Response of 35 Cacao Collections of ICCRI against *P. palmivora* Butl. Infection Based on Detached Pod Assay[1]

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Introduction

Black pod because of *P. palmivora* infection is a serious cacao disease in Indonesia. In Indonesia, under suitable and severe infection, 100% yield losses may be possible. This research activities were conducted to determine responses of cacao collection against infection of black pod disease due to *Phytophthora palmivora*. The objectives of this experiment were (i) to evaluate the response of 35 cacao clones against infection of *P. palmivora* using detached pod assay, (ii) to determine the most resistance cacao clones, and (iii) the most susceptible cacao clones among evaluated cacao collections against infection of *P. palmivora*.

Materials & Methods

In the experiment, pods of 35 cacao clones (at 4-5 months after anthesis) were harvested. The tested pods were injured using cork borer (0.8 cm in diameter) and inoculated with agar plug carrying mycelia of *P. palmivora*. The inoculated pods were incubated in wooden box with 100% relative humidity and 28 C temperature and maintained in laboratory. The occurrences of necrotic symptoms because of *P. palmivora* infection and length and width of the symptoms on the surface of tested cacao pods were observed starting at 3 days after inoculation. The collected length and width data were used to calculate the amount of symptoms occurring on the surface of tested pods and they were subsequently used to determine responses of tested cacao clones against *P. palmivora* infection. Clustering of cacao clones using their responses against *P. palmivora* infection was also conducted. Occurrences were recorded at 7 days after inoculation.

Fig. 1. (left) Wooden box for incubation of inoculated pods in detached pod assay. (2 right) Differential responses among clones.

Table 1: Symptomless pod, average symptom width, and resistance category of 35 cacao clones after detached-pod assay under laboratory conditions. Observation was at 7 days after cacao pod inoculation with *P. palmivora*

Cacao clone	Symptomless pod (%)	Symptom width (cm^2)	Resistance	Cacao clone	Symptomless pod (%)	Symptom width (cm^2)	Resistance
DRC15	0	214.9	VS	ICCRI2	44	66.9	LS
TSH908	0	203.0	VS	NIC7	33	65.5	LS
KEE2	0	161.3	VS	ICS60	11	62.0	LS
GC7	0	155.8	VS	RCC71	0	60.6	LS
BL301	0	149.9	VS	DR1	11	55.8	LS
BL300	11	134.9	VS	SCA6	22	52.1	LS
RCC73	33	133.8	VS	TSH858	11	51.8	LS
DRC16	0	133.1	VS	BL97	44	41.5	LR
RCC70	0	118.8	VS	ICS13	0	39.3	LR
KKM22	11	113.6	VS	SD6225	44	36.8	LR
SCA89	11	100.1	VS	NW6261	44	24.8	RS
PBC123	0	96.5	SC	UIT1	56	3.2	RS
DR2	0	95.5	SC	ICCRI3	33	13.4	RS
SCA12	0	95.0	SC	PA300	56	10.0	RS
ICCRI4	0	91.3	SC	NIC4	78	8.7	RS
PA7	0	87.7	SC	DR38	89	4.5	RS
RCC72	22	86.4	SC	ICCRI1	78	1.8	RS
PA303	33	80.7	SC				

Note: *RS: resistance (symptoms width < 25 cm^2), LR: less resistance (25-50 cm^2), LS: less susceptible (50-75 cm^2), SC: susceptible (75-100 cm^2), and VS: very susceptible (> 100 cm^2) after *P. palmivora* infection.

Results

The cacao clones tested were either very susceptible (VS), susceptible (SC), less susceptible (LS), or resistance (RS) against newly identified, very pathogenic *P. palmivora* isolate (LbSBR) from West Sumatra (Table 1). Differential response of tested cacao clones were presented in Fig. 1. (b & c)

Conclusion

Collections of Indonesian Coffee and Cacao Research Institute, ID no. **DR38, ICCRI1, ICCRI3, NIC4, NW6261, PA300, and UIT1** were resistance against *P. palmivora* based on detached pod assay.

Literature

Sudarsono A. Purwantara & Suhendi D. 2007. Molecular Technique and Plant Breeding to Speed up the Development of Cacao (*Theobroma cacao* L.) Cultivar with Resistance against Black Pod Disease Due to *Phytophthora palmivora* Butl. Infection. KKP3T Research Report, Institut Pertanian Bogor, Bogor, Indonesia. 122 pp.

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