

## Abstract

Testing and selection of bio-product for soil fumigant to control plant diseases and insect pest were investigated. A mixture of eugenol (10% wt./vol.) and dolomite powder as additive was applied 20 g/plant to control flea beetle and root rot and stem rot disease of kale caused by *Rhizoctonia* sp. under field condition. The growing area was cover with black plastic mulch for 1 week before planting. An average damage level of plants from flea beetle was recorded but no significance different was found when compared with eugenol treatment, chemical application, short stem Barley tobacco aqueous extract and control treatment. Moreover, under greenhouse condition, 14 days after planting, no disease incidence was found in treatment that applied with eugenol but disease incidence with 50% was observed in control treatment.

Besides, mixture of clove extract (10% wt./vol.) and fly ash as additive was applied 20 g/plant to control *Ralstonia solanacearum* caused of tomato wilt disease and cover with black plastic mulch for 1 week. Fourteen days after planting, disease incidence of bacterial wilt was observed in all treatments. The lowest of disease incidence was found in the treatment of eugenol (12.5% wt./vol.), followed by bactericide and control with 17.5% and 22.5%, respectively. From this experiment, it was showed that mixture of clove extract (10% wt./vol.) and fly ash could be applied in the field to control bacterial wilt disease.

The efficacy of 10% wt/wt eugenol and clove extract as liquid and dry powder formulation which preserved at room temperature and 4°C for 1, 3 and 6 months were decreased to control fungus and bacterium. The 10% wt/wt eugenol as dry powder formulation preserved under 4°C for 1, 3 and 6 months to control flea beetle did not decreased. From this research, the used of 10% wt/wt eugenol mixed with dolomite (in soil and covered with black plastic mulch for 7 days before planting of kale can be used to control *Rhizoctonia* sp. and flea beetle in the soil. However, 10% wt/wt cloves extract mixed with fly ash can be used to control *R. solanacearum* in soil but with moderate efficacy. However, bio-products production cost need to be considered.