



THE BEHAVIOR OF THE USE OF CHEMICAL PESTICIDES BY FARMERS IN INDONESIA

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Abstract

Improper use of pesticides can cause various negative impacts, both for the environment, pets, and even the health of farmers. So a study is needed that aims to find out how good the action of using pesticides by farmers from various regions in Indonesia is. This study is a narrative review. Information was obtained from Google Scholar, resulting in 299 articles, which were then selected based on technical and substantive considerations, resulting in 11 articles to be synthesized and interpreted. The results of the study show that in most areas in Indonesia, farmers are not good at using pesticides, namely from 72.73% of districts/cities. It was concluded that the correct actions of farmers in using pesticides were still few, causing the risk of health problems.

Keywords: pesticides; action; farmer; health problems

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1. Introduction


Today, pesticides have been widely used to increase and maintain agricultural production [1]. It has become commonplace that in general farmers in this world have used pesticides to fight plant pests [2, 3], with the consideration that the presence of pests can inhibit optimal plant growth, so that the fruit, seeds, leaves or other plant parts that are taken cannot reach maximum results as expected. For this reason, it is not surprising that pesticides have always been used massively until now. However, it should be noted that pesticides contain hazardous chemicals, as detailed in table 1 [4].

Thus, the use of pesticides that are not correct can cause various negative impacts, for the environment [1], for pets [5] and the most important is the health impact for humans, especially farmers [6]. Pesticides can cause various health problems in the

human body, depending on the location of exposure, for example oral, inhalation, dermal, eye, and others; besides that it also depends on the amount of exposure to pesticides on the body [4]. These two main factors can determine the level of toxicity due to exposure to pesticides, in addition to other factors such as the duration and frequency of exposure.

Several studies in Indonesia have proven that there are health problems in pesticide-using farmers who have used it for a long time with high frequency. In this case, one of the determinants of the level of health problems due to exposure to pesticides is the behavior or actions of using pesticides [7-10], although this information has only been obtained from several published research results in Indonesia. Therefore it is necessary to search for further information, about how good the use of pesticides by farmers from various regions in Indonesia is, through a literature study.

Table 1: Toxicity categories for active ingredients (Source: Hock WK, 2022) [4].

Routes of Exposure	Toxicity Category			
	I	II	III	IV
Oral LD ₅₀	Up to and including 50 mg/kg	50–500 mg/kg	500–5,000 mg/kg	>5,000 mg/kg
Inhalation LC ₅₀	Up to and including 0.2 mg/l	0.2–2 mg/l	2–20 mg/l	>20 mg/l
Dermal LD ₅₀	Up to and including 200 mg/kg	200–2,000 mg/kg	2,000–20,000 mg/kg	>20,000 mg/kg
Eye Effects	Corrosive corneal opacity not reversible within 7 days	Corneal opacity reversible within 7 days; irritation persisting for 7 days	No corneal opacity; irritation reversible within 7 days	No irritation
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours
Signal Word	DANGER POISON 	WARNING	CAUTION	CAUTION

Adapted from 40 CFR Part 156.

2. Methods

This study was a literature review with a narrative review approach. Data was taken from one database, namely Google Scholar, while in terms of timeline, articles were limited to 2013 to 2023. This review was limited to the use of pesticides by farmers, in the form of categorical data which was divided into 3 levels namely, "good", "moderate" and "less", or other categories but with the same meaning. The keywords used in the literature search were "pesticide use" AND "farmer action".

In the early stages of the search process, 299 articles were obtained, which were then selected according to technical and substantive considerations. Technical considerations in including literature as study material included: 1) articles from journals or proceedings, 2) full text available, 3) can be accessed openly; while substantive considerations included: 1) research in Indonesia; 2) involving farmers using pesticides as research subjects, 3) measuring pesticide use actions, either with or without other variables, 4) pesticide use actions in the form of categorical data with 3 levels. After

paying attention to technical and substantive considerations, 11 articles were finally obtained which were further studied in the process of synthesis and interpretation.

3. Results and Discussion

This study had obtained a number of expected literature, based on technical and substantive considerations, which are then arranged in a concise and systematic manner as shown in table 2. It appears that in a balanced way, the research results came from the main agricultural centers in

Indonesia, namely the islands of Java, Bali and Sumatra, 3 studies each, while the rest were from Maluku and West Nusa Tenggara. This is logical because indeed Java, Bali and Sumatra are areas with advanced agricultural lands [18]. Of course, it is in these main areas that farmers are more familiar and dominant with the use of pesticides to support their farming activities. Thus, these areas need serious attention, especially from the ministry of agriculture and ministry of health, regarding the correct use of pesticides and to minimize risks to the health of farmers.

Table 2: Summary of literature search results

No	Researchers	Regions	Action (%)		
			Good	Moderate	Less
1	Hidayat, et al. [7]	Tegal, Jawa Tengah	5.56	48.89	45.56
2	Hidayati [8]	Agam, Sumatera Barat	45.5		54.5
3	Ihsan, et al. [9]	Pidie, Aceh	36.8		63.2
4	Sugiarto, et al. [10]	Pamekasan, Jawa Timur	8.3	72.2	19.4
5	Indriana, et al. [11]	Tabanan, Bali	0	10	90
6	Rianty, et al. [12]	Tabanan, Bali	53	47	0
7	Erawati, et al. [13]	Tabanan Bali	60.32	39.68	0
8	Jannah, et al. [14]	Nganjuk, Jawa Timur	0	95.8	4.2
9	Yuliansari, et al. [15]	Lombok Barat, Nusa Tenggara Barat	17	51	32
10	Hasanah, et al. [16]	Kota Jambi	65.4		34.6
11	Souisa, et al. [17]	Ambon, Maluku	40		60

Note: All literature comes from Indonesia

It can be seen in table 2 that from various regions in Indonesia, most were not good at using pesticides. This is known from the small proportion of the good category (less than 50%) in the use of pesticides by farmers. This was represented by research results from 8 districts/cities, namely in Tegal, Agam, Pidie, Pamekasan, Tabanan, Nganjuk, Lombok and Ambon. Thus, from all the research results collected, some 72.73% of the research results showed that farmers were not using pesticides correctly [7-11, 14, 15, 17]. Of course this is a risk that endangers farmers, considering that behavior and its various derivatives, including the use of pesticides is one of the factors that determine the severity or severity of health problems due to exposure to pesticides [7-10]. Changing the behavior of farmers is not easy. The behavior of using pesticides has been going on for a long time, even for a very long time, which most likely they do not feel or do not take into account that exposure to pesticides has an impact on their bodies. This is very possible, because the effects of exposure to pesticides last for a long time, and the impact is gradual and symptoms of disturbance will appear after many years. For this reason, further identification is needed regarding the parts of the action of using pesticides, such as: personal protective equipment (PPE), storage of pesticides,

procedure for using pesticides, use of pesticide doses, duration and frequency of spraying pesticides, maintain cleanliness of equipment, spraying pesticides in the direction of the wind and time spraying pesticides [19, 20].

Given the many elements of the behavior of using pesticides, the government must intervene to protect farmers from health threats due to improper use of pesticides. Of course, it is not easy to control and improve every element of this behavior simultaneously. Therefore, priority-based management is needed, so that each element of behavior can be leveled up gradually and take turns in order of priority. In this case there are many ways to arrange elements based on priority order to be handled first, for example using the "Difficulty-Usefulness Pyramid (DUP)" as has been implemented in several studies in the field [19, 21-25]. Another alternative for selecting priority elements is the "Quadrant of Difficulty-Usefulness (QoDU)" method, as has been used in several studies in the field [26-27].

4. Conclusion

Based on the results of the study it can be concluded that the behavior or actions of farmers in using

pesticides in general are still few in the good category, thus causing the risk of health problems.

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