Investigation of Leaf Traits and Genetic Variation Analysis of Tea Germplasm in Taiwan

Chih-Yi Hu Kuan-Li Kuo You-Zenn Tsai Shun-Fu Lin

One hundred and twenty-three germplasm of tea preserved in Tea Research and Extension Station and its Branches were investigated in this study. According to 7 qualitative traits of leaf, including bud color, leaf color, leaf shape, apex shape, base shape, bud hair and morphology of leaf teeth, and 8 quantitative traits of leaf, including leaf length, leaf width, leaf thickness, internode length, leaf area, length/width ratio, number of leaf teeth and angle of vein, we have established database of leaf traits for tea germplasm in Taiwan. The leaf shape is suited for primiary or fast germplasm identification due to the similar frequencies of various types. In addition, the remaining 6 qualitative traits with genetic variation are helpful for germplasm identification. As for the quantitative traits, wide genetic variation was observed in leaf width, leaf length, and more stability was observed in leaf thickness, and length/width ratio suggesting good criteria for germplasm identification. Most of the quantitative traits are usually correlative. Therefore, when the labor support is limited and two correlative traits need to be investigated, the trait with greater genetic diversity and more convenience in evaluation will have higher priority in the investigation. The database established from this study could provide information for genetic diversity analysis, germplasm management, germplasm identification, and cross breeding of tea plants.

Key words：Tea, Leaf character, Genetic variation, Germplasm identification

The Investigation of Nutrient Composition in Different Chin-Shin Oolong Plants Positin

Wei-Yee Wang

Allow ten-year-old Chin-shin Oolong winter flush to grow naturally in the field, before spring sprout, then the dry weight distribution ratio of different positions in relatively strong/week plant is quite steady. The highest dry weight is found in coarse roots, and which also contains the highest total carbohydrate and higher inorganic nutrients; leaves, fine shoots and fine roots contain the highest inorganic nutrients but the lowest total carbohydrates; medium branches, sub main branches, main branches and trunk contain the lowest inorganic nutrients but higher total carbohydrate. Under same degree of pruning, weak plants lost a little more inorganic nutrients and total carbohydrate than strong plants, but the major nutrients composition differences of inorganic and carbohydrate is existing in between different plant’s positions. Calcium and manganese concentrate in the upper parts of tea plant and also lost the largest amount caused by pruning. As to winter flush, if that has been medium-prune before spring sprouts and re-build leaf layer, the calcium, manganese, iron composition are 10% and potassium is 5% lower than check plant.

Key words：Chin-shin Oolong, Nutrient distribution

Survey of Trichoderma of Tea Gardens in Taiwan

Hsiu-Sui Lin

Trichoderma is a kind of soil fungi. Nowadays, they are considered as one of the fungal antagonists of plant pathogens and a very important material for biological controls of plant diseases. In this study, the soil dilution method was applied to isolate Trichoderma from the surface soil samples collected from 30 tea gardens in Taiwan. Four different colony types of Trichoderma were isolated. There were 23 strains of Trichoderma harzianum, 12 strains of T. atroviride, 4 strains of T.virens and 15 other unidentified Trichoderma isolates. Recently, the problems of pesticides and fungicides residues of tea are among the most important issues that tea consumers concerned. Biological controls might provide other choices of tea diseases control. This study could execute not only a survey of the species of Trichoderma of tea garden in Taiwan. Moreover, the Trichoderma originated from the tea gardens could be used to study for biological controls of tea diseases in future.
Key words：Camellia sinensis, Trichoderma, Taiwan

A New Species of Telenomus (Hymenoptera: Scelionidae) Reared from Eggs of Andraca bipunctata Walker in Taiwan

Hisn-Kuang Tseng Shu-Pei Chen

In this paper a new species of Telenomus, which was reared from eggs of Andraca bipunctata Walker was recorded for the first time in Taiwan. The original taxonomic description and illustrations of morphology were presented.
Key words：Andraca bipunctata Walker, Scelionidae, Telenomus, New species, Taiwan

Effect of Shading on the Growth and Manufacture Quality of Wild Tea Tree

Hun-Yuan Cheng Horng-Jey Fan

For the purpose of establishing economic culture production model of wild tea plantation at plain, long shading by artifical black net were used to modify cultivation environment to understand response and adaptation of wild tea tree. The experimental treatments included 70%, 50% shading and no-shading (CK). The results were summarized as follows:
Both the survival ratio of 50% or 70% shading treatments were higher than that of the no-shading treatment in wild tea seedling period. Tree height, leaf length, leaf width, leaf area and leaf number had the same trend. But the leaf thickness was thinner in shading treatment. Under the shading canopy, the air temperature and light intensity were decreased in summer tea season, while air temperature keep warmer in winter tea season. The extension of wild tea canopy and shoot yield of shading treatment were higher than that of the no-shading treatment . The manufacture quality also had the same trend, which suggested wild tea tree grows was better in the shading environment. However, the soluble solid, polyphenol, catechin, soluble sugar content of fresh tea shoot and made tea of no shading were significantly higher than that of the long-shading treatment, and the same trend appeared in the different tea seasons. The caffeine and total free amino acid content varied differently among tea seasons.

Key words：Wild tea tree, Shading, Yield, Quality, Chemical component

Effect of Smaller Green Leafhoppers Feeding on the Aroma of Formosa Oolong Tea

Chih-Yi Hu Chih-Jen Lee

TTES No.12 was used as plant material to compare the aroma of Formosa Oolong Tea made of tea leaves with or without feeding injury by the smaller green leafhoppers. By using GC/MS analysis, we found that the aroma components of tea leaves with feeding damage contain much more linalool. Linalooloxide (furanoid type and pyranoid type), 3,7-dimethyl-1, 5,7-octatrien-3-ol, 2,6-dimethyl-3, 7-octadien-2,6-diol, benzaldehyde, benzyl alcohol, 2-phenylethanol, and methyl salicylate. Linalool and its derivatives are the key aroma components in tea leaves with feeding injury by the smaller green leafhoppers. Compared with other foods with mature-fruit-like and honey-like aroma, we found that except for methyl salicylate, those components are related to mature-fruit-like and honey-like aroma, and make up the characteristic mature-fruit-like and honey-like aroma in Formosa Oolong Tea.
Key words：Aroma, GC/MS, SPME, Formosa Oolong tea, Smaller green leafhopper (Jacobiasca formosana)

The Stability of the Solution of Catechins

Ying-Ling Chen Shu-Yen Lin

Tea catechins undergo many chemical reactions in pure water such as spontaneous oxidation and epimerization. The predominant change appears to be epimerization from the epistructure to the nonepistructure. Catechins with 2R, 3R configuration (cis-form) are easier to achieve epimerization than that of 2R, 3S (trans-form). It was shown that the configuration of 2R, 3S is more stable in nature. Among eight individual catechins, the contents of EGCG and EGC were above 70% of total catechins. Tea catechins which almost to be cis-forms are difficult to be stored in pure water because of their frequent epimerization.

Crude catechins in pH 4 buffer of which EGCG and EGC decrease under about 5% have been stored at 25℃ for 30 days. EGCG also had not been found its epimer-GCG in pH 4 buffer at 85℃ for one or two days. Catechins in alcoholic solution are more stable than that of in pure water. It was found that catechins had decreased significantly to be stored from the fourteenth to twenty-eighth days.
Key words：Catechin solutions, Epimers, Stability

Study on the Management Style of Self-managing Tea Farmers

Cheng-Nan Lai Shang-Shiun Yung Yei-Fei Su

We can make a comprehensive understanding for the major transportation and sale distribution of

Taiwan teas, which is the management style, scale, and bottleneck of self-managing tea farmers, through this study. We can provide some suggestions to let them be a reference of proposing counsel policy for relative units. The research methods are questionnaire surveys and in-field interviews that are used to collect and analysis some information and other suggestions.
The results of this study are as follows: Most tea farmers had attended tea production and marketing groups. The average numbers of participating in tea management are 1-2 persons; that males number the same as female. The majority cultivar, which was cultivated by tea farmers, is Chin-Shin-Oolong. The major management style is self-production, self-manufacture, and self-marketing at present. Most of tea leaves, which were plucked by tea farmers were used to manufacture teas by themselves. Most of types of made tea are semi-ball Oolong tea Nearly 50% of tea farmers had sold other products simultaneously. They sold well leas are winter teas. Sixty percent of tea farmers expressed their teas had conducted grading & packaging or constructed their brands. Nearly 70% of tea farmers expressed that their selling targets of teas are fixed. The major selling distribution of teas or relative products is from selling at home. The major resource of knowledge, information or skill of management is the information, training or guidance was provided by government units. Nearly 70% of tea farmers expressed they will buy a computer for data management. The items of most urgent reinforcement or improvement are that they want to combine tea culture and leisure agriculture to promote consuming level and desire, take part with tea strategic alliance, and construct joint brands for promotion and to utilize new distribution for sell. The major bottleneck of management they face is that the expenditure costs are too high. Most tea farmers hold that government should strengthen the monitor of pesticide-residue and propagate the benefit of tea drinking or multiple utilization of tea.
Key words：Tea, Tea farmer, Self-managing, Management

Introduction of Registration, Search and Recent progress in Genomic Sequences of Tea Plant

Chih-Yi Hu Shun-Fu Lin You-Zenn Tsai

In this paper, some methods of gene examination, registration and recent progress in genomic research of tea plants are introduced. In addition, chloroplast and mitochondrial DNA sequences of 15 tea cultivars and closely related germplasm in Taiwan registered by Wunshan Branch, Tea Research and Extension Station, and Department of Agronomy, National Taiwan University are available for identification, genetic diversity study, and parent tracking of cultivars of tea plants.
Key words：Tea plant, Camellia sinensis, Gene examination, Gene registration, DNA sequence, Chloroplast sequence, Mitochondria sequence