Thesis Title:	Integrated Biological Control of Black Pepper Root and Basal Stem Rot Caused by *Phytophthora palmivora* Bult.
Student	Pinit Sodsa-art
Student ID.	38065306
Degree	Master of Science
Programme	Plant Pest Management Technology
Year	1999
Thesis Advisor	Assoc. Prof. Dr. Kasem Soytong
Thesis Co-advisor	Assist. Prof. Dr. Thanimnun Jaenaksorn
	Assist. Prof. Dr. Wirat Phuwiwat

ABSTRACT

Root and basal stem rot of black pepper (*Piper nigrum* L.) in the epidemic area was surveyed in Chantaburi province at the total area of 138.76 rai which belongs to 39 growers in 1997-1998 . The disease prevalence was 64 per cent, disease incidence averaged 16.71 per cent and disease index was averaged 2.09. The infected plant showed yellowing leaves and small brown spot over 25 per cent of the canopy. The causal agent was isolated from root rot, basal stem rot and rhizophere identified as *Phytophthora palmivora* MF3 according to morphological and molecular studies of SDS-PAGE (polyacrylamide gel electrophoresis). These isolates were distinguished into 5 groups according to protein bands which compared these molecular weight with standard marker as follows: Group A was isolate P5 and isolate P6, Group B was isolate P1, isolate P2 and isolate P10, Group C was isolate P3 Group D was isolate P6, isolate P8 and isolate P12 and Group E was isolate P4 and isolate P5.

All isolates had been proved for pathogenicity test according to Koch's Postulation. It was shown that *P. palmivora* MF3 isolate P1 gave the highest disease incidence of Black pepper. var. Malaysia. Moreover, Isolate P1 had also infected the other plant hosts such as Durian var. Montong, var. Kradoom, var.Chanee, var.Kanyao, Longan, Rambutan and Pararubber, except for Mafai. This virulent isolate required the optimum condition for growing on carrot agar and incubated at 30 °C.

Bi-culture antagonistic test showed that *Trichoderma harzianum* PC01 had the highest per cent inhibition of colony growth of *P. palmivora* P1 (78.45) and followed by *Trichoderma hamatum* PC02 (77.37) *Chaetomium cupreum* CC10 (65.08) and *Chaetomium globosum* CG5

(63.84), respectively. Control mechanism of *T. harzianum* and *T. hamatum* was shown under compound microscopy revealed that the hyphae of *Trichoderma* could interfere the hypha of *P. palmivora* P1 implies hyphal interference. On the other hand, *C. cupreum* and *C. globosum* could release the antagonistic substances to destroy the hypha of *P. palmivora* P1 implies antibiosis and lysis.

In pot experiment. results showed that applying *Chaetomium* in pellet form at the rate of 20 g./plant, could significantly reduce the disease of 64.58 per cent, followed by applying *Trichoderma* in pellet form at 20g./plant *Chaetomium* and *Trichoderma* at 10 g./plant in each mycofungicide which could reduce the disease of Black Pepper 58.33, and 56.25 per cent, respectively. Biological products of *Chaetomium* and *Trichoderma* treatments had significantly difference in reduction of disease as effetive as Metalaxyl treatment which disease reduction was only 17 per cent. However, the inoculum of *P. palmivora* in the soil was also significantly reduced by biological products of *Chaetomium* and *Trichoderma* treatments as compared with Metalaxyl and non treated check.

The applications of mycofungicides in pellet form of *Trichoderma* (PC01+PC02), *Chaetomium* (CG05+CC10) and mixture of these mycofungicides were conducted in the infested fieldsoil in Chantaburi province to prevent root and stem rot of black pepper(*Piper nigrum* L) caused by *P. palmivora* MF3 using these mycofungicide treaments at the application rate of 20 g./plant incorporation with lime and organic compost every 4 months for 1 year. Result showed that applications of the mixtures of *Trichoderma* and *Chaetomium* mycofungicides could significantly reduce disease incidence which averaged as 8.60 per cent followed by the application of *Trichoderma* and *Chaetomium* which the disease incidence were 10.94 and 22.66 per cent, respectively. *Chaetomium* treatment was not significantly difference in reduction disease incidence when compared to the Metalaxyl treatment which the disease incidence was averaged as 21.88 per cent . All treatments were significantly lower disease incidence than the non-treated one which shown the highest percentage of disease incidence averaged as 71 per cent. However, the inoculum of *P. palmivora* in rhizospere soil of black pepper had significantly lower in mycofungicides and Metalaxyl treatment than the non-treated one. Moreover, it was showed that the plant stands in treatments of *Chaetomium,Trichoderma,* Metalaxyl ,mixture *Trichoderma* and *Chaetomium* were 208, 200, 177 and 172 cm, respectively which significantly higher plant stands than the non-treated one (81 cm.)