

ABSTRACT

This final report: sub-project 5th: Arabica Coffee Cultivation System under The Natural Resources Conservation. This is the 2nd annual report from the 4 years period project. The main objectives are (1) to study the best practices in coffee growing under the shade and (2) to study Arabica cultivation under shade with soil and water conservation. There are two main parts: to study the full canopy of unshade and shade grown coffee. The plots use for this research are at Pa Miang Royal Project Development Center, Teen Tok, Inthanont Royal Agricultural Royal Project Station, Khun Chang Khian and Nong Hoy Highland Research Station. For 2nd research studied in new coffee growing areas. At Ban Pa kluay-Khunya under the cooperation program between the Royal Project and Thai Petroleum Public Company Limited

The best practice in each station was studied in two plots: full sun and shaded plots. Field assessment to record general information, install and record continuous air temperature and relative humidity, soil property and nutrients content was analyzed. General cultural practice, measurement of coffee tree size, yield components and calculate yield per tree. For the new coffee plantation record microclimate, soil information, management and measure the growth of coffee plants and shade tree with. Soil erosion were assess and outbreaks of insects and diseases.

The Pa-Miang Royal Project Development Center. Plot selected Mr.Suwan Thavokat. Average stem diameter of 6.24 cm, 226 cm, yield estimated 4.29 kg./plant. Shaded plot Mr. Tawee Chankaew. Average stem diameter of 6.6 cm, height 159 cm, yield estimat 5.62 kg./plant.

Teen Tok Royal Project Development Center. Full sun Mr. Tua Zhang Arun. Average stem diameter 7.1 cm, height 195 cm, yield estimated 11.6 kg/plant. Shade grown Mr. Suwan Moonkhamdee, average stem diameter 6.36 cm, height 315 cm, yield estimated per plant 3.8 kg.

Inthanont Royal Agricultural Royal Project Station (Mae Ya Noi sub unit). Full sun average stem diameter 3.4 cm, 130 cm height, yield estimated per plant 0.90 kg. Shade plot, average stem diameter 3.04 cm, height 193.8 cm, yield estimated per plant 5.5 kg.

Khun Chang Khian Highland Research Station. Full sun plot, average stem diameter 10.1 cm, height 222 cm, yield estimated/plant 6.87 kg. Forest shade plot average diameter was 5.7 cm, plant height 294.4 cm, yield estimated per plant 6.32 kg. Fruit tree shade (lychee) plot, average stem diameter of 7.24 cm, plant height 251.2 cm, yield estimated/plant 4.72 kg.

Nong Hoy Highland Research Station. Full sun plot, average stem diameter is 6.8 cm, the height 229 cm, yield estimated/plant 7.26 kg. Shaded plot, average stem diameter was 8.3 cm, plant height 276 cm, yield estimated per plant 4.39 kg.

Plots at Ban Pa Kluay- Khun Ya. Data record continue from the first year, 2016. Collect data for 7 plots. (1) Mr. Bueke Predapana (2) Mr. Pichet Udompraiwan (3) Mr. Tib Duangchewan (4) Mr. Wirat Pongpanacheewin (5) Mr. Comeron Jaewjantuek (6) Mr. Alo Udom Praiwan (7) Mr. Keno Kajiri. These coffee plots are new plantation, 2 years old and never fruiting. Every farmer grown cash crops in the rainy season. Most coffee trees are unshade. The shade tree grown in same time with coffee. Coffee tree and shade tree have normal growth and development. Data in August 2017. The coffee stem diameter average 1.16-3.36 cm and 49-136 cm height.

Microclimate in cold and hot seasons, air temperatures change drastically during the day and at night. The full sun temperature is higher than 40 °C. In the rainy season, the difference in daytime and nighttime temperatures is slightly different. The temperature will peak in the range of 11.00-16.00 hrs, and slow down until about 8.00 pm. The temperature will remain constant until 07.00 hrs. in the next day. Temperature at Mae Ya Noi is lower than the other stations. When the temperature is continuously drawn into a line graph. It found that the full sun and shade grown coffee give the same trend of falling down and up with the same pattern. But graphs from full sun plot was more steep slope. Which means suddenly changed.

Relative humidity changes with opposite time with temperature. That is, after 18.00 pm the relative humidity will increase. Most of them are very high, almost 100 percent, and will begin to reduce after 8.00 am of the next day. The relative humidity was measured from Royal Inthanon Agricultural Royal Station was higher than other stations in cold, hot and wet seasons. While the lowest relative humidity is measured from the Teen Tok Royal Project Development Center and the Nong Hoi Station. In

the rainy season, the relative humidity measured at all stations is over 80 per cent, higher than at any other time and up to 100 per cent during the night. Graph of the continuous relative humidity full sun or shade grown are the same trend. However, full sun during the day, relative humidity is lower than shaded. While at night, the relative humidity from full sun always higher. The relative humidity of every new planting plots. At Ban Pa Kluay - Khun Ya. In the winter and hot season, during the day, the value is very low. Some plots are less than 10 percent, which is different from full sun coffee plantation. The relative humidity drop much slowly and slightly.

Soil samples from all plots were relatively low in pH but high organic matter content, low bulk density. For the old coffee plantation from every station and every plots. Macro nutrients such as potassium, phosphorus, and calcium were very high concentrations. For new plantation at Ban Pa kluay-Khun Ya the concentration of phosphorus is very low.

Keywords : Arabica coffee, Soil and water conservation, Agroforest, Microclimate

