant growth. N deficiency causes plants to grow stunted, leaves turn yellow and harvest failure, while excess N can cause nutrient imbalances so that plant growth is disrupted (Mulyadi, 2012).

During the vegetative phase of plants, meristem tissue that will perform cell division, elongation, and enlargement requires sufficient nitrogen for the formation of cell walls and protoplasm (Made, 2010). Based on the results of the variance of treatment with chicken manure and NPK fertilizer on wheat plants, there was no interaction on the number of leaves, while the leaf weight showed an interaction. The highest chicken manure treatment on the number of leaves was found at a dose of 15 tons/ha, not significantly different from the treatment of 5 tons/ha, a dose of 10 tons/ha and control.

The highest NPK fertilizer treatment was found at a dose of 200 kg/ha, not significantly different from a dose of 150 kg/ha, 100 kg/ha and control. These results indicate that the number of leaves does not affect leaf weight where there is an interaction of chicken manure and NPK fertilizer. The number of leaves will be in line with the number of branches that appear, it is suspected that the availability of N, P, and K which increases is not in line with the increase in the dose of chicken manure.

Treatment of chicken manure on plant fresh weight and plant dry weight showed a significant difference between the treatment at a dose of 15 tons/ha, with a dose of 10 tons/ha, 5 tons/ha and control. The NPK fertilizer treatment showed no significant difference in the fresh weight of the plant, but the dry weight of the plant showed a significant difference between the treatment at a dose of 200 kg/ha and 150 kg/ha, a dose of 100 kg/ha and control. The fresh weight of the plant also affects the dry weight of the plant, seen from the results of the dry weight variance, there is also no interaction from the treatment given. So it can be said that in these plants the water content and elements are the same. It is suspected that the application of NPK fertilizer and chicken manure

did not cause differences in water absorption and accumulation of photosynthetic products.

According to Murselindo (2014), the smooth process of nutrient absorption by plants, especially diffusion, depends on the supply of ground water which is closely related to the water holding capacity of the soil, all of these components are able to stimulate the photosynthesis process optimally.

The treatment given did not show a significant difference due to the less high dose and dose used. This is reinforced by research conducted by Prastya et al. (2016), showed that the application of NPK fertilizer at a dose of 300 kg/ha increased the dry weight of the plant, while the application of chicken manure at a dose of 40 tons/ha increased the dry weight of the plant higher and differed at a dose of 10 tons/ha. The increase in nitrogen (N) uptake of plants may be caused by an increase in the concentration of nitrogen (N) in plant tissues and plant dry weight. According to Wahyudi (2009), an increase in plant N uptake is related to an increase in plant dry weight, an improvement in plant root development, and an increase in soil N availability. Increased plant development has to do with improving soil conditions.

VI. CONCLUSION

Treatment of chicken manure and NPK fertilizer showed an interaction on several variables of leaf weight, age of flower emergence, and number of plant pods. Variables that showed no interaction consisted of variables, plant height, number of leaves, plant fresh weight, plant dry weight, fruit ripening age, and plant pod weight. The combination of treatment with chicken manure and NPK fertilizer was highest for wheat plants at a dose of 15 tons/ha and 200 kg/ha.

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