

Influence of Fertilization on Rotated Organic Rice and Vegetable

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Abstract

The purpose of this experiment was to study the impact of long-term fertilizer application on the yields of organic farming crops under different farming management. The experiment was conducted at Ho Xing Organic Farm in Chi Nan branch, Kaohsiung District Agricultural Research and Extension Station. The experiment has been carried out for five years, since spring 2001 to summer 2006. The farmlands were divided into two experimental groups, which are based on the types and the rates of compost. The types of composts are marked as M0, MA, MB, MC, and MD, on the other hands, the different application rates of composts is marked as N0, N1, N2, N3 and N4. Based on the recommendation rate of N of the crop planted, N1, N2, N3, and N4 represented one, two, three, and four times of recommendation rate of N, respectively. M0 and N0 are no fertilizer-treated plots and CK is chemical fertilizer treatment, respectively. The plot size was 0.05 ha without replication. The crops studied included a spring rice, a summer rice, a sesbania or an okra, and a autumn vegetable within one year. The result shows that the yields of spring rice of N4 treatment were the highest among different treatments. As for summer rice, the highest yield was found in N2 treatment. However, the economic profit of N2 spring rice was the highest, and that of summer rice of non-fertilizer treatment was the highest. Owing to high N content, the MC and MD composts were adequate for applying to spring crops. On the contrary, MA and MB that contain lower N are suitable for summer crops. There was a negative relationship between the taste and the protein content of the rice, and there was no significant relationship between the taste and the application rates of compost. However, there was a good relationship

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between the quality of rice and the planting seasons or crop species.

Generally speaking, the economic profit of summer okra lowered as composts were applied instead of chemical fertilizer. Therefore, compost is not recommended for this crop. The response of autumn cabbage and kale turnip to compost applied was significant. However, the degree of response was related to the previous farming management and the amount of N applied with the compost.

The yields of autumn vegetable were unstable after the summer rice. Compared with chemical fertilizer treatment, the yields of autumn vegetable of most compost treatments lowered significantly. Owing to the high N contents, MC and MD composts resulted in high yields of autumn vegetable. Instead of planting summer rice, planting okra or sesbania as summer crop resulted in rather stable yields of autumn vegetables. In general, most of compost treatments were able to increase the yields as compared with the chemical fertilizer treatment; furthermore, N2 treatment resulted in the highest yields and also economic profit. For each year, the percentages of compost N remained in the soil after harvesting in N2 treatment were related to the types of compost applied. Owing to high carbon content of MA and MB composts, 58% and 54% of N applied were remained in the soil after the harvesting of crops for MA and MB, respectively. In contrast, 19% and 39%, respectively, of N were remained in soil for MC and MD in which the C contents were low.

Key words: Organic farming, Composts, Rice, Vegetables