Abstract

The study for improving fertilizer and water use in vegetable production was conducted in the farm of Royal Project's farmers, using RCBD experiment design. Six vegetables used were: baby cos, aby pak choi and cos at Mae Tho Royal Project Center, sweet pepper and table tomato at Khun Wang Royal Project Center and Japanese cucumber at Mae Tha Nuae Royal Project Center. Soil samples were analyzed for soil properties to plan the experiments. Especially, the texture, field capacity (FC) and permanent wilting point (PWP) were used for water use experiment, and the nutrients of N P K for fertilizer use experiment. The 4 treatments of water use experiment consisted of 1) conventional practice, 2) every day irrigation with plant requirement, 3) limited irrigation when soil moisture reduced to 50% available water capacity (AWC) and 4) limited irrigation when soil moisture reduced to 30% AWC. For fertilizer use experiment, the 4 treatments consisted of 1) conventional practice, 2) based on crop removal, 3) based on site specific fertilizer application (SSFA) and 4) control by not adding fertilizer. The results of the studies were evaluated by comparison of the development of fresh and dry weight of shoot and root and weight of yield.

The results of improving water use for baby cos indicated that the treatment which gave high production and high water use efficiency (WUE) was the treatment of using 30% of available water capacity (AWC) to limit water application. For pak choi and cos, the high production and high WUE were found in the treatment of using 50% of available water capacity (AWC) to limit water application. The treatment could decrease water use 1-14% from farmer doing.

The treatment which gave high production and WUE for sweet pepper was the treatment of using 50% of AWC to limit water application and it could save water 4.3% from farmer doing. For table tomato, the treatment which gave high production and high WUE was the treatment of using 30% of AWC to limit water application and it could save water 16.7% from farmer doing. For Japanese cucumber, the treatment which gave highest production was the treatment of farmer doing, but it gave a low

WUE because of a high water application. The second treatment was using 50% of AWC to limit water application with saving water by 17.9% from farmer doing.

The saving water management limited by the soil moisture and the evapotranspiration rate of the plants was conducted by using the automatic irrigation controller for controlling the quantity of irrigation water as needed and the available time with the irrigation timer could be set.

For the fertilizer use experiment, the results showed that to produce vegetable in 180 m^2 –greenhouse at Mae Tho Royal Project Development Center, under conditions of high soil fertility (the level of organic matter, available phosphorus and exchangeable potassium was very high), the rate of fertilizer application based on the nutrient requirements of the plants grown together with soil nutrient was sufficient to produce quality leafy vegetables by applying nitrogen fertilizer at 0.66, 2.93 and 1.53 kg for baby cos, cos and pak choi, respectively.

For the production of table tomato and sweet pepper, they were planted on the soil in a plastic tunnel under conditions of high soil fertility (the levels of organic matter, available phosphorus and exchangeable potassium were very high) at the Royal Development Project, Khun Wang Royal Project Development Center. Fertilizer rate was determined by the nutrient requirements of the crops planted, together with the amount of nutrients available in the soil which was sufficient to produce table tomato and sweet pepper with quality. To produce table tomato, at least 50 kg / rai nitrogen should be used, as well as, for the production of sweet pepper, nitrogen fertilizer at least 40 kg / rai should be used whereas phosphorus and potassium fertilizers were unnecessary. For the results of Japanese cucumber production in the greenhouse at Mae Tha Nuae Royal Project Development Center, fertilizer rate was determined by the nutrient requirements of the plants grown, together with the nutrient content of the soil. Sixty-five kg / rai of nitrogen fertilizer might not be sufficient to produce good Japanese cucumber. More research work is required to get the suitable rate.