Effect Mulching and Fertilizer Za on the Growth and Production of Red Chili in Seluma Lowlands

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ABSTRACT

The purpose of this research was to determine the effect of mulching and ZA fertilizer dose on the growth and production of red chili in the lowlands. The research was conducted in farmers' fields Rimbo Kedui Village from April to August 2011. The research used a factorial randomized block design (RBD) consisting of two factors: first factor (I) used of mulch (M) with 3 types of mulch : M0 = Without mulch (control), M1 = Black plastic mulch and M2 = Straw Mulching with a thickness of 5 cm each treatment, while second factor (II) dose of ZA fertilizr with 5 levels: Z0 = without ZA (control), Z1 = 350 kg / ha, Z2 = 400 kg / ha, Z3 = 450 kg / ha, Z4 = 500 kg / ha. Each treatment was repeated 5 replicates. Data were analyzed by analysis of variance and tested further by DMRT to determine differences between treatments. The results showed that the use of mulch significantly affect the number of branches, stem diameter, yield plant and productivity with the highest value in the treatment of black plastic mulch. Provision of ZA fertilizer significant effect on the productivity of pepper plants with the highest average value of 16.81 t / ha in the provision of ZA fertilizer with a dose of 400 kg/ha.

Keywords: Capsicum annum L., growth and production, mulch, ZA fertilizer.

INTRODUCTION

Red chilli (*Capsicum annum* L.) is one of the vegetable commodity has a high economic value and can not be left out of society in everyday life. High demand every day cause red chili is one of the strategic commodities. The need for chili in Indonesia continues to increase from year to year with the price fluctuating (volatile). The phenomenon of planting chili peppers make into one very attractive agricultural business. In addition to its high selling price, chili also can be harvested many times in a vulnerable time is not too long (Agromedia, 2011).

One of the problems encountered in the cultivation of red chilli at the farmers' level is the low productivity of the plant. Many factors need to be considered in getting the plant in order to obtain optimum results and the quality is good, one of which is a factor cultivation techniques. Mulching is a way of improving the system of air soil and availability of water for crops. Besides mulching can accelerate the growth of newly planted crop (Barus, 2006). The use of mulch material on the cultivation of red chillies can be of natural materials, such as crops, crop waste, leaves, plant stems and rice straw. While the synthetic materials can be used such as polyethylene plastic just from synthetic materials are quite expensive when compared with natural mulch material.

Chili plants also will provide maximum results if less nutrient availability and poor soil structure. In this case the fertilizer business will increase yields quantitatively. The composition of NPK compound fertilizers and ZA is the type of fertilizer used by farmers in the cultivation of chili. However, the dose is so diverse that it is necessary to study a dose of ZA.

The aim of research to determine the effect of mulching and ZA fertilizer on the growth and production of red chilli lowland Seluma.

MATERIALS AND METHODS

The study was conducted in farmers' fields Rimbo Kedui Village District of South Seluma carried out from April to August 2011. Materials and tools used are red chilli seeds TM 999 varieties of

manure, fertilizer base, urea fertilizer, straw, black plastic, desenemix fungicides, insecticides curacon 50 EC, hoes and others deemed necessary.

This study uses a randomized block design (RAK) factorial consisting of two factors: the first factor the use of mulch (M) with 3 types of mulch: M0 = Without mulch, M1 = plastic mulch Black and M2 = Mulching Straw thickness of 5 cm each treatment, whereas the second factor ZA dosing with 5 levels ie: Z0 = without ZA, Z1 = 350 kg / ha, Z2 = 400 kg / ha, Z3 = 450 kg / ha, Z4 = 500 kg / ha. Each treatment was repeated 5 times.

Implementation of research that perfectly cultivated land (plowed and raked) and made beds / plots with a size of 1 x 3 m, 40 cm high and 60 cm distance between the plot. after fertilization (base fertilizer). Installation of mulch made during the scorching sun in order to not loose mulch, while mulching straw and reeds that have been dried is spread evenly over the surface of the plot. Further planting by punching holes in the mulch in accordance with spacing and size of the planting medium. Fertilization is done 3 times (0, 1 and 2 months after planting). Dose of fertilizer given SP-36 300 kg / ha, Urea 150 kg / ha, KCl 150 kg / ha and ZA (according to treatment), given three times at the age of 0 hst, ages 1 and 2 months after planting each third dose SP-36 except that the entire fertilizer given at 0 DAP.

Parameters measured were plant height (cm), stem diameter (mm), the number of branches (fruit). Yields per plant (kg) and productivity (t / ha). Data were analyzed by analysis of variance (ANOVA) and tested further by DMRT to determine differences between treatments.

RESULTS AND DISCUSSION

Growth Performance of Chili

From the research that the parameters of plant height, stem diameter and number of branches there is no interaction between treatment mulching and the use of doses of ZA are presented in Table 1-3 below.

Table 1-3 shows that the behavior of mulching there is significant differences on plant height age 4 WAP, but at the age of 8 plants and 12 WAP plant height there is no real difference. While treatment doses of ZA only at the age of 12 WAP plants that do not show differences, but at the age of 4 and 8 weeks after planting there is a real difference between the dosage of ZA on plant height.

In the parameter stem diameter that between the behavior of mulching with doses of ZA did not show significant differences in plant age 4 WAP and 8 WAP, but at the age of 12 WAP in the treatment of mulching differences while treatment doses of ZA still did not show differences real.

On the parameter number of branches that the behavior of mulching with the use of fertilizers ZA showed significant differences in the age of the plant 4 WAP and 8 WAP, but at the age of 12 WAP in the treatment of mulching still showed significant differences while the treatment doses of ZA did not show significant differences (P>0.05).

Table 1. Mean plant height (cm) by the use of mulch and fertilizer plants ZA at the age of 4, 8 and 12 weeks after planting (WAP)

No	Treatment	Age		
		4 WAP	8 WAP	12 WAP
	Use of Mulch (M) :			
1.	M0= Without Mulch	24.19^{b}	74.19^{a}	115.97^{a}
2.	M1= Black plastic mulch	32.83^{a}	79.83^{a}	124.89^{a}
3.	M2= Straw mulch	24.43^{b}	68.27^{a}	121.7 ^{a}
	Fertilizer use ZA (Z) :			
1.	Z0 = no ZA	27.65^{ab}	67.75^{c}	115.99^{a}
2.	Z1 = 350 kg/ha	25.22^{ab}	85.12^{a}	125.26^{a}
3.	Z2 = 400 kg/ha	21.43^{b}	71.47^{ab}	121.73^{a}
4.	Z3 = 450 kg/ha	30.61^{a}	83.21^{a}	124.68^{a}
5.	Z4 = 500 kg/ha	26.53^{ab}	76.43^{ab}	116.63^{a}

Description: The numbers in the same column followed by the same letter show no significant difference at 5% level DMRT.

Table 2. Mean stem diameter (mm) with the use of mulch and fertilizer plants ZA at the age of 4, 8 and 12 weeks after planting (WAP).

No	Treatment	Age		
		4 WAP	8 WAP	12 WAP
	Use of Mulch (M) :			
1.	M0= Without Mulch	3.21^{ab}	6.34^{ab}	9.21^{a}
2.	M1= Black plastic mulch	4.65^{a}	7.26^{a}	10.86^{b}
3.	M2= Straw mulch	4.16^{a}	6.13^{ab}	11.16^{b}
	Fertilizer use ZA (Z) :			
1.	Z0 = no ZA	3.25^{a}	6.34^{a}	9.45^{a}
2.	Z1 = 350 kg/ha	3.32^{a}	8.65^{a}	10.64^{a}
3.	Z2 = 400 kg/ha	4.62^{a}	7.96^{a}	10.66^{a}
4.	Z3 = 450 kg/ha	3.20^{a}	7.39^{a}	11.09^{a}
5.	Z4 = 500 kg/ha	4.25^{a}	6.06^{a}	10.23^{a}

Description: The numbers in the same column followed by the same letter show no significant difference at 5% level DMRT.

Table 3. Mean number of branches with the use of mulch and fertilizer plants ZA at the age of 4, 8 and 12 weeks after planting (WAP)

No	Treatment	Age		
		4 WAP	8 WAP	12 WAP
	Use of Mulch (M) :			
1.	M0= Without Mulch	6.10^{b}	25.28^{b}	38.08^{b}
2.	M1= Black plastic mulch	8.56^{a}	30.12^{a}	40.88^{a}
3.	M2= Straw mulch	6.33^{b}	29.32^{ab}	40.32^{ab}
	Fertilizer use ZA (Z) :			
1.	Z0 = no ZA	6.16^{b}	24.15^{b}	38.13^{a}
2.	Z1 = 350 kg/ha	7.23^{ab}	26.46^{ab}	40.87^{a}
3.	Z2 = 400 kg/ha	9.12^{a}	27.68^{a}	39.87^{a}
4.	Z3 = 450 kg/ha	8.45^{ab}	26.25^{ab}	41.40^{a}
5.	Z4 = 500 kg/ha	6.52^{ab}	25.05^{ab}	38.53^{a}

Description: The numbers in the same column followed by the same letter show no significant difference at 5% level DMRT.

Plants Production Performance of chili

From the research that pepper crop production data, production per hectare and the results of each treatment tile there is no interaction between treatment mulching with doses of ZA. The average yield and tile can be seen in Table 4 below.

Table 4. Average chilli crop production per plant (kg) and productivity from the paving (t / ha)

Treatment	Production per Plant (kg/tan)	Productivity (t/ha)
Use of Mulch (M) :		
M0= Without Mulch	0.99^{b}	10.43^{b}
M1= Black plastic mulch	1.33^{a}	16.63^{a}
M2= Straw mulch	1.21^{ab}	13.88^{ab}
Fertilizer use ZA (Z) :	0.69^{a}	10.57^{b}
Z0 = no ZA	1.03^{a}	12.03^{b}
Z1 = 350 kg/ha	1.16^{a}	16.81^{a}
Z2 = 400 kg/ha	1.13^{a}	15.93^{ab}
Z3 = 450 kg/ha	1.11^{a}	15.91^{ab}
Z4 = 500 kg/ha		

Description: The numbers in the same column followed by the same letter show no significant difference at 5% level DMRT.

Based on Table 4 can be seen more and more the resulting production per plant, the production per hectare is higher. The parameters of production per plant and yield per hectare was significantly different in the treatment of mulching, whereas treatment with doses of ZA fertilizer production per plant was no significant differences in production per hectare but there is significant differences.

In the treatment of mulching highest average production per well production plant and the production per hectare is the use of black plastic mulch (M1) which is an average of 1.33 kg/tan and 16.63 t/ha. While a low of treatment without the use of mulch (M0) which is an average of 0.99 kg/tan and 10.43 t/ha. At treatment doses of ZA highest average production per well production plant and the production per hectare is ZA dose of 400 kg/ha (Z2) which is an average of 1.16 kg/tan and 16.81 t/ha. While a low of treatment without using ZA (Z0) is an average of 0.69 kg/tan and 10.57 t/ha.

Mulching showed that mulch could increase the photosynthesis process of plants and can maintain soil fertility and soil moisture as a result of the influence of mulch which can reduce the rate of evaporation so that the water content of the soil will be available for plant growth (Barus, 2006). According to Wiryanta (2006) that the use of mulch a positive impact on the growth of plants because it can stabilize the temperature, keeping humidity and maintain the availability of water that can be used for translocation of nutrients from the roots to the leaves. The use of organic mulches can improve growth and yield great chili. That is because the organic mulch can retain moisture and reduce soil temperature, and suppress the growth of weeds and reduce weed competition (Damaiyanti *et al.*, 2013). While the use of black plastic mulch can improve outcomes chili silver, because silver black plastic mulch can suppress weed growth which is the main competitor in the use of light, water and nutrients; as well as reducing crop damage due to thrips and virus (Voss, 1994).

While the addition of nitrogen fertilizer with ZA obtained the optimal dose in the range of 400 kg / ha (Table 4). According to Taufik et. al. (2013) that administration of too much nitrogen will make the plant supplied chilli grown too fertile, but delayed flowering plants for vegetative growth of pepper plants are more dominant than the generative growth. This is in accordance with the statement of King and Purcell (2005) that the nitrogen can seriously hamper flowering so that the longer harvest period.

CONCLUSION

The results showed that the use of mulch significantly affect the number of branches, stem diameter, yield plant and productivity with the highest value in the treatment of black plastic mulch. Provision of ZA fertilizer significant effect on the productivity of pepper plants with the highest average value of 16.81 t / ha in the provision of ZA fertilizer with a dose of 400 kg/ha.

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