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A SOIL RESPIRATION ON CASSAVA PLANTATION SUBJECTED BY SOIL AMENDMENT AND ANTAGONIST PLANT FOR WHITE ROT FUNGI ON ULTISOLS TULANG BAWANG, LAMPUNG

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Introduction

Tulang Bawang District at Lampung Province is covered by Ultisols soil to which have been incidenced by White Rot Fungi (*Rigidiporus microporus*) at rubber plantation since long time ago. Beside it attacked rubber tree, it also attacked cassava, so that cassava tree can be using as an indicator for controlling its disease. For controlling White Rot Fungi diseases, application of soil amendment and antagonist plant was inhibited the growth of soil borne diseases, especially which is caused by fungi. Soil biological properties, such as soil respiration could be used as indicator for soil health, biodiversity, and ecological balance. The principal objective of this study was to examine the White Rot Fungi incidence and soil respiration samples collected from the cassava plantation on the Ultisols soil subjected by soil amendment and antagonist plant.

Keywords. Antagonist plant, soil amendment, soil respiration, white rot fungi

Materials and Methods

Field experiment had been started on April 2009 at Penumangan Baru Village, Tulang Bawang District, Lampung Province. Before the land was planted by cassava, the land had been planted by rubber in which attacked by White Rot Fungi diseases. The experiment were arranged in a completely random block design with four replications. The treatments were consisted of : K0= control, Cm: Cow dung compost with a dose of 1.6 kg plant^{-1}, Sf = Sulfur element with a dose of 45 g plant^{-1}, Do = Dolomite ($(CaMg(CO_3)_2$ with a dose of 45 g plant^{-1}, L= 'Lengkuas' (*Alpinia galanga*) with 2 nurseries at the side of cassava plant, G = 'Garut' (*Marantha arundinacea*) with 2 nurseries at the side of cassava plant and Lm= 'Lidah Mertua' (*Sansieviera trifasciata*) with 2 nurseries at the side of cassava plant. Soils in the cassava row were sampled two times (3 and 6 month after application). Soil samples (0–15 cm) from individual plots per treatment were collected for the analysis of chemical properties and microbial parameters. Soil respiration was analyzed using Jenkinson Methods (*Jenkinson* and Powlson (1976)

Results and Discussion

The results showed that the application of soil amendment and antagonist plant significantly decreased soil respiration in soil that was incidenced by soil borne fungus both on 3 month and 6 month after application (Figure 1 and Table 1). Application of antagonist plant significantly decreased soil respiration on 3 month after application and it more decreased on 6 month after application compared to the application of soil amendment materials (compost, dolomite, and sulfur) with percentage of differences around 2.89% on 3 month after application (Table 1). Application of soil amendment such as dolomite and sulfur could decrease soil respiration on 3 month after application compared to application of compost with percentage of differences around 11.57% (Table 1). It was indicated that compost supported the activity of soil microrganism. However, on the 6 month after application of dolomite and sulfur, soil respiration increased compared to compost. Planting of *A. Galanga* and *M. Arundinacea* between row of cassava plantation decreased soil respiration compared to *S. Trifasciata*. The highest of soil respiration on control was in concomitant with the highest incidence of White Rot fungi in the cassava plantation. The low soil respiration because of soil amendment and antagonist plant application is likely to be suprresed the activity of soil microorganism, especially the activity of white rot fungi, consequently, the soil borne fungi decreased.

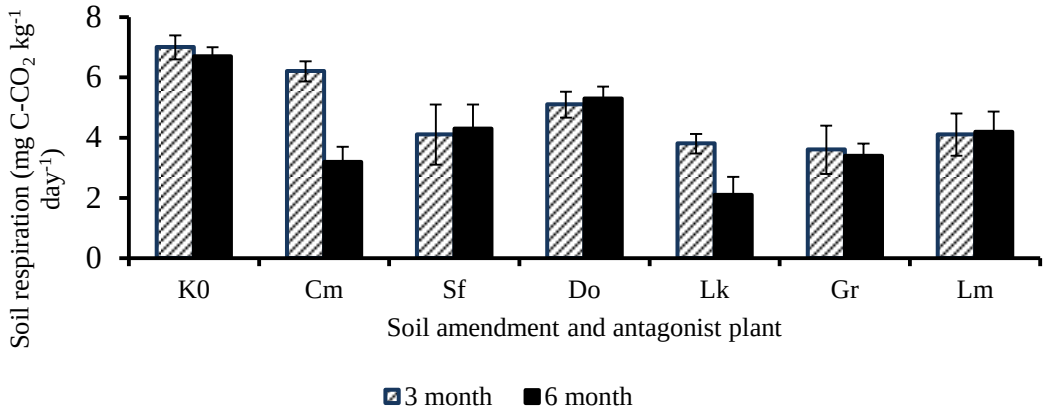

Figure 1. Soil respiration in the cassava plantation caused by soil amendment and antagonist plant application. (K0 = control, Cm = compost, Sf = sulfur, Do = dolomite, Lk = *A. Galanga*, Gr = *M. Arundinacea*, and Lm = *S. Trifasciata*.

Table 1. The contrast orthogonal effect of application of soil amendment and antagonist plant application on 3 and 6 month after application.

Contrast	F	Differences	% differences
3 Month			
C1 : Do, Sf, Cm, Lk, Gr, Lm vs K0	443.34**	-7.88	-1.58
C2 : Do,Sf, Cm vs K0	247.28**	-5.34	-8.15
C3 : Lk, Gr, Lm vs K0	560.11**	-9.47	-8.60
C4 : Lk, Gr, Lm vs Do, S, Cm	126.14**	-3.18	-2.89
C5 : Do, Sf vs Cm	212.18**	-6.18	-11.57
C6 : Gr, Lk vs Lm	10.97**	-1.405	-2.99
6 Month			
C1 : Do, Sf, Cm, Lk, Gr, Lm vs K0	304.15**	-9.23	-2.25
C2 : Do,Sf, Cm vs K0	192.90**	-8.34	-16.99
C3 : Lk, Gr, Lm vs K0	351.13**	-10.6	-11.78
C4 : Lk, Gr, Lm vs Do, S, Cm	47.04**	-2.74	-3.05
C5 : Do, Sf vs Cm	36.40**	3.62	6.49
C6 : Gr, Lk vs Lm	72.25**	-5.1	-15.36

Conclusions

Soil amendment had siginificant effect to decreasing soil respiration on the soil incidence with soil born disease. Antagonist plant were more effective to decrease soil respiration than that of soil amendment.

References

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