Effects of Urin Cow Dosage on Growth and Production of Sorgum Plant (Sorghum Bicolor L) on Peat Land

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Abstract
Sweet sorghum (Sorghum bicolor (L)), is a potential cultivated plant, especially in marginal and dry areas, sorghum has an important role as a source of carbohydrates, sorghum is expected as an alternative choice for peatland cultivation, with the use of peatlands is also expected Raising awareness of the environment by cultivating more environmentally friendly plants. The aim of this research is to know the influence and get the best dosage of cow urine on growth and production of Sorghum (Sorghum bicolor L) plant on peat soil. The experiment was conducted experimentally by using Completely Randomized Design (RAL), with one factor, namely: Cow urine administration, given in 5 treatments and 4 replications, resulting in 20 trials. Each experimental unit consists of 4 plants and 2 plants to be sampled. The factors studied were A0 = dose of cow urine 0 cc / l, A1 = dose of cow urine 25 cc / l, A2 = dose of cow urine 50 cc / l, A3 = dose of cow urine 75 cc / l, A4 = dose Cow urine 100 cc / l. Conclusion Giving of cow urine has significant effect on growth and production of sorghum plant which is seen on the parameters of plant height, leaf length, leaf width. While wet weight 100 seeds and dry weight of 100 seeds of sorghum plants have no significant effect. The best dose is given by A4 treatment with the best dose of 100 cc / l.

Keywords: sorghum, urine, peat

1. INTRODUCTION
1.1 Background
Sorghum is a plant that has great potential to develop, broad adaptability, drought-resistant, some varieties can diaksun, and all parts of the plant has economic value. Sorgum developed in Indonesia, generally the type of seed for human food. Not for animal feed, glue or for beverage industry. Sweet sorghum (Sorghum bicolor (L)), is a potential cultivated plant, especially in marginal and dry areas, sorghum has an important role as a source of carbohydrates, sorghum is expected as an alternative choice for peatland cultivation, with the use of peatlands is also expected Raising awareness of the environment by cultivating more environmentally friendly plants. The limitation of productive land causes agricultural extensification to lead to marginal lands. Peatland is one of the selected marginal land species, especially by large plantations, as it is relatively less populated and therefore the possibility of land use conflict is relatively small. Peat or peat soil or organic soil is a synonym that is the soil that has more than 50% organic material in the top 80 cm layer. The soil used for cultivation of sorghum is peat soil which is known to contain little nutrients and is acidic, for that Need improvement materials such as fertilizer.
Fertilizer is an organic material or an organic material derived from natural or man-made nutrients that plants need to grow. Fertilization is very effective on the soil less fertility, and to avoid competition of nutrient removal of plants with each other.

The use of inorganic fertilizers is quickly available to plants but if it continues to use it will damage the texture and structure of the soil, while the price is also expensive, whereas organic fertilizer requires decomposition process first but the price is not expensive and the amount is abundant. The specialty of organic fertilizers is to improve soil properties such as soil porosity, soil structure and water holding capacity, help neutralize soil pH, help neutralize toxins caused by heavy metals in the soil, one type of organic fertilizer is cow urine.

Cow urine has been allowed to waste as a waste is useful in agriculture as organic fertilizer, in addition to relatively cheap price, cow urine is also not difficult to find, and the process of making it very easy with the fermentation process. Based on these descriptions, the authors conducted a study entitled "The Effect of Cattle Urin Dose on Growth and Sorghum Plant Production (Sorghum bicolor L) On Peat Land".

1.2 Research Objectives
The aim of this research is to know the influence and get the best dosage of cow urine on growth and production of Sorghum (Sorghum bicolor L) plant on peat soil.

1.3 Hypothesis
Giving doses of cow urine had a significant effect on the growth and production of sorghum bicolor (Sorghum bicolor L) on peat soil.

2. MATERIALS AND METHODS
2.1. Materials and tools
The materials used are: sorghum seed varieties Numbu, lime dolomite, cow urine, NPK fertilizer (16:16:16), Urea fertilizer, Decis 35 EC and polybag size 35 x 40.

The tools used are machete, hoe, bucket, meter, raffia strap, hammer, knife, jerry can, gembor, measuring cylinder, hansprayer, scales, camera and stationery.

2.2. Research methods
The experiment was conducted experimentally using Completely Randomized Design (RAL), with one factor, namely: Giving of cow urine, which will be sampled. It was given in 5 treatments and 4 replications, so it amounted to 20 experiments. Each experimental unit consists of 4 plants and 2 plants which the factors studied are:

A0 = dose of cow urine 0 cc / l
A1 = dose of cow urine 25 cc / l
A2 = dose of cow urine 50 cc / l
A3 = dose of cow urine 75 cc / l
A4 = dose of cow urine 100 cc / l

The complete random design mathematical model (RAL) used is: (Surtinah 2013).

\[ Y_{ij} = \mu + \tau_j + \varepsilon_{ij} \]

Information :
Yij: The observation result on the therapeutic treatment and the k-j repeat
M: Middle value (Avg.
Tj: Effect of i th treatment
Eij: Effect of errors (residuals) due to the i th treatment and the j th repetition

Fingerprint data shows F. Count> F. The table is followed by DMRT test (Duncan's Multiple Range Test) at 5% level.
2.3. Implementation of Research

1) Land preparation
   The land where the research was first cleaned from weeds and the remains of existing plants. Land area required for planting area of 9 x 7 m. Then done plot making with size 100 x 100 cm as much as 20 plot, with distance between polybag 50 x 50 cm.

2) Media Preparation
   After the plot is completed, the ground is filled into polybags with a size of 35 x 40 polybag, weight of soil media 7 kg per polybag. The soil used is peat soil, on planting medium done liming using dolomite fertilizer. The dolomite dose used is 0.14 g / polybag.

3) Labeling
   Labeling is prepared and installed on each plot according to treatment. Installation of labels is done to facilitate the treatment in the implementation of research.

4) Planting
   Planting done a week after the labeling, making a planting hole with a depth of ± 3cm, then the seeds of sorghum are inserted as much as 3 grains per hole.

5) Provision of NPK 16: 16: 16 and Urea fertilizer
   NPK Mutiara 16: 16 NPK fertilizer was given 3.6 g and Urea was given 2.4 g of planting, given twice that first fertilization was given simultaneously with planting time, then second fertilization was given at age one month after planting. The dose of NPK Pearls 16:16:16 once administration is 1.8 g and urea with a dose of 1.2 g. Fertilization is done by means in the tugal as far as 7 cm from the plant.

6) Treatment
   Cow urine used is fermented cow urine for 30 days, cow urine treatment is given in accordance with the level of treatment. Treatment of cow urine begins at seedlings 2 weeks after planting and given 2-week intervals. Treatment was stopped 2 weeks before harvest.

7) Maintenance
   Maintenance conducted in this research are:
   • Watering done in the morning and afternoon by using gembor, the amount of water given in accordance with the conditions in the field with the same volume of each polybag and not done watering if it rains.
   • Weeding done if there are weeds that grow around the plant or plot in a manual way by using the hand pull weeds that grow.
   • Pest and disease control is done by spraying Decis 35 EC with concentration 2 cc / liter of water, spraying done a week after planting, with interval 2 weeks once using hand sprayer, spraying stopped a week before harvest.
   • Thinning is done at the age of the plant 2 weeks after planting, treated plants are healthy plants to avoid pests.

8) Harvest
   Harvesting is done at the age of 96 days, after the seeds are formed by looking at the visual characteristics such as the leaves are yellow and dried, the seeds are pithy and hard and the maximum flour content.

9) Observation
   All observation parameters were performed at the end of the study, taking 2 plot samples. The parameters observed are as follows:
   • Plant Height (cm)
     The measurement of plant height starts from the base of the stem to the highest leaf tip perpendicular to the stem.
   • Leaf Length (cm)
     The measured leaves are the longest leaves and have opened perfectly, measurements made from the base of the leaf to the tip of the leaf.
- Leaf Width (cm)
  The measured leaf width is the widest part of the leaf starting from the right leaf edge of the left leaf is perpendicular to the mother's leaf bone.
- Wet Weight 100 Seed (g)
  Observation of 100 seed weight was done after harvesting with counted 100 seeds and then weighed with analytical scales.
- Dry Weight 100 Seed (g)
  Observation of weight of 100 seeds was done after all seeds were dried under sunlight until constant weight for 3 days and then counted 100 seeds and weighed with analytical scales.

3. RESULTS AND DISCUSSION

3.1. Results

1. Plant height (cm)
The result of variance analysis on plant height showed that cow urine administration had significant effect on the height of sorghum plant, the data are presented in appendix 5. The result of DMRT further test at 5% level on plant height is presented in Table 1.

| Treatment | Plant Height (cm) |
|-----------|-------------------|
| A0        | 234.00 a          |
| A1        | 237.87 ab         |
| A2        | 240.37 ab         |
| A3        | 253.62 bc         |
| A4        | 259.37 c          |

Figures followed by the same small letters are not significant based on the DMRT advanced test at the 5% level.

Table 1, indicating that the higher the dose given the result is increased. Treatment of A4 with dose of 100 cc / l gave the best result at the height of sorghum plant that is 259.37 cm, although different is not real with treatment of A3. While the lowest plant height is A0 is 234 cm.

2. Leaf Length (cm)
The result of analysis of variance to leaf length showed that cow urine administration had significant effect on the length of leaves of sorghum plant, the data are presented in appendix 6. The result of further DMRT test at 5% level against leaf length is presented in Table 2.

| Treatment | Leaf Length (cm) |
|-----------|-----------------|
| A0        | 87.50 a         |
| A1        | 89.62 ab        |
| A2        | 91.50 abc       |
| A3        | 92.12 bc        |
| A4        | 95.75 c         |

Figures followed by the same small letters are not significant based on the DMRT advanced test at the 5% level.

Table 2, shows that the higher the doses given the results are increasing. Treatment of A4 doses of 100 cc / l gives the best results on the length of leaves of sorghum plants that is 95.75 cm. Although not significantly different in treatment A2 and A3, while the lowest leaf length is A0 that is 87.50 cm.
3. Leaf Width (cm)
Result of analysis of variance to width of leaf showing that giving of cow urine have significant effect to sorghum leaf width, data presented in appendix 7. DMRT further test result at 5% level to leaf width is presented in Table 3.

Table 3. Average Leaves of Sorghum Plant Leaves Resulting from Urine Cattle Urine.

| Treatment | Leaf Width (cm) |
|-----------|----------------|
| A₀        | 9.73 a         |
| A₁        | 10.75 ab       |
| A₂        | 11.43 abc      |
| A₃        | 11.81 bc       |
| A₄        | 12.12 c        |

Figures followed by the same small letters are not significant based on the DMRT advanced test at the 5% level.

Table 3, indicating that the higher the dose given the result is increased. Treatment of A₄ with dose of 100 cc / l gave the best results on the width of the sorghum leaf of 12.12 cm, although not significantly different from the treatment of A₂ and A₃. While the lowest leaf width is A₀ that is 9.73 cm.

4. Wet weight 100 seeds (g)
The result of analysis of variance to wet weight of 100 seeds showed that cow urine administration had no significant effect on wet weight of 100 seeds of sorghum, the data are presented in appendix 8.

Table 4. Average Weight of Wet 100 Seeds of Sorghum Plant Resulting from Urine Cattle Urine.

| Treatment | Wet Weight (g) |
|-----------|----------------|
| A₀        | 4.55           |
| A₁        | 4.69           |
| A₂        | 4.81           |
| A₃        | 4.97           |
| A₄        | 5.34           |

No further tests were performed

Table 4, shows that the average wet weight of 100 seeds is not significant. But from the data obtained, the higher the dosage of urine of cow to sorghum crop yields increased yield.

5. Dry weight 100 seeds (g)
The result of analysis of variance to dry weight of 100 seeds showed that cow urine administration had no significant effect on dry weight of 100 seeds of sorghum plant, the data are presented in appendix 9.

Table 5. Average Dry Weight of 100 Seeds of Sorghum Plant Resulting from Urine Cattle Urine

| Treatment | Dry Weight (g) |
|-----------|----------------|
| A₀        | 4.11           |
| A₁        | 4.11           |
| A₂        | 4.18           |
| A₃        | 4.47           |
| A₄        | 4.50           |

No further tests were performed
Table 5 shows that the average dry weight of 100 unrefined seeds is not real. But from the data obtained, the higher the dosage of urine of cow to sorghum crop yields increased yield.

4. Discussion
The result of variance analysis showed that cow urine giving significant effect on the growth and production of sorghum plants seen in observation parameters are plant height, leaf length and leaf width, while wet weight 100 grain and 100 seed dry weight have no significant effect. Annexes 5, 6, 7, 8, and 9.
In this study showed that in treatment A0 showed the lowest result on every parameter observed. The low rate of growth and production of sorghum in treatment A0 is thought to be due to the fact that the plants do not obtain nutrient supply either from the fertilizer given as the treatment or from the growing medium. As we know the growing media used in this study is peat soil, where peat soil is poor soil nutrients. Thus, less nutrients can disrupt the growth so that the resulting production is low. This is in accordance with the opinion of Sutejo (2002) which states that incomplete macro and micro nutrients can lead to obstacles to the growth and development of plants. Lakitan (1993) also states that if the availability of essential nutrients is less than the required amount, then the plant will be disturbed metabolism because the plants have a positive correlation with the availability of nutrients so that in the cultivation of nutrient availability plants is a very decisive factor.
The best treatment in the study that is found in treatment A4. The increase in the treatment is thought to be due to the nutrients needed for sorghum plants available for growth and development. As we know cow urine has many advantages, including as a source of nutrients for plants that are easily absorbed by plants can also help water absorption is also one of the potential organic fertilizer as a source of nutrients for plants such as N, P and K. From the aspect of haranya, Cow urine fluid has a higher nutrient content than the solid dung. In addition to the nutrient content it has, in cow urine there is also Indole Asetat Asid (IAA) of 704.26 mg L-1 (Sutari, 2010).
Roshana and Seswita (2007) reported that auxin is very influential in root formation by increasing the number and length of roots. So that the maximum plant in the absorption of nutrients / plant nutrients. The results of the study also obtained a corresponding result that increased urine use can increase the components of plant growth such as improving the function of plants and the number of fruit weight.
With the absorption of nutrients and nutrients are expected to maximize the maximum growth of vegetative plants sorghum.
The high growth of sorghum plant during vegetative period caused by liquid manure (cow urine) can accelerate and contain the hormone that can stimulate the growth of plants, and in liquid manure the content of N and K elements is quite big (Aisyah, 2011).
So with the composition of nutrients contained suspected to be able to stimulate the growth of sorghum plants as a whole. Syarief (1986) states that the Nitrogen element has an influence in the growth of plant height and gives green color to the leaves, enlarges the size of the fruit, the formation of proteins and other compounds. If the available nitrogen elements are balanced with other elements, more proteins can be produced and leaves can grow wider due to photosynthesis going well.
Further Nyakpa et al (1988) states that the optimal availability of N, P, and K nutrients for plants can increase the amount of chlorophyll, an increase in the amount of chlorophyll will increase the activity of photosynthesis which results in more assimilate. The results of photosynthesis are also used in the respiration process which will produce energy used for the formation of carbohydrates, proteins and fats in the formation of new cells.
As for the production parameters have no significant effect is suspected to be caused that the availability of nutrients on planting medium is not sufficient for the needs of crop production. Nutrient elements are a very important factor in the process of plant growth and development. According to Purnamayani et al. (2004), generally peatland is deficient in K. Furthermore, Coorley and Gray (1976) stated that potassium in plants acts as an activator of enzymes due to the presence of K + ions needed in enzyme activity. In addition Potassium also plays a role in assisting the transportation of assimilates...
from photosynthesis and contributes to the formation of carbohydrates and proteins and increases resistance to disease and fruit quality.

5. CONCLUSIONS AND SUGGESTIONS

5.1. Conclusion
Giving cow urine has a significant effect on the growth and production of sorghum plant which is seen on the parameters of plant height, leaf length, leaf width. While wet weight 100 seeds and dry weight of 100 seeds of sorghum plant have no significant effect. The best dose is given by A4 treatment with the best dose of 100 cc / l.

5.2. Suggestion
Based on the research that has been done, the researcher suggested that for further research by giving the addition of inorganic fertilizer higher than the dose given in this research (Urea: 2.4 g / plant, NPK: 3.6 g / plant) Better sorghum production.

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