Variations of Chemical Compositions and Quality of Chin-Shin Oolong in Tea Plantations with Different Altitudes

Fang-Ching Chiu Chui-Feng Chiu Jin-Chih Lin Cheng-Chung Huang Mau-Shing Yeh

This research focused on five areas for tea cultivation in Taiwan with a similar longitude and latitude: Jaujingshan (180 m), Shanpingding (534 m), Shrbi (1,275 m), Santsengping (1,560 m) and Wuling Farm (2,048 m). The autumn and winter season of 2006, and the spring season of 2007 were further selected as the test periods. The main focuses of investigations were the chemical composition of tea, and the quality of tea. Moreover, the relatively simple correlation coefficiency among these characters was further clarified. The results are described as follows:

1. Chemical compositions of tea

Jaujingshan: the spring tea has the highest soluble solid and total polyphenols contents, but the largest caffeine content is at the autumn season. Shanpingding: the spring tea has the highest soluble solid, total polyphenols, and caffeine contents. The total free amino acid level is highest in the winter tea in Shanpingding. Santsengping: contents of the total polyphenols, total free amino acid, and caffeine are all highest in the spring tea. Wuling Farm: only the total polyphenol content in the autumn tea is the highest, the others are the highest in the spring tea, such as soluble solid, total free amino acid, and caffeine contents.

2. Quality of tea

The autumn and winter tea showed higher quality than the spring tea in Jaujingshan and Shanpingding areas. On the other hand, the spring and winter tea has higher quality than the autumn tea among different seasons in Santsengping and Wuling Farm.

Key words：Tea; Chin-Shin Oolong; Quality; Altitudes

Rapid Analysis on Major Constituents of Taiwan Oolong Tea by Near Infrared Spectroscopy

Shih-Lun Liu1 Yung-Sheng Tasi Kuo-Renn Chen Andi Shau-mei Ou

The purpose of this study is to evaluate the feasibility to replace the traditional physicochemical analysis with Near Infrared Spectroscopy (NIRS) in the major constituents of Taiwan Oolong tea. Totally 348 tea samples produced on different seasons were collected as materials including 274 Oolong tea samples produced from Long-Tan (Tao-Yuan), Min-Jian, Lu-Ku, Jia-Yi, Tai-Dong, 34 Tieh-Kuan-Yin produced from Mu-Jha on winter, and 40 Oolong tea samples produced from Wu-she with different kinds of electric-roasting treatments. The abilities of explanation and prediction for the standard curves of 5 in 16 major constituents were better than others. The R2 of the 5 calibration curves for moisture, pH, total catechin contents, total polyphenol contents and total nitrogen contents were 0.92, 0.87, 0.91, 0.91 and 0.93, respectively. The correlation coefficients (r) for prediction of these 5 constituents were 0.90, 0.91, 0.96, 0.95 and 0.84, respectively. Ten unknown tea samples were used to evaluate these 5 calibration curves. It was found that there was no significant difference between experimental and NIR predicted data for these 5 calibration curves. It indicated that it was feasible to use NIRS to replace the traditional methods for rapidly analyzing the moisture, pH, total catechin contents, total polyphenol contents and total nitrogen

contents of Taiwan Oolong tea.
Key words：NIRS; Taiwan Oolong tea; Rapid analysis

Study on the Identification of Tea Original Place by Stable Isotope and Elemental Analysis

Chun-Liang Chen Kuo-Renn Chen

The objective of this research is to collect the information about the application of stable isotopes in crops. We collected teas of different original places to perform the stable isotope and mineral element analysis. We wish that we can find a index to distinguish different tea original place, which can prevent foreign teas from imitating Taiwan teas.
Experimental results showed that we can differentiate the tea original places by principal component analysis using stable isotope13C, 15N and other elements. The first principal component is significant high negative correlated with the altitude of tea producing area, which can identify the high mountain tea.
Key words：Stable isotope; Tea; Identification of original place

Researches on the Effect of Pesticide Drift and Farmers' Habit of Pesticide Application in Northern Taiwan

Hsin-Hui Shih Ming-Tzu Chiou Hsien-Tsung Tsai Yao-Jen Tsai

According to the questionnaire survey on pesticide application habit by tea farmers in Taipei and Yilan, the tea trees (43.1%) and woods (35%) are the major kinds of the neighbor crops. Besides, high pressure power sprayer (47.4%), backpack sprayer (25.3%) and backpack power sprayer (22.1%) with one hole (53.01%) or four-hole (36.1%) nozzles are the common spraying machines. We conducted the pesticide drift tests and field experiments using the above described agricultural machines. The results of pesticide drift tests using the backpack power sprayer with the one-hole or four-hole nozzle are as follow: (1) under no wind condition, water spary range was limited in 2 meters; (2) when wind velocity was 0.5 m/s above, the average density of water droplets was concentrated in 2-4 meters. Besides, the average density of water drift and the drift distance was increasing with the wind velocity increasing; (3) when wind velocity was 2-2.5 m/s, the density of water droplets also lowered near non detectable when the distance was over 6 meters. In the field experiment, the result revealed that when the wind velocity lowered to 0.5 m/s below, the drifted pesticide concentration lowered to 0.7 mg/kg below in 2-4 meters away from the sprayed region and lowered 0.5mg/kg below in 4 meters. Besides, the distance of spraying pesticide from the high pressure power sprayer was affected more than 12 meters when we sprayed on high stem crop, e.g., betel nuts.
Key words：Tea garden; Pesticide drif; Pesticides pollution

A Study on the Correlation between Innovative Management Strategies and Strategic Alliance Types of Tea Farmers-A Case of Luye, Taitung

Hsiu-Hua Chen Feng-Jui Lin

According to the research motivation and objectives, the tea farmers in Luye Hsiang were the subjects to be studied by questionnaire and the raw data was analyzed by using SPSS statistical software. The conclusions, implications for management practice, and the suggestions for tea farmers will be proposed. Whether tea farmers' population background characteristics have divergence in these three dimensions (business environment, innovative management strategies, and types of strategic alliances) were investigated with ANOVA in this study. Meanwhile, for tea farmers, whether the three dimensions (business environment, innovative management strategies, and types of strategic alliances) have influence on each other was also investigated with path analysis in this study.

The results showed that different levels of recognition of tea farmers on business environment, innovative management strategies, and types of strategic alliances, are depending on their different ages and education. And there are directly and indirectly influential relations between business environment, innovative management strategies, and types of strategic alliances. Ultimately, this study will propose, according to the studied result, the possible implications for management practice, and specific practical suggestions for the references to the tea farmers at Luye Hsiang in further.

Key words：Business environment; Strategic alliance type; Tea farmer

Survey on Tea Pests in a Conversional Tea Garden Converting to Organic Farm

Fang-Ming Thseng Shin-Kung Tseng Chui-Feng Chiu

Implementation of conventional tea garden converting to organic farm, in the early stage of operation, the fluctuation of diseases, pests and ecosystem in the garden were the research focus. Test area SanYi tea garden was located in Miaoli County, was up to 128 hectares, the garden was converted to organic farming at January 2008. Survey was conducted once every month, from May 2008 to December 2009. It showed that diseases and pests were found in this test area. Diseases included blister blight, algal leaf spot, die back and brown blight diseases of tea. The occurrence of pests vary according to the seasons, late spring to summer were lopper, tea yellow thrips and green smaller leafhopper. Termite was serious in dry summer. The numbers of male moths attracted by sex pheromone of smaller tea tortrix and tea tortrix in 2009 were fewer than in 2008. Lac insect rarely seen in tea pest was found on July 2009 in Taiwan. More than 10 kinds of beneficial insects, including bees, were found in the garden. Three kinds of lichens have also been observed.

Key words：Tea; Survey of pest; Organic tea garden

LC/MS/MS Analysis of Carbamate Pesticide Residues in Tea

Chia-Chang Wu Zheng-Wai Lin Min-Wen Chu

A high performance liquid chromatography/tandem mass spectrometry (LC/MS/MS) was developed to simultaneously analyze seventeen carbamate pesticides in tea. The developed method used acetonitrile as extraction solvent, LC/MS/MS analyzed by positive ion electrospray ionization and multiple reaction monitoring method. The present results showed good linearity by correlation coefficients of more than 0.995 for all analyses. Limits of detection varied from 0.05-3.95 ng/mL, limits of quantification varied from 0.18-13.16 ng/mL. Recoveries of sixnteen carbamate pesticides ranged from 70.69 to 121.13 at the spiked level of 50 ng/mL. The results showed that the LC/MS/MS method was successfully utilized to determine the trace level amounts of carbamate pesticides residues in tea samples.

Key words：Tea; Carbamate pesticide; LC/MS/MS

Promotion and Prospect of Certification Mark of Origin for Tea

Hsien-Tsung Tsai Yao-Jen Tsai

Promotion of certification mark of origin can guarantee agricultural product quality and improve competitive advantage in these products. In Taiwan, many kinds of products including rice, fruit, wine and tea have been labeling geographical term. Taiwan tea has been exporting to other countries as 「Taiwan Oolong Tea」 for hundred years. Additionally,「 Wenshan Paochong Tea」「 Donding Oolong Tea」「Alishan high-mountain tea」 and other characteristic tea from different regions are also famous in tea consumption market. We have been promoting registered trademark for a long time. Because names of tea are always registered viciously, certification mark of origin has been encouraging since 2006. In this article, we discuss promotion and prospect of present registered certification mark of origin.

Key words：Tea; Certification mark of origin; Origin of tea; Geographical indication

Inquiry on the Adoption of the Tea Innovation Technology from the Tea Farmers' Need Level

Cheng-Nan Lai

Most of the goals of tea technology extension, i.e., tea farmers, have managed their tea industries with different ways. They have some common needs to develop production, increase incomes, increase knowledge and skills. But they also have their own different needs because of the differences among socio-economic circumstances, management conditions, cultural or educational levels, productive management, marketing & management experiences. Extensioners of tea technology should understand tea farmers needs and encourage their behaviors through appropriate extension goals and plans. Thus the new knowledge and technologies could obtain more effective communication. The paper holds this concept to gather and sort out tea technology categories researched, developed and extended by TRES in recent 30 years, and aims at the interactive

relationships between researchers and tea farmers to make a comprehensive inquiry on the relation, communication and share about innovation technology needs views.
Key words：Tea farmer; Need; Innovation technology