ASSOCIATION OF *CERCOSPORA* SPP. FUNGI WITH SOME PLANT SPECIES AT THREE LEVELS OF ALTITUDE 1)

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ABSTRACT

The *Cercospora* spp. are one of the important pathogenic fungi, because it cause high losses on plants. These pathogens are widespread throughout the world, especially in the tropics. There are many species included and of them, about 1400 species have been identified.

The aims of this research were (1) to study the kinds of species of *Cercospora* spp. attacking some crop plants at three levels of altitude namely, the first level (near sea level to 300 meters up), the second level (about 300 to 500 meters), and third level (about 500 to 1000 meters) respectively, (2) to know the disease intensity on each crop spesies caused by *Cercospora* spp. at all three levels of altitude, and (3) to evaluate factors which dominantly effect the fungus attack.

This result showed that the kinds of species of *Cercospora* attacking host plants as groundnuts, rices, chilies, bananas, and sweet potatoes were *C. personatum* Hori, *C. oryzae* Miyake, *C. capsici* Heald et Wolf, *C. musae* Zimm, dan *C. timorensis* Cke respectively. The high disease intensities at first level had been detected on groundnuts, rices, chilies, and sweet potatoes, whereas this situation occured on bananas at third level. Some factors which dominantly effected the disease intensity were host variety, cultivation techniques, growth age, and environments.

Key word: *Cercospora* spp., plant species, and altitude.

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1) Article presented in The 1st International Conference of Crop Security 2005, September 20 -22, Brawijaya University, Malang, Indonesia.

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International Conference of Crops Security 2005 1st

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INTRODUCTION

Cercospora spp. are one of the important pathogenic fungi because it cause losses on plant. These pathogens have been reported to attack various plant species such as food, horticultural and plantation crops. It widesspread throughout the world, especially in the tropics and subtropics (Hino dan Tokeshi, 1978).

There are many species of Cercospora spp. fungus attacking various plant species. Reports about *Cercospora* spp., show that many different species have been identified and there are up to 1400 species recorded out of the world (Hino dan Tokeshi, 1978).

Altitude is one of factors which affects indirectly the disease development. Altitude or elevation directly affects through temperature and humidity of air, wind, and sunrise (Agrios, 1997). Thus, an experiment was needed to search the species of *Cercospora* spp. on various crop plant grown at some zones of altitude.

The aim of this research was to study the species of *Cercospora* which attack some plant species at three levels of altitude, the disease intensity caused by each of the fungus species on some plant species and to evaluate the factors which dominantly affect the disease intensity.

MATERIALS AND METHODS

The three months field survey had been carried out in some crop areas of groundnut, chilies, bananas, rices, and sweet potatoes grown at three levels of altitude. Microscopic examination was done in the laboratory of plant disease, Faculty of Agriculture UNSOED.

The collected samples was designed in Stratified random Sampling with three levels of altitude, i.e. the first level (0-300 metres), the second (300 m up-500 metres), and the third (500 m up-1000 metres) above sea levels. Variables observed were pathogen morphology (shape and series colour, cell wall, septate), disease intensity, and rate of infection.

RESULTS AND DISCUSSION

A. Species detection at Three levels of altitude

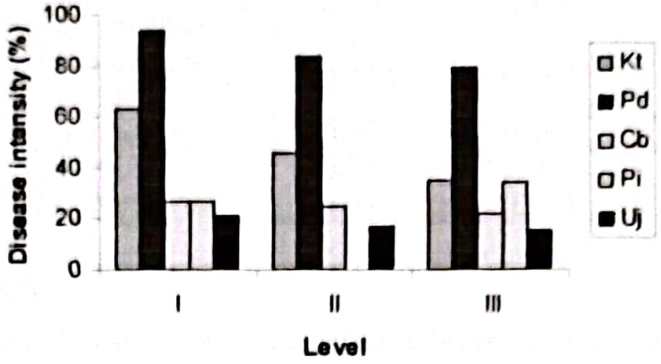
Samples of pathogen collected from each levels of altitude were detected through microscopic examination to determinates species category of each (Table 1).

Tabel 1. Species of *Cercospora* spp. detected on plant hosts at three levels of altitude

Host plant	Level of altitude (metres)		
	(0-300)	(300-500)	(500-1000)
Groundnut	*Cercosporidium personatum*	*C. personatum*	*C. personatum*
Rice	*Cercospora oryzae/C.janseana*	*C. oryzae/ C. janseana*	*C.oryzae/ C. janseana*
Chilli	*C. capsici*	*C. capsici*	*C. capsici*
Banana	*C. musae*	*C. musae*	*C. musae*
Sweet potato	*C. timorensis*	*C. timorensis*	*C. timorensis*

Table 1 showed that some species of *Cercospora* spp. had been detected microscopically on some host plant species. These mean that all of three levels of altitude did not effect the morphology of fungus conidia.

B. Effect of Species of *Cercospora* spp. on host destruction at three levels of Altitude



Gambar 1. Disease intensity on some plants at three levels of altitude.

Figure 1 showed the higher disease intensity occurred on groundnut, rice, chili and sweet potato at first level rather than the other two (the second and third level). This situation was similar to previously noted by Wellman (1972) and this pathogen was more destructive effect in crop areas with high tropical temperature (Agrios, 1997; Clark dan Mayer, 1988).

The sigatoka disease intensity on banana occurred higher at third level (500 m up – 1000 m asl), like Wellman says (1972) that sigatoka was more destructive at altitude levels of more than 500 to 1000 metres; as well as the pathogen development at this level will be optimal at mean temperature of 24°C.

The highest rate of infection at first level occurred in groundnut, rice, and sweet potato whereas the lowest one was on banana (Table 2). Those fact showed that the high infection rates relate with fast disease progress, whreas the low ones relate with slow disease progerss. The development of disease was determined largely by factors such as weather, host susceptibility, and pathogen aggressiveness (Oka, 1993).

Table 2. Average of infection rate of species of *Cercospora* spp. at three levels of altitude

Host plant	Pathogen	Infection rate (per unit per day)		
		(0-300)	(300-500)	(500-1000)
Groundnut	*Cercosporidium personatum*	0,100	0,100	0,080
Rice	*Cercospora oryzae*	0,110	0,090	0,080
Chilli	*C. capsici*	0,050	0,060	0,060
Banana	*C. musae*	0,020	0,000	0,040
Sweet potato	*C. timorensis*	0,090	0,070	0,080

CONCLUSION

1. The species of *Cercospora* spp. which attacks each of groundnut, rice, chili, banana, and sweet potato were *Cercosporidium personatum* Hori, *Cercospora oryzae* Miyake, *C. capsici* Heald et Wolf, *C. musae* Zimm, and *C. timorensis* Cke, respectively.
2. The highest disease intensity at first level occurred in groundnut, rice, chili, and sweet potato, whereas at third level it occurred only on banana.
3. The factors which dominantly affect disease intensity were host variety, cultivation techniques, growth age, and environments.

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International Conference of Crops Security 2005

"The 1st International Conference of Crop Security 2005"

Brawijaya University-Malang, September, 20th - 22nd 2005

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