

International Journal of ChemTech Research

CODEN (USA): IJCRGG, ISSN: 0974-4290, ISSN(Online):2455-9555 Vol.10 No.15, pp 365-370, **2017**

ChemTech

Evaluation pesticides residue in salted fish products marketed in Makassar

Nursinah Amir¹* and Chanif Mahdi²

¹Faculty of Marine Sciences and Fisheries, University of Hasanuddin, JI. Perintis Kemerdekaan KM. 10 Tamalanrea Makassar, Indonesia ²Faculty of Mathematics and Natural Sciences, University of Brawijaya, JI. Veteran Malang 65145, Indonesia

Abstract: Pesticides are chemical substances used to kill or control pests. But by the processor or trader is often used to prevent decay so that the shelf life of the product is longer and the losses can be reduced. This study aims to determine the use of pesticides in salted fish products that are marketed in Makassar. In this research used *Accidental Sampling Technique*. Samples are taken from the modern market (Lotte Mart and Hypermart), traditional markets (Pabaeng-baeng, Daya, Terong) and Paotere. Samples were analyzed by using kit tester and GC (Gas Chromatography) at BIOCHEM Laboratory of Chemistry Department of Brawijaya University and Laboratory of Pesticides and Fertilizers Testing, *UPT* (Technical implementation unit) Plant Protection and Horticulture of South Sulawesi. The results show that the salted fish marketed in Makassar does not contain pesticide residues. **Key words :** pesticide, residue, salted fish, Makassar.

Introduction

Pesticides are chemical substances used to kill or control pests. The word pesticides comes from the word pest and cida which means murderer^[1]. Pesticides are defined as substances to kill or control pests ^[2]. Based on *Food and Agriculture Organization* (FAO) 1986 and Regulation of Indonesian Government Number 7th of 1973, pesticides are a mixture of chemicals used to prevent, eradicate and control animals/herbs such as rodents, including disease-fighting insects, for the purpose of human welfare^[3].

The use of pesticides is generally intended to kill certain types of pests. This is related to the important properties of pesticides that are poison or toxicity ^[4].Unwise use of pesticides enables the presence of pesticide residues left in the product^[5].Pesticide residues are the remaining pesticides in food and affect the food safety and harm the health of human beings. The danger in humans arises from consuming products containing pesticide residues. The effects of human in the short term (acute) will cause poisoning, and in the long term will cause cancer, growth disorders in children and the decline of the immune system^{[6],[7]}.

Pesticide residues are getting serious attention both to national and international interest in producing safe food. The era of globalization will affect to the food safety and security system. Safe food is the demand of consumers and will compete in the global market^[8]. The availability of safe food can minimize the cases occurrence of foodborne disease. It also presses the cost of foodborne disease cases and creates healthier and more productive human beings. *Codex Alimentarius Commision* (CAC) has made the existence of pesticide residue an international requirement for food safety by establishing *Maximum Residue Limits (MRLs)* pesticide.

Indonesian National Standardization Agency has also set the Maximum Limit Residual (BMR) of pesticides on agricultural products based on Joint Decision of Minister of Health and Minister of Agriculture^[9].

The Law of Republic of Indonesia No. 7 of 1996 about mandated that food is safe, quality, nutritious, diverse and sufficiently available. It is a main prerequisite to the systems that provides protection for the good health and functioned in increasing the prosperity and welfare of the people. The Law of Republic of Indonesia No. 38 of 2009 about health, it is stated that every person and / or legal entity that manufactures, processes, and distributes beverage foods treated as food and beverages resulting from circulated engineering technology shall ensure that it is safe for humans, animals to be eaten by humans and the environment^[5].

Makassar City is the main area of business and marketing of fishery products in South Sulawesi. As a theprovincial capital, Makassar City has closeness to information related to food safety policy including the use of hazardous chemicals. Food safety is a worldwide concern because of the direct impact on human health.

Fishery products that are marketed in Makassar are generally still processed traditionally. Traditional processors, generally pay less attention to food safety issues produced products. ^[10]suggests that some food safety issues that come from deliberate processing are commonly found in traditional products such as jambal, salted fish, shrimp paste, pindang, peeled shellfish, peda, fish meal, shark fin and fish crackers. The processor uses hazardous additives such as pesticides, formalin, borax, artificial colouring agents.

Several studies that have been conducted on the presence of pesticide residues in food products include pesticide residues in red peppers, lettuce and onion ^[11],detection residue of phyrethroid in meat^[12], pesticide residue ini fruits and vegetables from Xiamen, China^[13], pesticide residue in fruits from Polandia^[14], insecticide residue in eggplant marketed in^[15], pesticide residue class of pyrethroidson several vegetables in Merauke City^[16], pesticide residue various active ingredients like organophosfat, organoclorine, carbamate and phyretroidon *jambal roti*^[17], pesticide residue on orange in Brazil^[18], pesticide residue on horticultural crops in West Bandung District^[19] and residue of organoposphatin strawberry^[20].

The presence of pesticide residues in the product, will have an impact on human health due to accumulation of toxic substances pesticides in the body. The effects of humans in the short term (acute) will cause toxicity, and in the long term will cause (1) cancer, (2) growth disorders in children and (3) decreased immune system ^[21]. Type of cypermetrin insecticide can increase levels of AST and ALT ^[22], increased level of urea and creatinine^[23].

Seeing the lack of research about pesticide residues on fishery products while its existence has an impact on human health, the authors are interested in doing research to determine the use of pesticides in fishery products, especially salted fish marketed in Makassar.

Materials and Methods

The materials used in this study include salted fish products, organophosphate and organochlorine reagents, acetone, dichloromethane, isooctane, toluene, diethyl ether, silica gel, eluent A (mixture of ethyl acetate and n-hexane, 0.2: 99.8 v/v), eluent B (mixture of ethyl acetate and n-hexane, 10: 90 v/v).

The method used in this research is survey and experiment to know the residue of pesticide contained in salted fish product which is marketed in Makassar City. Sampling is done by using Accidental Sampling technique in market of Daya, Terong, Pabbaeng-baeng, Paotere, Lotte Mart and Hypermart Makassar. Sample analysis was performed at BIOCHEM Laboratory of Chemistry Department of Brawijaya University and Laboratory of Pesticides and Fertilizers Testing, *UPT* (Technical implementation unit) Plant Protection and Horticulture of South Sulawesi. Pesticide testing was done using kit tester and gas chromatography.

Pesticide testing procedure using kit tester ^[24]are as follows:

- Taking 1-2 g of sample and put into test tube
- Adding 2-3 ml of acetone, shake for 3-5 minutes
- Poured the supernatant on two other test tubes

- Adding a solution of the main organophosphate and organochlorine reagent pesticide kits to each of the test tubes
- Shake for 3-5 minutes
- Observe the color change in the bottom layer
- If blue appears to mean positive organophosphate and if a purple-brown coloring occurs positive organochlorine

Pesticide testing procedure using gas chromatography ^[25]are as follows :

- Extraction : Total of 5 g samples were crushed and put into the lid Erlenmeyer to be added by Acetone: Dichloromethane (50:50). The mixture was left for one night for a static extraction process. The crude extract filtered through a funnel with a cotton or glass wool that has been cleaned with a mixture of Petroleum Ether and Acetone (4:1) for eight soxhlet hours. Total of 25 mL organic phase were pipetted into the round flask. It concentrated in *Rotary Evaporator* on the temperature of water bath 40°C, until almost dry, and then dried using nitrogen gas. The residues dissolved in 5 mL of Isooctane and Toluene (90:10) to get the extract.
- Purification :Total of 20 mL extract evaporated until almost dry by using *Rotary Evaporator* on the temperature of water bath at 40°C. The residues dissolved in 20 mL n-Hexanethatcontained1g of analytical samples. Glass wool, 5 mL of n-Hexane and 1 g of activated silica gel were added consecutively. The mixture stirred until homogenous. The inner wall of the column was rinsed with 2mL ofn-Hexane, tilits meniscus just above the silicagel. A total of2mL extract concentrates(equivalent to1ganalyticalsamples) putted in the column, and then rinsedwith3x1mLn-Hexane, til its meniscus just above the silicagel. Next, we eluted the mixturewith20mL of eluent A(a mixture of ethylacetate and n-Hexane, 0.2:99.8). The first eluate(contained internal standard) was taken for 10mL and we discarded theeluate residues. Meanwhile, pyrethroids were eluted with 35 mL eluent B (mixture of ethylacetate and n-Hexane, 10:90) resulting eluate to be collected in round flask and added with 10mL of first eluate which contained th einternal standard, and then evaporated until dry. The residue was dissolved in n-decane to the volume of 1 mL.
- Determination : Total of 1-2µL extract was injected into the gas chromatography with Electron Capture Detector (ECD) equipped with RTX-1 column, 30m x0.25mm. Temperature of injector and detector were set at 280°C, oven temperature at 255°C, carrier gas of Nitrogen flowed 30 ml/min. The content of the tested substance were determined by comparing the width of peak area on the substance component to the area of the standard reference. The amount of residues contained n the sample is formulated as follows^[25].

$$R = \frac{\frac{A_2}{A_1} x V_{i1} x K x \frac{V}{V_{i2}}}{W}$$

Description :

R	=	residues on sample (mg/kg)	
A_2	=	sample area	
A ₁	=	standard area	
V _{i1}	=	standard injection volume (µl)	
V _{i2}	=	sample injection volume (µl)	
K	=	standard solvent concentration (ng/µl)	
V	=	last volume of concentration (µl)	
W	=	weight of sample (g)	
ng/g	=	1000 = mg/kg	

Results and Discussion

Types of salted fish products marketed in Makassar can be seen in Table 1. The salted fish product is the dominant product found at the sampling site.

No.	Market	Types of Product
1.	Pabbaeng-baeng	Sunuasin
		Katambaasin
		Tongkol Pisangasin
		Peperekasin
		Ebi
		Teri
2.	Daya	Tongkol Pisangasin
		Tembangasin
		Teri asin
		Peperekasin
		Sunuasin
3.	Terong	Sunuasin
	-	Katambaasin
		Tongkolpisangasin
		Teri
		Peperekasin
		KakapMerahasin
4.	Paotere	Sunuasin
		Katambaasin
		KakapMerahAsin
		TongkolPisangasin
		Cakalangasin
5.	Hypermart	Jambal Roti
		Ebi
		Teri Jengki
		Teri Padang
		Teri Nasi
		Rebonasin
		Kapasan
		BuluAyam
		Cumi
6.	Lottemart	Teri nasi
		Ebi
		Jambal Roti
		Gabusasin
		Kapasan
		Rebonasin
		Teri padang

Table 1. Type of Salted Fish Products Products Marketed in Makassar City

Salted fish products that are marketed in traditional markets of Makassar City generally come from Selayar regency, Takalar, Pangkajene Islands, Makassar, Mamuju, PolewaliMandar, Ternate, and Kalimantan. Salted fish products that are marketed in the modern market of Makassar City, including from Tangerang, Surabaya and some are not known for sure origin, because it has been repackaged by the market. But from the product, allegedly some come from outside South Sulawesi Province.

Based on gas chromatography and kit tester analysis, it was found that pesticide residue was not found in salted fish marketed in Makassar City. In the chromatogram, no peak was found with the same retention time between standard chromatogram and sample chromatogram. And based on the results of the kit tester, there is no change in blue or brown color that indicates the existence of pesticides from the group organopos fat and organochlorie. This indicates that the salted fish that is served in Makassar City is undetectable containing pesticide residues. The absence of pesticide residues in salted fish is marketed in Makassar because of the possibility that there is no use by traders. Another possibility also because, the time of sampling conducted in the dry season where the drying process is perfect so that the damage to the product because the fly or other insects can be minimized. In contrast to research that has been done by taking a sample of bread jambal in Lamongan area of East Java, where in the sample of bread tofu found pesticide residues of phyrethroid group made from active sipermetrin with levels above the maximum limit of residuals permitted by CAC and SNI ^[26].

The practice of using pesticides by merchants on marketed products, in fact aims to extend storage and expand marketing reach. The absence of pesticides in salted fish products marketed in Makassar, possibly because they can be sold for less than a month, so it does not take long for storage. Salted fish marketed in the city of Makassar can not be said safe for consumption because there are other chemical compounds found in the product found. Identification of pesticide residues is also only done on some active ingredients such as sipermetrin, organophosphate group and organochlorine.

Conclusion:

Based on the results and discussion, it was concluded that the salted fish marketed in Makassar City was found does not contain pesticide residues.

References:

- 1. Djojosumarto, P. 2008. Pestisida dan Aplikasinya. Agromedia Pustaka. Jakarta
- 2. Raini, M. 2007. Toksikologi Pestisidadan Penanganan Akibat Keracunan Pestisida. Jurnal Media Litbang KesehatanXVII (3): 10-18
- 3. Dwipayanti, N. M. U., M. A. H. Suryadhi, N. K. Sutiari, I. N. Sujaya, I. A. G. Wirasuta, dan N. T. Suryadhi. 2012. Pembinaan Petani Di Desa Songan, Kecamatan Kintamani-Bangli Mengenai Penggunaan Pestisida. Udayana Mengabdi11 (1): 15-17
- 4. Taufik, I. danYosmaniar. 2010. PencemaranPestisidapadaLahanPerikanan Di Daerah Karawang -Jawa Barat. Prosiding Seminar Nasional Limnologi V tahun 2010
- Amir, N., E. Suprayitno, Hardoko and H. Nursyam. 2014. Cypermethrin Residues on Jambal Roti Product of Giant Catfish (Arius thalassinus Ruppell). International Journal of Chemtech 6(11):4789-4795
- 6. Indraningsih, R. Widiastuti, Y. Sanidan Yuningsih. 2011. *Bahaya Pestididadan Residunyapada Produk Peternakan*. Bulletin Balitvet Edisi Khusus Penas XIII
- 7. Saenong, M. S. 2007. *Beberapa Senyawa Pestisida yang Berbahaya*. Prosiding Seminar Ilmiahdan Pertemuan Tahunan PEI dan PFI XVIII Komda Sul-Sel
- 8. Hardinsyahdan Pranadji DK. 2004. *Pangan Dalam Era Globalisasi*. Di dalam Baliwati YF, Khomsan A, Dwiriani C.M, editor. *Pengantar Pangandan Gizi*, Jakarta: Penebar Swadaya. hlm 12-18
- 9. Hariyadi, P. 2008. *IsuTerkiniTerkait Dengan Keamanan Pangan*. Pokja Mutudan Keamanan Pangan. Jakarta.
- Purnomo A. H., E. S. Heruwati, A. Poernomo, Murniyati, I.R. Astuti. 2002. Analisis Kebijakan Jaminan Mutudan Keamanan Produk Perikanan. Didalam Heruwati ES, Sudradjat A, dan Wardoyo SE, editor. Analisis Kebijakan Pembangunan Perikanan 2001. Jakarta: Pusat Riset Pengolahan Produkdan Sosial Ekonomi Kelautandan Perikanan, Departemen Kelautandan Perikanan: 103-115
- Miskiyahdan S. J. Munarso. 2009.Kontaminasi Residu Pestisidapada Cabai Merah, Selada, dan Bawang Merah (Studi Kasus di Bandungandan Brebes Jawa Tengah serta Cianjur Jawa Barat).J. Hort. 19(1):101-111
- 12. Niewiadowska, A., T. Kiljanek, S. Semeniuk, AND J. Żmudzki. 2010. Determination OfPyrethroid Residues In Meat By Gas Chromatography With Electron Capture Detection. Bull Vet InstPulawy 54, 595-599, 2010
- 13. Chen, C., Y. Qian, Q. Chen, C. Tao, C. Li, and Y. Li. 2011. Evaluation of pesticide residues in fruits and vegetables from Xiamen, China. Journal Food Control 22 (7): 1114-1120.
- B. Łozowicka, P. Kaczyński, E. Rutkowska, M. Jankowska, and I. Hrynko. 2013. Evaluation Of Pesticide Residues In Fruit From Poland And Health Risk Assessment. Agricultural Sciences 4 (5B): 106-111

- 15. M. Fatema, M.M Rahman, K.H. Kabir, M. Mahmudunnabi, and M.A. Akter. 2013. *Residues of insecticide in farm and market samples of Eggplant in Bangladesh*. Journal of Entomology and Zoology Studies 1(6): 147-150
- 16. Buyang, Y and Y. Pasaribu. 2014. Analisis Residu Pestisida Golongan Piretroid Pada Beberapa Sayuran Di Kota Merauke. Agricola 4 (1): 41-48
- 17. Amir, N., E. Suprayitno, Hardoko and H. Nursyam. 2014a. *EvaluasiResidu Pestisidapada Produk Jambal Roti Ikan Manyung (Arius thalassinus Ruppell)*.Prosiding Simposium Nasional I Kelautandan Perikanan. Fakultas Ilmu Kelautandan Perikanan Universitas Hasanuddin. Makassar
- Viviane, E. N., T. A. Kussumi, V. R. R. Lemes, I. de A. Kimura, S. B. Rocha, J. Alaburda, M. C. C. de Oliveira, R. A. Ribeiro, A. L. R. Faria, and K. C. Waldhelm. 2016. *Evaluation of pesticide residues in oranges from São Paulo, Brazil.* Food Science and Technology 36(1): 40-48
- Amilia, E., B. Joy danSunardi. 2016. Residu Pestisidapada Tanaman Hortikultura (Studi Kasus di Desa Cihanjuang Rahayu Kecamatan Parongpong Kabupaten Bandung Barat. Jurnal Agrikultura 27(1): 23-29
- 20. Susilawati, N. P. A., I. E. Suprihatin, and N. G. A. M. D. A. Suastuti. 2016. Analisis Residu Pestisida Organofosfat Pada Buah Stawberry (Fragaria ananassa Rosalinda) Menggunakan Kromatografi Gas. Cakra Kimia (Indonesian E-Journal of Applied Chemistry) 4 (1): 18-23
- 21. Indraningsih, R. Widiastuti, Y. SanidanYuningsih. 2011. Bahaya Pestididadan Residunyapada Produk Peternakan. Bulletin Balitvet EdisiKhususPenas XIII
- 22. Amir, N., E. Suprayitno, Hardoko, H. Nursyam. 2015. *The Effect of Cypermethrinon Jambal Rotito A Stand ALT Levels the Wista rRat(Rattus norvegicus)*. International Journal of PharmTech Research 8(2):235-240
- 23. Nursinah Amir, Eddy Suprayitno, HardokoHardoko, Happy Nursyam. 2015. Pengaruh Sipermetrin Pada Jambal Roti terhadap Kadar Ureumdan Kreatinin TikusWistar (Rattusn orvegicus).Jurnal IPTEKS Pemanfaatan Sumberdaya Perikanan 2(3)
- 24. Mahdi, C. 2016. Mengenalberbagai ProdukReagen Kit Tester untuk Uji Formalin, Borak, Zat Pewarna Berbahayadan Kandungan Yodiumpada Garam Beryodium. Malang. Laboratorium Biokimia Universitas Brawijaya.
- 25. Dirjen Bina Produksi Tanaman Pangan. 2004. Pedoman Pengujian Residu Pestisida Dalam Hasil Pertanian. Direktorat PerlindunganTanaman. Jakarta.
- 26. Amir, N., E. Suprayitno, Hardoko, H. Nursyam. 2014. *Cypermethrin Residues on Jambal Roti Product of Giant Catfish (Arius thalassinus Ruppell)*. International Journal of ChemTech Research 6(11):4789-4795