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Pesticide residue analysis of "Pinakbet type" vegetables in the municipality of Lal-Lo, Cagayan

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Abstract

The study was conducted among the pre-identified major vegetable producing barangays in the Municipality of Lal-lo. It aims to determine the management practices of vegetable producers, the most common pesticides used, the level of pesticide residue, conformity of pesticide residue to ASEAN's MRL, conformity of farmers practices to the pre-harvest interval (PHI) practices and to Geo-tag vegetable farms producing vegetables with positive detection to pesticide residue. Data were gathered through interview with questionnaire to the farmers. The information gathered includes production techniques, crop management practices, and marketing strategy. Vegetable sampling was done on-farm and on commercial market for the pesticide residue analysis. Analysis was conducted at Cagayan Valley Integrated Agricultural Laboratory (CVIAL) and Cagayan State University at Lal-lo using Rapid Test Kit. Lastly, Geo-tagging was done using Global Positioning System (GPS) application. Based on the results, most farmers practice mono-cropping in vegetable production with pesticide chemicals being used in managing pest infestation. Application of the chemical was done early in the morning and late in the afternoon with a frequency of twice a week and every after harvest. The most commonly used pesticide were malathion, lannate and magnum. Furthermore, results of pesticide residue analysis showed that most vegetable samples taken from public market and on-farm had positive detection both in carbamates and organophosphate test. The concentration level of pesticide residue is higher than the Association of South East Asian Nation on Maximum Residue Level/Limit (ASEAN MRL).

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Introduction

One of the crops being produced by the farmers in the country is the lowland vegetables which are also known as ingredients of the popular recipe of the Ilocanos which is the “pinakbet”. These lowland vegetables are also important components of the human diet since they provide essential nutrients that are required for most of the reactions occurring in the body. With the high demand of these crops, farmers have been producing them intensively just like the case of Cagayan Valley Region particularly in the Province of Isabela and, It was noticed that there was an increase in land area devoted for its production and were planted throughout the year, This is in accordance with the study conducted by the Regional Crop Protection Center- Region 02 (RCPC-RFO2).

However, like other crops, vegetables are attacked by pests and diseases during production and storage leading to damages that reduce the yield and quality. In spite of the promulgation of Republic Act 10068 of 2010 otherwise known as the Organic Agriculture Act, farmers are still using pesticides to attain higher yield and because for them, in order to reduce the loss and maintain the quality of vegetables harvest, pesticides are used together with other pest management techniques during cropping to destroy pests and prevent diseases. In the case of our province, despite of the efforts to promote organic agriculture, there are only few farmers who practice organic agriculture fully.

The use of pesticides have increased because they have rapid action, decrease toxins produced by food infecting organisms and are less labor intensive than other pest control methods. Nevertheless, there is a problem on the use of pesticides wherein farmers lack technical-know-how on the proper application of these chemicals and they applied it even if it is not needed and without following the recommended rate of application. Thus, the use of pesticides during production often leads to the presence of pesticide residues in fruits and vegetables after harvest. The presence of pesticide residues is a concern for all of us consumers because pesticides are known to have potential harmful effects to other non-targeted organisms than pests and diseases. The major concerns are their toxic effects resulted in contamination of the environment and also caused many associated long term effects on human health such as interfering with the reproductive systems and fetal development as well as their capacity to cause cancer and asthma. Some of the pesticides are persistent and therefore remain in the body causing long term exposure.

The municipality of Lal-lo, particularly barangay Jurisdiction dubbed as producer of vegetable crops and even farmers from other barangays are planting pinakbet type vegetables. Lal-lo has two public markets which is located at Barangay Magapit and Centro. Vegetables being sold there are not all produced of the farmers of Lal-lo where there are some which is being imported from neighboring municipalities, province and region. Therefore, there was confusion for the consumers if these vegetable are safe. Consumers nowadays are health conscious due to rampant use of chemicals. They assumed that the vegetable that they are buying in the market are chemical free.

This issue has led us in setting up monitoring on the residue of pesticides most especially the lowland vegetables being produced by the farmers and sold at the public markets in the municipality of Lal-lo in order to assess the safety situation and make informed decisions most especially in recommending the correct management all throughout the production cycle of lowland vegetables. Therefore, the objective of the proposed research work is to assess the concentration of such deleterious agro-chemicals in vegetables of Lal-lo market and farms.

Generally, the study aims to assess the residue of pesticide in *pinakbet type* vegetables produced by the farmers and sold at the public markets of the municipality of Lal-lo. Specifically, it aims to answer the following:

a) What are the management practices of vegetable producers in the major vegetable growing barangays of Lal-lo?

b) What is the level of pesticide residue in pinakbet type vegetables sold in commercial centers and on-farm product?

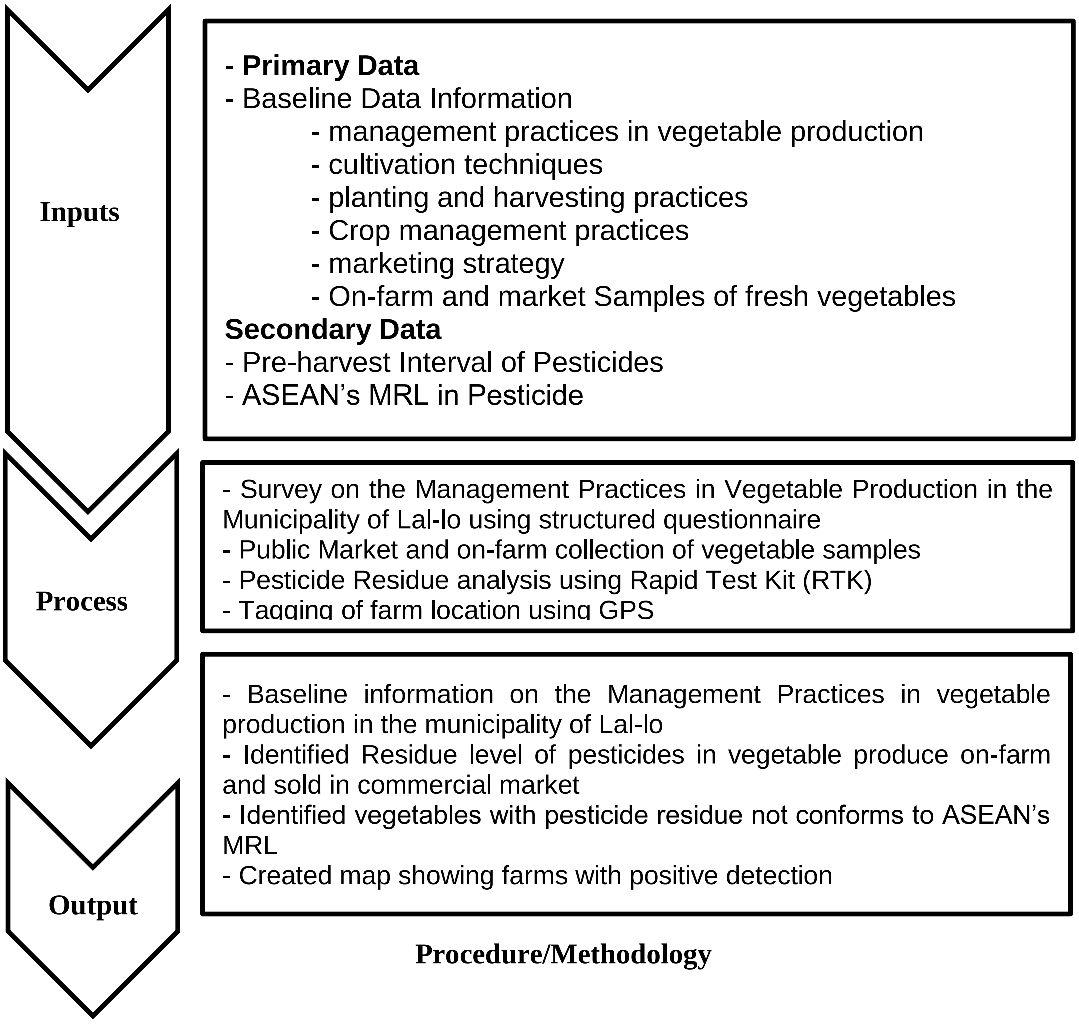
c) Which among the vegetables with pesticide residue do not conform with the Association of South East Asian Nations on Maximum Residue Level/Limit (ASEAN MRL)

d) What are the most common pesticides used by the vegetable growers in Lal-lo

e) Which of the commonly used pesticide conforms with Pre-harvest Interval when applied in vegetable crops and conformity of farmers/producers practices to the Pre-harvest Interval (PHI) practices.

f) What map could be created to show farms with positive detection and do not conform with ASEAN's MRL using Global Positioning System (GPS)?

Conceptual Framework



Procedure/Methodology

Materials and methods

Site Selection

Vegetable producer in the selected barangay of Lal-lo were pre-identified through the assistance of the Municipal Agriculture Office (MAO).

Sampling

Data were gathered through questionnaire and interview with the farmers. This is to determine the management practices in terms of vegetable production. The questionnaire was adopted from the Department of Agriculture- Regional Crop Protection Center (DA-RFO-02-RCPC). The information gathered were the following; cultivation techniques which includes, source of planting, cultivars and cropping system; planting and harvesting; crop management practices which includes, land preparation, fertilizer application, disease and insect pest observed, its management, pesticide applied, frequency and time of application, marketing strategy and other practices. Another interview with vendors was conducted in the public market of municipality to determine the sources of the crops.

Collection of Sample

Samples of fresh vegetables such as eggplant, ladies finger, pechay, hot pepper, and tomato were collected from the farmers (on-farm) and in the market. These were used for the analysis of the residue of pesticides.

Geo-tagging of Vegetable Farms

Geo-tagging of the vegetable farms using the Global Positioning System (GPS) application was carried out during the collection of samples. The data collected was transferred in google earth program and it was used as a basis in making a map showing farm areas with positive detection of pesticide residue.

Packaging and Labeling of Samples

The collected samples were weighed based on the recommended weight of sample per analysis after which it was labelled and packed in a clean plastic bag. The collected sample which was not analyzed immediately was stored in a refrigerator. Labelling was done based on its source, name of farmer or vendor, date of collection, weight and the community of vegetables.

Laboratory Work and Analysis of Residue

Samples collected on-farm and in the local market was brought in the laboratory for analysis. The Rapid Test Kit (RPK) was used for the initial test. The recommended procedure for the analysis was followed.

Extraction of Vegetable Samples

A whole vegetable sample weighing 25 grams was extracted using trickling extraction method with 5 ml acetone but for leafy vegetable extra volume of acetone was added. The glass was swirled to evaporate extract until volume is 1ml. The extract was used for analysis of organophosphate or carbamate residues.

Procedure in Organophosphate Test

Three pieces of pre-treated filter papers were placed in a glass slide and the extract was dropped 5 times on each filter paper. One drop of solution O was added after which it was covered with another glass slide and it was heated for at least 2 minutes. Blue rings that appear indicate positive result. Pesticides usually detected under this are malathion, fenthion, chlorpyrifos, triophos, profenofos and diazinon.

Note: Preparation of solution O was done by dissolving contents in 10 mL distilled water

Procedure in Carbamates test

Three pre-treated filter papers were placed on the glass slide and the extract was dropped 5 times on each paper. It was covered with another glass slide and heated for 15 seconds. A drop of freshly prepared solution C was applied. Positive result is indicated by blue spots for carbaryl and pesticides under it are sevin, victory forteinphantom and zacarb, purple spots for carbufuran with pesticides under it are furadan, fuerza, sure done, and pinkish spots for fenobucarb (BPMC) with brodan, carvil, diacarb, convoy. Hopcin, alakdan, hopkill and methomyl with lannate, strength detonate and scorpio detected under its test. The Preparation of solution C was done by mixing contents in 4mL methanol. It was freshly prepared and capsules were stored under refrigerated conditions.

Results and discussions

Baseline Data on Vegetable Production

The barangays that were identified with significant areas for vegetable production (pinakbet type) were Jurisdiction, Catugan, Dalaya and Fabrica. Thirty six farmers were interviewed from these four barangays (Table 1). The following information was gathered:

Seed Selection

Most of the farmers got planting materials from their own produce. However there are some who bought their seed materials from seed growers and subsidized by the Department of Agriculture. Seed selections were merely based on visual assessment method after harvest. The 'pinakbet" type is the common vegetable planted by the farmers. This includes eggplant, ladies finger, tomato, bitter gourd, and pepper. However there are different varieties of this crop preferred by the farmers.

Cropping System

The usual practice of the farmers is the mono-cropping method. However, some of them practiced crop rotation. The vegetables were planted twice in a cropping season.

Planting and Crop Management Practices

Land Preparation- Most farmers prepared the land manually using bolo and plow with the aid of carabao. However there are some uses machine like hand tractor. They plowed once before planting and cultivation once in a month.

Planting- Farmers used to plant in the month of November to December during wet season and in the month June during dry season or depending the availability of moist most especially in rain fed areas.

Fertilizer Application- All of the farmers apply inorganic fertilizer trough basal method before planting using urea (16-20-0) and side dress application two weeks after planting 14-14-14 being applied.

Disease and Insect Pest Observe- There are symptoms of diseases like wilting however the farmers cannot diagnose it. Fruit and shoot borer, aphids, squash beetle, army worm and other leaf feeding insects are the common pest observed by the farmers which infest the crops throughout its growing stage.

Management of Insect Pest and Diseases- Majority of the farmers employ control measure and management of insect pest and diseases. They use chemical like pesticide and fungicide in controlling the pest and diseases. The time of application is during early in the morning and some are late in the afternoon. The interval of application is twice a week and some practiced spraying right after harvesting. On the other hand some farmers employ cultural management by removing manually the insect pest (fruit borer) and infected plants/affected clumps but just threw away within the production area.

Pesticide Applied and Frequency of Application- Common pesticides applied by the farmers are malathion, lannate, magnum and matrix. Spraying of these pesticides was usually done early in the morning and late in the afternoon. The frequency of application was twice a week or right after harvesting.

Marketing Strategy- All of the farmers sell their produce with in the locality mostly in the public market of the municipality of Lal-lo in wholesale and in retail sale.

Results of Pesticide Residue Analysis in the Public Market of Lal-lo, Cagayan

Municipality of Lal-lo has two public markets. These are located at barangay Magapit and Centro Lal-lo. Collection of vegetable samples was done per stalls. In Magapit Public Market there are 2 stalls while in Centro Lal-lo Public Market there are 6 stalls. A total of forty-five (45) vegetable samples were collected from the two public markets. Twelve samples were taken from Magapit public market and thirty-three are from Centro Lal-lo public market.

As shown on the table below (table2), all collected vegetable samples at stall 1, Magapit Public Market showed positive detection under carbamates test but under organophosphate test, only eggplant and hot pepper showed positive detection. Among these samples, hot pepper showed the highest residue level of 13 mg/kg (ppm). As for eggplant, it has a residue level in carbofuran with 0.4 mg/kg (ppm) which is higher than the ASEAN's MRL of 0.1mg/kg.

Table 3 shows the results of pesticide residue analysis of vegetable samples collected at Stall 2, Magapit Public Market. Based on the analysis all sample showed positive detection under carbamate test but under organophosphate test, pechay, bitter gourd and hot pepper showed negative result. In terms of residue level of concentration, pechay and hot pepper had the highest level of concentration with 8mg/kg.

Centro Lal-lo Public Market

Under Centro Lal-lo Public market, there are 6 stalls selling vegetables. Vegetable samples namely; bitter gourd, ladies finger, eggplant, sweet pepper and tomato which were taken from these stalls. Tables below show the result of pesticide residue analysis. For stall 1 (table 4), all samples collected showed positive detection under carbamates test but negative result in organophosphate test. The result of the analysis further shows that the level of concentration of pesticide residue in eggplant, sweet pepper and tomato with 3mg/kg is higher than the ASEAN's MRL of 0.2 mg/kg and 1 mg/kg.

Magapit Public Market

Table 2. Collected vegetable sample and its results of pesticide residue analysis, Stall 1 Magapit Public Market.

Vegetable Sample	Carbamates		Level of Concentration	Organophosphate		Level of Concentration	ASEAN's MRL
	(-)	(+)		(-)	(+)		
Petchay		BPMC	3mg/kg	(-)			
Ampalaya		Carbofuran	0.8mg/kg	(-)			
Kamatis		BPMC	4mg/kg	(-)			
Talong		Carbofuran	0.4mg/kg		OP	0.50mg/kg	0.1mg/kg
Okra		BPMC	7mg/kg	(-)			
Sili		BPMC	13mg/kg		OP	2.0mg/kg	

Table 3. Collected vegetable sample and its results of pesticide residue analysis, Stall 2 Magapit Public Market.

Vegetable Sample	Carbamates		Level of Concentration	Organophosphate		Level of Concentration	ASEAN's MRL
	(-)	(+)		(-)	(+)		
Petchay		BPMC	8mg/kg	(-)			
Ampalaya		BPMC	7mg/kg	(-)			
Kamatis		BPMC	7mg/kg		OP	1.0mg/kg	
Talong		BPMC	1.5mg/kg		OP	0.50mg/kg	
Okra		Carbofuran	0.3mg/kg		OP	0.25mg/kg	
Sili		BPMC	8mg/kg	(-)			

Table 4. Collected Vegetable sample and its results of Pesticide residue Analysis, Stall 1 Centro Public Market.

Vegetable Sample	Carbamates		Level of Concentration	Organophosphate		Level of Concentration	ASEAN's MRL
	(-)	(+)		(-)	(+)		
Ampalaya		BPMC	3mg/kg	(-)			
Okra		Methomyl	3mg/kg	(-)			
Talong		Methomyl	3mg/kg	(-)			0.2mg/kg
Sili		Methomyl	3mg/kg	(-)			1mg/kg
Kamatis		Methomyl	3mg/kg	(-)			1mg/kg
Petchay		Methomyl	3mg/kg	(-)			5mg/kg

Table 5. Collected Vegetable sample and its results of Pesticide residue Analysis, Stall 2 Centro Public Market.

Vegetable Sample	Carbamates		Level of Concentration	Organophosphate		Level of Concentration	ASEAN's MRL
	(-)	(+)		(-)	(+)		
Talong		Carbofuran	0.5mg/kg		OP	0.13mg/kg	0.1mg/kg
Kamatis		Cabofuran	0.4mg/kg	(-)			0.1mg/kg
Sili		BPMC	8mg/kg	(-)			
okra		BPMC	8mg/kg	(-)			
Ampalaya		Carbofuran	0.7mg/kg	(-)			
Petchay		Carbofuran	1.3mg/kg	(-)			

Table 5 shows the results of analysis from stall 2 at Centro Public Market. As shown on the table, all collected samples of vegetable were detected with pesticide residue under carbamate test with carbofuran and BPMC as the pesticide used. In organophosphate test, eggplant showed positive result with 0.13 mg/kg which is higher than the ASEAN's MRL with 0.1mg/kg. Similarly, Tomato with pesticide residue level of 0.4mg/kg is higher than the ASEAN's MRL of 0.1mg/kg.

Pesticide residue analysis at Stall 3 at Centro Public Market is shown in table 6. The result shows that only tomato showed positive detection result under carbamate test with 1.5mg/kg which is higher than the ASEAN's MRL of 1mg/kg.

Table 6. Collected Vegetable sample and its results of Pesticide residue Analysis, Stall 3 Centro Public Market.

Vegetable	Carbamates		Level of	Organophosphate		Level of	ASEAN's
Sample	(-)	(+)	Concentration	(-)	(+)	Concentration	MRL
Talong				(-)			
Okra				(-)			
Ampalaya				(-)			
Sili				(-)			
Kamatis		methomyl	1.5mg/kg	(-)			1mg/kg

Table 7. Collected Vegetable sample and its results of Pesticide residue Analysis, Stall 4 Centro Public Market.

Vegetable	Carbamates		Level of	Organophosphate		Level of	ASEAN's
Sample	(-)	(+)	Concentration	(-)	(+)	Concentration	MRL
Talong				(-)			
Kamatis				(-)			
Sili		Methomyl	4mg/kg	(-)			1mg/kg
Okra		BPMC	4mg/kg	(-)			
Ampalaya		BPMC	1mg/kg	(-)			

Table 8. Collected Vegetable sample and its results of Pesticide residue Analysis, Stall 5 Centro Public Market.

Vegetable	Carbamates		Level of	Organophosphate		Level of	ASEAN's
Sample	(-)	(+)	Concentration	(-)	(+)	Concentration	MRL
Talong		Carbofuran	0.5mg/kg	(-)			
Kamatis		Carbofuran	1mg/kg		OP	0.5mg/kg	0.1mg/kg
Sili		BPMC	8mg/kg		OP	0.5mg/kg	0.1mg/kg
Okra		Carbofuran	1.3mg/kg		OP	0.5mg/kg	
Ampalaya		Carbofuran	1.3mg/kg		OP	0.5mg/kg	
Petchay		BPMC	6mg/kg	(-)			

Table 9. Collected Vegetable sample and its results of Pesticide residue Analysis, Stall 6 Centro Lal-lo Public Market.

Vegetable	Carbamates		Level of	Organophosphate		Level of	ASEAN's
Sample	(-)	(+)	Concentration	(-)	(+)	Concentration	MRL
Ampalaya		BPMC	0.2mg/kg	(-)			
Okra		Methomyl	2mg/kg	(-)			
Talong		Methomyl	2mg/kg	(-)			0.2mg/kg
Sili		Methomyl	3mg/kg	(-)			1mg/kg
Kamatis		Methomyl	3mg/kg	(-)			1mg/kg

Table 7 shows the result of pesticide residue analysis at stall 4 in Centro Public Market. Sweet pepper, ladies finger and bitter gourd detected with pesticide residue under carbamate test with 4mg/kg and 1 mg/kg level of concentration. No residue of pesticide was detected in organophosphate. However, sweet pepper with 4mg/kg level of concentration is higher than the ASEAN's MRL of 1mg/kg. Table 8 shows the result of analysis at stall 5 in Centro Lal-lo Public Market. All the vegetable samples are detected with pesticide residue in carbamate test with carbofuran and BMPC as the pesticide applied. Similarly, eggplant, sweet pepper, ladies finger and bitter gourd are positive in organophosphate test. If compared with the ASEAN's MRL of 0.1mg/kg, eggplant and sweet pepper residue level of 1mg/kg and 8mg/kg is very high. Table 9 shows the result of pesticide residue analysis in vegetable samples collected at stall 6 Centro Lal-lo Public Market. As shown on the table, carbamate test revealed that pesticide residue was detected in all the samples analyzed with BMPC and Methomyl applied as pesticide. Eggplant, Sweet pepper and tomato with residue level of 2mg/kg and 3 mg/kg does not conforms with ASEAN's MRL of 0.2 mg/kg for eggplant and 1 mg/kg for sweet pepper and tomato. On the other hand, organophosphate test showed negative results in all the sample tested.

Results of Pesticide Residue Analysis in on-farm Collection of Vegetable Samples

Table 10 shows the summary of vegetable samples analyzed and collected on-farm at the Municipality of

Lal-lo, Cagayan. Vegetable samples were collected from 28 pre-identified farms. The result of the analysis showed that almost all vegetable samples collected were detected with pesticide residue. The highest residue level was noted in tomato with a 8mg/kg. Most of the vegetable analyzed collected on-farm does not conforms with the ASEAN's MRL. However, some samples with positive results conforms with ASEAN's MRL. In fig. 1, it shows the generated map using GPS and Google earth program wherein farms with positive detection and does not conform with ASEAN'n MRL is being shown.

Table 10. Pesticide Residue Analysis on On-farm Collected Vegetable Samples.

Farm	Vegetable Planted						Remarks
	Eggplant	Tomato	Sweet Pepper	Ladies Finger	String Beans	Bitter Gourd	
1	+			+			Both do not conform with ASEAN's MRL
2	+	+				+	Conform with ASEAN's MRL
3		+		+			Tomato do not conform with ASEAN's MRL
4		+			+		Tomato do not conform with ASEAN's MRL
5	+	+					Tomato do not conform with ASEAN's MRL
6						+	conform with ASEAN's MRL
7				+	+		Conform with ASEAN's MRL
8	+		+		+		Sweet Pepper do not conform with ASEAN's MRL
9	+		+			+	Bitter gourd do not Conform with ASEAN's MRL
10		+					conform with ASEAN's MRL
11	+					+	Both do not Conform with ASEAN's MRL
12		+	+				Conform with ASEAN's MRL
13	+			+			Eggplant do not Conform with ASEAN's MRL
14				+	+		String Beans do not Conform with ASEAN's MRL
15	+	+					Tomato do not Conform with ASEAN's MRL
16	+		+		+		Sweet pepper do not Conform with ASEAN's MRL
17	+	+		+			Eggplant do not Conform with ASEAN's MRL
18				+			Conform with ASEAN's MRL
19		+	+		+		Conform with ASEAN's MRL
20				+		+	Bitter gourd do not Conform with ASEAN's MRL
21	+					+	Both do not Conform with ASEAN's MRL
22		+	+				Conform with ASEAN's MRL
23	+			+			Conform with ASEAN's MRL
24	+				+		Conform with ASEAN's MRL
25		+					Conform with ASEAN's MRL
26		+	+				Both do not Conform with ASEAN's MRL
27	+		+				Conform with ASEAN's MRL
28	+					+	Conform with ASEAN's MRL

Commodities Collected in the Municipality of Lal-lo not conforming to the Association of South East Asian Nations on Maximum Residue Level/Limit (ASEAN MRL's)

Fig. 2 shows the commodities collected in the Municipality of Lal-lo not conforming to the Association of South East Asian Nations on Maximum Residue Level/Limit (ASEAN MRL's) in carabmate test with Carbufuran as the active ingredients represented by the trade names Furadan, Advantage and Eltra. As shown on the fig., eggplant and tomato were the only commodities identified with its MRL of 1mg/kg (ppm). The result shows that eggplant and tomato with positive detection on carbufuran conforms to ASEAN MRL's wherein its pesticide level of concentration is 0.3mg/kg and 0.4mg/kg (ppm) which is lower than the ASEAN MRL's of 1mg/kg (ppm).

Fig. 3 shows the commodities collected in the Municipality of Lal-lo not conforming to the Association of South East Asian Nations on Maximum Residue Level/Limit (ASEAN MRL's) in carabmate test with Methomyl as the active ingredients represented by the trade names Lannate. As shown on the fig., eggplant, finger pepper, bitter gourd and tomato were the commodities identified its MRL with 2mg/kg (ppm) eggplant, 1 mg\kg for finger paper, 2mg\kg for bitter gourd and 1mg\kg for tomato. The result shows that finger pepper, tomato okra and pechay were the vegetable commodities which do not conform to ASEAN MRL's where in its pesticide level of concentrations are 3mg/kg (ppm) which is lower than the ASEAN MRL's of 1mg/kg (ppm).

On-Field Test of Top 3 Commonly Used Pesticide

Top 3 pesticide commonly used by the farmers is tested on field to test if it conforms to its Pre-harvest Interval. These are Malathion, Lannate and Magnum. These were tested in four vegetable commodities. For malathion, as shown in fig. 3, its residue in vegetables was not detected on its third day after application, while magnum (fig. 4), it was observed that its residue was not detected on its fourth day after application. Lastly, the residue of lannate in vegetable was not detected on the third day of application. Results further show that these pesticides do not conform to its labeled Pre-harvest Interval (PHI).

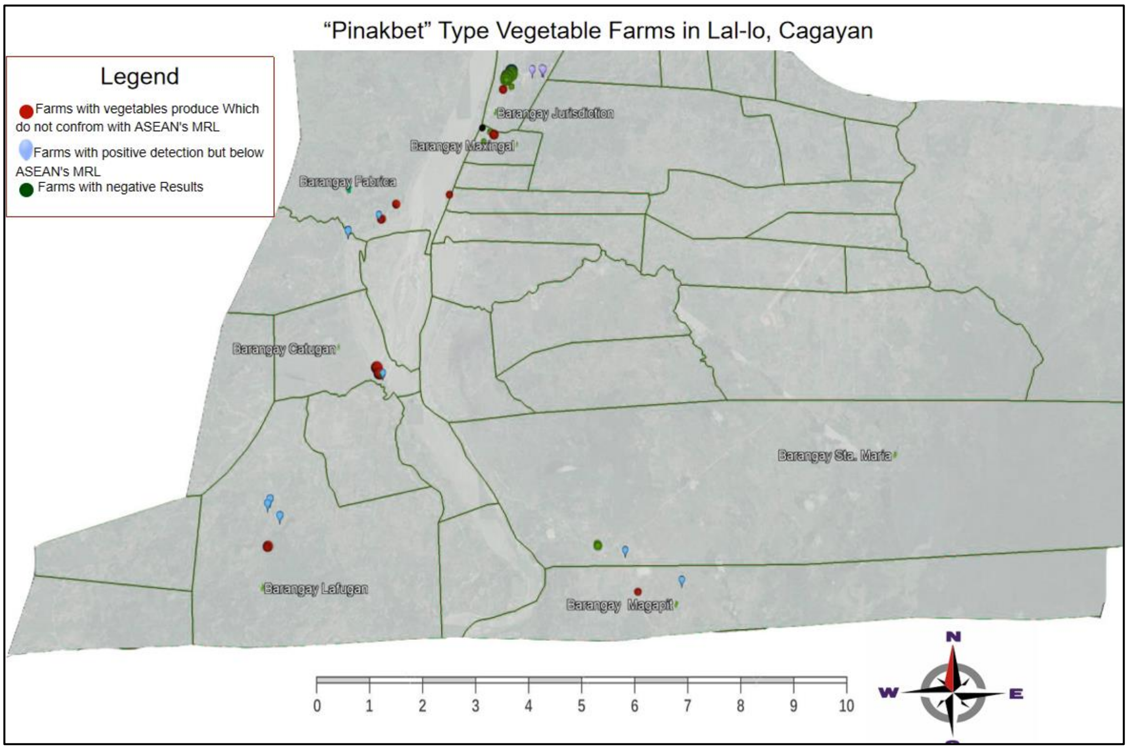


Fig. 1. GPS Generated "pinakbet" type vegetable farms in the Municipality of Lal-lo, Cagayan.

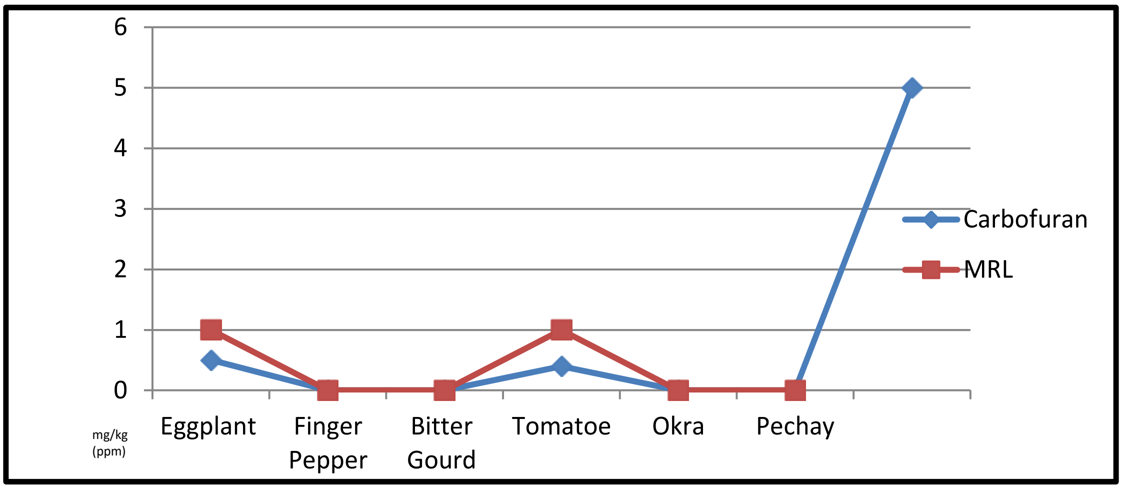


Fig. 2. Vegetable Commodities not conforming with ASEAN MRL's on Carbamates- Carbufuran (Furadan, Advantage, Eltra).

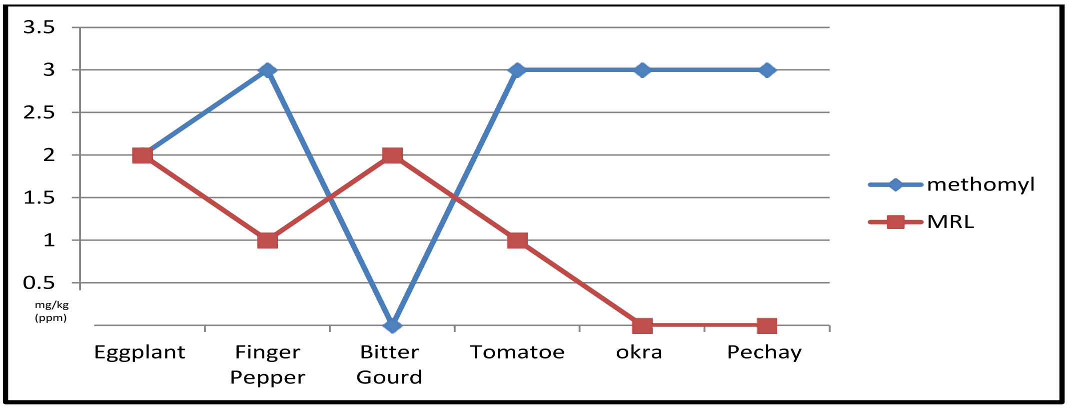


Fig. 3. Vegetable Commodities not conforming with ASEAN MRL's on Carbamate - Methomy (Lannate).

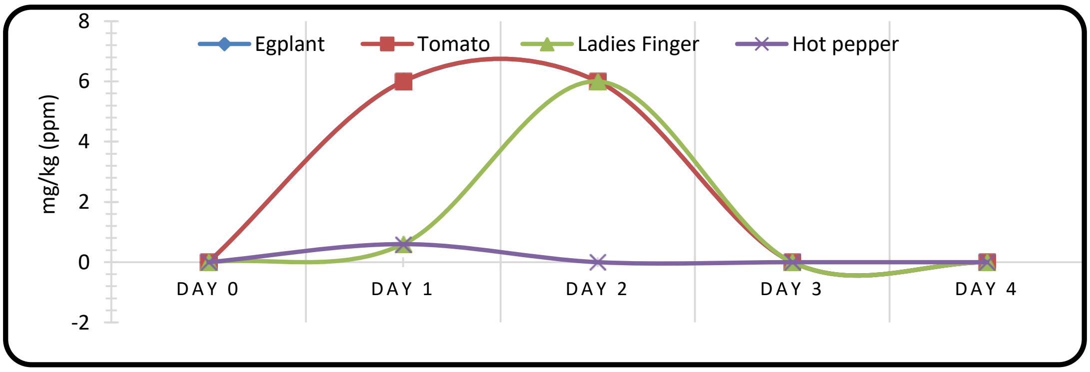


Fig. 3. Malathion.

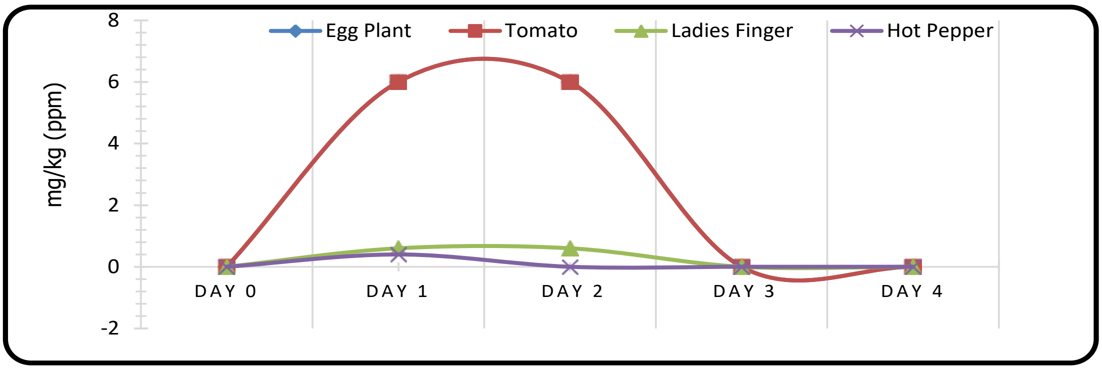


Fig. 4. Lannate.

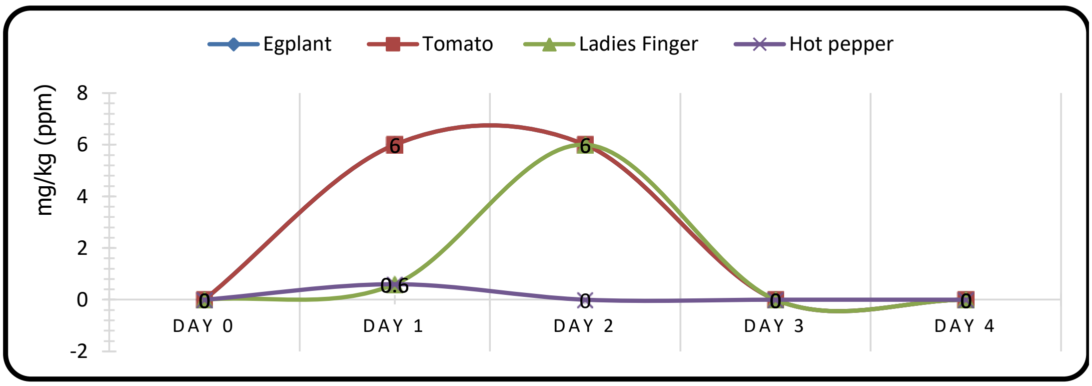


Fig. 5. Magnum.

Conclusions

The study was conducted at the per-identified major vegetable growing barangays of the Municipality of Lal-lo namely; Jurisdiction, Dalaya, Catugan and Fabrica including the two public market to assess the residue of pesticide in *pinakbet* type vegetables. Specifically, it aims to find out the management practices of vegetable producers, the most common pesticides used, the level of pesticide residue, conformity of pesticide residue to ASEAN's MRL and Conformity of farmers practices to the Pre-harvest Interval (PHI) practices. Data were gathered through interview with questionnaire to the farmers. The information gathered were the following; cultivation techniques which includes, source of planting, cultivars and cropping system; planting and harvesting; crop management practices which includes, land preparation, fertilizer application, disease and insect pest observed, its management, pesticide applied, frequency and time of application and marketing strategy. Vegetable sampling was done on-farm and on commercial market for the pesticide residue analysis.

Analysis was conducted at Cagayan Valley Integrated Agricultural Laboratory (CVIAL) and Cagayan State University at Lal-lo using Rapid Test Kit. Based on the results generated, most farmers practiced mono-cropping in vegetable production with pesticide chemicals being used in managing pest infestation. Application of the chemical was done early in the morning and late in the afternoon with a frequency of twice a week and every after harvest. The most commonly used pesticide were malathion, lannate and magnum. Furthermore, results of pesticide residue analysis showed that most vegetable samples taken from public market and on-farm had positive detection both in carbamates and organophosphate test. The concentration level of pesticide residue is higher than the Association of South East Asian Nation on Maximum Residue Level/Limit (ASEAN MRL).

Based from the results of the study, *Pinakbet type* vegetable samples taken in public market and on-farm had pesticide residue wherein its residue level of concentration is higher than the ASEAN's MRL. It is further concluded that farmer's practice in pesticide application is one factor in the presence of pesticide residue in the vegetables.

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