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BANDAR LAMPUNG**

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**SUMMARY**

In Indonesia cassava is the third main staple food after rice and corn. Increased cassava production can be done by improving agronomic technic, such as by tillage and more suitable cropping patterns. Tillage and weed control can affect the growth, production and uptake of nutrients in cassava. The objective of this research was to determine the effect of tillage and herbicides which can affect the production and harvested nutrient in cassava. The treatments being repeated 4 times of T1H0 = minimum tillage, T1H1 = minimum tillage + herbicide, T2H0 = full tillage, T2H1 = full tillage + herbicide. The results showed that (1) The minimum tillage + herbicide produced the highest harvested N and K in cassava compared to that of the other treatments; full tillage + herbicide produced the highest harvested P and C of cassava compared to that of the other treatments, (2) Minimum tillage + herbicide produced the highest fresh weight of tubers and dry weight of plants compared to other treatments.

**Introduction**

In Indonesia cassava is third main staple food after rice and corn. In addition to domestic consumption, Indonesia is also one of the countries that export cassava, finally the demand for cassava production is always increasing both in Indonesia and abroad. But the production itself decreases and cannot meet those needs. Efforts that can be made to increase cassava production are processing soil and herbicides. The objectives of this research were to determine the effect of tillage and herbicides which can affect the production and harvested nutrient in cassava.

**Material and Method**

The field experiment was conducted at Integrated Field Laboratory, University of Lampung. The treatments being arranged in non factorial Random Block Design (RBD) and repeated 4 times were T1H0 = minimum tillage, T1H1 = minimum tillage + herbicide, T2H0 = full tillage, T2H1 = full tillage + herbicide. The dry tuber., total-C of both soil and plant, total-N of soil samples and plant, available P of soil samples and the plant, exchangeable K and potassium of the plant had been measured as described by Thom and Utomo (1991).

**Result and Discussions**

**Effect of on Harvested Nutrient of Cassava**

**Nitrogen (N)**

The treatment of the minimum tillage + herbicide affected the highest harvested N in tubers, stems and in total plants compared to that of the other treatments (Table 1). Fuady (2010) reported that in treated soil was limited and not treated at all, the mineralization rate was moderate and rather slow, so that the organic N level of the soil was more sustained in the soil so it would not be easily lost and could be utilized by plants.

Table 1. Effect of Tillage and Herbicides on Nitrogen

Treatment	Harvested N (kg ha <sup>-1</sup> )				
	Tuber	Tuber Skin	Stem	Leaves	Total Plant
T1H0	33,8 ab	2,4	46,4 a	10,0	92,7 a
T1H1	51,1 c	3,8	104,2 c	9,5	168,6 c
T2H0	20,4a	3,1	50,6 a	13,5	87,6 a
T2H1	35,9b	2,2	67,0 b	12,9	118,0 b
F Test	*	ns	*	ns	*
HSD 0,05	14,1	-	10,6	-	19,5

## Phosphor (P)

The cassava yield in the treatment of the minimum tillage + herbicide produced the highest harvested P but not significantly different from the treatment of the minimum tillage and full tillage + herbicide (Table 2). The highest harvested P of cassava tubers was found at the minimum tillage treatment.

Table 2. Effect of Tillage and Herbicides on Phosphor

Treatment	Harvested P (kg ha <sup>-1</sup> )				
	Tuber	Tuber Skin	Stem	Leaves	Total Plant
T1H0	16,9 b	1,1	27,9 b	3,1	49,1 b
T1H1	18,8 b	1,7	23,9 ab	3,1	47,4 b
T2H0	9,3 a	1,2	23,1 a	4,0	37,7 a
T2H1	16,2 b	1,1	31,7 b	4,5	53,9 b
F Test	*	ns	*	ns	*
HSD 0,05	6,3	-	4,6	-	8,2

## Potassium (K)

The harvested K in tuber and the cassava plant affected by the treatments of minimum tillage + herbicide and full tillage + herbicide was higher compare to that of the treatments of minimum tillage and full tillage (Table 3). The quantity of harvested K was found mostly in the cassava stem.

Table 3. Effect of Tillage and Herbicides on Potassium

Treatment	Harvested K (kg ha <sup>-1</sup> )				
	Tuber	Tuber Skin	Stem	Leaves	Total Plant
T1H0	37,4 a	9,4	97,1 a	12,1	155,9 a
T1H1	62,4 b	10,5	119,0 b	12,0	203,9 b
T2H0	31,7 a	9,9	94,7 a	15,3	151,6 a
T2H1	45,9 a	8,7	129,3 b	16,3	200,3 b
F Test	*	ns	*	ns	*
HSD 0,05	17,4	-	17,9	-	27,0

## Carbon (C)

The highest harvested C by cassava was found in the full tillage + herbicide treatment which was significantly different compare to the other treatments (Table 4). The low carbon harvested by cassava was similar to the yield of tubers in the full tillage was observed being rotten before harvested in the poorly drainage soil.

## Effect on Production of Cassava

The highest production of tubers was found in the treatment of minimum tillage + herbicide (Table 5). This

was observed that the tubers in the treatments of both full tillage (with and without herbicide) were undergoing decay caused by a poorly soil drainage during high rainfall before harvesting.

Table 4. Effect of Tillage and Herbicides on Harvested Carbon of Cassava

Treatment	Harvested C (Mg ha <sup>-1</sup> )				
	Tuber	Tuber Skin	Stem	Leaves	Total Plant
T1H0	5,1 b	0,3	4,1 b	0,8	10,4 b
T1H1	6,6 b	0,4	3,3 a	0,8	11,1 b
T2H0	2,9 a	0,4	3,9 b	0,7	7,9 a
T2H1	4,9 b	0,4	9,9 c	1,2	16,4 c
F Test	*	ns	*	ns	*
HSD 0,05	2,0	-	0,8	-	2,3

The dry weight (biomass) of cassava in the full tillage without herbicide was the lowest compare to the other treatments (Table 6). There were no significant different of cassava total biomass among minimum tillage with and without herbicide and full tillage with herbicide.

Table 5. Effect of tillage and herbicide on to the fresh weight of cassava tubers.

Treatment	Fresh weight of tubers (Mg ha <sup>-1</sup> )		
	Tuber	Tuber skin	Tuber + Tuber skin
T1H0	38,1 a	2,3	40,4 a
T1H1	58,6 b	2,8	61,4 b
T2H0	28,3 a	2,4	30,7 a
T2H1	34,0 a	2,3	36,3 a
F Test	*	ns	*
BNT 0,05	17,1	-	17,6

Table 6. Effect of tillage and herbicide on the dry weight of cassava.

Treatment	dry weight of cassava (Mg ha <sup>-1</sup> )				
	Tuber	Tuber Skin	Stem	Leaves	Total Plant
T1H0	16,3 b	1,1	15,2 a	1,9	34,5 b
T1H1	18,9 b	1,4	16,3 ab	1,8	38,4 b
T2H0	9,3 a	1,2	14,1 a	2,3	26,9 a
T2H1	15,9 b	1,1	18,7 b	2,8	38,0 b
F Test	*	ns	*	ns	*
BNT 0,05	6,2	-	2,7	-	6,9

## **Conclusion**

(1) The treatment of minimum tillage + herbicide affected the highest harvested N and K in cassava compared to other treatments, while the treatments of full tillage + herbicide affected the highest harvested P and total-C of cassava compared to other treatments. (2) The treatment of the minimum tillage + herbicide affected the highest fresh weight of tubers and dry weight of plants compared to other treatments.

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