

# **Risk Analysis of Insecticide Residues Detected on Fresh Produce on Guam**

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The Division of Environmental Health of the Guam Department of Public Health and Social Services (DPSS) collected samples of fresh produce from a fresh vegetable stand on Guam on March 24, 2009 and sent these to a Food and Drug Administration (FDA) laboratory for pesticide residue analysis. FDA detected less than 0.01 ppm of permethrin on what was described as either "pechay" or "bok choy" and 0.03 ppm of bifenthrin on what was described as "Kam Kong". These two pesticides are not approved for use on the respective vegetables on which they were found. Therefore, the US Environmental Protection Agency (USEPA) has not established a tolerance level for residues.

Permethrin and bifenthrin are pyrethroid insecticides with relatively low mammalian toxicity. Products containing permethrin and bifenthrin for agricultural uses have been by the USEPA as Restricted Use Products (RUP's) because they are highly toxic to aquatic organisms in contrast to low mammalian toxicity. Purchasers of RUP's on Guam are required to show a Pesticide Applicator's Certificate issued by the Guam Environmental Protection Agency.

The FDA residue reports resulted in the following:

- Issuance of a [public advisory](#) by the Guam Department of Public Health on Division of Environmental Health of DPHSS.
- One large vendor of fresh produce, Payless Markets, has reacted by banning purchase of fresh produce from growers who do not possess a Pesticide Applicator's Certificate.

The intent of this risk analysis is to evaluate the raw data from the residue analysis in terms of risk to Guam consumers.

## **Permethrin**

Permethrin is a pyrethroid insecticide which is practically nontoxic to mammals by oral ingestion. In addition to being used for controlling agricultural pests, it is at rates up to 5% a.i. in shampoo for human and animal ectoparasites and it is used for impregnating mosquito nets.

### **Sample Description**

The sample analysis report describes the sample as "#1 (A&B) Pechay Cabbage (identified by PRLSW as Bok Choy)". This is confusing because pechay is *Brassica pekinensis* and bok choy is *B. chinensis*. Both pechay and bok choy are considered to be varieties of Chinese cabbage.

The Guam Fruit and Vegetable Pesticide Guide 5<sup>th</sup> Edition 2004 does not list any pesticide products registered for pechay or bok choy. However Pounce 3.2 EC which contains permethrin is listed as registered for use on Chinese cabbage.

### **Sample Residue Level**

Pechay cabbage or Bok Choy                  less than 0.01 ppm

### **Residue Tolerance for Permethrin on Similar Vegetables**

Cabbage	6.0 ppm
Leafy petioles subgroup 4B	5.0 ppm
Leafy greens subgroup 4A	20.0 ppm

### **Mammalian Toxicity**

Oral LD50 (rats)                                  430 to 4000 mg/kg

### **How much of the tainted Chinese cabbage would I need to eat to poison myself?**

I am about 100 kg in mass. Given an LD50 of 430 mg/kg, if I eat 43,000 mg of permethrin, there is a 50% probability that I will die from acute toxicity. Each kg of the sample contains less than 0.01 mg, so to get a dose of 43,000 mg I would need to eat at least 4,300,000 kg or 4,300 tonnes of the tainted Chinese cabbage.

## **Bifenthrin**

Bifenthrin is a pyrethroid insecticide which is moderately toxic to mammals when ingested.

### **Sample Description**

The sample analysis report describes the sample as "Kam Kong" and later on refers to it as "Kan Kong". The sample is most probably kangkong, *Ipomoea aquatica*, a member of the morning glory family.

I am unaware of any pesticides that have been registered by USEPA for use on kangkong.

### **Sample Residue Level**

kangkong	0.03 ppm
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### **Residue Tolerance for Bifenthrin on Similar Vegetables**

Brassica, leafy greens, subgroup 5B	3.5 ppm
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### **Mammalian Toxicity**

Oral LD50:	54 mg/kg (female rats), 70 mg/kg (male rats)
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### **How much of the tainted kangkong would I need to eat to poison myself?**

I am about 100 kg in mass. Given an LD50 of 70 mg/kg, if I eat 7,000 mg of bifenthrin, there is a 50% probability that I will die from acute toxicity. Each kg of the sample contains 0.03 mg, so to get a dose of 7,000 mg I would need to eat 233,333 kg or 233 tonnes of the tainted kangkong.

## **Conclusions**

### **Risk to Human Health**

The levels of permethrin and bifenthrin residues found on the samples of fresh produce were far too low to harm Guam's consumers.

### **Compliance Issues**

Permethrin residues detected on the Chinese cabbage would not have been an issue if the sample had been identified as Chinese cabbage rather than pechay or bok choy.

I am unaware of any pesticides registered by the EPA for use on kangkong. Therefore, there are no tolerance levels established for any pesticide residues on this crop. This situation is not unique. There are several crops grown on Guam for which there are no USEPA approved pesticides. Resources to pursue minor use registrations for pesticides to protect these crops are currently lacking on Guam.