SUSTAINABLE VEGETABLE PRODUCTION THROUGH THE USE OF EFFECTIVE MICROORGANISMS

H.A.H. Sharifuddin and A.R. Anuar

Department of Land Management, Faculty of Agriculture Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

Keywords: sustainable agriculture, effective microbes, biodynamic agriculture, organic farming, nature farming.

Introduction

There is increasing concern over health and environmental problems associated with the use of chemicals in modern agriculture. Many still consider organic agriculture as primitive, unable to produce enough to feed the hungry populations. However, in the past two decades, alternative organic farming systems such as Kyusei Nature Farming and Biodynamic system have been looked upon as the solution to the inherent shortcomings of the conventional organic farming methods. Nature and biodynamic farming regard earth and soil as living. They avoid all practices that are unnatural. This project developed a system that increases the inherent productive capacity of natural and biological resources and minimises adverse impact on environments.

Materials and Methods

A field study was conducted using white mustard grown on Bungor series soil for five seasons in culverts measuring 60 cm high by 90 cm diameter. Two tonnes of lime per hectare were added to the soil before the first crop. The chemical fertiliser used were NPK Blue Special at 100 kg ha^{-1} and chicken manure at 10, 20 and 30 ton ha^{-1}. Effective microorganisms 4 (EM4) was used in the EM treatments. For pest management, EM5 was used. Plant and soil samples were taken at each harvest. The shelf life of plants was determined, while microbial counts were determined from the soil samples. Laboratory experiments were also conducted to supplement to the field experiments.

Results and Discussion

There were no significance difference in yield and keeping quality of vegetables between treatments. Microbial counts from the soil showed no significant difference in microbial activities between treatments. The use of EM5 to control pest and diseases was not satisfactory. Laboratory studies indicated that the quality of molasses used to propagate EM played a significant role; newer molasses solution gave high microbial activities. After using fresh molasses in the laboratory studies, application of EM4 and organic amendments increased soil microbial activities and soil organic C. Amendments of soil with organic amendments together with EM4 increased N mineralisation. The P mineralised in the soil was correlated with NO_3-N, NH_4-N and CO_2 evolution. The soil organic C was correlated with NH_4-N. There was also a positive correlation between NO_3-N and the evolved CO_2. Organic C in the soil was negatively correlated with the evolved CO_2. Results showed that the increasing order in the capacity of the organic amendments to release plant nutrients were palm oil mill cake<rice straw<chicken manure. Mineralisation indicated that chicken manure had better N and P characteristics than rice straw and palm oil mill cake during the first week of incubation. After seven weeks of incubation, CO_2 evolution was higher in rice straw and palm oil mill cake treatment with addition of EM4.

Conclusions

The nonsignificant microbial number, yield and keeping quality of vegetables between treatments may have been due to the poor molasses quality used. Pest and diseases control by EM5 were not satisfactory. Greater proportion of plant nutrients (N,P,K, Ca and Mg) were mineralised from soil amended with chicken manure either with inoculation of EM4 or without.

Supported by IRPA Grant 01-02-04-0066