Table of contents

Volume 1208

2023

Previous issue Next issue

Joint International Seminar and Congress 2022 - Southeast Asia Plant Protection Conference (SEAPPRO) and The International Society for Southeast Asian Agricultural Sciences (ISSAAS) "Smart Agriculture: Challenges and Opportunities" 03/11/2022 - 04/11/2022 Bogor, Indonesia

Accepted papers received: 20 June 2022
Published online: 21 July 2023

Open all abstracts

Preface

OPEN ACCESS 011001

Preface

+ Open abstract View article PDF

OPEN ACCESS 011002

Peer Review Statement

+ Open abstract View article PDF

Plant Protection / Entomology / Plant Pathology

OPEN ACCESS 012001

Adaptability and damage capacity of *Spodoptera frugiperda* J.E Smith (Lepidoptera: Noctuidae) on various Gramineae: a laboratory study

I W Supartha, I W Susila, I K W Yudha, I W E K Utama, I W S Yasa and P M P Gautama

+ Open abstract View article PDF

OPEN ACCESS 012002

The causal agent and the distribution of maize stalk rot disease in the Tanah Laut Regency, South Kalimantan

Salamiah, D Fitriyanti, Y Marsuni, H O Rosa and M I Pramudi

+ Open abstract View article PDF

OPEN ACCESS 012003

Evaluation of toxicity assay of the methanolic extract of oleander leaves against fall armyworm

S N Subakti Putri, A Susanto and I N Bari

+ Open abstract View article PDF

OPEN ACCESS 012004

Effect of Trap Height Level on The Capture of Fruit Fly (*Bactrocera* spp.) on Crystal Guava Field

Agus Susanto, Tohidin, Toto Sunarto, Luciana Veronica Sinaga, Ariyo Nugroho, Muhamad Basuki, Luciana Djaya and Andi Fadillah

+ Open abstract View article PDF

OPEN ACCESS 012005

The use of pre-mixture pheromone for controlling rhinoceros beetle and weevil stem borer in oil palm plantation

H Priwiratama, A E Prasetyo, T A P Rozziansha and A Susanto

+ Open abstract View article PDF

OPEN ACCESS 012006

Evaluate the population development of green leafhopper as a tungro vector in the endemic area from long-term data

Wasis Senoaji, Elisurya Ibrahim, Nur Rosida and R Heru Praptana

+ Open abstract View article PDF

OPEN ACCESS 012007

Male inflorescences, natural enemies, and climate as biotic and abiotic factors on population *Elaeidobius kamerunicus* at three soil types

F I Lubis, I Agustin, G I S Putra, I Mailisa, Taufiq, S Rahmah, C P Damayani and Rudiansyah

+ Open abstract View article PDF

OPEN ACCESS 012008

Chemical Compounds and Effectivity of *Eucalyptus grandis* Oil Against *Sitophilus oryzae* (Coleoptera: Curculionidae)

Aulia Maulidya, Rismayani, Suharto, Wiratno, Molide Rizal, Tri Lestari Mardiningsih, Evi Savitri Iriani and Rita Noveriza

+ Open abstract View article PDF

OPEN ACCESS 012009

Effect of botanical insecticide application on the population of brown planthopper and its natural enemies and the growth and production of rice plants

Rismayani, I M Trisawa, A Jufri, M Syakir and Wiratno

+ Open abstract View article PDF

OPEN ACCESS 012010

Current Infestation Status and Damage Severity of Eucalyptus Gall Wasps, *Leptocybe invasa* (Fisher & La Salle), and *Ophelimus maskelli* Ashmead (Hymenoptera: Eulophidae), Infesting Eucalyptus Germplasms in Tanzania

J Lazaro, Pudjianto and I S Harahap

+ Open abstract View article PDF

OPEN ACCESS 012011

Mechanical and Chemical Management of Wild Boar (*Sus scrofa* L.) Pests in the Bireuen District of Aceh Province

J Andrian, S Priyambodo and Dadang

+ Open abstract View article PDF

OPEN ACCESS 012012

Survey of coffee damage by coffee berry borer (*Hypothenemus hampei* Ferr.) attack in Purwabakti, Pamijahan – Bogor

Nadzirum Mubin, Bela Hasna Audia, Khalisa Sasti Andina and Farriza Diyasti

+ Open abstract View article PDF

OPEN ACCESS 012013

Detection and identification of viruses associated to mealybug wilt pineapple in Blitar, East Java, Indonesia

H Valentino, T A Damayanti, S Nurulita, F Kurniawati, D Sartiami, I S Harahap, N Mubin, M Basuki, Ratdiana and R Aziz

+ Open abstract View article PDF

OPEN ACCESS 012014

Effect of installation time and mesh size of fruit wrapping to scab symptoms on Cavendish banana

K A Kristiyani, L Nurulalia and N Maryana

+ Open abstract View article PDF

OPEN ACCESS 012015

Phytonematode on Pineapple (*Ananas comosus* L. Merrill) GP3 Clone With Symptoms of *Pineapple mealybug wilt-associated virus* (PMWaV)

Fatimatuzzahroh, F Kurniawati, TA Damayanti, M Basuki, Ratdiana and Masdiyawati

+ Open abstract View article PDF

OPEN ACCESS 012016

Effectiveness of *Trichoderma* spp. secondary metabolites formulation in controlling vascular streak dieback of cacao

R Harni, I Lakani, M Puspitasari, B Hafif and S Fadhlia

+ Open abstract View article PDF

OPEN ACCESS 012017

Efficacy of organic fertilizer, biofertilizer and endophytic bacteria to control nematodes in robusta coffee

R Harni, Saefudin, K D Sasmita, Sakiroh and W Amaria

+ Open abstract View article PDF

OPEN ACCESS 012018

Review of species, host plants, and distribution of fruit flies (Diptera: Tephritidae) in Indonesia

P Hidayat, N B Adilah, N Maryana and Suputa

+ Open abstract View article PDF

OPEN ACCESS 012019

Population Dynamics of The Bagworm, *Clania tertia* Templeton (Lepidoptera: *Psychidae*) on Immature Oil Palm at Pelalawan Regency, Riau

Castro FB Manurung and Ruly Anwar

+ Open abstract View article PDF

OPEN ACCESS 012020

Trichoderma asperellum integrated with *Fusarium decemcellulare* and *Lasiodioplodia pseudotheobromae* applications increase its colonisation in cacao seedling tissues and suppression of leaf anthracnose disease

A Rosmana, M Junaid, A Asman, U L Hanum, L Maulydia and K Yusuf

+ Open abstract View article PDF

OPEN ACCESS 012021

Effectiveness of Homemade Repellents and Spray Timing in Controlling Insect Pest in Okra (*Abelmoschus esculentus*) and Chinese Mustard (*Brassica rapa* var. *Parachinensis*)

M Norida, S S Yahya and F Ghazali

+ Open abstract View article PDF

OPEN ACCESS 012022

The sublethal doses effect on controlling of the nettle caterpillar *Setothosea asigna* (Lepidoptera: Limacodidae) on oil palm plantation

T A P Rozziansha, Ardi Juliansyah Putra Lubis and Fitria

+ Open abstract View article PDF

OPEN ACCESS 012023

The abundance of gall fly *Cecidochares connexa* as biocontrol agent of *Chromolaena odorata* in several habitat types

M G Pradana, M I Aulia, T A P Rozziansha, U Nasution and A Asmanizar

+ Open abstract View article PDF

OPEN ACCESS 012024

Survey of diseases affecting tropical fruit trees in Central Panay Island, Philippines

Belinda G. Leonida, Noemi G. Laspiñas and Greta G. Gabinete

+ Open abstract View article PDF

OPEN ACCESS 012025

Diversity and Population Dynamics of Pest in Sambawa Tea Plantation, West Java

N N Rahmah, D Sartiami and R Y M Kusumah

+ Open abstract View article PDF

OPEN ACCESS 012026

Insecticidal activity of fermented *Calatropis gigantea* L and *Crescentea cujete* L. extract combination against rice pests and natural enemies

Sylvia Sjam, A. Rosmana, S.D. Vien, T. Sulaeha, Farida, Muh. Agung and H. Adhyaksa

+ Open abstract View article PDF

OPEN ACCESS 012027

Detection and Identification of Fungal Plant Associated Diseases on Begonia

Sri Wahyuni, Hartutiningsih-M. Siregar, Titin Yulinery and Nilam Fadmaulidha Wulandari

+ Open abstract View article PDF

Agronomy / Crop Sciences / Plant Sciences

OPEN ACCESS 012028

Runner production of strawberry (*Fragaria x ananassa* Duch) production under greenhouse and open field conditions in Misamis Oriental, Philippines

R D Taylaran, A B Gonzaga Jr, J M M Lantud and B G S Silverio

+ Open abstract View article PDF

OPEN ACCESS 012029

Chitosan-based fruit coating as postharvest treatments on two pineapples (*Ananas comosus* L. Merr) clones

P M Fahmi, S E Widodo, A Karyanto and S Waluyo

+ Open abstract View article PDF

OPEN ACCESS 012030

Correlation and path analysis of three elite clones of cassava (*Manihot esculenta* Crantz)

K Setiawan, R Paresta, M S Hadi, S D Utomo, A Karyanto and Ardian

+ Open abstract View article PDF

OPEN ACCESS 012

Can boron application increase the starch content in cassava roots?

M S Hadi, R Hidayat, K Setiawan and Sarno

+ Open abstract View article PDF

OPEN ACCESS 012032

Yield performance of Sorghum Ratoon-1 as affected by different dosages of N fertilization

Muhammad Kamal, M. S. Hadi, K. Setiawan, M. Iqbal Annafi and Sungkono

+ Open abstract View article PDF

OPEN ACCESS 012033

Improved cassava (*Manihot esculenta* Crantz) growth and production by application of potassium

Sungkono, Kukuh Setiawan, Latif Nurul Fatah, Dadang Rieswanto, Muhammad Syamsoel Hadi and Ardian

+ Open abstract View article PDF

OPEN ACCESS 012034

Detection of early harvest cassava clone through plant height development and starch content in dry land of Lampung

Ardian, K Setiawan, K Noerwijati, S D Utomo, F Yelli, A Syaifudin and Sungkono

+ Open abstract View article PDF

OPEN ACCESS 012035

Comparative study of maceration and steam distilation extraction methods of volatile organic compounds composition from female oil palm inflorescences

F I Lubis, G I S Putra, I Mailisa, C P Damayani, I Agustin, Taufiq and S Rahmah

+ Open abstract View article PDF

OPEN ACCESS 012036

Heterosis analysis of F_1 progenies derived from IS21 × MR220CL2 and IS21 × UKMRC16 crossing combinations

F Ahmad, S N Hisham, S N Yusof, M S Ahmad, N A Hasan, A A Hassan, N L Sukiran, A R Bhuiyan, S Hussein, A R Harun *et al*

+ Open abstract View article PDF

OPEN ACCESS 012037

Morpho-physiological characterization of multi-canopy rice cultivation systems in various genotype combinations

M B R Khamid, A Junaedi, H Aswidinnoor, H Purnamawati and L B Prasetyo

+ Open abstract View article PDF

OPEN ACCESS 012038

Performance evaluation of pechay (*Brassica rapa* var. chinensis) using different organic growing media under hydroponic system

E S Solis

+ Open abstract View article PDF

OPEN ACCESS 012039

The agronomic performance of ratoon and modified ratoon salibu in the multi-canopy rice cultivation system

M J Simarmata, A Junaedi, H Purnamawati and I Lubis

+ Open abstract View article PDF

OPEN ACCESS 012040

Growth performances of maize (*Zea mays* L.) intercropping with soybean (*Glycine max* (L.) Merrill.) in the *legowo* row system applied with bokashi plus fertilizer on marginal soils

L Karimuna, Halim, L M H Kilowasid, T Wijayanto, W O Anti, Suharjo, Asmin and Wahid

+ Open abstract View article PDF

OPEN ACCESS 012041

In vitro propagation of red ginger (*Zingiber officinale* Roxb. var. Rubrum) in different concentrations of sucrose and growth regulator

Sitti Inderiati, Yanti, Hanafi and S. Ruhumuddin

+ Open abstract View article PDF

OPEN ACCESS 012042

Dynamics of Nutrient Availability of Inorganic Fertilizers in Oil Palm (*Elaeis guineensis* Jacq) Nursery

D W Prasetyo, L Kurniawan, M Andriani, S A Almatholib and G I S Putra

+ Open abstract View article PDF

OPEN ACCESS 012043

Response of Banggai Yam Plant (*Dioscorea alata*) and Peanut (*Arachys hypogaea*) to Liquid Organic Fertilizer in Intercropping system

Indrianto Kadekoh, Ramal Yusuf and Usman Made

+ Open abstract View article PDF

OPEN ACCESS 012044

Enhancing the yield of rice and corn using field-specific crop production management recommendations in selected areas in the Province of Iloilo, Philippines

J A Araquil Sr, L G Consabo and G G Gabinete

+ Open abstract View article PDF

OPEN ACCESS 012045

Agronomic growth and yield response of bell pepper (*Capsicum annum*) fertilized with different levels of lactic acid bacteria serum (LABS) and frequency of irrigation

L G Consabo, I E De Asis, J T Forro and J A Ganancial

+ Open abstract View article PDF

OPEN ACCESS 012046

Growth response of oil palm seedling from decanter cake application as fertiliser substitute in nursery

Abdullah Abdul Rahman, Nur Aainaa Hasbullah and Mohamadu Boyie Jalloh

+ Open abstract View article PDF

OPEN ACCESS 012047

Test the viability and effectiveness of the AMF biofertilizer prototypes using different spore carrier media on production of organic cocoa

I N Rai, I M Sudana, I W Wiraatmaja, N K A Astiari and G Wijana

+ Open abstract View article PDF

OPEN ACCESS 012048

Ensuring household food security through enhanced production of pechay (*Brassica rapa* L.) as influenced by different levels of carbonized rice hull integration

N R Gonzaga, A B Gonzaga Jr., B G S Silverio, J M L Pabellon, R D Taylaran and L L C Montecalvo

+ Open abstract View article PDF

Soil Sciences

OPEN ACCESS 012049

Correlation of Hg-N on ex-gold mining soil ameliorated with Sub-Bituminous coal and activation of Sub-Bituminous coal–NaOH

A Maulana, M Harianti, T B Prasetyo and Herviyanti

+ Open abstract View article PDF

OPEN ACCESS 012050

Characteristics of glyphosate adsorption with biochar from young coconut waste

Herviyanti, A Maulana, T B Prasetyo, A L Lita, M Harianti and M Monikasari

+ Open abstract View article PDF

OPEN ACCESS 012051

Zeoponic formula for plant growth media for ornamental plants *Aglaonema siam aurora and Anthurium crystallinum*

H Widjaja, A N Hidayah, D T Suryaningtyas, P Oktariani and Suwardi

+ Open abstract View article PDF

OPEN ACCESS 012052

Composition of Macro and Micro Fertilizers in Zeoponics for Growing Variegated Ornamental Plants

Suwardi, Octaviana Randrikasari, S. Dyah Tjahyandari, Putri Oktariani and Hermanu Widjaja

+ Open abstract View article PDF

Smart Agriculture / Digital Agriculture

OPEN ACCESS 012053

Assessing Paddy Field Health Using High-Resolution Multi-Spectral Camera in Subang Indonesia to Implement Precision Agriculture 4.0

Rendy Ferixsen The, Ali Nurmansyah, Dewi Sartiami, Wilson Ong Weizheng,

Bernadetta Alnybera Febriannaningsih, Faaris Hizba Muhammad and Farhan Alfian Nur

+ Open abstract View article PDF

Environmental Agriculture and Landscape Architecture

OPEN ACCESS 012054

Review on socioeconomic and sustainability of oil palm plantations among rural communities in Malaysia

M J Ahmad, R Ismail and F A Ghani

+ Open abstract View article PDF

OPEN ACCESS 012055

Planning for greenery under Light Rail Transit (LRT) in the section of Kelapa Gading North Jakarta

Feby Parmita Riani and Nizar Nasrullah

+ Open abstract View article PDF

Animal Sciences and Aquatic Sciences

OPEN ACCESS 012056

Traditional polyculture as a mangrove restoration solution in Delta Mahakam, East Kalimantan Indonesia

E H Hardi, H R Susmiyati, R Diana, N P Palupi, M Agriandini, G Saptiani, A N Asikin and Agustina

+ Open abstract View article PDF

OPEN ACCESS 012057

Antihelmintic Effect of Squash Seeds (*Cucurbita moschata*) and Papaya Seeds (*Carica papaya*) in Gastrointestinal Parasites in Native Chicken (*Gallus gallus domesticus*).

Charles Philip A Catedral, Renz Oliver L Gallego, Niko S De Asis and Christian Jess P Orrillante

+ Open abstract View article PDF

OPEN ACCESS 012058

Amplification of CHD-1 gene fragment in Z and W sex chromosomes of Cemani chicken using a different set of PCR primers

Galih Pambuko, Rebecca Vanessa and Sigit Prastowo

+ Open abstract View article PDF

OPEN ACCESS 012059

Effects of *Black Soldier Fly* oil and calcium soap supplementation on rumen fermentability of Garut Sheep

R H C Ningsih, A D Ramadani, D J Raynissa, D Diapari, D M Fassah, D A Astuti and A Sudarman

+ Open abstract View article PDF

OPEN ACCESS 012060

The effect of different energy sources on the performance and blood metabolites of sheep

A Sudarman, A Ananda, R Pangestu and L Khotijah

+ Open abstract View article PDF

JOURNAL LINKS

Journal home

Journal scope

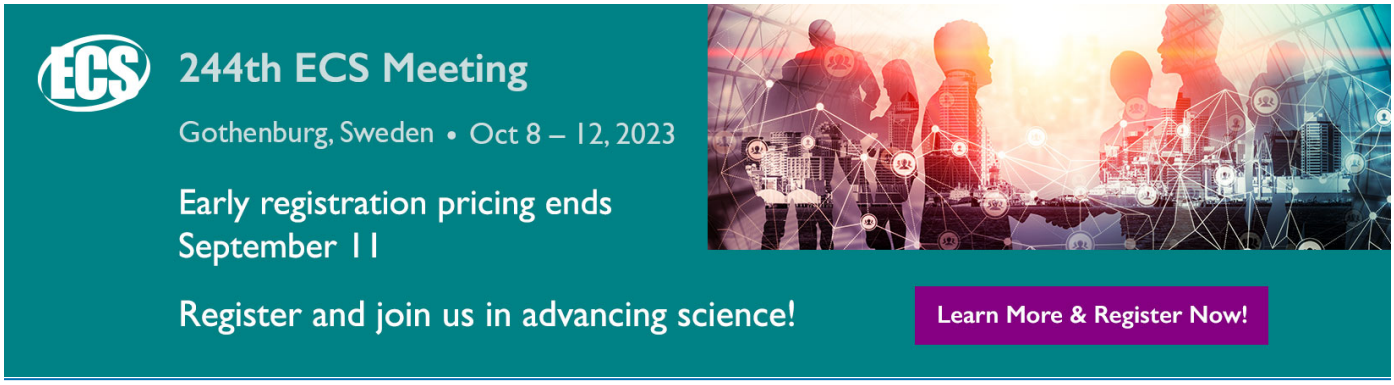
Information for organizers

Information for authors

Contact us

Reprint services from Curran Associates

Correlation and path analysis of three elite clones of cassava (*Manihot esculenta* Crantz)



Correlation and path analysis of three elite clones of cassava (*Manihot esculenta* Crantz)

K Setiawan[1*], R Paresta[1], M S Hadi[1], S D Utomo[1], A Karyanto[1], Ardian[1]

[1] Agronomy and Horticulture Department, College of Agriculture, University of Lampung

[*]Email: kukuhsetiawan38@gmail.com

Abstract. Waxy cassava having high amylopectin content could contribute and increase genetic background. Unfortunately, the genetic parameter information of three elite cassava clones as Waxy, UJ-5, and BW-1 is still limited. Consequently, the objective of this study was to evaluate leaf weight and yield by correlation and path analysis of three cassava clones. This study was conducted on the Integrated Field Lab of Lampung from December 2019 to October 2020. Treatment was arranged by a single factor in RCBD with two replications. There were three cassava genotype clones, as Waxy, UJ-5 (originally Kasetsart), and BW-1 (originally Huay Bong-60). Genetics parameters were analysed by using Minitab programs (Version 17). Variables observed were plant height (PH), total leaf number (TLN), tuber number (TN), tuber fresh weight (TFW), tuber dry weight (TDW), attached leaf dry weight (ALDW), stem dry weight (SDW), petiole dry weight (PDW), starch weight (SW), and harvest index (HI). These variables were observed and measured at 10 months after planting (MAP) on one tree. The results showed that attached leaf dry weight has direct effect of 1.16 on starch weight with correlation coefficient of 0.58. It was recommended to select a criterion for high yielding of elite clones based on high attached leaf dry weight.

1. Introduction

Lampung is the biggest cassava harvest areas still need a new cassava clone having high yield. The productivity of root fresh weight of cassava was around 26 tons/ha. This cassava productivity was still low compared to potential productivity which could achieve up to 60 tons/ha. To increase the productivity, it should be analyzed the genetic variability. The previous study was reported by [1] who stated that starch content had low genetic advanced and low heritability. Among 43 cassava genotypes showed high genetic variably to be useful for selection of desirable traits [2]. One of the established methods to achieve high yielding cassava clone is selection method through path analysis. In wheat, the most significant and positive direct effect (P= 0.57) by harvest index [3]. Moreover, a significant and positive correlation was found between root yield and plant height (r =0.5436***) [4]. Their result also showed that plant height had direst effect to yield, as 0.29. It seems that plant height could contribute to the cassava yield.

Root fresh weight did not have correlation with plant height yet, root fresh weight showed high correlation with stem gird (r=0.80**) [5]. Interestingly, they also reported that root fresh weight had a high negative correlation with shoot dry weight (r=-1.00**). Cassava yield had a positive correlation with stem gird (0.37*) yet cassava yield did not have a correlation with plant height. It could imply

that cassava leaves were able to contribute high cassava yield [6]. Consequently, the objective of this study was to evaluate leaf weight and yield by correlation and path analysis of three cassava clones.

2. Methods

This study was conducted on Integrated Field Lab of Agriculture College, University of Lampung from December 2019 to October 2020. Treatments were arranged by a single factor in randomized completely block design (RCBD) with two reps. There were three cassava genotype clones, as Waxy, UJ-5 (selected from Kasetsart), and BW-1 (selected from Huay Bong 60). Stem cutting of cassava was planted using a monoculture planting system with a spacing of 80 cm x 60 cm to obtain population of 424 plants plot^{-1}. Fertilizers used in this study were 200 kg urea ha^{-1} (45% N), 150 kg TSP ha^{-1} (46% P_2O_5), and 200 kg KCl ha^{-1} (60% K_2O).

Variables observed in this study were plant height (PH), total leaf number (TLN), tuber number (TN), tuber fresh weight (TFW), tuber dry weight (TDW), attached leaf dry weight (ALDW), stem dry weight (SDW), petiole dry weight (PDW), starch weight (SW), and harvest index (HI). These variables were observed and measured at 10 months after planting (MAP) on one tree. Total leaf number was calculated from total dropped leaf and total attached leaf. Data were analyzed by Minitab 17 for analysis of variance and different treatment means were analyzed by least significant difference (LSD) with 5% level.

The measurement of cassava starch content as follow: first, tuber was peeled skin out and then weighed as skinless tuber fresh weight (STFW). Second, tuber was washed and cleaned and then sliced into small pieces like chips. Third, small pieces of chips were collected and then air dried for one day. After this, air dried small pieces were put in oven at 70ºC for three days then weighed as tuber dry weight (TDW). To calculate starch content (1) and starch weight (2) used the formula:

$$\text{Starch content (SC)} = \frac{\text{TDW}}{\text{STFW}} \quad (1)$$

$$\text{Starch weight (SW)} = \text{SC x TFW} \quad (2)$$

Harvest index calculation (3) is as followed:

$$\text{Harvest index (HI)} = \frac{\text{TDW}}{(\text{SDW} + \text{ALDW} + \text{PDW} + \text{TDW})} \quad (3)$$

To determine relationship between characters, correlation analysis (4) was carried out using the following formula:

$$r_{xy} = \frac{n\Sigma X_i Y_i - (\Sigma X_i)(\Sigma Y_i)}{\sqrt{[n\Sigma X_i{}^2 - (\Sigma X_i)^2][n\Sigma Y_i{}^2 - (\Sigma Y_i)^2]}} \quad (4)$$

rxy = correlation between variables x and y
x = variable X
y = variable Y
n = number of observations

$$t - hit = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \quad (5)$$

If the value of t count > t table 5% is significant, t count > t table 1% means very real, t count < t table means not real (5).

The data obtained from results of the correlation analysis are used to determine direct and indirect effects by means of path analysis with the following simultaneous equations.

$$\begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ r_{p1} & r_{p2} & \cdots & r_{pp} \end{bmatrix} \quad \begin{bmatrix} C_1 \\ C_2 \\ \cdot \\ \cdot \\ \cdot \\ C_p \end{bmatrix} \quad \begin{bmatrix} r_{1y} \\ r_{2y} \\ \cdot \\ \cdot \\ \cdot \\ r_{py} \end{bmatrix}$$

R_x $\underline{C}$ R_y

Rx = correlation matrix between observed agronomic traits R XiXj (i,j = 1,2,…n)
C = the coefficient matrix of the direct influence of Xi on Y (I = 1, 2,…n)
Ry = correlation coefficient matrix against Xi against Y (i = 1, 2,…n)
Rx-1 = the inverse of the matrix Rx

The direct effect of the 1st variable on the Y factor is obtained from:
P= R-1 A
P = path coefficient vector between the variable and the outcome factor (Y).
R-1 = inverse matrix R
A = correlation between variable and outcome factor

The indirect effect of a variable xi through a variable to xj on vector Y is obtained by the formula [4]:
Pij= rij Pj
rij = correlation between the i component and the j component
Pij = indirect effect of a variable Xi through a variable to Xj on the vector Y
Pj = the path coefficient of the jth component with respect to the result.

3. Result and discussion

Correlation coefficients between independent variables (PH, TLN, TN, TFW, TDW, ALDW, SDW, PDW, HI) and between the independent variables and the dependent variable (SW) are presented in Table 1. Correlation analysis shows that there is correlation between the independent variable and dependent variable as well as between independent variables. In this study there was correlation between SW and ALDW (r=0.58*) and PDW (r=0.61*). This indicates that two variables are closely related and interrelated with SW. Furthermore, independent variables are correlated with one another. PH had correlation with SDW (r=0.85**) but negatively correlated with HI (r=-0.68*). This means that the higher the plant, the lower the HI. This seems to be due to the negative correlation between HI and SDW (r=-0.67*). So far, no literature has been found regarding negative correlation between PH and HI, but in this study PH had negative correlation with HI. Furthermore, TLN correlated with ALDW (r=0.73**) so that TN (r=0.78**), then ALDW correlated with PDW (r=0.82**).

The greatest correlation coefficient between the independent variables, namely TFW and TDW was r=0.945**. This means that the heavier the TFW, the heavier the TDW. Furthermore, the TFW was also significantly correlated with TLN (r=0.67*) which, in a correlation with ALDW (r=0.79**) and PDW (r=0.58*) so that TN (r=0.85**). TFW was positively correlated with the dry matter partition, TN, and TLN [1,7-8]. It means the more photosynthate that is translocated to the stem and leaves, the more photosynthate that is translocated to the root part of cassava.

Similarly, TDW was significantly correlated with TLN (r=0.69*), TN (r=0.78**), and ALDW (r=0.85**). This could explain that translocation photosynthate from source (leaves) to the root parts,

as TDW and TN. Moreover, positive correlation between TDW and PDW (r=0.69**) indicated that photosynthate would be translocated from leaf to root parts through petiole, then passed through stem.

Table 1. Correlation coefficient between independent variables Xi (r-XiXi) and between independent variables Xi and dependent Y (starch weight)

Variable independent (Xi)	PH	TLN	TN	TFW	TDW	ALDW	PDW	SDW	HI	SW
PH		0.49	0.17	0.28	0.14	0.19	-0.18	0.85**	-0.68*	-0.13
TLN			0.42	0.67*	0.69*	0.73**	0.39	0.55	0.00	0.42
TN				0.85**	0.78**	0.65*	0.41	0.28	0.37	0.06
TFW					0.95**	0.79**	0.58*	0.40	0.38	0.22
TDW						0.85**	0.69*	0.33	0.48	0.51
ALDW							0.82**	0.37	0.34	0.58*
PDW								0.05	0.50	0.61*
SDW									-0.67*	0.07
HI										0.30

Table 2. Coefficient of indirect influence (CII) of the Xi variable through the independent variable (Xb), coefficient of direct influence (CDI), and coefficient of total influence (CTI) of the independent variable Xi on the dependent variable Y = starch weight

Variable independent (Xi)	PH	TLN	TN	TFW	TDW	ALDW	PDW	SDW	HI	R2
PH		0.04	0.02	0.02	0.01	0.02	-0.02	0.08	-0.06	
TLN	-0.24		-0.20	-0.32	-0.34	-0.36	-0.19	-0.27	0.00	
TN	-0.07	-0.17		-0.34	-0.31	-0.26	-0.16	-0.11	-0.15	
TFW	-0.54	-1.31	-1.66		-1.86	-1.55	-1.15	-0.78	-0.74	
TDW	0.57	2.88	3.25	3.95		3.55	2.89	1.36	1.99	
ALDW	0.22	0.85	0.75	0.92	0.99		0.95	0.43	0.40	
PDW	0.07	-0.16	-0.17	-0.24	-0.28	-0.34		-0.02	-0.21	
SDW	-1.88	-1.23	-0.62	-0.89	-0.73	-0.82	-0.10		1.48	
HI	1.64	-0.01	-0.90	-0.91	-1.15	-0.83	-1.21	1.61		
∑CII	-0.22	0.90	0.46	2.19	-3.66	-0.58	1.02	2.29	2.71	0.97
CDI	0.09	-0.49	-0.40	-1.96	4.17	1.16	-0.41	-2.22	-2.41	
CTI	-0.13	0.42	0.06	0.22	0.51	0.58	0.61	0.07	0.30	

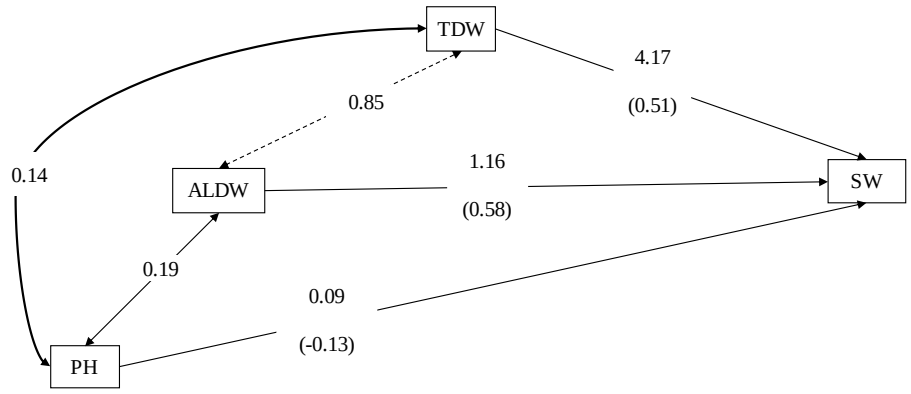


Figure 1. Path diagram of the direct influence of the independent variable Xi on the dependent variable Y=starch weight (SW) of the three cassava clones; Line = direct effect is real, = correlation is real, = correlation is not real. The number in brackets is the total effect coefficient; on the correlation line is the correlation coefficient; on the line of direct influence is the coefficient of direct influence.

Path analysis showed that there were three variables that directly affected SW, namely ALDW, TDW and PH (Table 2). TDW has highest direct influence coefficient, which is 4.17. The value of this direct influence there is direct effect between soybean production and the number of filled pods (2.16) and there is direct effect between the weight per cob and the weight of 100 seeds (1.10) [7-11]. The direct influence value was obtained by involving several other value factors such as correlation and regression so it was very possible if the direct influence value was more than 1 [10]. Although TDW has no correlation with SW, this variable can be considered for selection criteria for high SW.

Figure 1 shows the value of the correlation coefficient of the variable which has almost the same direct Influence value, namely ALDW. Photosynthate from leaves as source was translocated to cassava via stems. Thus, before going to the stem, photosynthate passes through the petiole first. This is supported by the high correlation value between PDW and SW, namely r=0.61. Direct selection using ALDW variable to obtain SW will be effective because the direct effect is 1.16. In addition, the correlation coefficient value of SW and PH was also high, namely r = 0.58. Thus, these variables can be considered to be a determinant for producing high SW. This is in line with [12] who revealed that if the x and y correlations are almost as large as the direct effect, then the correlation actually measures the degree of closeness of the two relationships, so selection based on x will be very effective.

4. Conclusion

It could be concluded that attached leaf dry weight had direct effect on starch weight as 1.16 and also showed a high positive correlation coefficient of 0.58. It was recommended to select high attached leaf dry weight as a criterion for high yielding of elite clones.

Acknowledgement

We would like to thank to Graduate School, College of Agriculture University of Lampung for giving opportunity to conduct the valuable research in correlation and path analysis of three elite cassava clones. High appreciation is also expressed for staffs of Integrated Field Laboratory of Agriculture College University of Lampung for their help and support in this research. Furthermore, the author also give appreciation to the Committee of the Joint International Seminar and Congress of SEAPPRO-ISSAAS 2022 who have given the opportunity to present and publish this paper.

References

[1] Setiawan, K., R Paresta, MS Hadi, SD Utomo, A Karyanto, and MF Najib. 2022. *IOP Conf. Ser.: Earth Environ. Sci. 1012 012067*.
[2] Akinwale M G, Akinyele B O, Dixon A G O and Odiyi AC 2010 *J. Plant Breed. Crop Sci.* **2** 104-9.
[3] Nasri R, Ali Kashani F, Paknejad S V and Barary M 2014 *Indian J. Fundam. Appl. Life Sci*. **4** 188-98.
[4] Kundy A C, Mkamilo G S and Misangu R N 2022 *J. Nat. Sci. Res*. **4** 6-10.
[5] Mulualim, T and Kifle A 2013 *Unique Res. J. Agric. Sci*. **1** 34-9.
[6] Aina O O, Dixon A G O and Akinrinde E A 2007 *J. Bio. Sci*. **7** 759-64.
[7] Rao B B, Swami D V, Ashok P, Babu B K, Ramajayam D and Sasikala K 2017. *Int. J. Curr. Microbiol. Appl. Sci.* **6** 549-57.
[8] Peprah B B, Parkes E, Manu-Aduening J, Kulakow P, Biljon A V and Labuschagne M 2020 *Euphytica* **216** 1-13.
[9] Timotiwu P B, Nurmiaty Y, Pramono E and Kusuma Y R 2018. *Indones. J. Appl. Agric.* **18** 87-100.
[10] Safuan L O, Boer D, Wijayanto T and Susanti N 2014 *Agriplus* **24** 136-43.
[11] Preacher K and Kelley K 2011 *Psychol. Methods* **16** 93-115.
[12] Singh R K and Chaudhary B D 1979 *Biometrical Methods in Quantitative Genetic Analysis* (Ludhiana: Kalyani Publishers) p 302.