The effects of agricultural extension for improvement environmental behavior by vegetable farmers in Padang city

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Abstract. Efforts to safeguard the use of pesticides at the farm level was still inadequate. Data from monitoring by the West Sumatra Health Office until 2010 known about the effects of pesticide poisoning in farmers 45,3% recorded in the normal category, 39,5% are exposed to light, 12,8% moderate and 2,4% exposure to heavy exposure. This study aims to determine the effect of agricultural extension for improving environmental behavior by vegetable farmers in Padang City. This type of research was Research and Development or R&D. This research done in Padang City, Subdistrict of Kuranji, Koto Tangah and Nanggalo Padang. A data analysis technique used paired sample test and one way anova. Based on the existing needs for support the establishment of environmental behavior by vegetable farmer specifications of the resulting product was a module on the knowledge of environmental health, motivation healthy lifestyle, and a family environment. The module guidelines on the use of agricultural technology, environmental friendly and to encourage awareness of farmers in the act was to provide motivation through electronic media with their video used in the extension contains an explanation of the behavior of farmers, environmental behavior by farmers, technicians, the benefits of environmentally friendly behavior by farmers.

1. Introduction
According to WHO pesticide used higher, especially in developing countries in Asia, Africa, Central America and Latin America, but the developing countries have only used 25% of pesticides throughout the world. Surprisingly was that even though developing countries have only used 25% of pesticides throughout the world, but in the case of death caused by pesticides 99% experienced by developing countries, It was caused by low levels of education farmers in developing countries, so that in the use of pesticides was very unsafe. Based on the research of WHO and the UN environment program in 2013, deaths due to pesticide poisoning reach 5,000 cases and about 5 million people worked in the agricultural sector in developing countries exposed to toxic pesticides, about 18,000 of whom die each year [5].

The use of pesticide impacts on human health and the environment. Every day, thousands of farmers and workers in agriculture poisoned by pesticides every year and an estimated millions of people involved in agriculture suffer from pesticide poisoning. Farmers and other workers exposed (contaminated) pesticides in the process of mixing and spraying pesticides. Besides, the community around the farm was very risky exposure to pesticides by air, land and water are polluted participate, even consumers through the use of agricultural products at risk of pesticide contaminated with pesticides [3].
Based on the record of the Ministry of Agriculture Republic of Indonesia in 2007, showed approximately 50% (± 110.200.000 people) of Indonesia's population are farmers. It was estimated that approximately 37.1% of them are farmers who have been exposed to the pesticide sprayers (± 40.792.500 people). And 35% are farmers who have suffered pesticide poisoning (14.277.375) people and this rate was increasing annually [7].

The Ministry of Agriculture states the number of brands of pesticides circulating in Indonesia as many as 3.327 formula, formula 297 (9%) was circulated in the Province of West Sumatra [7]. Efforts to safeguard the use of pesticides at the farm level was still inadequate, negative effects such as acute intoxication or poisoning, long-term inevitable. From the results of monitoring of the Health Department of West Sumatra Province until 2010 recorded 45.3% in the normal category, 39.5% are exposed to light, 12.8% moderate and 2.4% exposure to heavy exposure.

Based on the above phenomenon, vegetable farmers located in the Padang City were inseparable from the problems of health and environmental crisis. From the observations of researchers, vegetable farmers around the outskirts of the Padang City namely Kuranji Subdistrict, Pauh Subdistrict, Koto Tangah Subdistrict, and Nanggalo Subdistrict located along the watershed Kuranji still many planted vegetable in gutters, provide water irrigation or washing vegetables regardless of the quality of the source water used, as well as the use of pesticides was not in accordance with procedures. Whereas the results of the Dewata and Adiri showed that the region upstream watershed Kuranji have water quality and pollution load capacity with good category, the middle area has a water quality has exceeded the quality standard Grade I government Regulations Number 82 in 2001 with a load capacity of river pollution in not good category [2]. While the downstream areas of water quality and pollution load capacity of the river belongs to the category not good exceeding the threshold of fourth grade Regulations Number 82 in 2001. If in the water used for irrigation or washing vegetables, there was an element that exceeds the threshold, it can negatively impact plant or cause the plant contain heavy metals.

Heavy metals were absorbed into the stems and leaves were consumed, then will go into the food chain cycle. The heavy metals will act as a pro oxidant free radicals, when exceeding the tolerance limit cause toxicity to plants, animals and humans. In addition to heavy metals due to the use of water, vegetable products can also be polluted by pesticide residues. In the short term, pesticide residues will not cause any negative impact on human health, but in the long term can lead to kidney disorders, neurology, metabolic enzymes and carcinogenic effects [10]

In research Hamzah was demonstrated that the dose of pollution insecticide malathion found in vegetables in Indonesia, if taken for 60 consecutive days can cause significant damage to the liver, but not significantly damage the brains of rats that is one of the pests or vegetables [4]. Thus, there was a possibility of vegetables consumed by people already contain pesticide residues, so pesticides can poison people not only when pesticides are used, but also the time to prepare, after spraying even to people who eat the crops.

Farmers' lack of knowledge about the environment and behaviors that tend not environmentally sound in managing agricultural land be one contributing factor. Agriculture performed only oriented to production without considering environmental aspects will harm themselves and others (consumers). According to Keraf research, approach to environmental issues must be moved from the concept of culture, both cultural perceptions of the environment were the basis for the behavior of individuals or communities, as well as the development of technologies that are part of the culture [6]. Furthermore Pratiwi adds that the farmers of environmentally sound behavior in processing of agricultural land affected by the age of the farmer, the old farm and farmer participation in agricultural extension follow [9].

Based on the description above, it was known that many factors affect the behavior of an environmental insight on farmers. Among them are knowledge, perception, motivation, habits, abilities and skills, including experience in participating in counseling. According to Walgito, the behavior can be shaped according to the situation expected by pledging expected behavior, through understanding, and using models or examples of actions [12]. Thus, to gain insight into the behavior of
the environment on the farmers, can be done by giving the sense at once an example of actions that can be implemented through the agricultural extension [8].

2. Method
The method of this research was Research and Development or R&D. The model used is a model of Analysis, Design, Development, Implementation and Evaluation (ADDIE) by quasi experimental study. This research was done in the Padang City, Subdistrict of Kuranji, Koto Tangah and Nanggalo Padang. The sample of this research was vegetable farmer subdistrict of Kuranji, Koto Tangah and Nanggalo Padang which amounted 108 people. The instrument of this study was the questionnaire of environmental insight, knowledge, motivation, a family environment and environmental behavior variables by using a Likert scale. Before the questionnaire was used first tested the validity and reliability. A data analysis technique used paired sample test and one way anova.

3. Results and Discussion
The result of research after agriculture extension 2 times post-test known.

Table 1. Descriptive Statistic Analysis of Research Variables Before and After Agricultural Extension.

| Variable                  | N  | Mean  | Std. Deviation |
|---------------------------|----|-------|----------------|
| Environmental Behavior    | 108| 143.37| 9.375          |
| Posttest 1                | 108| 161.18| 10.965         |
| Posttest 2                | 108| 167.23| 7.292          |
| Total                     | 324| 157.26| 13.764         |
| Knowledge                 | 108| 20.73 | 3.409          |
| Posttest 1                | 108| 22.27 | 3.303          |
| Posttest 2                | 108| 25.34 | 2.971          |
| Total                     | 324| 22.78 | 3.751          |
| Motivation                | 108| 60.19 | 4.087          |
| Posttest 1                | 108| 70.52 | 5.980          |
| Posttest 2                | 108| 74.15 | 3.837          |
| Total                     | 324| 68.29 | 7.570          |
| Family Environment        | 108| 65.63 | 4.465          |
| Posttest 1                | 108| 65.44 | 4.752          |
| Posttest 2                | 108| 70.33 | 6.443          |
| Total                     | 324| 67.13 | 5.743          |

Table 1 known there were improvement of environmental insight, knowledge, motivation, family environment and environmental behavior variables before and after agricultural extension for 2 times posttest. The result of the paired sample test can be known table 2.

Table 2. The Result of Paired Sample Test

| Variables   | Unstandardized Coefficients | Standardized Coefficients | t    | Sig. |
|-------------|-----------------------------|---------------------------|------|------|
| (Constant)  | 86.55                       | 14.92                     | 5.801| 0.000|
| Knowledge   | 0.108                       | 0.240                     | 0.448| 0.655|
| Motivation  | 0.459                       | 0.146                     | 3.147| 0.002|
| Family      | 0.700                       | 0.153                     | 4.587| 0.000|
| Environment | 0.396                       |                            |      |      |
The probability value of t of the independent variable of environmental health knowledge was 0.665 greater than 0.05 so that the independent variable of environmental health knowledge has no significant effect on the dependent variable of environmental behaviour at alpha 5%. The independent variable of healthy life motivation toward the dependent variable of environmental behavior have prob. t arithmetic (0.002) was smaller than 0.05 so it can be said that the independent variables of healthy living motivation significantly affects the dependent variable of environmental behavior at 95% confidence level. Furthermore, the family environment with probability t value 0.001 was also smaller than 0.05 so it has a significant effect on the dependent variable of environmental behavior.

Table 3. The Result of Paired Sample Test

| Variable   | Pretest Mean±SD | Posttest I Mean±SD | Posttest II Mean±SD | p value |
|------------|-----------------|--------------------|---------------------|---------|
| Knowledge  | 21.08 ± 3.74    | 22.68 ± 3.61       | 25.34 ± 2.97        | 0.000   |
| Motivation | 60.64 ± 4.34    | 71.81 ± 5.92       | 74.15 ± 3.83        | 0.000   |
| Family     | 66.41 ± 5.29    | 66.31 ± 5.65       | 70.33 ± 6.44        | 0.000   |
| Environment| 144.89 ± 11.18  | 163.52 ± 10.02     | 167.23 ± 7.29       | 0.000   |

The result of research shows that there was an effect of farmers’ knowledge (p = 0.000), healthy life motivation (p = 0.000), family environment (p = 0.000) and environmental behavior (p = 0.000) before and after agricultural extension on posttest I and II. In general, the results of applying eco-friendly agricultural extension to vegetable farmers using understanding and sample approaches can improve farmers’ knowledge about environmental health, healthy life motivation, influence and application of healthy living in families with different effectiveness values. Increasing environmental health knowledge on vegetable farmers was quite effective; the healthy life motivation was very effective; increased influence and application in the family environment was less effective; while environmentally sound behavior with effective criteria. Establishment of environmentally-oriented farmers’ behavior can create sustainable agriculture as found in the Triangle Framework for Sustainable Development Concepts. A development activity (including agriculture and agribusiness) was declared sustainable, if the activity was economically, ecologically and socially sustainable. The behavior of environmentally friendly vegetable farmers was a manifestation of ecological sustainability, maintaining environmental support and conservation of natural resources including biodiversity. So farmers not only prioritize agricultural production to pursue the economy, but also to keep the environment so that the sustainability of human social life does not need to worry about. Therefore, the realization of sustainable agriculture should also be supported by the government and society. Efforts by the government to support agriculture, environmental were consistent assistance and commitment to organic farming, government assistance and subsidies both in terms of availability of organic fertilizers, ensuring the market of organic farming and government assertiveness in regulation to support organic agriculture. Such support was urgently needed by vegetable farmers in environmental behavior, because farmers have a desire for organic farming but there was still anxiety of failure in crops, selling prices similar to inorganic products, market unavailability, and low consumer awareness in organic consumption. However, awareness of consumer about organic vegetables can be improved by providing more intensive information about pesticide residues and the dangers to health. With this information, consumers were expected to be more aware of the importance of organic vegetable consumption, so that higher organic selling price will not affect consumer decision in buying it. In addition, farmers’ anxiety also arises from the transition of inorganic to organic plants causing unstable soil conditions, requiring time in processing. Therefore, with the support of government, market availability, and public awareness about organic vegetables,
can change the farmer's decision in behaving, so that the behavior of environmentally vegetable growers can be realized.

4. Conclusion
There were improvement of environmental insight, knowledge, motivation, family environment and environmental behavior variables before and after agricultural extension.

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