



The Impact of Pesticides Use on Farmer Health and Environment

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Abstract - Pesticides are supporting component in agricultural sector. However, the excessive use of pesticides can have negative impacts on the health of farmers and the environment. This research was conducted in Kebonagung village, Sumowono sub-district to determine the impact of pesticides on health and the environment. The study population was vegetable farmers in Kebonagung Village, Sumowono District. The sample selection technique used purposive sampling method. In-depth interviews were conducted with 10 vegetable farmers and data triangulation was obtained through interviews with the Village Head of Kebon Agung. The results showed that farmers' knowledge was still lacking, farmers did not have awareness of the importance of using personal protective equipment when applying pesticides, pesticide control was carried out once every 6 months but not all farmers received this supervision. The impact of pesticides on health and the environment in Kebonagung village is still relatively light but there are indicators of an imbalance in the ecosystem due to excessive use of pesticides

Keywords – Pesticide Use, Health Impact, Environment

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1. Introduction

Agricultural sector is one of contributing sectors to economy in Semarang Regency. Based on data from the Badan Pusat Statistik, as many as 20.33% of the population of Semarang Regency work in the agriculture, plantation and forestry sectors with agricultural commodities which are superior to be chilies, leeks, and mustard greens [1]. Increasing the agricultural sector requires various means of support in order to increase food and economic needs. The means that support this increase in agricultural output are agricultural equipment, fertilizers, chemicals which include pesticides.

According to Hassaan et al, the word "pesticide" is a complex word that includes all compounds used to destroy or regulate pests; these include insecticides (insects), herbicides (weeds) and fungicides (fungi)[2]. Berg et al stated that low-income countries generally have specific deficiencies in pesticide legislation, insufficient capacity for pesticide registration, protection against exposure to pesticides in workplace, consumer protection against residues in food, and environmental protection against pesticide contamination that causes pesticide abuse which

ultimately has a negative impact on health and the environment [3].

The results of Arfianto's research in Candi Village, Bandungan District in 2008 showed that 26% of farmers experienced severe poisoning and 74% experienced mild poisoning [4]. In addition, based on data from the Semarang District Health Office, the incidence of hypertension in Sumowono District continues to increase every year [5]. In 2018 there were 38.7% of the population experiencing hypertension in Sumowono District. This is similar to the findings in the study of Sankoh et al. Health problems such as nausea, respiratory distress and reduced vision ability were higher in farmers who used pesticides than farmers who did not use pesticides [6]. Meftaul et al's study showed that if applied accidentally at higher concentrations even in small urban areas such as lawns, parks and watertight surfaces, pesticide contamination can pose a serious threat to the environment, living organisms and food safety [7].

Based on data from a preliminary study, farmers in the village of Kebon Agung use pesticides as the only ingredient to exterminate pests. However, farmers do not understand the bad effects of pesticides if they are not

properly managed. Thus, the aim of this study was to determine the impact of pesticides on farmer health and the environment.

2. Methodology

This research is a qualitative research. The population in this study were vegetable farmers who used pesticides in Kebon Agung Village, Sumowono District, Semarang Regency, Central Java Province, Indonesia. A sample of 10 farmers was obtained using purposive sampling technique. The validity test of the data uses the triangulation method, which is to cross check data or information to stakeholders, namely the Chairman of Kebon Agung Village.

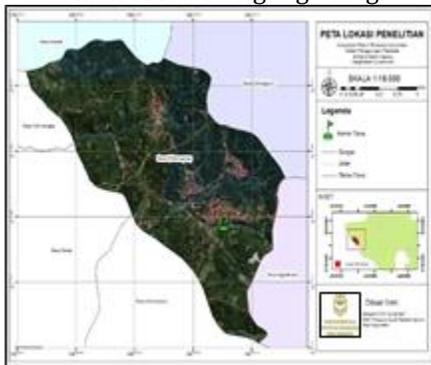


Figure 1. Map of Research Location
Source: Google Map

3. Result and Discussion

3.1 Characteristic of Participants

The results of interviews and observations with participants are shown in Table 1. Characteristics of participants shows that 60% of the participants are 41-50 years old. The majority sex (70%) is male. As many as 90% of participants have an elementary education. The length of time the respondent works as a majority farmer (50%). Meanwhile, the types of plants planted varied. The majority are chilies and leeks at 50%, according to the vegetable commodities in Sumowono District are chilies and leeks [8]. Daily work hours are approximately 9 hours, from 07.00-17.00, with a break of 1 hour to rest.

Table 1. Characteristics of Participants

Characteristics	N	Percentage (%)
Farmer Age		
30-40	1	10
41-50	6	60
51-60	3	30
Total	10	100
Gender		
Men	7	70
Women	3	30
Total	10	100
Education		
Elementary School	9	90
Junior High School	1	10
Total	10	100
Length of Work as a Farmer		
10-20 years	4	40

21-30 years	5	50
Above 30 years	1	10
Total	10	100
Types of Plants		
Chili And Leeks	5	50
Chili And Cabbage	1	10
Cabbage And Leeks	2	20
Mustard And Long Beans	1	10
Tubers	1	10
Total	10	100

Through these characteristics, it can be seen that the job of vegetable farmers is still dominated by men because it is related to jobs that use physical strength. In addition, 50% of participants have worked as vegetable farmers for 21-30 years. These results indicate that the participants have experience in managing agriculture, including using pesticides. The longer the working period of a person will increase one's skills and knowledge in doing their job [9]. However, research in Magelang Regency also stated that the working tenure of farmers is related to the disturbance of body balance in horticultural farmers [10]. In addition, the longer the working tenure of farmers also increases the level of exposure to pesticides and the risk of pesticide poisoning is greater [11]. Based on this, there is a risk of disturbing the balance of the farmer's body and poisoning exposure to pesticides in Kebon Agung village so that prevention efforts need to be done immediately.

From Table 1, most (90%) of the participants have an elementary education level. The level of education describe knowledge and skills. Participants who mostly have primary school education difficult to understand and digest unfamiliar terms such as terms in agriculture. The terms and explanations in government regulations tend to be poorly understood by ordinary people. This can cause the implementation of government regulations in the general public to become obstructed. So, parties from the relevant agencies are needed to provide socialization and supervision, especially regarding the implementation of regulations on pesticide use.

3.2 Participants Knowledge about Pesticides

Participants' knowledge about pesticides is only limited to the type of pesticide used, namely insecticide. All participants did not know the active ingredients contained in the insecticide. Some of the trademarks used by participants have active ingredients, namely organochlorine which can disrupt the activity of Ca²⁺ in neurons [12][13]. Meanwhile, the participants' knowledge about the dosage of pesticide use was only based on the experiences of fellow farmers and previous habits. Participants do not know the meaning of the symbols and labels written on the pesticide packaging. Similar things were also found in research with apple farmer participants. Farmers' behavior is uncontrollable in using pesticides because these activities are based on hereditary habits [14].

As many as 8 out of 10 participants (80%) stated that spraying was carried out once a week until harvest time, but the frequency could be increased to more than once a week if the pests had not decreased. In addition, 60% of the participants used other pesticides to treat other pests such as rats. Participants stated that the use of these pesticides was not mixed or mixed but instead used interchangeably with one another. Dilution should be carried out according to the instructions on the package. In addition, the label / packaging also provides guidelines on whether or not to mix pesticides with the active ingredients [15]. The dose that participants used when spraying pesticides was 100 ml per bottle. For spraying, participants used 200 ml and diluted it into 1 tank with a volume of 14 liters. The liquid is used for an area of 300 m² - 500 m². However, 10% of participants measure according to hereditary habits, namely 100 ml for a 10 liter dilution. During the spraying process, participants spray in the direction of the wind to reduce the risk of being exposed to pesticide splashes on the face and body.

Participants' knowledge of the dangers of using pesticides for the environment is still quite low. This is indicated by the statement of participants who only know the use of pesticides as pest control without knowing the negative impact of pesticide use. As many as 90% of participants stated that there was no opportunity to replace pesticides with organic pesticides because existing pests could not be eradicated using organic pesticides. Participants stated that they would not reduce the pesticide dose or change the type of pesticide because they did not want to take the risk of crop failure. All participants only rely on agricultural products as a support for the family economy. Participants' knowledge about pesticide regulations is still lacking, especially regarding pesticide use, pesticide management and pesticide control. Participants stated that they only know that pesticides are important for eradicating pests in the field and do not understand the rules or regulations that govern these pesticides.

Participants knowledge has a significant relationship with pesticide use practices [16][17][18]. The research stated that the level of farmers' lack of knowledge about pesticide use causes farmers to use pesticides based on their own estimates and experiences rather than based on the proper guidelines or rules. Meanwhile, rules or regulations regarding pesticides that are useful for reducing the risk of health problems and the environment around the farm have no significant impact.

3.3 Practical Use of PPE on Participants

Participants stated that they only wash their hands after spraying if they remember. In addition, participants still wear the same clothes for spraying. As many as 50% of participants stated that the clothes for spraying were intentionally left in the fields to be worn during the next spraying. Participants stated that they could not

immediately bathe / clean up after spraying pesticides because they were in the fields until late afternoon.

Minister of Health Regulation No. 50 of 2017 concerning Environmental Health Quality Standards and Health Requirements for Vectors and Animals Carrying Diseases and Their Control, describes the Personal Protective Equipment (PPE) used when spraying pesticides, namely boots, long sleeves and trousers (coverall), hats, gloves, aprons, face shields, and masks [19].

All participants only wore long sleeves and hats when spraying pesticides. The use of masks is still rarely used because participants feel cramped when they have to use them. Bagheri et al's research also found the same results [20]. All participants stated that PPE was impractical, uncomfortable, and reduced farmers' movements while working so that participants chose not to use PPE even if it was given free of charge.

A person's behavior is determined by various external factors [18]. One of them is the work comfort factor. Kaligis 'research shows that farmers' knowledge about the use of PPE is not sufficient to support farmers in applying PPE when spraying pesticides. This is due to the discomfort when using PPE. In addition, the encouragement of fellow farmers not to use it is greater than the understanding possessed by farmers [9].

3.4 Pesticide Education

As many as 8 out of 10 participants (80%) stated that they had never attended any counseling from either the agriculture or health office that discussed pesticides. However, 20% of participants stated that they had attended counseling about pesticides, but in the past. Responding to this, participants stated that they were willing to come if the agriculture or health office provided counseling on pesticides.

Supervision is an aspect that encourages or inhibits a person's behavior. The absence of regular pesticide control causes farmers to not prioritize the use of PPE in spraying activities. This is similar to Sofiana's research which shows a significant relationship between supervision and PPE use behavior [21].

3.5 Impact of Pesticides on Health and the Environment

Observations on farmers in the village of Kebonagung showed that health impact on farmers is still relatively mild. Farmers only complain about itching and redness which does not interfere with their work. There has been no routine and periodic health checkup so that if there are no symptoms after that, the farmers will ignore it. In addition, farmers in Kebonagung village do not always use gloves when mixing pesticides, so the risk of being exposed to pesticides is higher. In the research, Rani et al stated that pesticides that are accidentally exposed to the skin due to being spilled or scattered when mixing can cause health threats such as diabetes, reproductive disorders, nerve dysfunction, cancer and respiratory problems [22].

The citizen village also complained about the environmental impact caused the use of pesticides in particular. The increasing number of planthoppers or pests that damage agricultural crops makes farmers increase the dose of pesticides but there is no decrease in the number of destructive pests / planthoppers. Bergman examines the ability of pesticides pollute wider environment [23]. This condition is an indicator that there has been an imbalance in the natural ecosystem according to the research results of Pelosi et al. [24]. There is a desire for farmers to reduce pesticide use, but farmers do not know it. Method of using appropriate pesticides and there is no support from farmers in other areas. The results of Bakker et al's research show that the intention to reduce pesticide use is largely determined by whether other farmers also take action [25]. Reducing pesticide use is considered risky, but the relatively important risk attitude is offset by environmental considerations of the farmers. This shows that farmers need successful examples of how to reduce pesticide use, either through exchanges with peer farmers or by providing knowledge about alternative pest control methods.

4. Conclusion

Farmers' knowledge about pesticide use is still lacking, they still lacking awareness of the importance of using personal protective equipment when applying pesticides, pesticide control has been carried out once in 6 months but not all farmers get this supervision. The impact of pesticides on health and the environment in Kebonagung village is still relatively light but there are indicators of an imbalance in the ecosystem due to excessive use of pesticides.

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