

## CHAPTER 5

### CONCLUSION

The present developed method showed sensitive for determination of carbendazim residue in at least 8 kinds of vegetables. The residue was extracted with ethyl acetate and cleaned-up by SAX/PSA solid-phase extraction (SPE). Chromatographic analysis was performed on a reversed phase HPLC (C18) column using isocratic elution with methanol-water (25:75) and UV detection at 280 nm. The method can determine carbendazim residues at concentration lower than MRLs. It can also be used with HPLC systems, which are common in most laboratories, as opposed to the LC-MS technique which is much more expensive and less widely used. This method is also fast, simple, good recovery (92-96%) and need only 5 g of sample for analysis. The developed sample preparation method has been successfully applied in variety of vegetables without any problem encountered.

The secondary aims to develop an analytical method for detecting dithiocarbamate fungicides in ginger, cucumber, and pepper using gas chromatography with flame photometric detection (GC-FPD). The optimum of extraction for shown that 5 g of samples and 4.0 mL of 0.5%  $\text{SnCl}_2$  made in 5 M hydrochloric acid was added 1.0 mL of isooctane after the addition of the hydrolysis solution (samples were heated in an ultrasonic bath at 80°C for 40 min with continuous stirring). The limit of detection (LOD) of the developed method is 0.03 mg/kg and the limit of quantitation (LOQ) is 0.10 mg/kg. This method provides a quick and easy method of determining for

mancozeb residue in ginger, cucumber, and pepper. Slightly modification of method can be used for the analysis of mancozeb residue in other plants.

The individual-based survey data was deployed to assess exposure accuracy. The pilot study of consumption data was collected from 244 participants consumers aged 35-65 years living in Suthep sub-district of Chiang Mai city. The consumption data was collected by using the vegetable frequency questionnaire and the dietary exposure assessment were calculated from the consumption data. Concerning health risk from food consumption, assessment of pesticide exposure should be frequently surveyed by using simple analytical method in order to reduce the cost. Furthermore, providing research results to general public and encouraging them to consume vegetables from safe growing sources are warrant for national and community food safety policy.

The health risk assessment of fungicide exposure should be frequently surveyed because of carbendazim and mancozeb are the most fungicide currently used in agriculture in Thailand. Therefore, the results of this research indicate that the carbendazim and mancozeb residue in cucumber are harmful to consumers. Thus, it is necessary to monitor the residue of carbendazim and mancozeb because of risk to human health.

The present study has limitations. Firstly, the direct analysis of dithiocarbamate is difficult, particularly due to their low solubility in water, even in a large range of organic solvents. Secondly, measurement errors were inevitable in the estimates of vegetable consumption and there was no control group of consumers.