Analysis of The Reducing Sugar and Carbohydrates Total of Cassava (*Manihot esculenta* Crantz.) Lampung Local Resistant to Drought Stress

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Introduction

Cassava (*Manihot esculenta* Crantz.) is the third most important crop in the world after rice and corn, and a source of staple food and income because it’s high in carbohydrates.

However, under water-deficient conditions, cassava productivity decreases and causes plant death. Therefore, cassava's tolerance to drought needs to be improved.

Induction of drought stress is using a high molecular weight osmotic agent, *Polyethylene glycol* (PEG). PEG has the ability to reduce water potential and as a selective condition to determine plant response to drought stress.

Purpose

Determine the content of reducing sugars and total soluble carbohydrates that are effective and resistant to drought stress

Procedurs

The planting medium used is a mixture of soil and organic fertilizer in a 1:1 ratio. Then, the prepared media was put into 1 kg polybags and placed in a green house. This study used 5 concentration levels consisting of 0% (control), 10%, 20%, 30%, and 40% with each concentration repeated five times. Cassava seedlings aged 4 weeks were given PEG solution into the planting media according to the concentration.

Analysis of Reducing Sugar

using the Somogyi-Nelson method

1. Preparation of Calibration Curve of Reducing Sugar

Preparation of standard glucose solution (10 mg glucose/100 mL)

→ Added 1 mL of Regensia Nelson in each tube, heated on a boiling water bath for 20 minutes

→ Cooled in a cold water until the temperature of the tube is 25° C

↓ Added 1 mL of Arsenomolybdat Regensia, shake until homogeneous.

← Measured with a Vis spectrophotometer at a wavelength of 540 nm

2. Determination of Reducing Sugar

Fresh Cassava leaf extract each concentration was taken 1 mL and put into each test tube and added 1 ml of Nelson's Regensia

Cooled in a cold water until the temperature of the tube is 25° C

Added 1 mL of Regensia Arsenomolybdat was added to the solution and then shaken until all precipitates dissolved

After the solution was mixed homogeneously, the solution was added 7 mL of distilled water and shaken until homogeneous

Measured with a Vis spectrophotometer at a wavelength of 540 nm

Analysis reducing sugar was calculated using formula.

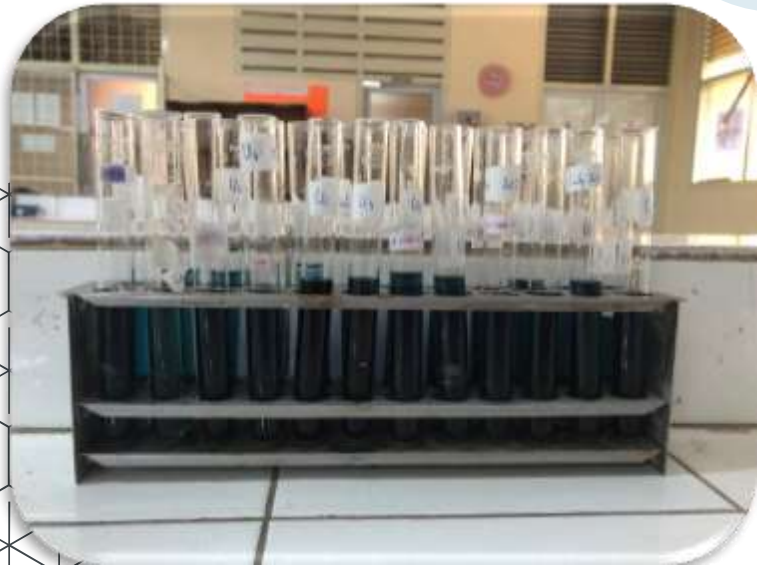
Reducing sugar content (%) = $\frac{X \text{ x } Fp}{BS}$ x 100%

Notes:

y : Sample x value

Fp : Dilution factor

BS : Sample weight



Analysis of Total Soluble Carbohydrate Content

using the phenol-sulfur method

Cassava leaves were taken and weighed as much as 0.1 gram from each plant

Leaves were pounded with a mortar and then given 10 ml of distilled water, filtered with Whatman No. 1 filter paper, after which it was put into the reaction tube

Filtrate was taken as much as 1 ml and then added 1 ml of H_2SO_4 and added 2 ml of phenol

Measured on a spectrophotometer with a wavelength of 490 nm

Absorbance results of the standard solution were made linear regression equations so that the equation was obtained $y = ax + b$

Data Analysis

Using Analysis of Variance or Anova
at 5% real level and further tested with
Tukey test at 5% real level

Results

TABLE 1. Average Reduced Sugar of Cassava

Treatment (%)	Average Reduced Sugar (Mean ± St. Dev)
0	$0{,}453 \pm 0{,}741^{b}$
10	$0{,}569 \pm 0{,}248^{b}$
20	$0{,}883 \pm 0{,}145^{b}$
30	$1{,}161 \pm 0{,}171^{a}$
40	$2{,}229 \pm 1{,}073^{a}$

Notes: **Numbers followed by the same letter indicate no significant difference between treatments at 95% confidence level.**

Results

TABLE 2. Average Total Soluble Carbohydrate of Cassava

Treatment (%)	Average Total Soluble Carbohydrate of Cassava (Mean ± St. Dev)
0	$0{,}175 \pm 0{,}081^{c}$
10	$0{,}465 \pm 0{,}215^{c}$
20	$0{,}703 \pm 0{,}123^{c}$
30	$1{,}471 \pm 0{,}742^{b}$
40	$2{,}189 \pm 0{,}166^{a}$

Notes: **Numbers followed by the same letter indicate no significant difference between treatments at 95% confidence level.**

Conclusion

The 40% concentration has the most effective reducing sugar and total soluble carbohydrate and is resistant under drought stress conditions. The higher concentration of PEG 6000, the highest content of reducing sugars and total soluble carbohydrates increased

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Thank you