

Abstract

Soil fumigant from biological-based product from plant, major chemical constituents from essential oil and essential oil for soil fumigant are tend to reduce the agrochemical for plantation. The objectives of the research are selected plant or plant-based chemical which can control pests in soil and selected chemicals or materials which can promote the select plant or plant-based chemical. The selected plants were clove, Chinese star anise, tobacco, Bird Chilli and Mandarin orange peel. The selected plant- based chemical were eugenol and limonene. The selected additive or carrier was chitosan, dolomite, zeolite and fly ash. The result showed that eugenol, crude ethanol extract of cloves and essential oil of cloves at concentration of 1,000 ppm were minimum antimicrobial activity against *Rhizoctonia* sp. of 100% in the laboratory. In green house, Soil amendment with *Rhizoctonia* sp. and eugenol, crude ethanol extract of cloves and essential oil of cloves mixed with chitosan, dolomite and fly ash (1 g / soil 1 kg) at concentration of 1,000 ppm, the number of fungi were increased in all treatments after 7 days of incubation with 92.50-100% of *Rhizoctonia* colonization in 50 g of soil. In the laboratory for growth inhibition *R. solanacearum*, the antimicrobial effect of crude aqueous extract of cloves was maximum antimicrobial activity against *R. solanacearum* (inhibition zone average 0.48 cm after 24-48 h incubation) following by Eugenol (inhibition zone average 0.13 cm) at concentration of 5,000 ppm (20 µl/disc). Minimum concentration at 2,000 ppm of crude aqueous extract of cloves was antimicrobial activity against *R. solanacearum* (inhibition zone average 0.26 cm), while Eugenol was not found effective against the bacteria. In green house, soil amendment with *R. solanacearum* and 4,000 ppm of crude aqueous extract of cloves mixed with chitosan, dolomite and fly ash (1 g / soil 1 kg) were determined for their effects to population of bacteria. Fourteen days after treatment, it was found that population of bacteria was decrease in all treatments when compared with soil amendment contained only *R. solanacearum*. In laboratory condition 1,000 ppm eugenol sprayed directly on *Phyllotreta flexuosa* showed of 93.33% mortality, following by ethanol extract of mandarin orange peel, essential oil of Chinese star anise and crude aqueous extract of Burley tobacco (short stem) at 1,000 ppm resulted in 90.00%, 86.67% and 86.66% mortality, respectively. Then 4,000 ppm eugenol with soil amendments were applied on soil to control *P. flexuosa*. Chitosan and fly ash mixed with 4,000 ppm eugenol (0.44 g/soil 100 g) were applied on soil without plastic covered showed 60% mortality of *P. flexuosa* while soil amendment dolomite mixed with 4,000 ppm eugenol with plastic covered showed 56% mortality. The crude aqueous extract of cloves, crude ethanol extract of cloves, crude aqueous extract of short stem of burley tobacco and essential oil of clove were analyzed by GC-MS, all samples revealed different main chemical constituents, ethanolic extract of clove (found 2-methoxy-3-(2-propenyl)-phenol), aqueous extract of clove (found 1,2,3-benzenetriol), aqueous extract of burley tobacco (short stem) (found 3-(1-methyl-2-pyrrolidyl)-pyridine) and essential oil of clove (found eugenol).