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“6TH INTERNATIONAL WORKSHOP ON CROP PRODUCTION AND PRODUCTIVITY UNDER GLOBAL CLIMATE CHANGE”

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*(Manihot esculenta)* AFFECTED BY TILLAGE AND HERBICIDE  
IN THE 4th PLANTING PERIOD IN GEDUNG MENENG SOIL  
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**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Tuber</th>
<th>Tuber Skin</th>
<th>Stem</th>
<th>Leaves</th>
<th>Total Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1H0</td>
<td>33.8  ab</td>
<td>2.4</td>
<td>46.4 a</td>
<td>10.0</td>
<td>92.7 a</td>
</tr>
<tr>
<td>T1H1</td>
<td>51.1  c</td>
<td>3.8</td>
<td>104.2 a</td>
<td>9.5</td>
<td>168.6 c</td>
</tr>
<tr>
<td>T2H0</td>
<td>20.4  a</td>
<td>3.1</td>
<td>50.6 a</td>
<td>13.5</td>
<td>87.6 a</td>
</tr>
<tr>
<td>T2H1</td>
<td>35.9  ab</td>
<td>2.2</td>
<td>67.0 b</td>
<td>12.9</td>
<td>118.0 b</td>
</tr>
</tbody>
</table>

**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>
<thead>
<tr>
<th>Treatment</th>
<th>Harvested P (kg ha⁻¹)</th>
<th>Tuber</th>
<th>Tuber Skin</th>
<th>Stem</th>
<th>Leaves</th>
<th>Total Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1H0</td>
<td>16.9 b</td>
<td>1.1</td>
<td>27.9 b</td>
<td>3.1</td>
<td>49.1 b</td>
<td></td>
</tr>
<tr>
<td>T1H1</td>
<td>18.8 b</td>
<td>1.7</td>
<td>23.9 ab</td>
<td>3.1</td>
<td>47.4 b</td>
<td></td>
</tr>
<tr>
<td>T2H0</td>
<td>9.3 a</td>
<td>1.2</td>
<td>23.1 a</td>
<td>4.0</td>
<td>37.7 a</td>
<td></td>
</tr>
<tr>
<td>T2H1</td>
<td>16.2 b</td>
<td>1.1</td>
<td>31.7 b</td>
<td>4.5</td>
<td>53.9 b</td>
<td></td>
</tr>
</tbody>
</table>

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 compared 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>
<thead>
<tr>
<th>Treatment</th>
<th>Harvested K (kg ha⁻¹)</th>
<th>Tuber</th>
<th>Tuber Skin</th>
<th>Stem</th>
<th>Leaves</th>
<th>Total Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1H0</td>
<td>37.4 a</td>
<td>9.4</td>
<td>97.1 a</td>
<td>12.1</td>
<td>155.9 a</td>
<td></td>
</tr>
<tr>
<td>T1H1</td>
<td>62.4 b</td>
<td>10.5</td>
<td>119.0 b</td>
<td>12.0</td>
<td>203.9 b</td>
<td></td>
</tr>
<tr>
<td>T2H0</td>
<td>31.7 a</td>
<td>9.9</td>
<td>94.7 a</td>
<td>15.3</td>
<td>151.6 a</td>
<td></td>
</tr>
<tr>
<td>T2H1</td>
<td>45.9 a</td>
<td>8.7</td>
<td>129.3 b</td>
<td>16.3</td>
<td>200.3 b</td>
<td></td>
</tr>
</tbody>
</table>

Carbon (C)
The highest harvested C by cassava was found in the full tillage + herbicide treatment which was significantly different compared 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 2. Effect of Tillage and Herbicides on Phosphor

Table 3. Effect of Tillage and Herbicides on Potassium

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

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

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

**Reference**


