

Effects of the Tea Leaf Materials on Catechins Content and Quality of Green Tea Made from TTES No.8

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The study was conducted to investigate the effect of tea leaf materials on the catechins content and quality of green tea made from TTES No.8. By tea season, leaf age, leaf number of plucking and foliar fertilization, in order to establish a high EGCG tea production and manufacturing technology, thus improving the quality of green tea, but also retains high EGCG content. The experimental results show that TTES No.8 of large-leaved cultivar plucked with 2-3 or 3-4 leaf age, tea leaf materials of hand-plucking as one bud two leaves, 3-4 leaf age mechanical plucking, can maintain yield, quality of green tea and higher EGCG content, and foliar fertilization had no obvious effect. The tea leaf materials could supply as a reference for high EGCG tea production technology.

Key words: Tea leaf materials, TTES No.8, Catechins, Green tea quality

Effects of Withering Time and Blanching Condition on Catechins Content and Quality of Green Tea Made from TTES No.8

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The study was conducted to investigate the effect of withering time and blanching condition on the catechins content and quality of green tea made from TTES No.8. The experimental results was show that TTES No.8 of large-leaved cultivar processed 4 hours withering, high temperature (300 °C) panning conditions, could obtain the best quality, and can maintain a high EGCG content. Thus manufacture process can improve the bitter taste produced from large-leaved green tea, but also retains high EGCG content. The manufacture processing was could supply as a reference for high EGCG tea production technology.

Key words: Withering time, Blanching condition, TTES No.8, Catechins, Green tea quality

Resolution of Tree Ring Characteristics and Tree Ages of Tea Trees by X-ray Densitometric Techniques

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The purpose of this research was to explore the ring characteristics and tree ages of teatrees (*Camellia sinensis*, TTES No.12) by X-ray densitometric techniques. The results revealed that the average ring width, ring density, and tree ages of sampled tea trees were 1.48 mm, 735.4 kg m⁻³, and 24.5 yrs, respectively. The tree ages of tea trees could be examined by tree ring analysis techniques. The ring width (RW), ring density (RD), latewood percentage (LWP), and in a ring density difference value (RDW) showed different reactions lasting several years after heavy pruning of removed crown. Overall, the heavy pruning caused immediate production (first year) of lower RW and LWP, lasting for three years; however,

lower RD and RDW were delayed up to two years after heavy pruning of removed crown than those of other rings. Sudden drop in the RW, RD, LWP, and RDW value of tea trees were found in the 25th tree ring due to the tree growth and vitality of decline by visual observation. Experimental results could provide some vital information and techniques for management and practice of tea tree.

Key words: Tea tree (*Camellia sinensis*, TTES No.12), Ring width, Ring density, Nondestructive technique

Studies on the Processing of Tea Liqueur

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The present study used distilled rice wine from 'Tai Chung indica rice-10' (TC-10) rice as alcoholic base for making tea liqueur. Shy Jih Chuen tea leaves and powder were used for tea liqueur by maceration. The effects of six maceration times (10, 20, 30, 40, 50, and 60 days), filtration and clarification on the color, turbidity, volatile compounds content, catechin content, and caffeine content in tea liqueur were studied. Sensory evaluation was also conducted to find out the optimum processing method for making tea liqueur from the point of views of customers. n-Propyl alcohol, ethyl lactate, ethyl hexanoate, isoamyl alcohol and 2-Phenylethanol are main volatile compounds in rice wine. The 'TC-10' rice wine was chosen as alcoholic base for making tea wine. From sensory results we found that tea liqueurs made from tea leaf macerated for 40 days and tea powder macerated for 20 days showed the best color. The content of volatile compounds in the tea liqueur increased with the time of maceration increased. Tea liqueur made from tea leaf after 50 and 60 days, maceration showed the most acceptable flavor among all samples. Contents of catechins and caffeine in tea liqueur made from tea powder were higher than those in tea liqueur made from leaf. Catechins content decreased, caffeine content increased with the time of maceration increased. Tea liqueur will become much bitter with the time of maceration increased, however, it can be improved by clarification significantly. To conclude the results, we suggest that tea liqueur made from tea leaf macerated in 'TC-10' rice alcohol for 50 days and followed by clarification using 0.1% glutinous rice flour was the optimum processing method for Shy Jih Chuen tea liqueur.

Key words: Tea liqueur, Shy Jih Chuen tea, Rice wine, Clarity, Catechins, Caffeine

Simultaneous Determination of Pesticides Residues in Chrysanthemum Flowers Samples by Liquid Chromatography-tandem Mass Spectrometry

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Chrysanthemum morifolium Ramat is a common Chinese herbal medicine and healthy crops. In recent years, events of having exceeded maximum residue levels (MRLs) of pesticides in *Chrysanthemum morifolium* Ramat had been revealed one after another. Thus, it is necessary to develop a simple, quick, effective and rugged method for determining multiple pesticide residues in *Chrysanthemum morifolium* to ensure the safety of *Chrysanthemum morifolium* cultivation. In this study, we used liquid-liquid

extraction (LLE) and solid phase extraction (SPE) as the sample preparation, followed by liquid chromatography-tandem mass spectrometry (LC/MS/MS) to develop four multi-residue methods for the determination of pesticides in *Chrysanthemum morifolium*. We developed a multi-residue method for the determination of 130 pesticides in dry chrysanthemum flowers by LLE with acetonitrile, amino cartridges for SPE and LC/MS/MS. The present results showed good linearity by correlation coefficients of $r^2 \geq 0.995$ for all analyses. The limit of detection (LOD) was less or equal to 10 $\mu\text{g}/\text{kg}$ for approximate 97.69% pesticides. The limit of quantification (LOQ) was equal to 10 $\mu\text{g}/\text{kg}$ for approximate 85.38% pesticides. The attained recoveries were typically between 70% and 120% with relative standard deviation (RSD) values that are typically lower than 20% for about 80%-91.54% pesticides at four spiking levels of 10, 20, 50 and 100 $\mu\text{g}/\text{kg}$. The results are in good agreement and indicate that the proposed method provide to determine the trace level amounts of pesticides residues in *Chrysanthemum* samples.

Key words: Chrysanthemum flower, Liquid-liquid extraction, LC/MS/MS, Multiple pesticide residues

Identification and Fungicides Selection for Two Chrysanthemum Anthracnose Isolates

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Chrysanthemum anthracnose fungus causes leaves disease mainly. The diseased plants show leaf fallen, plant weaken, lower the enrichment of buds and reduce the yield of fresh flowers while it occurs seriously. So far, there is only one registered fungicide for controlling anthracnose on *Chrysanthemum morifolium*. The study is to select the commercially available fungicides for testing the efficacy on control of Chrysanthemum anthracnose fungus and provides the information for use in future. Two tested isolates, ChH-1 and ChP-3, were identified by morphology and molecular biology as *Colletotrichum gloeosporioides* from *C. morifolium* in Tea Research and Extension Station in Taoyuan County. Test the sensitive/resistance of two isolates for 25 fungicides on potato dextrose agar. The tested pesticides of "Difenoconazole", "Metconazole", "Pyraclostrobin", "Benomyl", "Thiophanate-Methyl", "Fluazinam", "Prochlora", and "Kasugamycin hydrochloride + Carbendazim" could inhibit the mycelium growth of the two *Colletotrichum* isolates with EC₅₀ values at 1 $\mu\text{g}/\text{mL}$. Three pesticides, "Benomyl", "Fluazinam" and "Kasugamycin hydrochloride + Carbendazim", were the most effectively inhibiting the mycelium growth of tested isolates among 25 pesticides.

Key words: Chrysanthemum anthracnose, Sensitive/resistance, Fungicide

Discussion of Fungicides for Controlling of *Colletotrichum gloeosporioides* on Coffee

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Coffee anthracnose not only infects coffee leaves and branches but fruits. If there is no control on coffee anthracnose, it would reach over 70 % yield loss. Four testing isolates, L-3, F-8, L-10 and F-11, from

Plant Protection Lab of Tea Research and Extension Station were identified as *Colletotrichum gloeosporioides* by molecular biology. Testing the efficacy of five testing isolates mycelium growth by thirteen fungicides registered on controlling tea brown blight. The result showed Tebuconazole, Difenoconazole, Benomyl, Fluazinam and Kasugamycin hydrochloride hydrate + carbendazim could reach 50 % inhibition rate to all four testing isolates. However, four testing isolates showed low sensitive to Azoxystrobin and Dithianon. In the field trail, Benomyl diluted 2,000 times and Kasugamycin hydrochloride hydrate + carbendazim, diluted 1,000 times could inhibit coffee anthracnose.

Key words: Coffee anthracnose, Benomyl, Kasugamycin hydrochloride hydrate + carbendazim, Fungicide

Inhibition of Twenty-five Fungicides for Mycelium Growth of *Colletotrichum* spp. On Coffee

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Coffee anthracnose is one of important diseases of coffee. It infects leaves, branches and fruits so that induces growth reduction and yield loss. There are few permitted fungicides for use in coffee plants in Taiwan. Therefore, twenty-five fungicides were tested for control anthracnose disease in laboratory in this study. Five *Colletotrichum* isolates designed as MLL-3, MLF-8, TTL-9, TTL-10 TTF-11 were isolated from diseased leaves and fruit of arabica coffee plants and identified as *Colletotrichum* spp. by morphology. Potato dextrose agar added with individual fungicide was used to evaluate the efficacy of different concentrations on inhibiting the mycelium growth of five isolates. Prochloraz and Fluazinam inhibited the mycelium growth of five isolates with EC50 values < 1 µg a.i./mL. There are twelve fungicides included Penconazole, Tebuconazole, Difenoconazole, Hexaconazole, Metconazole, Myclobutanil, Benomyl, Thiabendazole, Pyraclostrobin, Carbendazim + Tetraconazole, Kasugamycin hydrochloride + Carbendazim and Cyprodinil + Fludioxonil inhibit the mycelial growth of all isolates with EC50 values < 10 µg/mL.

Key words: Coffee anthracnose, Fungicide, Inhibition, Mycelium

Determination of Organophosphate and Pyrethroids Residues in Tea Samples by Microwave-assisted Extraction with GC/MS/MS

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In this study, we developed microwave-assisted extraction (MAE) method for the determination of organophosphate and pyrethroids residues in tea samples with gas chromatograph tandem mass spectrometer (GC/MS/MS). The results showed that the recovery was better under the microwave program: increase to 60°C in 5 min and hold 5 min. Recovery yields of spiked tea were from 37.7 to 117.2% for 44 of the organophosphate and 21.1% for Mephosfolan, 21.3% for Disulfoton and 18.0% for Demeton-S-methyl. For 15 of the pyrethroids, the recovery were from 83.6 to 107.0%. Except Methacrifos (26.9%), the relative standard deviations were from 1.0 to 16.7%. Method detection limits

were in the range from 10 to 100 ng/g. Compared to liquid-liquid extraction method, the advantages of MAE method were low solvent consumption and less extraction time.

Key words: Microwave-assisted extraction, Tea, Pesticide residues, Gas chromatograph tandem mass spectrometer

Utilization of Tea Leaf Wastes as Growing Medium of Mushrooms

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We inoculated *Pleurotus sojor-caju* and *P. citrinopileatus* on the growing media which include tea leaf wastes (W), tea leaf wastes mixing with sawdust (WF), tea (T), tea mixing with sawdust (TF), and sawdust (F). Ten days after inoculating, the mycelium growth of F, W and WF treatments of *P. sojor-caju* is the best. The mycelium growth of F treatment of *P. citrinopileatus* is better than WF and W treatments. Both the mycelium growth of *P. sojor-caju* and *P. citrinopileatus* of T treatment is the worst. To investigate the possibility of the tea chemicals absorbed by the mushroom, we inoculated the *P. sojor-caju* and *P. citrinopileatus* on the potato dextrose broth (PDB) with additional standard method brewed green tea and black tea. The water extracts of treatments not only have the higher contents of γ -aminobutyric acid, but also contents of theanine and caffeine. Results show that the tea leaf waste has the potential to replace the sawdust as a mushroom medium without drying process.

Key words: Tea leaf waste, Mushroom, Reuse

The Experiment of the Improvement for Hot-air Withering Tank

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Traditional hot-air withering tank with blower can produce hot-air with about 30 to 38 degree Celsius to wither the tea. The heat resource and blower is located on the one side of withering tank, it would cause uneven distribution of hot-air. To solve this problem, we cover nylon cloth on the withering tank. We used mechanical-plucking Chin-shin Oolong tea as material in two different processing experiments: A: uncovered withering tank B: covered withering tank with nylon cloth After withering, A and B are used to produce Wenshan-Paochung tea which will be conducted sensory evaluation. The result showed that the tea with A treatment has features such as large variation of quality, astringent taste, yellow-green color. Otherwise, tea with B treatment has features like quality with low variation, color of bright honey-green and rich taste. This technology would improve the problem of unstable quality of tea.

Key words: Hot-air withering, Tea quality, Tea processing technology