Preliminary Study On Field Application Of Human Urine Fertilizer On Cultivation of Green Amaranth In Bajeng Distric, Gowa, South Sulawesi.

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Abstract: A field study was conducted in District Bajeng, Gowa regency, South Sulawesi to evaluate the efficay of human urine as fertilizer on green amaranth (*Amaranthus sp*.). Amaranth planted on two seedbeds for fertilize application and the other two seedbeds for unfertilized amaranth planting. Fertilizer made of fresh human urine that were collected from farmers around the cultivation area, then diluted with water to obtain a concentration of 25%. Using an electric sprayer, fertilizer was watered directly to the soil, once in four days. Its efficacy was observed based on growth rate and yield performance including plant height, number of leaves, leaf width and biomass yield. The results indecated that all the fifth parameters are significantly better in urin-fertilized amaranth compared to unfertilized one. In conclusion, human urine may be effective as alternatif fertilizer for growing *Amaranthus sp* in field scale.

Keywords: Human urine, fertilizer, Amaranthus sp., plant height, number of leaves, leaf widt and yield biomass.

INTRODUCTION

In the last decade, people in the world have started to give more attention to potency of human urine as alternatif fertilizer. Several research have carried out in laboratory or field scale. In Finland, urine was applied on tomatoes (Pradhan *et.al*, 2009), cabbage (Pradhan, *et. al*., 2007), and cucumber (Heinonen-Tanski *et. al* 2006). Di Sweden, Kirchmann & Pettersson (1995) apply urine on corn. Richert *et. al* (2010) reported that the application also conducted in Eastern Europe and India on cereal and fruit crops, while in South Africa, West Africa, North Africa dan Central America urine applied on vegetable crops.

In Indonesia, in the other hand, the use of urine as fertilizer is still rare. An unpublished report presented by Rofiqoh & Soedjono (2010), described the application of human urine on rice production. This is ironic since Indonesia is an agricultural country with the fourth highest population in the world. The nation should have vary strategy to increase agriculture product, especially by using easy organic fertilizer like human urine. For that reasons, it is important to conduct the research for convincing people about the use of human urin as fertilizer.

A Laboratory study in Makassar show that human urine fertilizer were able to enhance growth performance of Ammarantus Sp compare to unfertilezed one. Furthermore, its yield biomass were insignificant compare to urea-fertilized Amaranthus Sp (Asmawati & Kurnia, 2015). Those result show that human urine might have potential as an alternative fertilizer in Indonesia's agriculture. However, it needs further research to study the efficacy of human urine as fertilizer on field scale. Hence, this pilot field study was conducted with the main objective was to evaluate the use of urine fertilizer on the performance of *Ammarantus* Sp.

MATERIALS AND METHODS

Seeds of amaranth were comercial seeds produced by Panah Merah®, cultivar Maestro that available at local farm shops. Cultivation were conducted on seedbeds sized 0,5 X 2 m with 10 -15 cm depth. 400 seeds were planted on each seedbeds. Two seedbeds were made for urine fertilized amaranth, while the others two for unfertilized one.

Fertilizer were made of human urine from local farmer lived around cultivation area. It was dilluted with water up to 25% concentration. Using electric sprayer, it was applied directly on soil away from edible part of amaranth. Meanwhile unfertilized amaranth were treated by water only. Fertilizing were conducted once in four day, 5L for each seedbed. In the other days plants were treated by watering only, the same as unfertilized one.

The growth rate were studied by observing weekly height of amaranths. Using a metal ruler, the height was taken from ground level to shoot based. The other plant performance including yield leaves number, leaf width and yield biomass were observed once at the harvest day (28 days after seedling). The number and width of leaves were counted based on the main leaf, while leaflet or stipule were excluded. However, all amaranth body were weighed for biomass collecting data.

RESULTS AND DISCUSSION

The amarants grew well on both fertilized and unfertilized seedbed and also gave good harvest on days 28 after seedling. However, there were better growth performance on urine fertilized amaranth compare to unfertilized. Based on Figure 1., it is clearly can be seen that the line graph of fertilized amaranths grew with almost double acceleration by slope 11.71 than unfertilized amarants that have slope only 6.46. Furthermore, based on Figure 2, the mean of growth rate also doubled on fertilized amaranth by 10.7 mm/day, compare to unfertilized amaranth that only 5.7 mm/day. Consequently, based on observed characteristics on harvest day, fertilized amaranth had better appearance than unfertilized amaranth, (Figure 2). Harvested biomass and height on fertilized amaranth reached 29.1 gram and 38,53 cm, that was far different from unfertilized amaranth that only 6.61 gram and 23.11 cm respectively. On the other hand, leaf number and width was 9 sheet and 6.99 cm, which was slightly higher compare to unfertilized amaranth by 7 sheets and 4.33 cm respectively.

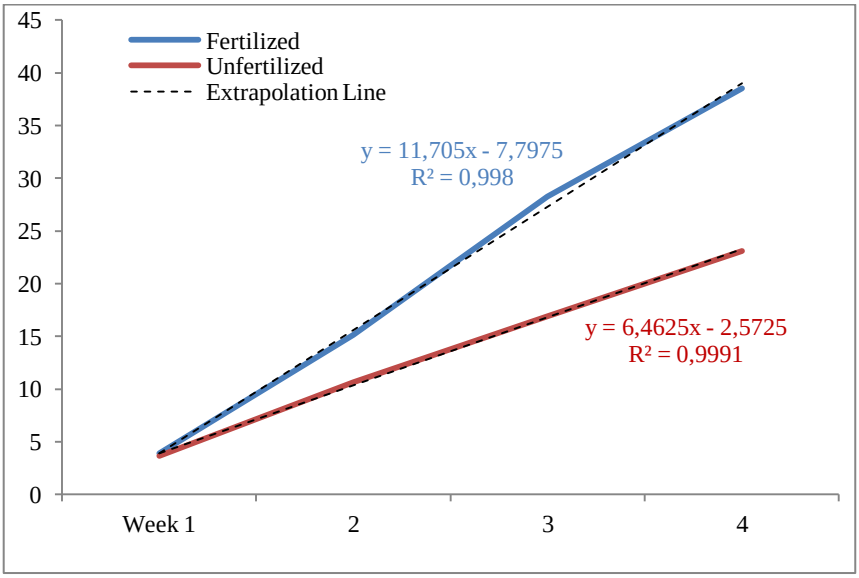

Figure 1. Growth Rate of *Amaranthus* sp.

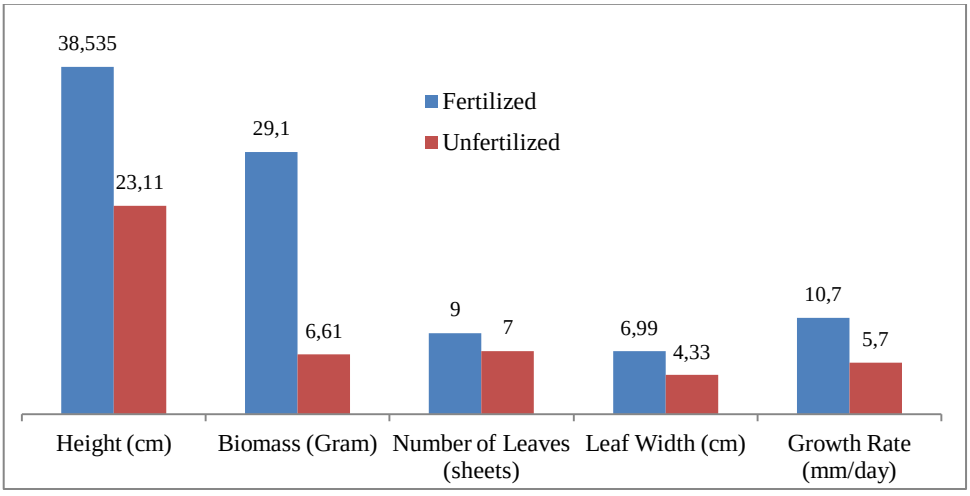

Figure 2. Performace of Harvested *Amaranthus* sp.

Better growth of fertilized amaranth in this study, indicates that urine might be used as a good fertilizer for amaranth and could represent a feasible alternative of fertilizers. This potency have been oberved since the initial growth (week 1), amaranth plants in fertilized plots was faster than that in unfertilized plots. The difference became wider in the following weeks as seen on Figure 1, even though the amount of applied urin were constant since the begining of planting. It seems, the applied urin was sufficient for amaranth nutrition need. Although chemical composition human urine is vary, Pradhan *et.al*. (2007) said that in general, human urine contains mostly nitrogen (N), phosphorus (P), and potassium (K) with ratio18:2:5. Since mineral total in the urin is 5%, it means in 1 L human urine comprise of 50g mineral consisting at least 36 g N, 4 g P and 10 g K. In this study one seedbed that planted by 400 amaranths, fertilized by 5L urine fertilizer concentration 25%. So each amaranth kept 0.5g nitrogen in 4 days or 3.15 g during cultivation.

This result were similar with AdeOluwa and Cofie (2012), they planted amaranth with 100% urine fertilizer. The harvest even higher than other fertilizer including chemical fertilizer. They also explained that the better yield was due to the nutrients in urine are in forms that are readily

available to plants. The urea in urine readily degrades to ammonium and nitrate ions, both of which are in forms that plants can absorb. It also fits with results from Finland where cabbages grown with human urine performs better than those from conventional plots (Pradhan *et.al*., 2007).

CONCLUSION

Human urine may be used as amaranth fertilizer in Bajeng, Gowa South Sulawesi. Thus further study is needed to ensure its efficacy.

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