

ESTABLISHING GENETIC PARAMETERS BLACK POD DISEASE FOR SOME OF ACEH'S ORIGIN GENOTIPE COCOA (*Theobroma cacao* L.)

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Abstract

Research of prediction parameter genetics in cacao plants at the nursery fase important as information on cacao plants that is resistant to attack *Phytophthora palmivora* and can characterized of morphology of that plants. The goal of this research is to know the value of thought of the parameters of genetics on growth and resistance characters to black pod disease for some of Aceh's origin genotypes. The research is done in two packages, namely the growth and resistance plants packages. Design used are thought of random complete (ral) with ten genotypes as treatments and repeated as many as three times. Variables endurance are qualitative variable (the form of stem of plant, a leaf shape, form the base of a leaf, the form of leaf tips, and flush color) quantitative variable (high plants, long leaves, number of leaves per stem, wide leaves, and the angle between the leaves with stem), and resistance variable (the incubation, the percentage of disease, and severity of illness). The result show that: genotype categorized somewhat endurance element is AT7 and SR45.

Keywords: cacao, diversity, genotype, resistance, and black pod disease

BACKGROUND

Cocoa (*Theobroma cacao* L.) is one of plantation crops important and a mainstay for this plant introduced in Indonesia by the Spaniards in Minahasa, Sulawesi in the 1560 (Puslitkoka, 2010). The effort to cacao plants besides still directed at population increase is also many directed at the increased production of and product quality.

Obstacles in the development and the increased production of cocoa besides on limited land cultivation, can also caused by pest attacks and disease. One disease important to cacao plants is the disease foul fruit caused by *Phytophthora palmivora* Butler (Semangun, 1996). Planting of genotype cocoa resistant and intolerant toward infection *P. palmivora* Butler is one of strategy effective to solve the problem foul fruit cocoa.

The results of exploration cocoa on some genotype in Aceh east and Aceh Besar indicating the level of resistance to disease foul fruit different. Observation at the field show that genotype resistant to attack foul the fruit is genotype derived from saree, Aceh Besar (Hafisah and Zuyasna, 2013).

The study is done as testing power attack disease foul fruit *P. palmivora* and observation on the growth of some genotype cacao plants in phase a nursery done as prediction genotype cacao plants that resists or prone to foul fruit *P. palmivora*

METHODS

This study was conducted at Balai for agricultural technology (BPTP) and laboratory diseases of plants Prody Agroteknologi the faculty of Agriculture, Syiah Kuala University, Banda Aceh, Darussalam in July by October 2013.

Seeds used is 10 genotype used originates from two different regions, is 5 genotype come from Aceh Timur and 5 genotype other from Aceh Besar. Genotype used is 001AT3, 002AT6, 003AT7, 004AT10, 005AT025, 006SR27, 007SR35, 008SR39, 009SR45, and 010SR46 who were a result of selection in the field of the study Hafsah and Zuyasna (2013).

The study is done in 2 packages research that is package growth and package resistance against attack *P. palmivora*. Seed cocoa is germinated in a container that contains cotton with the thickness of plus or minus one centimeters and have moistened first use aquades. Two weeks after germinated, seeds cocoa then moved to polybag that have been filled a mixture of and manure by comparison 1: 1. The transfer of seeds done by means of set the root in the ground and cotyledons above the ground.

In packs research resistance to *P. palmivora*, done inoculation on 30 HST. Making suspension done with the methods dilution and the reckoning spores previously been conducted by Muarif (2013), namely by take the outskirts of patches of the cocoa infected. We do calculation spores and was conducted dilution use aquades by comparison 10-1 until obtained suspension *P. palmivora* by concentration of the 1×10^6 . Inokulasi performed on upper and lower surfaces plant with doses 10 ml / plants.

The design used in this study was a randomized Complete Design (RAL) non factorial 3 times repeats and there are 2 plants on each repeat with 120 total overall seedling plants and is done in 2 packages of research i.e. package growth and resistance to the attacks of *P. palmivora*. The data obtained were analyzed with F-test and test Real Honest Difference on the level of 5% (BNJ0.05).

The observation made is qualitative variables (a form of the stem of a plant, a leaf shape, and colored leaves young), quantitative variables (high plants, long leaves, number of leaves per stems, wide leaves, and the angle between the trunk leaves with a stem), security and variables (the incubation period is complete, the percentage disease, and severity a disease).

RESULTS AND DISCUSSION

Morphological characteristics

Qualitative variables observed in package research the growth of plants at the age of 90 hst. Result of observation qualitative on each seeds cacao plants being tested can be seen in Table 1.

In Table 1 can be seen that each genotype having the character morphology diverse. Features is expected to be basis for the choice seeds cocoa that is resistant to attack *P. Palmivora* causing a disease foul fruit on cocoa. According to Wink (1988), characteristic of a plant are related with security the plant against attack disease and demonstrable with this disease security.

Characteristic of security seeds cacao plants

Observation endurance seeds consisting of three parts, the incubation period is complete the observation, and severity penyakit.masa incubation done since the first day he did inoculation to show signs of seeds attack of illness on plant leaves. Severity disease calculated use skoring parameters referring to the Fee (1983) in Rubiyo and Sudarsono (2011). Our observations presented in Table 2.

Table 2 shows differences in the incubation period is complete of the genotype seeds cocoa being tested. The incubation period is complete longest shown in genotype sr45

different with real genotype at 10 but not different with real genotype other .This is in accordance with statement Nyadanu (2009) , asserting the existence distinction genotype with a different security affect a period of time penetration pathogenic in and developed in the tissues of plants

The highest figure severity disease found in genotype AT 3 and AT6 but not different with real AT10, SR27, and SR46, which means the genotype constituting a genotype most vulnerable of genotype other.While genotype with the lowest percentage and regarded as genotype least resistant to *P. palmivora* than genotype other namely genotype AT7 and SR45. Both genotype is expected to have the resistance desire of resistant to attack *P. palmivora* so that it can be used to steps of selection and as a candidate elders to the cultivation of having the resistance compared with other genotype .According to Iwaro *et al* . (1997) , characteristic of various leaves cocoa genotype different showing possibility of for the use of cocoa leaves as a prediction to develop cacao plants that are resistant to foul the disease

The value of genetic would expect the parameters of its genotype and phenotype cacao seedlings

The results of observations on diversity of its genotype and the phenotype seeds cacao plants character hight plant , long leaves , and long leaves age 60 and 90 hst is presented in Table 3 .

Figures and Tables

Table 1 .Character morphology seeds cacao plants age 90 hst

NO	GENOTIPE	BBT	BD	WDM
1	AT3	erect	oval	Yellow
2	AT6	Spring erect	ellipse	Red
3	AT7	erect	round length	Yellow
4	AT10	erect	oval	Red
5	AT25	Spring erect	ellipse	Yellow
6	SR27	Spring erect	oval	Yellow
7	SR35	erect	ellipse	yellow
8	SR39	erect	ellipse	Red
9	SR45	erect	ellipse	Red
10	SR46	erect	round length	Red

description: BBT= The form of the stem of a plant, BD = leaf shape, WDM = The color of young

Table 2 .The incubation period is complete , the percentage of disease and severity on sunday ke-3 following inoculation *P. palmivora*

Genotype	MI (hari)	KP (%)	category
AT3	2.33 ab	73.33 d	slightly susceptible
AT6	3.33 abc	73.33 d	slightly susceptible
AT7	2.33 ab	48.33 a	rather resistant
AT10	1.67 a	70.00 cd	slightly susceptible
AT25	4.00 abc	50.67 a	rather resistant
SR27	2.67 ab	64.00 bcd	slightly susceptible
SR35	4.33 abc	59.67 bc	slightly susceptible
SR39	5.33 bc	58.67 ab	slightly susceptible
SR45	6.00 c	48.33 a	rather resistant
SR46	3.00 abc	64.33 bcd	slightly susceptible
BNJ 0.05	3.28	11.10	

description: the followed by the same letter at of the same column different not significant at bnj test 0.05 .(MI= the incubation period is complete , KP= severity a disease .

Table 3.Diversity of its genotype and phenotype seedlings cocoa to the hight plant, long leaves and long petiole age 60 and 90 hst

No	Character	Criteria						
		σ^2g	σ^2f	KKG	KKF	σ_{σ^2g}	$2\sigma_{\sigma^2g}$	σ^2g
1	hight plant 60 HST	10.13	11.3	16.68	17.62	4.49	8.97	large
2	hight plant 90 HST	22.17	23.15	20.15	20.59	9.59	19.19	large
3	long leaves 60 HST	6.07	6.57	18.26	18.99	2.66	5.32	large
4	long leaves 90 HST	8.39	9.04	18.87	19.6	3.67	7.34	large
5	long petiole 60 HST	0.31	0.4	19.07	21.46	0.15	0.29	large
6	long petiole 90 HST	0.38	0.49	19.5	22.32	0.18	0.36	large

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Based on the results of research encountered genotype cocoa origin aceh categorized as somewhat resistant to attack *P. palmivora* With severity isease lowest , namely the genotype AT7 derived from East Aceh and genotype SR45 derived from saree.Tere is genetic diversity

high growth against character seedlings cacao plants , namely on the character of higher plants , long leaves , long leaf stalks , it and & the base of a leaf with stem the age of 60 and 90 hst .As well as the level of resilience there are different in each genotype , namely somewhat vulnerable categories seen in the genotype AT3 , AT6 , AT10 , SR27 , SR35 , SR39 , and SR46 .While on the somewhat resistant category seen in the genotype AT7 , AT25 , and SR55 .

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