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FERTILIZATING FREQUENCY OF SOYABEANS COMPOST TO THE GROWTH OF SENTANG SEEDLINGS (*Azadirachta excelsa* (JACK) M. JACOBS)

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ABSTRACT

One of less known timber species is *Azadirachta excelsa* (Jack) M. Jacobs known with the trading name as Sentang. Fertilizer as a nutrient supply was given to gain high quality seedlings. One of organic material which can be utilized as organic fertilizer is the waste of soybeans harvesting. Soybeans waste could be used as compost. This research aimed to examine the fertilizing frequency of soybeans compost to the growth of Sentang seedlings and compare them with cow manure fertilizer fertilizer. The frequency of fertilizing used were once a week, once in two weeks, once in three weeks, and once in four weeks during 12 weeks observation. The result shows that fertilizing soybeans compost to the Sentang seedlings once in two weeks give significant impact to the growth of diameter, height, total wet mass, total dry mass, and root-crown ratio of Sentang.

Key words: *Azadirachta excelsa*, frequency fertilizing, soybeans compost

INTRODUCTION

The demand of wood is mostly exist only on several species which have been known in the market. One of less known timber species is *A. excelsa* with trading name as Sentang. Sentang wood can be utilized as easy construction, furniture, panel and veneer (Joker 2002). To obtain high quality seedling, it is necessary to add fertilizer as nutrient supply for plant growth according to it needs. Organic fertilizer is more environmental friendly. Fertilizing frequency using organic material could improve the growth quality (Yuniarti *et al.* 2004). One of organic material which can be used as organic fertilizer is the waste of soybean harvesting. The utilization of waste harvesting is done to cut the budget needed for fertilizer purchasing in fertilizing activity.

Soybean is an annual species that can be harvested on the age of approximately 750 to 110 days (Prihatman 2000). The harvesting product taken is the seeds so there would be a waste from the plant. The amount of soybean waste would surely be high so that could be utilized as compost. Compost can be used as nutrient supply for plant. This research aimed to examine the frequency of fertilizing compost from soybean waste to the growth of Sentang (*A. excelsa*) seedling and compare it with cow manure fertilizer fertilizer.

METHODS

Location and Time

The study was conducted in the nursery section of Silviculture, Department of Silviculture, Faculty of Forestry, Bogor Agricultural University started on December 2014 to April 2015.

Equipments and Materials

The equipments were used thermometer, digital balance, hoe, barrel, scissor, pail, digital caliper, ruler, shovel, digital camera, oven, software SAS 9.1 portable, tally sheet. The materials used were soybean harvesting waste, cow manure fertilizer fertilizer, plastic bag, rope, sack, newspaper waste, EM4, bokashi (kind of organic fertilizer), rice bran, sugar, Sentang seedling, soil, and chaff.

Research Procedure

Soybean compost production

The compost production from waste harvesting is started by cutting the waste into smaller size (5 to 10 cm) (Indriani 2011). The remaining harvesting waste was obtained from Leuwikopo farm IPB with soybean variety of Anjasmoro. The waste was mixed with bokashi and rice bran then stirred evenly and pour to an iron barrel. EM4 solution was made by sugar addition and mix by water. The waste mixture was doused by EM4 solution slowly and evenly to achieve water content around 30-40% (tested by hand crushing).

A pile of material in the iron barrel covered with a sack and tied using rope. The pile temperature ranges between 40-50 °C. The Temperatures at the high pile is done by reversing the material and allowed to stand briefly and then closed again. The compost reversal was conducted once in a week. The composting process lasts for 30 days. The wet compost condition was then dried

by wind drying. The mature compost is characterized by a black color, crumbly, not hot, and odorless.

Seedling preparation and fertilizing

Sentang seedling used was age of two to three months. The seedling was gained from seedling distributor close to CIFOR. The seedling was derived from forest and moved to growing media made of mixture soil and chaff.

The fertilizers used were soybean compost and cow manure fertilizer. Cow manure fertilizer obtained from market purchasing. The fertilizer was given by spreading it around the plant. The amount given to each plant which about 100 gr with fertilizing frequency of once in a week, once in two weeks, once in three weeks, and once in four weeks (Yuniarti *et al.* 2004).

Observation and data collection

The parameters observed in this research were high gain, diameter gain, total wet weight, total dry weight, crown-root ratio, and seedling quality index. Nutrient analysis of soybeans compost (N,P, K, and C/N ratio) in the laboratory of soil fertilty, Faculty of Agriculture IPB. Crown-root ratio and seedling quality index by calculating the formula:

$$\text{Crown-root ratio} = \frac{\text{Crown dry weight}}{\text{Root dry weight}}$$

$$\text{Seedling quality index} = \frac{\text{high gain}}{\text{diameter gain}}$$

Research completely randomized design and data analysis

This research used Completely Randomized Design with nine treatments. The treatments are P0 (control), P1 (the frequency of fertilizing used were once a week with soybeans compost), P2 (the frequency of fertilizing used were once in two weeks with soybeans compost), P3 (the frequency of fertilizing used were once in three weeks with soybeans compost), P4 (the frequency of fertilizing used were once in four weeks with soybeans compost), P5 (the frequency of fertilizing used were once a week with cow manure fertilizer), P6 (the frequency of fertilizing used were once in two weeks with cow manure fertilizer), P7 (the frequency of fertilizing used were once in three weeks with cow manure fertilizer), and P8 (the frequency of fertilizing used were once in four weeks with cow manure fertilizer).

The data obtained from observation and measurement was analyzed using linear model as follow (Mattjik and Sumertajaya 2006):

$$Y_{ij} = \mu + \tau_i + \varepsilon_{ij}$$

Note:

Y_{ij} :`Response of treatment-i and repetition-j
μ : Average mean
τ_i : The influence of fertilizing treatment-i
ε_{ij} : Error of treatment-i and repetition-j
i : treatment
j : repetition 1, 2, 3, 4 and 5

The data was processed using software SAS 9.1 portable tallysheet. Duncan multiple range test was conducted to figure out the influence of significantly different treatment.

RESULT AND DISCUSSION

The parameters observed in this research were high gain, diameter gain, total wet weight, and total dry weight (Table 1). The influence of crown-root ratio and seedling quality index was figured out based on their classification.

Table 1 Recapitulation of variance the influence of fertilizing frequency to the Sentang seedling growth

Parameter	P-*value*
Height	0.0011*
Diameter	0.0003*
Total wet weight	<.0001*
Total dry weight	0.0002*

The numbers inside table is significantly different
* = The treatment has significant different in the interval of 95% with P-value < 0.05 (α).

The result on Table 1 shows that all parameter examined by statistic test have significant different to the fertilizing frequency treatment of Sentang seedling. The next step to know how big the influence of treatment was conducted by Duncan multiple range test.

Soybean is leguminose that contents high nitrogen (N) compared to cow manure fertilizer. The best result of high gain, diameter, total wet weight value, and total dry weight value is in the treatment of compost fertilizing once in two weeks. The nitrogen (N) also help to increase parameter value because it roles in chlorophyll production (Herdiana *et al.* 2008).

Fertilizing frequency with compost once in two weeks gave the highest crown-root ratio (5.38). The high of crown-root ratio indicates the existence of nutrient and water in high number so that the root could help the shoot to grow. Growth and survival rate capacity of plant can be determined on the crown-root ratio range 1 to 3 (Darwo and Sugiarti 2008).

The seedling adaptability to new environment can be described by seedling quality index. The higher seeding quality index indicates the better seedling quality. Fertilizing frequency treatment to Sentang seedling gave seedling quality index about 0.01 to 0.03. Seedling quality index under 0.09 have a low ability for adaptation in the field (Yuniarti *et al.* 2004). The seedling quality index value from fertilizing frequency is still low and unready to be moved to field. The seedling quality index can be increased as the time goes. Sentang seedling in plastic bag will be ready for planting on the age of 6 months or 12 months (Joker 2002). The short observation period is the factor of low seedling quality index.

The nutrient content of N, P, and K in soybean compost has achieved the minimum value. The minimum value of N is 0.40%, P 0.10%, and K 0.20%.

The C/N ratio content that suitable for plant is 10 at minimum and 20 at maximum (SNI 2004), while soybean compost manufactured has value of 27.25. That C/N ratio value is considered as slightly high. The content of N, P, K in cow manure fertilizer is lower than soybean compost. The C/N ratio content of cow manure fertilizer is higher than soybean compost. Organic material which content C/N ratio more than 30 would have soil nitrogen immobilization.

CONCLUSION

Fertilizing frequency using soybean compost and cow manure fertilizer gave an optimal growth to Sentang seedling. Fertilizing frequency once in two weeks using soybean compost gave significant different to the parameter observed except seedling quality index. Soybean compost has lower C/N ratio content compare to cow manure fertilizer so the nutrient content is easier to be absorbed by Sentang seedling.

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