

THE INCREASED PRODUCTION OF APPLICATED ASH SAWDUST ON MARSHLAND (INDRALAYA) FOR VEGETATIVE GROWTH OF RED PEPPER (*Capsicum annum L.*) VAR. CEMETI

Rahmat Pratama¹, Fikri Adriansah², Ayu Safitri³, Rahman Ismail M.S⁴

¹ Plant Protection Department, Faculty of Agriculture, Sriwijaya University

² Agronomy Department, Faculty of Agriculture, Sriwijaya University

³ Student of Management Environment, Sriwijaya University

⁴ Biology Department, Faculty of Mathematic and Natural Science

*Corresponding Author: rahmatpratamau@pps.unsri.ac.id

Received on 05th September 2017 and Accepted on 11th November 2017

ABSTRAK

Telah dilakukan penelitian tentang "Peningkatan Hasil Produksi dengan Pemberian Abu Serbuk Kayu Pada Tanah Rawa Terhadap Pertumbuhan Vegetatif Cabai (*Capsicum annum L.*) var. Cemetz". Penelitian ini dilaksanakan dari September sampai November 2017 di rumah kaca dan laboratorium Hama Penyakit Tanaman Jurusan Proteksi Tanaman Fakultas Pertanian. Tujuan penelitian untuk mengetahui pengaruh pemberian abu serbuk kayu pada tanah rawa terhadap pertumbuhan vegetatif cabai. Penelitian ini menggunakan Rancangan Acak Lengkap dengan taraf pemberian abu serbuk kayu 10, 20, dan 30 g/ kg tanah dan tanpa abu. serbuk gergaji (kontrol), masing-masing perlakuan dengan 6 ulangan. Hasil penelitian menunjukkan bahwa pemberian abu serbuk kayu pada tanah rawa dengan takaran 10 g/ kg tanah memberikan hasil yang nyata pada tinggi tanaman 53,28 cm dan jumlah cabang 9,2, tetapi tidak berpengaruh nyata terhadap berat kering tanaman.

ABSTRACT

The research " The Increased Production of Applied Ash Sawdust on Swamp Land (Indralaya) For Vegetative Growth of Red Pepper (*Capsicum annum L.*) var. Cemeti " has done, from September to November 2017. It was conducted at green house and Pest Diseases Plant Laboratory, Plant Protection Department, Agriculture Faculty, University of Sriwijaya. This research was aimed to know the effect of applied ash sawdust on vegetative growth of red pepper. The Completely Randomized Design with treatments are : 10, 20, and 30 g/ kg marshland and without ash sawdust (control), with 6 replicates each treatments. The result showed that applied ash sawdust on measure 10 g/ kg soil significantly on number of growth 53.28 cm and number of branch 9.2, but not differ on dry weight of red pepper.

Keywords : Swamp land, ash sawdust, branch, red pepper

INTRODUCTION

Chili (*Capsicum annum* L.) is a horticultural commodity that is cultivated by many farmers because these products are needed by almost every layer of society as a daily menu of dishes. Chili fruit is known as flavoring and complementary ingredients various Indonesian specialties. The need for this commodity continues and increases with the variety of types and diets that utilize this product (Nawangsih & Agus, 1998). Chilies can be used as an ingredient in traditional medicines and food seasoning (Setiadi, 1993).

Steps to be taken in increasing the production of chili especially technical preparation (toward generating production) and non technical preparation (production planning and marketing) (Prajnanta, 1999). The use of improved varieties (hybrids) is the first step in intensive chili cultivation. In general, hybrid chili has the following properties. the growth is so rapid that it is very early in life, highly responsive to high fertilization, better fruit quality and heavier fruit weight than local chilli, usually resistant to pests and plant diseases, and production per plant and per area is much higher than local chilli the same cultivation action. One type of chili varieties is Cemeti which has properties can be planted in the rainy season, resistant to pests, small fruit shape, long, and curly, has a very spicy flavor, can be harvested from the age of 85 days after planting, and can be harvested as much 10-13 times (Prajnanta, 1999).

Much effort has been made to improve the suitability of swamp land for agricultural production. The efforts that have been carried out generally lead to physical, chemical and biological soil improvements that are more suitable for plant growth and development (Lakitan, 2000). Sour soil is not good for chilli growth (Wamiati 1997), then the efforts undertaken to increase the productivity of marginal land are sprinkled with lime and fertilization, but at the farmer level the use of lime is difficult to implement because of its expensive price. Therefore it is necessary to find another alternative to increase the pH of swamp soil (Siregar, 1991).

Ash residue known to be very helpful in increasing the fertility of physical, chemical, and biological soil, but the content is relatively low haranya element, addition ash is also known to contain a lot of base cations and having a pH of alkalis (Hermawan & Nuni, 2000).

Based on research Siregar (1991), to examine the effect of sawdust ash in increasing the production of certain types of mustard greens (Cruciferae) on peat soils. The experiment was conducted using 4 types of mustard and 3 doses of sawdust as 0, 3, and 6 kg / mz. The application of sawdust ash increased the soil pH from 4.0 to 7.2 and 75, respectively, after treated ash dust as much as 3 and 6 kg / m² analyzed at the end of the study. The increase in soil pH is also followed by a marked increase in the amount and 'saturation of bases and the availability of soil phosphates. Each treatment had a significant effect on plant height, wet weight, and dry weight at harvest.

The swampy soil has a low pH, for improvement it can be done with the addition of wood dust ash. Ash wood powder is known to contain many alkaline cations and has alkaline pH so that it can increase soil pH and affect nutrient availability and nutrient absorption of chili plants.

MATERIALS AND METHOD

2.1. Time and Place

This research was conducted from September to November 2017. Sampling of soil sample in Tidal area of Tanjung Senai Village of Ogan Ilir District, South Sumatera. The research was conducted in Pest Diseases Plant Laboratory, Plant Protection Department, Agriculture Faculty, University of Sriwijaya.

2.2. Tools and Materials

Equipment used in the field such as 3 mm sieve, hoe, bucket, gauge, polybag 8 kg, soil tester, and scales, While the materials needed are water, meranti wood dust, chilli seed var. Cemeti, Furadan, sand, manure, KCl fertilizer, urea fertilizer, TSP fertilizer, and swamp land.

2.3. Research design

This study used a completely randomized design with four treatments and six replications. each treatment in each replication consisted of 1 plant so that the total was 24 plants. The treatments to be tried are different doses of meranti wood dust on the swamp soil:

- A0 = without meranti ash powder
- A1 = 10 g from meranti wood dust / kg of swamp soil
- A2 = 20 g from meranti wood dust / kg of swamp soil
- A3 = 30 from meranti wood dust / kg of swamp soil (Harun and Yernelis, 1990)

2.3.1. Preparation of Seed Media

Media in the form of a mixture of manure, soil, sand with a ratio of 1: 1: 1. Medium mixed medium and added with 4% formalin as much as 2.4 liters for sterilization. The media was watered and stirred, then covered with plastic for two weeks. Furthermore, the media is put into a tub nursery (Widiastiti, 1997).

2.3.2. Seed Seeding

The seeds are soaked in water at 40 ° C for 10 minutes and left for 4 hours. Then the chilli seeds are put into a nursery tub and placed in the shade. Chili seedlings are kept until the age of 21 days (Widiastiti, 1997).

2.3.3. Preparation of Planting Media

The soil taken for growing media is a swamp taken around the road of Bagan Siapi-api with a pH of 4.5, at a depth of 20 cm. Then dried and filtered with 3 mm sieve and then put as much as 5 kg of swamp soil in polybag measuring 8 kg then given ash powder of meranti wood according to treatment and sterilized with formalin 4% as much as 2,4 liter, closed left for 2 weeks (Widiastiti, 1997). 3.3.4. Seedling Seedling The ready seedling is seed 21 days old, put into plant medium as deep as 2 cm (Harun & Yemelis, 1990).

2.3.5. Maintenance

Maintenance includes watering, fertilizing, weed control, and pest control. Watering done 2 times a day in the morning and afternoon with a water volume of 2.4 liters. The fertilizer given is 0.2 g of urea fertilizer per 5 kg of soil, TSP fertilizer as much as 0.4 g per 5 kg of soil, KCl fertilizer as much as 0.2 g per 5 kg of soil. Urea fertilizer is given 2 times ie $\frac{1}{2}$ at planting, $\frac{1}{2}$ after 2 weeks after planting, while TSP fertilizer and KCl fertilizer are given at planting time. Weed control is performed on every weed that grows by weeding (Widiastiti, 1997).

3.3.6. Observation

Observations made to:

1) Plant height

The measurement of plant height from root neck to the point of growing stems begins after the plant is planted in planting medium and done every week until the flower primordia phase (Widiastiti, 1997).

2) Number of Branches

The number of chili branches was calculated at the end of the study, by counting the last number of branches (Sitompul and Bambang, 1995).

3) Dry weight

The weighed weights of root, stem, and observation leaf were done at the end of the study by drying the plants in the sun for 2 weeks until they were constant (Lakitan, 1996).

Supporting data include:

1) soil pH

soil pH measured initial pH, pH after treatment, and final pH of observation.

2) Age of vegetative plant

The age of the vegetative plant begins at the beginning of the nursery until a primordial flower emerges (Prajnanta, 1999).

2.4. Data analysis

Plant growth data were statistically analyzed using ANOVA if there is significant further test Duncan at α 0.05

RESULTS AND DISCUSSION

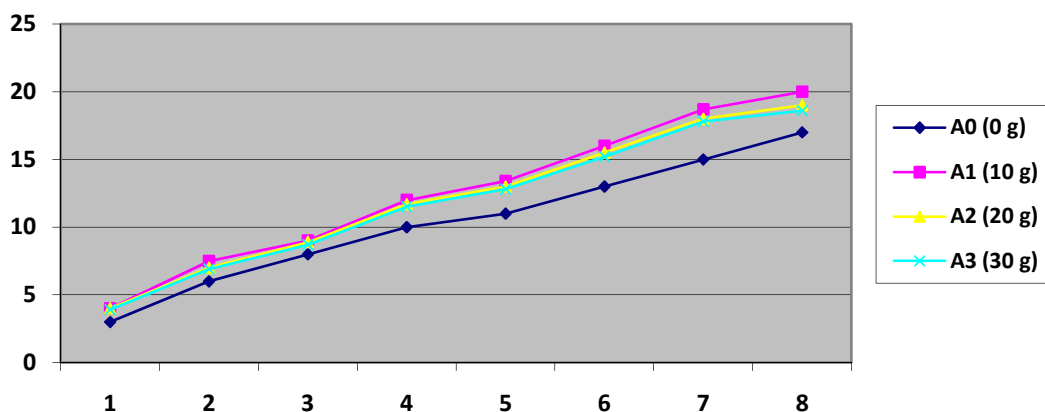
3.1 Plant height

Table 1. High pepper plants (*C. annum* L.) var. *Cemeti* the treatment dose Meranti sawdust ash different.

Dust of Meranti wood dust (g/kg soil)	Plant height (8 weak) (cm)
Without giving sawdust ash (control)	17,06 ± 5,97 bcd
10 (A1)	53,28 ± 22,80 a
20 (A2)	37,68 ± 21,28 Ab
30 (A3)	34,63 ± 9,31 bc

Note : the data followed by the same letter shows no significant difference in α 0.005 according to DNMR; \pm standar deviasi

The height of the pepper plant for 8 weeks shows the difference between the chili pepper and the wood powder. This is because the wood powder can improve the quality of the land. Alkaline ash may increase soil pH, ie from 4,5 to be 6,2 thus increasing the availability of soil nutrients to be absorbed by plants. According to Suastika (1999) organic matter from the wood powder can solve the dissolved aluminum complex, thus reducing its solubility and donating the OH- ion which can increase the pH. Increased soil ph is associated with an increase in the amount of calcium and magnesium in the soil solution, because it is the dominant exchangeable bases. As a result of pH above 5.5 the soil has a cation exchange capacity twice as much (Foth, 1998)., causing high Na + ions to inhibit the absorption of Ca²⁺ + ions (lakitan, 2000; Salisbury & Ross, 1995).



In the above graph shows the high difference of pepper plants. Pepper plants at a dose of 10 g / kg of soil showed the highest growth, whereas the lowest growth is in this control is thought to be caused by infertile plant growth on acid soil ph 4.5. Aluminum saturation, where direct damage to the root system (Sanchez, 1992). In the 20 and 30 g doses of wood powder / kg of soil crop growth is not too high, it is suspected that high Na + content causes deflection of soil clay particles and air-filled pore loss, therefore aggregation

of soil particles does not occur, resulting in low pore space and the soil becomes like a glue (Fitter & Hay, 1998).

3.2 Number of branches

The granting of meranti wood powder with different doses to the number of branches of chili can be seen in table 2 below:

Tabel 2. Number of chili branches (*C. annuum* L.) var. *Cemeti* on the treatment of different doses of Meranti ash powder

Meranti wood ash dose powder (g/kg soil)	Plant High (8 week) (cm)	
Without the grain of ash (control)	2 ± 1,03	Bcd
10 (A1)	9,2 ± 6,41	A
20 (A2)	4,3 ± 2,13	Ab
30 (A3)	3,5 ± 2,51	Bc

Ket: data followed by the same letters show no significant difference in α 0.005 according to DNMR; ± standard deviation

The difference is very evident in the number of chili branches. This is because the generative age of each treatment is not the same. The generative phase of each treatment is not the same because the division of assimilation results is important to produce flowers, fruits, and seeds, whereas in the vegetative growth phase it will determine the last leaf area, root development, and branching (Gardner, 1991). But N, P, K, and Mg in large quantities also leaf out of the leaves to branch before the leaves fall, and used for new growth in the following season (Salisbury & Ross, 1995).

3.3 Dry Weight

Provision of meranti powder ash with different doses of dry weight can be seen in table 3 below:

Tabel 3. Dry weight of chili (*C. annuum* L.) var. *Cemeti* on the treatment of different doses of Meranti ash powder

Meranti wood ash dose powder (g/kg soil)	Plant High (8 week) (cm)
Without the grain of ash (control)	26,6 ± 24,22
10 (A1)	508,3 ± 388,40
20 (A2)	315 ± 210,40
30 (A3)	235 ± 191,18

Ket: data followed by the same letters show no significant difference in α 0.005 according to DNMR; ± standard deviation

Differences in dry weight of each plant are affected by solar radiation is absorbed and the energy utilization efficiency for the fixation of CO₂, the main plant organ that absorbs solar radiation and is leaf (Gardner *et. al.*, 1991). To produce 1 kg of dry biomass, including stems, roots, and leaves as much as 230 kg of water is transpired, this is because the molecular framework of all organic materials in plants consists of carbon atoms

that must be obtained from the atmosphere. Carbon enters the plant as CO₂ through the stomata and water out diffusely through the same pore when the stomata opens.

CONCLUSION

Based on the research that has been done then it can be concluded that growth of pepper plants (*C. annum* L.) var. *Cemeti* with the grain of dust on a dose of 10 g / kg of swamp soil increases the plant height and number of branches. In addition, treatment of meranti ash powder has no significant effect on dry weight of pepper plant (*C. annum* L.) var. *Cemeti*

REFERENCES

- Foth, H.D. 1998. *Dasar-dasar ilmu tanah*. Endang, D.P, Dwi, R.L, & Rahayuning, T. (Penerjemah). Gadjah Mada University Press. Yogyakarta.
- Gardner. 1991., F.P., R.B. Pearce, & R.L. Mitchell. 1991. *Fisiologi Tanaman Budidaya*. (Penerjemah). Penerbit Universitas Indonesia.
- Harun, M.U. and Yernelis,S. 1990. Tanggapan Fisiologi Tanaman Cabai (*Capsicum annum* L.) Terhadap Penambahan Hara Mikro Melalui Daun. Lembaga Penelitian. Universitas Sriwijaya.
- Hill, A.F. 1978. *Economic Botany*. McGraw-Hill Book Company. Inc. New York. 560 hlm.
- Lakitan, B. 2000. *Dasar-Dasar Fisiologi Tumbuhan*. PT RajaGrafindo Persada. Jakarta.
- Nawangsih, A.A., Heri P., & Agus W. 1999. *Cabai Hot Beauty*. Penebar Swadaya. Jakarta.
- Prajnanta. 1999. *Mengatasi Permasalahan Bertanam Cabai*. Penebar Swadaya. Jakarta.
- Salisbury, F.B., & C.W.Ross. 1995. *Fisiologi Tumbuhan*. Diah R. Lukman & Sumaryono (Penerjemah). Penerbit ITB. Bandung.
- Sanchez, P.A. 1992. *Sifat dan Pengelolaan Tanah Tropika*. Johar T. Jayadinata (Penerjemah). Penerbit ITB. Bandung.
- Setiadi. 1993. *Bertanam Cabai*. Penebar Swadaya. Jakarta.
- Siregar, C. 1991. *Pengaruh Abu Serbuk Gergaji Terhadap Produksi Sayur Famili Cruciferae Pada Tanah Gambut*. Berita Ilmu Pertanian Hevea. Padang.
- Sitompul, S.M., and Bambang, G. 1995. *Analisis Pertumbuhan Tanaman*. Gadjah Mada University Press.
- Suastika, I.W. 1999. *Perbaikan Kualitas Lahan Gambut Dengan Menggunakan Abu*. Prosiding Seminar Hasil Pertanian BKS-PTN Barat. Vol. 2. Fakultas Pertanian Unsri. Indralaya. Iv-B4.
- Wamiati. 1997. Tinjauan Budidaya Tanaman Cabai (*Capsicum annum* L.) Dilahan Lebak Desa Pelabuhan Dalam Kecamatan Pemulutan Ogan Komering Ilir. Lembaga Penelitian. Universitas Sriwijaya. Indralaya.
- Widiastiti, I. 1997. Pengaruh Waktu Penggenangan Terhadap Pertumbuhan Dan Hasil Tanaman Cabai (*Capsicum annum* L.). Lembaga Penelitian. Unsri. Indaralaya