# **Effects of Different Coffee Cropping Systems on Nutrient Status and Yield of Arabica Coffee**

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## Introduction

- The current trend of increasing coffee consumption has led to a higher demand for coffee beans.
- In Thailand, farmers are increasingly converting land to coffee cultivation, employing various cropping practices. These include coffee monoculture, coffee agroforestry (where coffee is grown alongside forest trees), and intercropping coffee with economically valuable fruit trees such as mango, persimmon, and banana.
- Different ways of growing coffee plants are key to producing coffee in a lasting way. By studying how these growing methods affect soil nutrients and how much coffee is produced, we can create better plans to increase both the amount and guality of coffee grown in Thailand.
- Therefore, this research aimed to study the nutrient levels in green bean coffee under different coffee cropping systems.

#### **Materials and Method**

The study area is located at the Nong Hoi Highland Agricultural Research Station, Mae Rim, Chiang Mai (18°55'19.6"N 98°48'55.0"E) (Figure 1). For comparison purposes, samples were collected under the different land-use types including:

- coffee monoculture (T1)
- coffee agroforestry (T2)
- coffee cultivated with economic fruit trees (T3)



### Results

Nutrient status of green coffee bean





Figure 2. Nutrient contents of arabica coffee bean in different coffee cropping systems. (a; nitrogen, b; potassium, c; phosphorus, d; calcium and e; magnesium)

• Yield of green coffee bean









Figure 1. Nong Hoi Highland Agricultural Research Station

• Coffee processing; Natural process



Sorting and selecting

Sun drying 1-2 weeks

Milling

At full maturation stage coffee bean (red cherries)



- Nitrogen (N) -Combustion
- Phosphorus (P) -Bray II Extraction
- Potassium (K) AAS
- Calcium (Ca) AAS
- Magnesium (Mg) AAS
- Chlorogenic acid HPLC (Magdalena et al., 2016)
- Analysis of variance and significant differences among means were performed with oneway ANOVA. The significance level was based on a confidence level of 95.0 % and data were analyzed using Statistica 10.0 program (StatSoft Inc., Tulsa, OK, USA).

Green coffee beans

# Acknowledgement

This research project was supported by Faculty of Agriculture, Chiang Mai University.

- In this study, coffee monoculture had the highest yield at 22.76 tons/ha, significantly higher than the yield of coffee cultivation with economic fruit trees (10.31 tons/ha) and coffee cultivation with forest trees (2.92 tons/ha).
- Moreover, the highest nutrient contents of green coffee beans (N, P, K, Ca, Mg) were found under coffee monoculture, which were significantly higher than the contents under agroforestry and coffee cultivation with economic fruit trees.
- Chlorogenic acid content of green coffee beans under coffee monoculture was the highest, significantly higher than in coffee cultivation with forest trees and cultivation with economic fruit trees, respectively.

# References

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**Figure 4.** Chlorogenic acid of green coffee bean in different coffee cropping