

May 2010



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COMMITTEE ON COMMODITY PROBLEMS

INTERGOVERNMENTAL GROUP ON TEA

Nineteenth Session

New Delhi, India, 12 – 14 May 2010

**TRANSFERRING RATE AND RISK ASSESSMENT OF PESTICIDE
RESIDUE FROM DRY TEA TO TEA BREW AND THE SIGNIFICANCE
IN ESTABLISHING THE PESTICIDE MRL IN TEA**

Transferring Rate and Risk Assessment of Pesticide Residue from Dry Tea to Tea Brew and the significance in establishing the Pesticide MRL in tea

1 Background

Tea is a beverage whose consumption amount is just next to water in the world, is recognized as one of the most popular healthy drink in 21st century. The viewpoint of tea drinking is beneficial to human health was accepted by the consumers. The safety quality was paid more attention by the consumers all over the world. For the purpose of control of tea pests in the tea production, chemical pesticides are applied. Due to the following phenomenon, the residue level on/in tea plant is much higher than that on/in other crops under the same applied dosage.

- 1 The harvest portion of tea plant (tea shoot) is the pesticide direct applied portion.
- 2 Tea shoot with tender and thin leaves, the surface area per unit weight of tea plant is larger than that of other crops including the vegetable crops.
- 3 Tea plant is a crop that harvested multi-times annually, the interval days between the pesticide application and tea plucking is shorter than other crops.
- 4 The tea fresh leaves are directly manufactured after plucking and without washing.

A lot of pesticide MRL standards were established in tea producing countries and tea importing countries in the world for the control of safety quality of tea products. How to rationalize the MRL standard, the key basis is to know how many pesticide residue was intake via tea drinking. So, the investigation on the amounts of pesticide residue transferred from dry tea to tea infusion is important in establishing the MRLs of pesticide residue in tea. During the past 20 years, a certain amounts of literature on pesticide residue in tea brew were published. Research showed that the amounts of pesticide residue in dry tea transferred to tea brew was positively related to the water solubility of pesticide, and negatively related with the octanol/water partition coefficient. Those pesticides with higher water solubility and lower octanol/water partition coefficient showed a higher residue level in tea brew. Those pesticides with lower water solubility and higher octanol/water partition coefficient showed a lower or zero residue level in tea brew, and most of the residues were remained in the infused tea.

2 Objective.

In recent years, the establishment of MRL of pesticide residue in many tea

importing countries showed a more and more strict tendency. According to the "Method of risk assessment and principle of chemicals to human health" issued by WHO in 1999, the schedule of risk assessment of pesticide to human health includes hazard identification, dosage, reaction evaluation, exposure evaluation and risk description. As tea is drunk in the tea brew situation prepared from the tea, only those pesticide residue existed in the tea brew could be intake by human. Hence, in the evaluation of the risk of pesticide residue in tea to human health, it is necessary to investigate the transferring rate of various pesticides in tea brew during the infusion process firstly. Secondly, calculate the pesticide residue amounts intake from tea drinking according to the consumption amounts of tea by human and evaluate the risk degree. Hence, the key problem is how many pesticides could be extracted into the tea brew and intake by the consumer. The transferring rate of various pesticide from dry tea to tea infusion is conducted in this investigation. Based on the results of investigation, a risk assessment will be conducted according to the intake amounts of pesticide residue. The objective of this project is intended to provide the information on the residue level of pesticide in tea brew, and should be considered in the establishment of pesticide MRL in tea.

3. Contents of investigation

1. Establish the rapid determining method of pesticide residue in tea brew.

A large amounts of literature on the determination method of pesticide residue in tea brew have been published, however, these traditional methods mainly use the liquid-liquid partition technique. These method needs a rater more amounts of solvent and time-consuming. So, it is necessary to establish a rapid determining method to detect the different pesticides with various polarity simuouously.

2. Transfer rate of various type of pesticides from dry tea to tea brew.

Pluck the tea fresh leaves on tea plant 7 days after the application of the pesticide under natural conditions and manufactured to dry tea (Green tea, Black tea, Oolong tea, Dark tea and instant tea). Put 2 g of various dry tea in 250 flask, 100 ml boiling water was poured and infused 6 minutes. Determine the residue level in tea brew and establish the transfer rate of various pesticides(Organochlorine,organophosphate,Carbamate, Pyrethroid)feom dry tea to tea brew.

3. Influence of various substrate on the transfer rate of pesticide residue to tea brew.

Investigate the influence of different substrate (water PH, , milk), water from different location, different water type(deionilized water, mineral water, deep well water and) on the transfer rate of pesticide residue from dry tea to tea brew.

4. Relationship between the physical, chemical character and the transfer rate of pesticide residue from dry tea to tea brew.

Investigate the physical and chemical characters of various pesticides used in tea production and the transfer rate of pesticide residue from dry tea

to tea brew, and ascertain the important physical and chemical character which influence the transfer rate of pesticide residue from dry tea to tea brew.

5. Risk assessment of pesticide residue from the viewpoint of pesticide residue in tea brew.

The establishment of pesticide MRL in agricultural crops is based on the risk assessment of various pesticides, in other words, based on the intake amounts of pesticides via the food consumption. It is important to pointed out that the human drink the tea infusion rather than 'EAT' tea.. The key parameter is how many pesticides will be intake via tea drinking. Thus, the transfer rate of pesticide residue from dry tea to tea brew is important in the establishment of pesticide MRL in tea.

4. Participating institution.

Tea Research institute, Chinese academy of Agricultural Sciences

5. Time arrangement

Jan 2011-Dec.2013

6. Basis

Tea Research Institute of CAAS conducted the investigation of pesticide residue in tea for more than 45 years and published more than 50 papers in this field. Some advanced instruments including GC, GC/MS, GD/MS/MS, HPLC, HPLC/MS/MS have been equipped in the laboratory of pesticide residue.

7.

200,000 USD will be applied for the conducting of this project.