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Botryodiplodia Stem End Rot of Mango and Its Control

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ABSTRACTS

Botryodiplodia theobromae, the causal organism of stem end rot disease of mango was studied. Isolates of *B. theobromae* obtained from different sources had different degree of disease severity. Isolate from diseased mango fruit was the most virulent isolate. Six cultivars of mango were tested on their susceptibility. Okrong was the most susceptible cultivar. Length of pedicel also had an effect on disease development. Disease developed slower on the fruit with longer pedicel than on the shorter one. Control measure of the disease with different means indicated that dipping the fruits in benomyl at concentration of 500 ppm at 52 C for 5 minutes was the most effective mean.

INTRODUCTION

Mango was one of major exported fruit in Thailand. The exported values was 54.28 million baht in 1986 (Dept. of Commerce) and it tend to increase every year. Mango still had many unsolved problem. One of the major problem was postharvest diseases. These diseases including anthracnose *(Colletotrichum gloeosporioides),* stem end rot *(Botryodiplodia theobromae, Dothiorella dominicana, D. mangiferae, Dothiorella* sp.*)*, Aspergillus rot *(Aspergillus niger)* caused a problem to mango fruits at ripening stage. (Sangchote, 1987). Anthracnose was the most important disease. It infected the fruits in the orchard and developed symptom at the ripen stage after harvest. It could completely control by dipping the fruits in prochloraz at 250 ppm for 30 sec. (Johnson *et al,* 1988). Stem end rot was the next to anthracnose. It still couldn't completely control. Stem end rot caused by *B theobromae* was the predominance (Sangchote, 1987). It infected through stem end and wounded parts of the fruit and produced blackish, discolored region of decay. (Srivastava, 1964). Partially control was obtained by dipping in benomyl 500 ppm (52°C) for 5 minutes (Muirhead, 1984). In this paper the details of this disease and its control measure were conducted.

MATERIALS AND METHODS

Sources of inoculum and disease severity

Different isolates of *B. theobromae* were obtained from diseased guava fruit, diseased rambutan fruit, diseased mango fruit, diseased banana fruit, diseased passion fruit, diseased roseapple fruit, dry twig on plant, dry twig on ground, and soil. Each isolates were cultured on potato dextrose agar (PDA). Mango fruits were inoculated at the stem end with 4 days mycelial plug and incubated in moist chamber at ambient temperature for 24 hours. These inoculated fruits were riped in ripening chamber. The disease incidence were checked at ripen stage.

Length of pedicel and disease development

Mature green mango fruit cv. Nam Dok Mai were studied for the relationship of the length of pedicel and disease incidence. The length of pedical at 0,1,2,3,4 cm. were left on the fruits.

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These fruits were inoculated with 4 days old mycelial plug and incubated in moist chamber at ambient temperature for 24 hours. These inoculated fruits were riped in ripening chamber. The disease incidence were checked at ripen stage

Varietal susceptibility

Mature green mango fruits of six cultivars including Okrong, Nang Klang Wan, Nam Dok Mai, Tong Dum, Rad and Khaew were investigated on their susceptibility to *B. theobromae* The fruits were inoculated with mycelial plug which were obtained from 4 days old culture using 10 fruits/ treatment. These inoculated fruits were riped in the ripening chamber. Disease incidence were checked at riped stage.

Control measure

Control measure of *B. theobromae* on mango fruits were conducted. Mature green mango fruits cv. Nam Dok Mai were inoculated with mycelial plug obtained from 4 days old culture using 2 replication/treatment (10 fruit/replication). These inoculated fruits were treated with different control measure including benomyl 500 ppm, imizalil 500 ppp, systhane 500 ppm, hot benomyl 500 ppm (52°C), hot imizalil 500 ppm (52°C), hot systhane 500 ppm (52°C) by dipping for 5 minutes. The inoculated fruits were incubated in moist chamber at ambient temperature for 24 hours before treating. These treated fruits were riped in ripening chamber. Disease incidence were checked at the ripening stage.

RESULTS AND DISSCUSSION

Sources of inoculum and disease severity

Isolates of *B theobromae* which were obtained from different sources had different degrees in disease severity. Diseased mango fruits isolate was the most virulance isolate while soil isolate was the least. It indicated that sources of inoculum of *B. theobromae* would come from many sources. Due to the wide host range, it is rather difficult to eleminate this fungus. (Crammer, 1979). The way to reduce sources of inoculum can be done by avoid planting these host plants and also eliminate the other sources such as diseased twig, diseased fruit. (Table 1)

Table 1 Disease incidence (%) on mango which were inoculated with different isolates of B. theobromae

Sources of inoculum	Disease incidence (%)
Diseased mango fruits	34.5 a[1]
Dry twig on plant	32.5 a
Dry twig on ground	31.7 a
Diseased guava fruit	29.5 a
Diseased rambutan fruit	27.7 ab
Diseased banana fruit	26.2 ab
Diseased passion fruit	26.5 ab
Diseased roseapple fruit	22.0 ab
Soil	20.8 b

[1] Treatment means followed by the same letter are not significantly different by Duncan's multiple range test at the 5% level.

Length of pedicel and disease development

The length of pedicel had an influence on infection and disease development. Infected fruit with longer pedicel developed symptom slower than the shorter one. Fruits with no pedicel developed the highest disease incidence (40.75%) while the longest pedicel fruits (4 cm) developed the lowest disease incidence (11.9%)(Table 2) Usually the fungus infected at stem end scar and exposed surface of pedicel. Fruits with pedicel was less

Table 2 Disease development on mango fruit which were left pedicel at different length and inoculated with *B. theobromae*

Length of Pedicel (cm)	Disease development (%)
0	40.75 a[1]
1	28.00 b
2	19.30 c
3	15.90 d
4	11.90 e

[1] Treatment means followed by the same letter are not significantly different by Duncan's multiple range test at the 5% level.

infection than without pedicel when left in the orchard (Pathak, 1967). Therefore, the length of pedicel and disease development are closely related.

Varietal susceptibility

Six cultivars of mango fruits inoculated with *B. theobromae* showed different levels of disease incidence. Okrong and Tong Dum had high level of disease incidence while Khaew was the least (Table 3). Each cultivars had different degree of disease susceptibility as Sukda (1980) also indicated that Pimsen and Okrong were the cultivars susceptible to this disease. The susceptibility was closely related to the amount of sucrose and reducing sugar in the fruit and Okrong was one of the highest sucrose content in the fruit (Tongdee *et. al.* 1980)

Table 3 Disease incidence on mango fruits of six cultivars after inoculating with *B. theobromae*

Cultivars	Disease incidence (%)
Okrong	65.50 a[1]
Tong Dum	57.00 a
Nam Dork Mai	43.00 b
Rad	36.50 b
Nang Klang Wan	34.00 b
Khew	11.50 c

[1] Treatment means followed by the same letter are not significantly different by Duncan's multiple range test at the 5% level.

Control measure

Infected mango fruits after treated with different control measure by dipping for 5 minutes had developed different levels of disease incidence. The lowest level obtained from the fruits which were treated with hot benomyl at concentration of 500 ppm 52°C for 5 minutes (Table 4). Usually hot water (52°C) or benomyl 500 ppm was an effective control measure (Muirhead, 1984). However hot water didn't has any protective effect against reinfection of the organism so the combination of hot water and benomyl was the best way to solve this problem. This method (hot benomyl 500 ppm for 5 min.) was a recommended treatment for mango (Sangchote, 1988). The other chemicals in this trial such as imizalil or systhane was included to test its effective against this disease as well, but it's not better than benomyl. However, these chemicals had been used as post-harvest chemical treatment. (Eckert, 1985; Johnson *et al,* 1988)

Table 4 Disease incidence on mango fruits after treated with different control measure

Treatments	Disease incidence (%)
inoculated, untreated	34.75 a[1]
benomyl 500 ppm	16.50 b
imizalil 500 ppm	18.85 b
systhane 500 ppm	13.10 b
hot myclobutanil 500 ppm (52°C)	10.25 c
hot imizalil 500 ppm (52°C)	10.05 c
hot benomyl 500 ppm (52°C)	5.15 d
uninoculated, untreated	0.00 e

[1] Treatment means followed by the same letter are not significantly different by Duncan's multiple range test at the 5% level.

CONCLUSION

Isolate of *B. theobromae* obtained from diseased mango fruit was the most virulent isolate. Disease developed slower on the fruit with longer pedicel than on the shorter one and Okrong was the most susceptible cultivar. Dipping the fruit in hot benomyl (52°C) at concentration of 500 ppm for 5 minutes was the most effective method.

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