

## Abstract

Studies to improve the efficiency of irrigation and fertilization in three important fruit crops of the highland, i.e., strawberry, cape gooseberry and grape, were carried out at AngKhang Royal Agricultural station, Fang Distich, Kae Noi Royal Project Development centre, Chiang Dao District and Pang Da Royal Agricultural station, Samueang District during January-September 2562. The purposes of the studies were to identify economical and efficient method and best practice and the effect of irrigation and fertilization during critical period for these important fruit crops of the Royal Project. The studies were divided into 4 parts: (1) a study of best practice and water and fertilizer management of the farmers in producing strawberry and cape gooseberry. Samples of these fruit crops were collected at different growth stages, fresh and dry weights of underground and above-ground parts were recorded. Concentration of N, P and K in each plant part were recorded. Data on production (fertilization, irrigation and meteorological data) from the successful farmers farms were also recorded to evaluate the best practice in fertilization and irrigation management for the production of strawberry and cape gooseberry, (2) a study of suitable and effective fertilization on strawberry and cape gooseberry, using a completely randomized block design with four replicates, with 4 methods of fertilizer application, i.e., (i) Control no application, (ii) a conventional method used by farmers in strawberry and cape gooseberry cultivation (RFA), (iii) applied according to the requirement of strawberry and cape gooseberry (PWFM) and (iiii) applied according to the result of soil analysis (SSFM) and the requirement of strawberry and cape gooseberry, (3) a study an economical and effective irrigation method in grape, CV. Beauty Seedless, using a completely randomized block design with three replicates with 4 different methods of irrigation, i.e., (i) the method which the local farmers usually use, (ii) irrigated when soil moisture reduced by 30% of AWC, (iii) irrigated when soil moisture reduced by 50% of AWC, and (iv) irrigated when soil moisture reduced by 60% of AWC and (4) a study on the effect of irrigation at critical period on yield and quality of grape, using a completely randomized block design with three replicates with 4 methods of irrigation, comprising of (i) 4 weeks no irrigation before harvest, (ii) 3 weeks no irrigation before harvest, (iii) 2 weeks no irrigation before harvest (the method commonly practiced in the area) and (iv) 1 week no irrigation before harvest.

Results of the studies showed that, for strawberry production in AngKhang Royal Agricultural station area, N at the rate of 9.31 kg/rai, P at 2.49 kg/rai (5.70 kg  $P_2O_5$ /rai), K 10.61 kg/rai (13.08 kg  $K_2O$ /rai and 509.70 m<sup>3</sup>/rai of water were required while in the best practice of the farmers, there was the use of 68.48 kg/rai N, 185.92 kg/rai  $P_2O_5$ , 120.64 kg/rai  $K_2O$  and 370.40 m<sup>3</sup>/rai of water. For cape gooseberry production at Kae Noi Royal Project Development centre, cape gooseberry needed 46.64 kg/rai N, 2.39 kg/rai P (5.50 kg  $P_2O_5$ /rai) and 80.53 kg/rai K (93.63 kg  $K_2O$ /rai), and 619.50 m<sup>3</sup>/rai of irrigation water while in the farmers best practice, there was the use of 53.76 kg/rai N, 53.76 kg/rai  $P_2O_5$ , 69.12 kg  $K_2O$ /rai and 1,166.55 m<sup>3</sup> of water.

Results from the studies on optimal fertilization in the production of strawberry cv. Pharachatan 80 and cape gooseberry cv. Golden berry indicated that fertilizer management according to second method that used a conventional method by farmers in strawberry and cape gooseberry cultivation (RFA), third method that applied according to the requirement of strawberry and cape gooseberry (PUFM) and fourth method that applied according to the result of soil analysis and the requirement of strawberry and cape gooseberry (SSFm) did not result in a significant difference in growth, quantity and quality of strawberry and cape gooseberry. However, when considering the profit from the Production, it was found that strawberry cv. Pharachatan 80 and the fourth method of fertilizer management (SSFm) gave highest profit (89, 148 Baht/rai) which was 12,914 Baht/rai higher than that obtained by the farmers who used second method (RFA). For cape gooseberry, it was found that the third method of fertilizer management (PWFM) resulted in the highest profit which was 30,058 Baht/rai higher than the farmers who used RFA method. From the studies, it clearly indicated that fertilizer management based on the nutrient requirements of the crops and soil analysis enable the farmers to gain more profit from strawberry and cape gooseberry production.

The tests on economical and efficient method of irrigation in grape. CV. Beauty seedless indicated that irrigation by mini-sprinkler system at one month before the abstention of irrigation was the suitable method for grape production at Pang Da Royal Agricultural station. Amount of water given to each plant was 30 mL, equivalent to 1.60 litre/rai. Grape yielded 6.58 kg/plant or 2,807 kg/rai. Total soluble solids (TSS) was 16.87° Brix and

the amount of titratable acid (TA) was 0.46%. Results from the study on the effect of water at critical period on quantity and quality of grape indicated that all of the four irrigation methods did not result in a significant difference in yield. However, by withholding irrigation for four weeks before harvest resulted in best quality yield with highest TSS (16.82° Brix) and lowest TA (0.77%).

