

# Crop Production Growth Response Green Mustard (*Brassica juncea* L) Against Granting Urea Fertilizer and Manure Goat On Overseas Land Ultisol In District South

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## Abstract.

Giving Uera Fertilizer and Goat Coop Fertilizer in Ultisol Land for green mustard plants (*Brassica Juncea L*) aims to determine the fertilizer treatment of goats sometimes goats to increase leaf area, root volume and fresh weight of plants. And Interaction of fertilizer application, sometimes goat fertilizer (ton / ha) and urea fertilizer on green mustard plants. This research was conducted in Sona Village with a height of 18 meters above sea level in Labuhanbatu Regency in December 2019 until March 2020. The material used was green mustard seeds, goat manure. Uera fertilizer, water Tools used are cutter blades, analytical scales, rulers, scissors, mortars, measuring flasks, buckets, calipers, neat ropes, hoes. The research will be conducted with a factorial group design. The first factor is the provision of factorial Group Design (RBD) consisting of 2 factors, the first factor is Goat Cage fertilizer (K) consisting of 3 levels and the second factor is the provision of Urea fertilizer consisting of 2 dose levels, so we get 6 treatment combinations each - 4 replications, so that 24 plots were obtained. Each plot consisted of 25 plants and taken 5 plants as samples. The parameters observed were plant height (cm), number of leaves (strands), leaf area (cm<sup>2</sup>), root volume (ml) and weight of fresh plant weight (g). Data obtained from the results of the study were statistically analyzed with variance and continued with Duncan's New Multiple Range Test (DNMRT) at 5% level. Results of research The treatment of fertilizer Fertilizer sometimes goat (tons / ha) with a dose of 2 tons / ha and urea fertilizer at 100 kg / ha can increase leaf area, root volume and plant fresh weight. As well as the interaction of fertilizer application, sometimes goat fertilizer (ton / ha) and urea fertilizer have a significant influence on the parameters of leaf area, root volume and plant fresh weight.

**Keywords:** Goat Manure, Green Mustard Plant, Uera Fertilizer, Rantau Selatan District

## 1. INTRODUCTION

Mustard green (*Brassica rapa* L.) the vegetable is a plant of horticultural yan has a role as a source of vitamins and minerals. The demand on greens is increasing. Consumption of green mustard increased from 1.304 kg/capita/year in 2013 to 1.408 kg/capita/year in 2014 [1]. The production of mustard green in Indonesia increased between 3-7% per year in the period of five years from 2010-2014 and will likely continue to experience increase each year. Mustard greens should be developed to meet consumer demand. The condition of Indonesia is suitable for the cultivation of this plant. According to [2] aspects of agro-climate, several regions in Indonesia is very potential for the cultivation of vegetables, such as Sumatra, Java, Kalimantan, and Sulawesi. The harvest period is relatively short and easy in maintenance also is an attraction to cultivate mustard greens. Increased production can be reached through the efforts of intensification and extensification of land [3] . Therefore, in an effort to improve production and farmers ' income is by using the fertilizing of a

balanced and high yielding varieties. Efforts to improve the productivity of soybean plants, it is necessary to the business use of fertilizer as sources of nutrients. One of the availability of nutrient elements in the soil and on plants can be done by peemberian organic material [4].

Fertilizing is an important factor in the cultivation of plants that support the success of the production of mustard green. According to the [5], plants need nutrients that are always available during its life cycle to be able to grow and produce well. Land degradation caused by the use of excessive chemical fertilizers affect the quality of the vegetable products produced. The cultivation of plants that are environmentally friendly should be initiated to overcome the problem of the decline of land quality. To improve the quality of the soil, can be reached by several ways such as reducing the use of chemical fertilizers and use organic fertilizers such as green manure, compost, or manure. Some of the animal manure that can be utilized as organic fertilizer that is cow dung, goat manure and chicken manure [6]. The use of organic materials can be an alternative solution to reduce dependence on the use of chemical fertilizers in increasing the crop productivity of mustard greens. The addition of organic matter in the soil will improve soil structure and improve the stability of soil aggregates which in turn can maintain aerated soil with good and can support increased fertilizer use efficiency [7].

Organic fertilizer is fertilizer derived from the dead plant, animal droppings and/or animal parts and/or other organic wastes that have been through the engineering process, solid or liquid, can be enriched with mineral materials and/or microbes that are beneficial to improve the nutrient content and soil organic matter and improve the physical, chemical and biological soil [8]. One type of organic fertilizer is manure. According to [9] manure has properties that do not damage the soil, providing macro and micro nutrients. In addition, the manure serves to increase the holding power of water, the microbiological activity of the soil, the value of cation exchange capacity and improve soil structure. One type of manure that the manure from goat manure. According to [10], fertilizer goat manure has the advantage compared with the fertilizer of cow dung and horse, that has the macro elements Nitrogen (N), Phosphorus (P), and Potassium (K) is high. Based on the research They've and [11], the provision of organic materials such as manure goat manure up to 30 tons/ha can increase the content of organic matter, Zn plant tissue, fresh weight and dry weight of roots of maize. Hence the need for this study to determine the combination of the dose of manure of goat and fertilizer urea which can increase the growth and yield of green mustard. To determine the fertilizer Treatment Fertilizer sometimes a goat against the increase of leaf area, root volume and fresh weight of the plant. As well as the Interaction of fertilizer Fertilizer sometimes goat (tons/ha) and urea fertilizer to plant mustard greens

## 2. METHODS

This research was conducted in the Village of Sona with a height of 18 meters above sea level in the District Labuhanbatu in December 2019 to March 2020. The material used is seed mustard green manure goat. Fertilizer, urea, water Tool used is a knife cutter, analytical scales, a ruler, scissors, mortar, measuring flask, bucket, caliper, tali rapiyah, hoe. The study will be conducted with the design group factorial. The first factor is the provision of Random Group Design factorial consisting of 2 factors, the first factor is the manure of the Goat (K) which consists of 3 levels and the second factor is the Provision of Urea fertilizer which consists of 2 level of dose, so that the obtained 6 treatment combinations each of 4 replicates, so that the obtained 24 plots. Each plot consisted of 25 plants and taken 5 plants in the sample. Parameters observed were plant height (cm), number of leaves (strands), leaf area ( $cm^2$ ), root volume (ml) and weight of fresh weight of plant (g). Data obtained from the results of the study were statistically analyzed by fingerprint variety and proceed with the test further Duncan's New Multiple Range Test (DNMRT) at the level of 5 %. [12].

## 3. RESULTS AND DISCUSSION

### 1. Plant Height

The average plant height after analyzed by sidik ragam show that the interaction of Fertilizer treatment sometimes goat (tons/ha), treatment of urea do not affect the real against the high mustard plant. The results of the test map is shown in Table 1.

**Table 1.** The average plant height (cm) by treatment with a few doses of manure of goat and urea fertilizer on plant mustard greens (*Bressicca Juncea L*)

Manure goat (ton/ha)	Urea Fertilizer (kg/ha)		The average
	75	100	
1	27,03 a	30,45 a	28,74 a
1,5	32,86 a	20,59 a	26,72 a
2	34,61 a	28,44 a	31,52 a
The average	31,50 a	26,46	

The numbers on the rows and columns followed by small letters are the same different is not real according to Test DNMRT at level 5%.

From Table 1 shows that in the provision of treatment combination of fertilizer sometimes goat (tons/ha) with urea fertilizer on mustard plant showing different is not real on the height of the plant. Provision of fertilizer treatment Fertilizer sometimes goat (tons/ha) on dosis2 tons/ha and fertilizer treatment urea 100 kg/ha tend to show the response of the average high on the parameter of observation plant height that is 34,61 cm, at which treatment the plant height has reached plant height in the description of the plant mustard greens (*Bressicca Juncea L*), this is because the content of nutrients contained in the fertilizer sometimes goat (tons/ha) and urea fertilizer on the dose is already able to meet the nutrient elements in the plants and support the growth of higher plants. High growth on the plant is very closely related to the availability of macro nutrients one of which is Nitrogen (N). Elements N plays a role in stimulating vegetative growth in plants, one of them in the height increase of plants. In this case the dose of manure Fertilizer sometimes goat (tons/ha) 2 tons/ha and urea 100 kg/ha is adequate as a provider of elements of N which directly affects the nutrient availability of N in soil, and nitrogen that comes from material oraganik on Fertilizer sometimes goat (tons/ha) higher is better its effect as Fertilizer and sometimes a goat (ton/ha) into nutrients that are more complete, and this fertilizer contains Nitrogen (3,22%), K<sub>2</sub>O (4,47%), P<sub>2</sub>O<sub>5</sub> (3,24%), S (0,18%), Mg (0,86%), CaO (0,66%), Mo ppm (0,2%), SiO<sub>2</sub> (30,32%), Fe (0,15%), water Content (12,15%), and C-organic (5,13%). [13]. Administration of N from urea at low doses, the need N for the plant has been completed and there occurs shortage of N. According to [14] that the lack of N will limit the production of proteins and other important ingredients in the formation of new cells in the plant.

## 2. The Number Of Leaves

The average number of leaves after analyzed by sidik ragam show that the interaction of Fertilizer treatment sometimes goat (tons/ha) and the treatment of urea do not affect significantly to the number of leaves of the plant mustard greens (*Bressicca Juncea L*). The results of the test map is shown in Table 2.

**Table 2.** Average number of leaves treated with several doses of goat manure and urea fertilizer on mustard greens (*Bressicca Juncea L*)

Manure goat (ton/ha)	Urea Fertilizer (kg/ha)		The average
	75	100	
1	8,25 a	8,08 a	8,17 a
1,5	7,92 a	7,46 a	7,69 a
2	9,17 a	8,58 a	8,87 a
The average	8,44 a	8,04 a	

The numbers on the rows and columns followed by small letters are the same different is not real according to Test DNMRT at level 5%.

From Table 2 shows that in the provision of treatment combination of fertilizer sometimes goat (tons/ha) with urea fertilizer on mustard plant showed different unreal on the number of leaves. Provision of fertilizer treatment Fertilizer sometimes goat (tons/ha) at the dose of 2 tons/ha with fertilizer urea 100 kg/ha tend to show the response of the average number of leaves the highest 9,17

strands. All the treatment showed no optimal number of leaves due to the growth of the number of leaves in addition to influenced the supply of nutrients from fertilizers is also influenced by the nutrients available in the soil. This condition is caused due to the formation of new cells in a plant is determined by nutrient availability in the soil. The process of the formation of the leaves are not separated from the role of nutrient elements such as nitrogen and phosphate contained in the medium land and in a condition available to plants [15]. In general, if the plants lack nutrients that would interfere with the metabolic activities of the plant so that the process of the formation of the leaves in this case the new cells would be hampered.

The availability of low nitrogen causes the activity of cells that play a role in the activity of photosynthesis can not utilize the sun's energy optimally, so that the rate of photosynthesis will decrease and the photosynthate produced is little. These conditions will slow the rate of plant growth and development particularly in the formation of new organs. This is caused by not fulfillment of the requirement of nutrient elements, especially N, which plays a role in vegetative growth of the plant.

### 3. Leaf Area

The mean leaf area after being analyzed by sidik ragam show that the interaction of Fertilizer treatment sometimes goat (tons/ha) and the treatment of urea significantly affect the leaf area of mustard plant. The results of the test map is shown in Table 3.

**Table 3.** The average leaf area at the widest with the treatment of the treatment of some doses of manure of goat and urea fertilizer on plant mustard greens (*Bressicca Juncea L*)

Manure goat (ton/ha)	Urea Fertilizer (kg/ha)		The average
	75	100	
1	195.20 a	196.20 a	195.7a
1,5	198.24 a	197.25 a	197.7a
2	202,93 a	201,93 a	202.4a
The average	198,77 a	198.78 a	

The numbers on the rows and columns followed by small letters are the same different is not real according to Test DNMRT at level 5%.

From Table 3 shows that in the provision of treatment combination of fertilizer sometimes goat (tons/ha) with urea fertilizer on mustard plant showing different leaf area. Provision of fertilizer treatment Fertilizer sometimes goat (tons/ha) at the dose of 2 tons/ha and fertilizer urea 100 kg/ha showed a response of average leaf area widest that 202,93 cm<sup>2</sup> and followed by Fertilizer and sometimes goat (tons/ha) at the dose of 2 tons/ha and urea fertilizer 100 kg/ha average leaf area the widest, namely 19520 cm<sup>2</sup>. The parameters of leaf area can describe the quality of the vegetables. The greater the leaf area the more quality of a plant and the higher the resale value. [16], the parameters of leaf area can give an overview of the process and rate of photosynthesis in a plant, with broad leaves high, then the light will be more easily accepted by the leaves well. Light is the source of energy used to perform the formation of the photosynthate in the end related with the formation of a biomass plant. [17], say that nitrogen is necessary to support the growth of the vegetative parts compared generative and important for vegetable crops consumed bagiantajuknya, the provision of nitrogen in sufficient quantities, produce plant vigor and leaf size large.

Factors that influence the leaf area on a plant is nitrogen, phosphorus and potassium. One of the functions of phosphorus are to the development of the network of meristem [18]. Tissue meristem consists of meristem flattened and meristem tape. Meristem of the ribbon will produce a series of cells that function in extend the network so that the leaves of the plant will be the length and width, and will be hurting the broad leaves of the [19].

### 4. Root volume

The average volume of roots after analyzed by sidik ragam show that the interaction of Fertilizer treatment sometimes goat (tons/ha) and the treatment of urea do not affect significantly to the volume of the root of the mustard plant. The results of the test map is shown in Table 4

**Tabel 4.** The average volume of the roots with the treatment of the treatment of some doses of manure of goat and urea fertilizer on plant mustard greens (*Bressicca Juncea L*)

Manure goat (ton/ha)	Urea Fertilizer (kg/ha)		The average
	75	100	
1	4,36a	4,38a	4,37 a
1,5	4,66a	4,66a	4,66 a
2	5,56a	5,56a	5,56 a
Rata-rata	8,44 a	8,04 a	

The numbers on the rows and columns followed by small letters are the same different is not real according to Test DNMRT at level 5%.

From Table 4 show that in pemberian perlakuan combination of manure Fertilizer sometimes goat (tons/ha) with urea fertilizer on mustard plant showing different is not real on the root volume. Provision of fertilizer treatment Fertilizer sometimes goat (tons/ha) at the dose of 2 tons/ha and urea fertilizer 100 kg/ha tend to show the response of the average high on the parameters of the observation

the volume of the root, namely the 5.56 ml. This is due to the granting of fertilizer sometimes goat (tons/ha) can increase the content of nutrient elements in the soil so that it can increase the volume of the roots of the plants. In addition, according to [20], the growth of a crop followed by the growth of other plant parts, where the header will be increased by following the increase in the weight of roots.

Fertilizer Fertilizer is sometimes mutton (ton/ha) dose of 2 tons/ha have a root volume is the largest, because with increasing dose of fertilizer Fertilizer sometimes goat (tons/ha) and fertilizer urea ketersediaan nutrient elements for plants will be increased so that the volume of the roots of the plants become bigger to absorb nutrients. According [21], one of the functions of organic fertilizer is to improve soil structure. Good soil is soil that has a layout good air flow so air and water can enter the well so that the plant roots will develop better, more organic fertilizer is given then it will be the better aerase and drainage of land and will be the better growth of plant roots.

## 5. The weight of the Fresh crop

The average fresh weight of the plant after analyzed by sidik ragam show that the interaction of Fertilizer treatment sometimes goat (tons/ha) and the treatment of urea significantly affect the fresh weight of plants in the mustard plant. The results of the test map is shown in Table 5. Table 5. Average fresh weight of planting by treating several doses of goat manure and urea fertilizer on mustard greens (*Bressicca Juncea L*)

Manure goat (ton/ha)	Urea Fertilizer (kg/ha)		The average
	75	100	
1	11,48 a	26,00 a	18,74 a
1,5	10,68 a	38,00 a	24,34 a
2	11,88 a	40,00 a	25,94 a
The average	8,44 a	8,04 a	

The numbers on the rows and columns followed by small letters are the same different is not real according to Test DNMRT at level 5%.

From Table 5 show that in the provision of treatment combination of fertilizer sometimes goat (tons/ha) with urea fertilizer on mustard plant shows different real on the weight of the fresh plant. Provision of fertilizer treatment Fertilizer sometimes goat (tons/ha) at the dose of 2 tons/ha and urea fertilizer 100 kg/ha shows the response of the average high on the parameters of the observation fresh weight of plant 40,00 g. Response lowest taraf perlakuan the interaction of manure Fertilizer sometimes goat (tons/ha) 1 ton/ha and urea fertilizer 75 kg/ha which is of 11.88 g. This is because increasing the dose administered is able to provide nutrients in sufficient quantities for the growth and

production of mustard so that the activity metabolism and the accumulation of assimilate in the area of the leaves and stems of the plants increased and affect the fresh weight of such plants.

Fresh weight of the plants reflect the nutrient composition of the fertilizer is sometimes goat (tons/ha) can be used as a complete fertilizer because it contains Nitrogen substances (3,22%), K<sub>2</sub>O (4.47%), P<sub>2</sub>O<sub>5</sub> (3,24%), S (0,18%), Mg (0,86%), CaO (0,66%), Mo ppm (0,2%), SiO<sub>2</sub> (30,32%), Fe (0,15%), water Content (12,15%), and C-organic (5,13%) [21]. Nitrogen content serves to stimulate the growth of the mustard plant. Organic material supplied from the fertilizer sometimes goat (tons/ha) can increase the nutrient elements in the soil, including macro nutrients that is one is nitrogen [22], fertilizer sometimes goat (tons/ha) and urea fertilizer affect the growth of the mustard plant because it contains nutrients in sufficient quantities is very necessary the growth of the mustard plant.

#### IV. CONCLUSION

Fertilizer treatment Fertilizer sometimes goat (tons/ha) with a dose of 2 tons/ha and urea fertilizer dose of 100 kg/ha can produce an increase in leaf area, root volume and fresh weight of the plant. The interaction of fertilizer Fertilizer sometimes goat (tons/ha) and urea fertilizer gave significant effect on the parameters of leaf area, root volume and fresh weight of the plant.

Based on the results of the research obtained the best results on the provision of manure Fertilizer sometimes goat (tons/ha) with a dose of 2 tons/ha and urea fertilizer dose of 100 kg/ha can increase the growth and production of mustard plant but it needs to be an assessment of the economic value for the cultivation of crops horticulture other.

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