Abstract

Ten samples of manures, compost, dry leaves and compost inoculant were used for isolation of cellulolytic microorganisms. The total numbers of 189 microbial isolates were obtained consisting of 108 mesophilic isolates and 81 thermophilic ones. Based on diameter of clear zone to colony ratio and CMCase activities, 12 effective cellulolytic mesophilic microbial isolates and 22 thermophilic ones were selected. The first five effective cellulolytic isolates of thermophilic and mesophilic microbes were used for antagonistic activities against four fungal disease pathogens. It was found that one isolate of thermophilic bacterium from the pile of dry leaves at Mae Hae research station and training center and one isolate of mesophilic actinomycete isolated from the compost at Faculty of Agriculture showed their antagonistic activities against 4 fungal disease pathogens namely, *Fusarium spp.*, *Colletotrichum fragariae*, *Rhizoctonia spp.* and *Sclerotium rolfsii*. Based on base sequence of 16s rDNA, the selected actinomycete isolate was similar to *Streptomyces spp.* up to 99% while the selected bacterial isolate was similar to *Bacillus subtilis* up to 99%.

These two cellulolytic microbial isolates were tested for their effects on N, P and K releasing from decomposition of four types of waste material in Sansai soil series and the soil collected from Mae Hae Research station and training center (Mae Hae soil). The tested wastes
were sewage sludge from oxidation pond of potato processing factory, mushroom compost waste, filter cake from sugar cane mill and the waste from tobacco leaves. Sewage sludge and mushroom compost were added into each soil at the rate of 200 mg N/kg while filter cake and tobacco leave were added at the rate of 200 mg P/kg and 200 mg K/kg respectively. The soils with and without addition of each waste material were incubated in the plastic bags under room temperature and at soil moisture level of 50% of WHC for 2 months. It was found that inoculation of both cellulolytic microbes resulted in significant increasing of mineralizable N of sewage sludge added San Sai soil at one and two months after incubation. Actinomycete inoculate was significantly better than bacterial one. The similar result as San Sai soil was found for Mae Hae soil for 1 month incubation period but at 2 months after incubation only actinomycete had significant effect on improvement of mineralizable N as compared to uninoculated control treatment. No effects of cellulolytic microbial inoculations on mineralizable N of mushroom compost waste added soils were found when sterile soils and waste materials were used. There was no interaction effect of microbial inoculation and type of waste material on mineralizable N at both 1 and 2 months after incubation. There was no significant different between the two cellulolytic microbial inoculation and both resulted in increasing of the amount of mineralizable N released from the waste added San Sai soil. Addition of sewage sludge increased significantly the amount of released mineralizable N in sterile Mae Hae soil while that in mushroom compost waste added one reduced significantly compared to the control soil without waste material addition. The effect of actinomycete inoculation on released mineralizable N from sterile Mae Hae soil was not significant. At two months after incubation, the addition of both sewage sludge and mushroom compost waste increased the amount of released mineralizable N of steril Mae Hae soil and the stimulation effect from bacterial inoculation was significantly better than the actinomycete one.

In nonsterile filter cake added soils, inoculation of cellulolytic microbes resulted in significant improvement of the amount of released available P at 1 month after incubation. Bacterial inoculation was better than actinomycete at both incubation periods. In sterile soils, only bacterial inoculation had significant stimulation effect on improvement of available P released from filter cake added soils.

In nonsterile tobacco leaf added soils, both cellulolytic microbial inoculations had significant effects on improvement of the amount of exchangeable K of both San Sai soil series and Mae Hae soil. There was no difference between bacterial and actinomycete inoculations on the effects on improvement of K releasing of San Sai soil series at month incubation period but
at two months after incubation bacterial inoculation was significantly better than actinomycete. In sterile soils, addition of tobacco leaf waste, improved significantly the amount of exchangeable K and only bacterial incubation showed significant stimulation effect.