PRELIMINARY RESEARCH THE EFFECT OF NAA AND BAP ON CALLUS OF BANANA (*Musa acuminata* L) WITH ADDITION OF FUSARIUM WILT DISEASE FROM *Fusarium oxysporum* f.sp.cubense (Foc)

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ABSTRACT

THE EFFECTS OF NAA AND BAP ON Callus OF BANANA (Musa acuminata L) WITH THE ADDITION OF FUSARIUM WILT DISEASE FROM *Fusarium oxysporum* f.sp.cubense (Foc). This research was conducted on January to June 2016, at Tissue Culture Laboratory of Dinas Tanaman Pangan dan Hortikultura of North Sumatera Province, Jl.Karya Jasa No.6 Gedung Johor, Medan. The purpose of this research is to know the response of banana barangan callus (Musa acuminate L.) to fusarium (*Fusarium oxysporum* f. Sp.Cubens). The living callus is subsequently subcultured for organogenesis purposes by treatment of NAA and BAP. The research use Completely Random Design with two factors that is NAA and BAP. NAA consists of 3 levels: N1 = 1 ppm, N2 = 1.5 ppm and N3 = 2 ppm. The second factor using BAP consists of 3 levels: BA1 = 1.5 ppm, BA2 = 3 ppm and BA3 = 3.5 ppm. The results showed that the percentage of live callus after fusarium addition was only 33.33%, interaction of NAA and BAP did not significantly affect the percentage of live plantlets and wet weight of banana plantlet. The highest percentage of live plantlet on aged 9 - 13 week after subculture and the highest wet weight of planlet found on N1(1 ppm) each 7.05 % and 3.62 g, while the highest percentage of live plantlets on aged 9 - 13 Week after subculture and the highest wet weight of plantlet found on BA1 (1,5 ppm) each 5.69 % and 3.38 g. The treatment combinations that gave the highest percentage of planlets live and wet weight of planlet were N1BA1 and N1BA2.

Keywords: NAA, BAP, *Fusarium oxysporum* f. Sp.cubense, banana.

INTRODUCTION

Fusarium wilt is a disease in banana plants caused by the pathogenic fungus Fusarium oxysporum . f. sp. cubense, and is one of the main banana diseases that destroy banana crops in Indonesia. The natural cause of fusarium wilt endemic in Indonesia because of the cycle of diseases continue and humidity high. he usual controls for controlling Fusarium wilt are pathogenic biological controls that are integrated with technical culture. Fusarium oxysporum is an opportunistic pathogen that takes advantage of weakened or injured hosts .

Producing seeds tolerant to fusarium is expected to solve the problem. Callus of banana that candidate resistant to fusarium then subcultured with purpose organogenesis by the addition of NAA and BAP, later is expected to produce resistant to fusarium (*Fusarium oxysporum* f. sp.cubense).

MATERIALS AND METHODS

This research was conducted in January - June 2016, located at Tissue Culture Laboratory of Dinas Tanaman Pangan dan Hortikultura of North Sumatra Province Medan. The callus was added with 1000 spores of fusarium, after 3 days is observed. The callus that still live then is subcultured with purpose to organogenesis by addition of NAA and BAP. Callus is provided by Tissue Culture Laboratory while 1000 spores of fusarium is obtained by goodness of technical implement Unit of Food Crop Protection Agency and Horticulture of North Sumatra Province. This research one umbrella, it means involving many researchers. The design used was Factorial Randomized Complete Random (RAL) with two factors, Factor I NAA consisting of 3 levels that is N1 = 1 ppm, N2 = 1.5 ppm and N3 = 2 ppm. Next, Factor II using BAP consists of 3 levels that is BA1 = 1.5 ppm, BA2 = 3 ppm, BA3 = 3.5 ppm. Each replications consist of ten bottle contained cluster of callus. This research is repeated 3 times. Observation of parameter reported include percentage of live callus, percentage of live planlet and wet weight of planlet. Because the data obtained have too wide intervals then transformed the data is done by using formula:

$\sqrt{x + 0.5}$

RESULTS AND DISCUSSION

Banana callus after 3 days fusarium treatment producing only 33.33% of live. In this case the resistance of the callus to the fusarium indicate that pathogen can not directly attack the planlet because it is incompatible.

Figure 1. Callus Candidate of Resistant to Fusarium wilt Disease from *Fusarium oxysporum* f.sp.cubense (foc)

Percentage life of planlet

The percentage live of planlet on age 9 - 13 weeks after subculture (WAC) due to the NAA and BAP treatment is presented in Table 1, the results of the treatment were not significantly affected (data not shown).

Table 1 shows that NAA concentration treatment that gives the highest percentage of live planlet aged 9 - 13 WAC is N1, followed by N3 and N2 treatment. Table 2 shows that the treatment of BAP concentration that produce the highest percentage of live planlets is BA1, followed by BA3 and BA2 treatment. The treatment combinations that gave the highest percentage of planlets live were N1BA1 and N1BA2. The low percentage of plantlet survived is thought to be due to the spores still inherent in the callus used for organogenesis purposes.

Table 1. Percentage of planlet Live on Age 9-13 WAC due to the treatment of NAA and BAP

Treatment	The percentage of planlet live by using transformation {V (x + 0.5)} on age:				
	9 WAC	10 WAC	11 WAC	12 WAC	13 WAC
NAA					
N_1	8.02	7.37	7.05	7.05	7.05
N_2	6.01	5.30	5.30	5.30	3.55
N_3	5.30	5.30	4.98	4.98	4.27
BAP					
BA_1	8.08	7.76	7.43	7.43	5.69
BA_2	5.62	4.59	4.27	4.27	4.27
BA_3	5.62	5.62	5.62	5.62	4.91
Combination					
N_1BA_1	8.08	7.11	7.11	7.11	7.11
N_1BA_2	9.05	8.08	7.11	7.11	7.11
N_1BA_3	6.92	6.92	6.92	6.92	6.92
N_2BA_1	8.08	8.08	8.08	8.08	4.98
N_2BA_2	4.98	2.84	2.84	2.84	2.84
N_2BA_3	4.98	4.98	4.98	4.98	2.84
N_3BA_1	8.08	8.08	7.11	7.11	4.98
N_3BA_2	2.84	2.84	2.84	2.84	2.84
N_3BA_3	4.98	4.98	4.98	4.98	4.98

From Table 1 it can be seen that the percentage of planlet live is declining steadily but in the 12th to 13th week after sub culture steady relatively. This is allegedly that the fusarium toxin still present in the plantlets tissue being while living planlets suspected to have induced resistance to the fusarium toxin

Jumjunidang, N. Nasir, Riska and H. Handayani (2004) stated that living plantlets from filtrate of fusarium toxin is indicated growth disturbances such as dwarf, rooting is not formed, and sometimes blackened. Plantlets that grow perfectly about 13.2 % of whole the population of surviving plantlets, only occur in low concentration toxin filtrate of fusarium (10%). The death of the plant is caused by the destruction of cells due to the fusarium toxin, meaning that the fusarium toxin affects the function of mitochondria that can inhibit the catalase enzyme, as well as disrupt the cell membrane which can lead to ion leakage.

After infection, the pathogen will colonize and block the plant's vascular system, a process that leads to wilting and, eventually, plant mortality (Ploetz & Pegg, 2000).

Wet Weight of Planlet

wet weight of planlet of banana is presented in Table 2, the results of the treatments have no significant effect (not shown).

Table 2. Wet Weight of Planlet on Age 13 Week After Subculture due to the treatment of NAA and BAP

BAP	NAA			
	N_1	N_2	N_3	Average
	……g……			
BA_1	3.76	3.16	3.23	3.38
BA_2	3.70	2.70	2.76	3.05
BA_3	3.41	2.75	3.21	3.12
Average	3.62	2.87	3.07	3.19

Table 2 shows that NAA concentration treatment that gives the highest wet weight of planlet aged 13 week after subculture is N1, followed by N3 and N2 treatment. Table 2 shows that the treatment of BAP concentration that produce the highest percentage of live planlets is BA1, followed by BA3 and BA2 treatment. The treatment combinations that gave the wet weight of planlets were N1BA1 and N1BA2

CONCLUSIONS

1. Fusarium fungal spore 1000 spores in callus produce only 33.33% live callus.
2. Treatment of NAA, BAP and interaction did not significantly affect the percentage live of planlet and wet weight of banana planlet.
3. Plantlet live in the 12th to 13th week after sub culture steady relatively The highest percentage of live planlet on aged 9 - 13 Week after subculture found on N1, while the highest wet weight of planlet is BA1. The treatment combinations that gave the highest percentage of planlets live and wet weight of planlet were N1BA1 and N1BA2.

SUGGESTION

Further research is needed to prove resulting plantlet is resistant to Fusarium.

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