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PESTICIDE UTILIZATION OF ORNAMENTAL PLANT GARDENERS IN DARAGA, ALBAY: ITS IMPLICATION TO HEALTH EDUCATION

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ABSTRACT

The use of pesticide to control insects and other pest that destroy plants and crops have been practiced. This ensure quality products that demanded high paying sales. The ill and hazardous effects of pesticides both to man and to the environment have not been given much importance. It is but high time that this issue be considered. This study determined the extent of pesticide utilization by the ornamental plant gardeners in terms of profile of respondents, level of knowledge of pesticide use, health practices observed during pesticides application, the effects of pesticides on their health and measures to minimize its effects. This study used the descriptive research design utilizing a structured questionnaire. Fifty-five gardeners working in eleven gardens in the Municipality of Daraga, Albay, Philippines were taken as respondents. Simple statistical tools utilized in the analysis and interpretation of data. The gardeners working in the ornamental nurseries were generally male, single with average educational attainment and they possess average level of knowledge about pesticide utilization. Thus, extent of pesticide utilization among them varies they were not totally practicing all necessary preventive measure against the ill effects of pesticide use. They experience health problems secondary to pesticide use. Precautionary and safety measures were given to assist the gardeners in minimizing the ill effects of pesticide use.

KEYWORDS: Pesticide Utilization, Ornamental Plant Gardeners, Ill Effects, Health Education

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INTRODUCTION

In recent years, people have been exposed to several types of substances with broad spectrum due to the rapidly evolving technology. One of these chemical substance groups are pesticides. Pesticides have been an essential part of agriculture to protect crops and livestock from pest infestations and yield reduction for many decades. Despite their usefulness, pesticides could pose potential risks to food safety, the environment, and all living things. Concern about the environmental impact of repeated pesticide use has prompted research into the environmental fate of these agents, which can emigrate from treated fields to air, other land, and water bodies. The importance of agricultural pesticides for developing countries is undeniable. However, the issues on human health and environmental risks has emerged as a key problem for these countries in accordance to a number of studies. In the last five decades, pesticide usages increased the quantity and improved the quality of food. However, with the increasing amounts of their usage, concern about their adverse effects on nontarget organisms, including human beings, has also grown. The purpose of this publication is to explain the nature of pesticides and their history, classification, risks, and effects on health and the environment.

Pollution is the introduction of contaminants into the environments that cause harm or discomfort to other living organisms or damage the environment, which can come in the form of chemical substances or energy, such as heat, light, or noise. Pollutants can be naturally occurring energies or substances but are considered contaminants when in excess of the natural levels. Santos divided environmental pollutants into biodegradable and nonbiodegradable ones. Biodegradable pollutants can be broken down and processed by living organisms, including organic waste products, phosphates, and inorganic salts. Nonbiodegradable pollutants cannot be decomposed by living organisms and therefore persist in the ecosphere for extremely long periods of time. They contain metals, plastics, glass, pesticides, and radioactive isotopes. (MA, 1990)

Pesticides constitute any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. They can also serve as plant regulators, defoliants, or desiccants (USEPA, United States of Environmental Protection Agengy. About pesticides. U.S., 2014)

Chemicals have long been used to control pests. Sumerians already employed sulfur compounds to control insects and mites 4500 years ago. Pyrethrum, a compound derived from the dried flowers of *Chrysanthemum cinerariaefolium*, has been applied as an insecticide for over

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2000 years. Salt or sea water has been used to control weeds. Inorganic substances, such as sodium chlorate and sulfuric acid, or organic chemicals derived from natural sources were widely employed in pest control until the 1940s.

During World War II (1939-1945), the development of pesticides increased, because it was urgent to enhance food production and to find potential chemical warfare agents. Consequently, the1940s witnessed a marked growth in synthetic pesticides like Dichlorodiphenyltrichloroethane (DDT), aldrin, dieldrin, endrin, parathion, and 2,4-Dichlorophenoxyacetic acid (2,4-D). In the 1950s, the application of pesticides in agriculture was considered advantageous, and no concern about the potential risks of these chemicals to the environment and the human health existed. (Unsworth, 2014)

In recent years, people have been exposed to several types of substances with broad spectrum due to the rapidly evolving technology. Technology has brought us clear conveniences, and thousands of chemicals produced in different areas are up on the market every year. One of these chemical substance groups are pesticides. . (Pastor S, 2003;18(3):249–258.)

Pesticides present hazardous effects on human health, as it destroys the natural resources and other animal living in the farm and garden. Many workers and residents, especially in the rural sector, are in contact with pesticides on a daily basis, so they are at high risk of poisoning by these compounds. This exposure can cause neuropsychiatric sequelae (mood disorders, depression, and anxiety), because many pesticides underlie changes in the function (e.g., cholinergic crisis) of the central, peripheral, and autonomic nervous system, which are often followed by suicide attempts. In addition to being causative agents of neuropsychiatric disorders that might culminate in suicide, these effects may lead to the use of pesticides as a weapon. (Freire C, 2013)

Pesticides are used widely to control weeds and insect infestation in agricultural fields and various pests and disease carriers (e.g., mosquitoes, ticks, rats, and mice) in houses, offices, malls, and streets. As the modes of action for pesticides are not species-specific, concerns have been raised about environmental risks associated with their exposure through various routes (e.g., residues in food and drinking water). Although such hazards range from short-term (e.g., skin and eye irritation, headaches, dizziness, and nausea) to chronic impacts (e.g., cancer, asthma, and diabetes), their risks are difficult to elucidate due to the involvement of various factors (e.g., period and level of exposure, type of pesticide (regarding toxicity and persistence),

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and the environmental characteristics of the affected areas). There are no groups in the human population that are completely unexposed to pesticides while most diseases are multi-causal to add considerable complexity to public health assessments. Hence, development of eco-friendly pesticide alternatives (e.g., EcoSMART) and Integrated Pest Management (IPM) techniques is desirable to reduce the impacts of pesticides. This paper was hence organized to present a comprehensive review on pesticides with respect to their types, environmental distribution, routes of exposure, and health impacts. (Kim, 2017)

In the Philippines, the use of pesticides in rice production expanded rapidly during the 1970s and into the 1980s. This was partly due to concerns that crop losses from pests would negate the gains from planting modern rice varieties. However, by the mid-1980s, it was clear that the indiscriminate use of pesticides could cause ecological imbalances that could exacerbate, rather than alleviate, a pest problem. Moreover, research was providing evidence of negative environmental and human health effects from the excessive use of pesticides. Between 1989 and 1992, the International Rice Research Institute (IRRI) contributed to the body of research on the harmful effects of pesticide use through a number of detailed analyses of the private health costs and environmental consequences of pesticide use in rice farming in the Philippines. In particular, the analyses showed that the private health cost of using insecticides in rice production is large and overwhelms any potential economic gains. The primary policy recommendation resulting from this IRRI policy-oriented research (POR) was to restrict the use of hazardous (Category 1) pesticides by banning those that pose acute or chronic health effects, or adversely affect the environment; or, if banning was not feasible, to apply a selective pricing policy, taxing the more hazardous pesticides at higher rates than the less toxic alternatives. Policies banning the use of some hazardous pesticides had been enacted by the Fertilizer and Pesticide Authority (FPA) of the Philippines in the early 1980s. In 1989, the Ramos administration began developing the pesticide policy package (PPP), which was implemented between 1992 and 1996. The PPP was a multi-pronged approach to the safe and effective use of pesticides that directly targeted: The use of highly toxic insecticides in rice growing Regulatory policies and implementing guidelines on the importation, formulation, distribution, sale, and use of pesticides , the illegal smuggling of pesticides Regulation on the labeling and advertising of pesticides Hazard awareness, through an agro-medical training program Improved product stewardship, undertaken jointly by the pesticide industry and the government. (FAO, 2008)

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In the province of Albay, particularly in the Municipality of Daraga, it is well known for its many ornamental gardens, there are several of them ranging from average to large-sized nurseries. Specific locations of said gardens are barangay Tagas, Malabog and Busay. The vast areas of previous Riceland converted to gardens provide arable and fertile soil conducive for the cultivation of ornamental plants. Furthermore, their locations are so accessible being along national roads where commuters are easily attracted.

These nursery garden have learned to used pesticide to control damage to their plants. Using Pesticides spare their plants from the effects which result in poor produce and low income. They may not be aware of the consequences of using chemicals specifically the ill effects on their health since they are overwhelmed by the seemingly advantageous results pesticides bring forth to their business. Pesticides may be harmful to the health but it means quality plants, which could demand high prices.

The fast spreading of nurseries in may localities means the hiring of more gardeners. It is high time that these workers be also given considerable attention. They may not yet experience serious health problems. As early as now, they must be made aware and preventive measures instituted to protect their health and wellbeing. It is this context that this study was conceived of.

This study determined the extend of pesticide utilization by the ornamental plant gardeners and its effect on their health. Specifically, this sought to answers the following specific objectives:

1. Identify the profile of the ornamental plant's gardeners in terms of:
    a. Age
    b. Sex
    c. Civil status
    d. Highest educational attainment
    e. Number of years working as gardeners

2. To determine the level of knowledge regarding pesticides.

3. To determine the extent of pesticide utilization by gardeners in terms of:
    a. Pesticides used

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b. Frequency of application
c. Volume of application
d. Method of application

4. To determine the health practices observed during pesticides application along:

a. Use of protective clothing
b. Personal hygiene
c. Health habits
d. Storage/disposal of chemicals

5. To determine the effects of pesticides on their health as perceived by the respondents along:

a. Dermatological aspect
b. Respiratory aspect
c. Gastro-intestinal aspect
d. Neurological aspect

6. Proposed measures through health education minimize the effects of pesticides on the health of the gardeners

This study focused on the extent of pesticide use by the ornamental plant gardeners in Daraga, Albay and the effect on their health. There are eleven ornamental nurseries as the locale of the study. These have been in operation for more than five years and they have a minimum of five workers whose work experience is likewise at least five years. Three of these are situated in *Malabog*, two in *Tagas*; five in *Busay* and one in Poblacion.

The profile of the respondents includes *age, sex, highest educational attainment and number of years working as gardener*. The effects of pesticide use were determined based on the various bodily system, to wit: *dermatology, respiratory, gastrointestinal and neurology*. These effects are either diagnosed diseases or signs and symptoms experienced by the respondents. To determine whether such health effects are secondary to the use of pesticides, such data were taken before and after pesticide use. Considering all things equal if prior to working as gardener the health problems were not experienced then it may be safely said that these ill effects are secondary to pesticides if they were experienced after working and using pesticides There may

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be no documented health history of the respondents to serve as baseline data, this was among the identified limitation of this study.

METHODOLOGY

This section discusses the research method, sources of data, instruments in data gathering procedure and statistical treatment used in the conduct of the study.

This study used the descriptive research design utilizing a structured questionnaire as the main data collection tool. Descriptive research design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. (Shuttleworth, 2008).

The primary sources of date were the respondents of this research work. This was comprised of the gardeners who qualify to the preset criteria. Data obtained from them through the questionnaire and informal interview constituted the primary data. The respondents of the study were shown in Table 1 below:

Table 1
Respondents of the Study

Location	***Respondents***
Malabog	20
Busay	20
Tagas	5
Poblacion	10
Total	**55**

A questionnaire-checklist was structured as main data gathering tool. carefully crafted to be able to elicit data necessary to answer the specific objectives.

The questionnaire has five parts. Part I contains information regarding the respondents. The items were answered by providing the data being asked for. This part gave the profile of the respondents.

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The Part II intends to gather data on the respondent's level of knowledge about pesticides. Through a 21-item test, the respondent's knowledge was determined by the score obtained. To give a more accurate and detailed description of the respondent's level of knowledge regarding pesticides, the 21 questions were further sub-grouped into three, namely, components/nature of pesticides; benefits/actions derived from them; and the ill effects/side effects of pesticides. This provided further information as to what aspect of pesticide use, they are still wanting. This served as inputs in terms of health education. Thus, based on the scores, the level of knowledge could be described as follows:

Table 2
LEVEL OF KNOWLEDGE

Score	*Adjectival Description*
0-7	Low level of knowledge
8-14	Average level of knowledge
15-21	High level of knowledge

The Part III of the tool solicited information that described the extend of pesticide use. This gave information on the names of the pesticides, the frequency of application, volume or amount used as well as the method of application. No standard response was obtained but each respondent had the option to provide his own data or information.

Part IV of the tool desired to elicit data on the health practices of the gardeners in relation to pesticide use. This pertains specifically to use of protective clothing, personal hygiene, health status and storage /disposal of pesticides. This was easily accomplished by putting a checkmark on the yes/no column depending on compliance to the given statement.

The Part V, the last portion, referred to the effects of pesticides to the health of the gardeners. These effects are classified according to system, thus effects on the skin, respiratory system, gastro-intestinal, and the central nervous system. Under each classification are listed the sign and symptoms or complaints experienced either before or after working as a gardener. Spaces were provided where the respondents may put a check under options before and after. This provided information as to whether the problems experiences are secondary to pesticide

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use. Although there may be some factors attributable to the existence of the health problems, the researcher intends to focus it only to pesticide use.

Prior to the finalization of the subject matter to be researched on, a preliminary survey was first conducted to determine the feasibility of the research to be done. Visits to the ornamental plant gardens were made and informal/causal interviews were conducted. Likewise, significant persons from the Department of Agriculture of the Municipality of Daraga were sourced out to shed light on the investigation to be made. A positive feedback from all these preliminary endeavors gave the researcher the go-signal to pursue with the intended study. Afterwards, the intended study is communicated with the Municipal Mayor of Daraga. Upon approval of such request, data gathering started.

The researcher personally issued the questionnaires to the respondents. The respondents were assisted in accomplishing the research tool especially those who are not highly educated. Informal interviews were likewise made to supplement the gathered data. A time frame of one-month period was allotted for the date gathering phase.

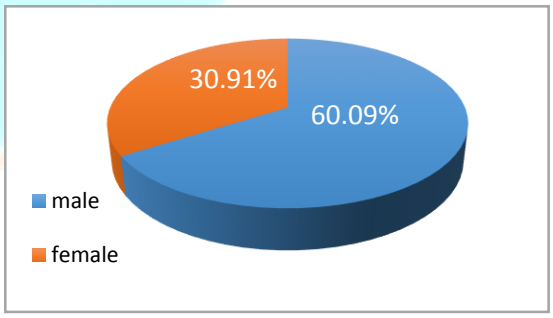
After the data have been collected, they were organized and collated for analysis and interpretation. Statistical tools were utilized in the process. To answer the sub-problems posed, frequency count, percentage and ranking were used.

RESULTS AND DISCUSSION

This section presents the result of the study obtained primarily from the questionnaire issued to the respondents. Discussion of such findings follows the sequencing of the specific objectives. The presentation is both textual and tabular to give a more meaningful and in-depth analysis of the data. Implications are also included to provide more relevant interpretation.

1. Profile of the Respondents

A description of the gardeners as respondents were presented in terms of some variables. The researcher believed that this profiling was important since it has some bearing on the other findings of the study.



Age. Among the 53 respondents who provided the date as to their age, 21 of them comprising 39.1 percent are aged 21-25 years old; thirteen or 24.52 percent were within 15-20 years and the third ranking were those 26-30 years

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composed of twelve of them or22.64 percent. Six of them or 11.33 percent were aged 31-35 years old while only one or 1.89 percent was within the age bracket 36-40 years.

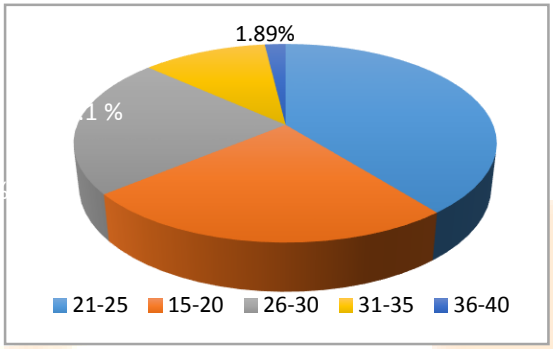

Figure 1. Age Distribution of the Respondents

It could be noted that majority of the gardeners were young in age. Younger ones have more stamina and vigor to do job as gardener. They need to be energetic and strong to perform the various tasks. A s shown in Figure 3, there was a diminishing number of them as the age increases. Thus, only one belong to age 36-40 bracket. Maybe the older one had decided to engage in less strenuous and less physically tiring work.

Sex. Majority of the respondents, 38 of them or 60.09% are males and 17 or 30.91% are females. The nature of the job as a gardener is more appropriate for a male since it entails lifting heavy objects such as pots, garden soil, plants and the like. The female workers on the other hand, have more gentle hands in tending the plants. They may be given the responsibility of weeding, transplanting or applying fertilizer.

Figure 2. Sex Distribution of the Respondents

Civil Status. Since most of the gardeners are between 21-25 years old, half (50.98%) of them are still single; 21(41.18%) are already married while 2(3.92%) are widowed and another 2(3.92%) are separated. Four of them failed to provide data as to their status.

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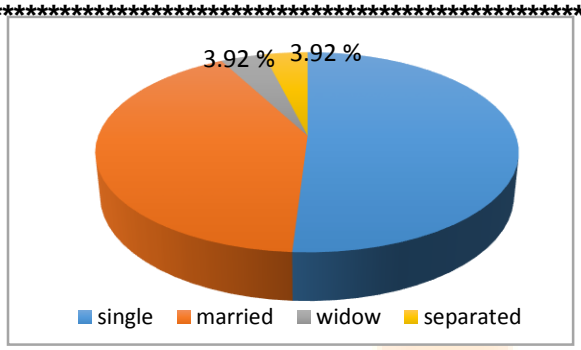

Figure 3. Civil Status of the Respondents

The unmarried gardeners are the younger ones who are just beginning to work for an income. From the informal interviews conducted during data gathering most of them are friend or relatives of the owners of the gardens and mostly come from the locality. The two widowed and the other two were separated and considered as chief gardeners since they were delegated the major responsibilities in maintaining the ornamental gardens.

Highest Educational Attainment. The schooling on an individual generally is considered as the common denominator in seeking for a job. The highly educated job applicants are able to land a high paying employment whereas the low educated one gest a job corresponding also to their work capability. Since being a gardener does not demand a high level education, it could be noted from the findings that almost half of the gardeners were high school undergraduate composed of 24(46.15%) of them; 16 (30.77%) were elementary graduate; 7 (13.46%) were high school graduate; and the remaining 4 (9.62%) failed to finish the elementary. As disclosed by the social researcher, in the rural areas most especially youngster stop schooling due to such reason of lack of interest or parents require these children to work and help augment the family income. Being hired as gardener is one of the more common job opportunities for them.

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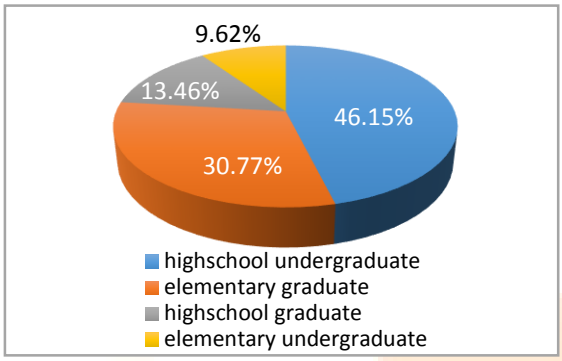

Figure 4. Highest Educational Attainment of Respondents

It could be safely mentioned that the educational attainment of workers is a plus factor to their performance. Giving instructions to them, understanding facts and principles, doing assigned task systematically, performing task with ease and convenience are all facilitated if they are well-educated. In this instance, for example, the use of effects of pesticides could be easily internalized by those with higher learning than those who may not even finished the elementary level.

Number of Years Working in Garden. As could be observed in Figure 7, there is an inverse order in the number of gardeners and the number of years having worked in the nurseries. Half of them equivalent to 50.94% have been working for 5-6 years; 12 or 22.65 percent for 7-8 years; 7 or 13.21 percent for 9-10 years; 5 or 9.43 percent for 11-12 years and lastly 2 or 3.77 have been employed for 13 years or more.

It could be inferred from the data presented that these workers don't stay for so long in their jobs. After a few years working, they may decide to look for another job, thus, they leave and get employed in a higher paying company or in less tiring job. Most of those stay long were the married and older ones who may find looking for another job more difficult.

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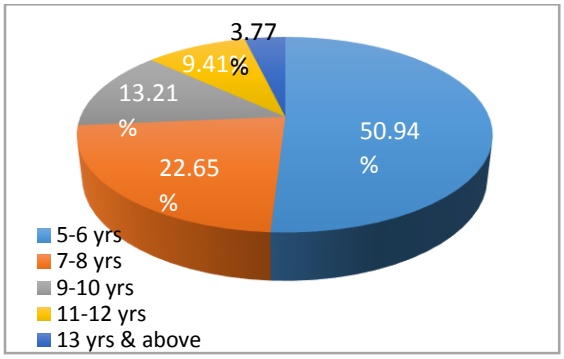

Figure 5. Number of Years Working as Gardener

2. Level of Knowledge About Pesticide

Possessing adequate about one's work and the factors related to it is very crucial for a satisfactory job performance. Knowledge is frequently defined as understanding or cognition about something (Heidgerken, 1981). This knowledge could be attained in several different ways; may be by formal schooling, reading, experience.

The ornamental gardeners are expected to possess knowledge base about gardening which all others may not be very knowledgeable about. This knowledge would be useful in improving as well as in increasing their produce in terms of quality and quantity. Adequate knowledge about pesticide would be of great help to the gardeners in protecting themselves against ill-effects especially to their health. Such adequacy of knowledge they posses was determined through a 21-item test. The score they obtained gave a description of their level of knowledge about pesticides and their use.

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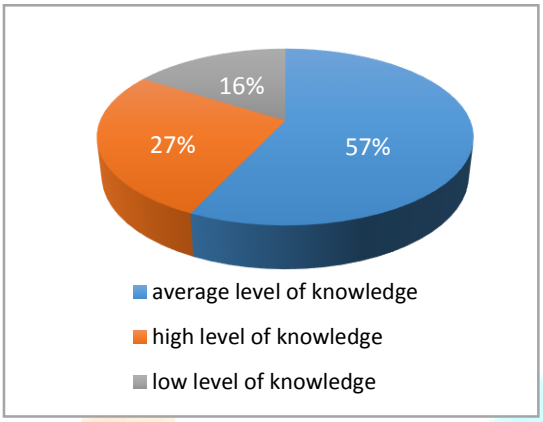
The pie graph presented in Figure 8 shows that 31 (57%) of them possess average level of knowledge; 15 (27%) have high level and 9 (16%) were of low level of knowledge. These description of their level of knowledge might bear significant implication in terms of health practices

Figure 6. Level of Knowledge About Pesticides

related to pesticide use and more importantly to identify health problems which may be secondary to the adverse effects of pesticides.



Item analysis of the test. This was done to determine on what aspect of pesticide use they are most knowledgeable and least knowledgeable. The first nine items pertain to the *nature/components of pesticides*; the next six refer to the *benefits /actions derived* from them and the last remaining six refer to the *ill effects or side effects* of these chemicals.

Result revealed that they are highest knowledgeable along the topic on nature/components of pesticide. The average correct answer to this group of items was 46.22. The one question with the highest wrong answer refers to pesticide use may result in pest resistance insurgence. Fourteen respondents got this wrong. This was followed by doubling the recommend dose of pesticide is a faster method of killing the pest with thirteen incorrect responses. The respondents may not be aware that pesticides just like also medicine for human beings, if used indiscriminately, may result to resistance. Similarly, they also more effective it will be in destroying the pest. These are two aspects of pesticides.

The respondents are higher knowledgeable about ill effects or side effects of these chemicals. The average correct responses were 44.5. The two which got the top and second ranking incorrect responses were: "pesticide application should be done during high winds so that it could reach wider coverage"", and "the indiscrete and heavy use of pesticide could contaminate the soil, fishpond and streams." There were 23 and eleven wrong answers, respectively.

Since pesticides are intended to destroy harmful pest, the gardener may believe that it constitutes the main action. They could not broaden their thinking that pesticides use may adversely affect soil, fishponds and streams. It might appear remote for the gardener to think about it. May of them may not have yet experienced themselves the ill effects of pesticides, thus, they may not be careful in preventing them.

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Finally, the gardeners have high knowledge regarding the benefits/actions of pesticides with sixteen as average correct responses. Forty-eight of them believe that pesticide use may be continuously practiced in order to assure good harvest while fourteen affirmed that mixing one pesticide with another is more effective than using only one kind.

It appears that the respondents fully believe that pesticide use is only way of destroying pest coming up with good harvest and produce. They further believe that two or more of them combined together prove more effective.

Table 3
Rank of Knowledge on Different Aspects of Pesticides

Aspect of Knowledge	***Average correct answers***	***Rank***
1.Nature/ components of pesticides	46.22	**1st** (highest knowledge)
2.Benefits /actions derived	44.5	**2nd** (higher knowledge)
3. Ill effects or side effects	16	**3rd** (high knowledge)

The above findings would prove as very useful insights in terms of providing health education to this group of workers. Emphasis should be placed on the aspect where they appear more wanting, thus, their knowledge on the actions or benefits obtained from using pesticides should be strengthened more than the other two groups of items. Furthermore, they may nee to be enlightened better on the topics where they got the most incorrect responses. Misconceptions about pesticides and pesticide use may be corrected based on the data obtained.

3. Extent of Pesticide Use

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This part discussed as regards the name of pesticides used, volume, preparation, frequency of application and manner of applying them. It could be noted that there are as many varying responses as given by the gardeners.

Name of Pesticides Used. As could be seen in Table 2, there is a quite there is a quite long lost of pesticides being used by the respondents. Most of the respondents use, two or more kinds of pesticides. Malathion, Sevin and Folidol are the three highest ranked among them with 47, 41 and 35 responses. Folidol is an insecticide that comes in either emulsifiable concentrate or capsule suspension. The main active ingredient is parathion-methyl and I belons to organophosphate chemical group. This is commonly used as an insecticide spray. The least commonly used are Aliet, Fungaran Oh and Renlit. From the conversational interviews conducted with the respondents, it was found out that that several of these kinds of pesticides are used by the gardeners. They just don't fix with one kind but change the pesticides as often as necessary. Furthermore, two or more kinds are mixed, this they call cocktailing.

Table 4
Pesticides Commonly Used

NAME	*Frequent*	*Rank*
Occis R	29	5
Funguran OH	6	12
Furadan 36	25	7
Malatahion	47	1
Aliet	4	13
Brodan	19	8
Sevin	41	2
Oithane	28	6
Folidol	35	3
Karate	15	9

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Chambo	12	10
Renlit	11	11
Albatross	30	4

Volume. Most of the respondents claimed that the volume of the spray solution they use depends upon the quantity of plants to be applied. At one time the sales may be high so that with the decrease in the ornamental plants, the volume of the pesticide preparation also is decreased. However, if for example, there has been deliveries of new plants, they would prepare greater volume of spray solution. Another factor they consider is the condition of the plants. If there appears more pest and insects invading the plant, they will likewise prepare greater volume of the pesticide.

Frequency of Application. Similar to the above-mentioned factor, volume, the frequency of application also varies based on some criteria. Three answers were obtained on this portion of the research instrument. Application is either once a week, every two weeks and depending on the present situation. Although they regularly use pesticide every two weeks, if they observe a persistent need to spray even before the scheduled date, they have to do so to prevent severe damage to the plants. However, this seldom occurs. This means also that the frequency of the gardener's exposure to the effects of pesticides varies with tendencies toward greater times of exposure.

Method of Application. All the gardener utilized spraying as the only method of application of pesticides. This method ensures even distribution of the chemical to all plants and it also proves economical as well since wastage is very minimal. It could reach the inner portion of the plants and kill all injurious pest that may attack and damage them.

There were, however, several precautionary measures to be employed in preparing or mixing insecticide as well as during application. Among these are: a.) farmers should mix pesticides in a well ventilated place away from homes and mixing implements should be separate from those used in preparing foods; b) proper personal protective equipment should be worn such as face shield to protect against splashes, gloves made up of nitrite, long-sleeved shirt with gloves inside the sleeve, boots worn inside the long pants. The above equipment should be washed after every use. Other reminders include applying pesticides make certain that the spray is not carried by wind toward the person spraying, unprotected person or homes. Family members should not be allowed to walk through a newly sprayed field. Warning signs showing that spraying was done should be installed with the safe re-entry date specified. After applying pesticide, the

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worker should bathe with soap and water and change into clean clothes. He should also wash hands and face before eating. Those pesticide should be stored only in the ornamental containers and never in food, beverage, feed or seed container. They should be stored away from food, feed and seed storage areas, preferably in self-sealing drums to prevent leakage. (Morgan, 19197).

Pesticide application plays an important role in pest management. Proper technique of application of pesticide and the equipment used for applying pesticide are vital to the success of pest control operations. The application of pesticide is not merely the operation of sprayer or duster. It has to be coupled with a thorough knowledge of the pest problem. The use of pesticides involves knowledge not only of application equipment, but of pest management as well. The main purpose of pesticide application technique is to cover the target with maximum efficiency and minimum efforts to keep the pest under control as well as minimum contamination of non-targets. All pesticides are poisonous substances and they can cause harm to all living things. Therefore, their use must be very judicious. The application techniques ideally should be target oriented so that safety to the non-targets and the environment is ensured. Therefore, proper selection of application equipment, knowledge of pest behavior and skillful dispersal methods are vital. (Plant Health Engineering Division, NIPHM , 2013)

4. Health Practices in Pesticide Utilization

The health practices in relation to pesticide use were grouped into four, namely; use of protective clothing, personal hygiene, health habits and storage/disposal of pesticides. There were six items considered in each group. Discussion of findings were in term of these classification. These data were depicted in Table 5.

Use of protective Clothing. Ideally, gardeners should wear a special attire during pesticide application. This is primarily intended to protect themselves from the anxious and hazardous effects of pesticides. Results of the survey revealed that almost all of them comprising of 40 respondents (72.73%) wear mask during pesticides application. They feel it most needed since the smell of the chemicals alone will make them feel sick. This was followed by the wearing of long-sleeved shirts during pesticide use, with 31 responses. This got the second highly practiced item since long-sleeved shirts not only protect themselves from the pesticides but protection from sunlight seems the more important reasons for this. Thus, it could be observed that long-sleeved shirts are used every time they are working in the garden not only during pesticide application.

This finding is closely-related to to next ranking item which is the wearing of long pants as given by 28 respondents. Similar to the long-sleeved shirts, long pants are added protection of their legs from the effects of sunlight.

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It could further note that the last two ranking protectives used by the gardeners are use of boots and foot socks. There were only 23 and 19 respectively who wear these apparels. That may not be fully aware of the need for this since they may have misconception that the legs and the feet are not as highly important to be protected unlike the mouth, and face.

Table 5

Health Practices of Gardeners

Health Practices	*Frequency*	*Rank*
1. ***Use of protective clothing***		
a. Using gloves when handling pesticides	26	4
b. Wearing masks	40	1
c. Wearing long-sleeve shirts when applying pesticides	31	2
d. Wearing long pants	28	3
e. Wearing hats	23	5
f. Wearing foot socks	19	6
2. ***Personal Hygiene***		
a. Washing hands after using pesticides	54	1
b. Taking shower after pesticide application	29	3
c. Separating working clothes from other clothes after using it	28	4
d. Using handkerchief to rub eyes while applying pesticides?	27	5
e. Disposing mask after every single use	12	6
f. Changing working clothes after each use.	32	2
3. ***Health habits***		
a. Eating while applying pesticides	9	5
b. Drinking while applying pesticides	37	2
c. Smoking when using pesticides	12	4
d. Checking if there are abnormalities in the body after using pesticides	15	3
e. See doctor when feeling something unusual after applying pesticides	8	6
f. Availability of first aid kit for pesticide poisoning.	39	1
4. ***Storage/disposal of pesticides***		
a. Pesticides locked in cabinet away from reach of children	27	6
b. Rinsing sprayer thoroughly and storing it in a safe place after use	36	5
c. Keeping pesticides in their original containers	49	1
d. Properly disposing empty pesticide container	37	4
e. Labeling all pesticide container legibly	44	3
f. Disposing pesticide containers with left-over mixed chemicals	46	2

Personal Hygiene. Except for one gardener who did not indicate his answer, all the respondents consider washing the hands after using pesticide as the most important personal hygiene practice. This was given by 54 of them. They may be aware that pesticides are poisonous so they are careful about it. The second highest noted measure was changing the working clothes after each use. Although ranked second, there were only 32 responses to this. Changing the clothes everyday might mean more expenses in terms of use of detergent. A group of 29 of them take shower after pesticide application. This practice rank number three. Those who may not take a shower, may still adhere to the belief that it is not advisable to takea bath after day's work since one has been tired the whole day and this is not good especially for the nerves.

The least practiced personal hygiene item was disposing the mask after every single use. Only twelve of them discard their masks after using them. Maybe the remaining 43 of them keep them after use and wear them again the next time they will apply pesticide. Mask used only once still appear clean and tidy that they could be still safely re-used. Besides, throwing them after single use might be also too expensive.

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Health habits. These health habits referred to here are the activities done by the gardeners in relation to pesticide use that are aimed towards promoting health and preventing illnesses. The top ranking among the six listed health habits is the keeping of first aid kit for pesticide poisoning. Thirty-nine of the respondents answered positively on this item. This partly implies the concern and responsibilities of the owners of these gardens since they are the ones providing for these kits. Pesticides poisoning may happen accidentally through eating or drinking. Aside from being taught what to do in case of pesticide poisoning, they were provided with materials needed.

Drinking while applying pesticides is being practiced by 37 of the gardeners giving ranked two. Danger of contaminating the drinks with pesticides is a risk. Pesticides have the potential to contaminate drinking water supplies in both agricultural and urban settings. Under the Safe Drinking Water Act (1974), the U.S. EPA and other federal agencies monitor and regulate drinking water supplies. Many contaminants of drinking water occur at very low concentrations. Whether the contaminants pose a health risk depends on how toxic the pesticides are, how much is in the water, and how much exposure occurs on a daily basis. (National Pesticide Information Center, 2016)

The second least practiced health habit is eating while applying pesticides. Only nine of the group does this. Such finding shows that they are conscious of possible poisoning if while eating their meals or foods may get contaminated with the pesticides.

Storage/Disposal of Pesticides. The highly measure regarding storage and disposal of pesticide is keeping them in

their original containers. A total of 49 responses was obtained. This is safety measure for preventing poisoning and other ill effects of pesticides. Most accidental pesticide poisonings occur when pesticides are mishandled. Young children are often victims. Pesticide accidents can be prevented by careful planning, using a secure storage location, adopting safe handling methods during transport, and following proper disposal guidelines for both products and containers. The first step in preventing accidental poisonings and environmental contamination is to use good judgment when buying pesticides (Clyde L. Ogg S. T., 2013). If properly placed in their original containers, there is complete and clear label thus, it could not be mistaken for another. Containers with left over pesticides can be source of hazard and injury; if they would not be used anymore then they have to be thrown away.

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The least positively respondent item refers to soring pesticides in a locked cabinet away from reach of children. Only 27 of the respondents are doing this. This may not appear a very significant precautionary measures since as observed most of the gardens and nurseries are away from the residence of the gardeners and the owners of these gardens. There were usually no children roaming around the garden so there's no danger of them being poisoned. The next lowest answered item was rinsing the sprayer thoroughly and storing it in a safe place after use. They may not see the relevance of this procedure since the sprayer is used solely for the purpose. Only 36 of the gardeners were performing this.

Going into deeper analysis of the findings would reveal that in terms of the average responses the health practices pertaining to storage/disposal of pesticides got the highest rating of 39.83. it may be inferred that the effects of these practices are very observable, tangible and predictable so that they are very careful about these. The next highest answer are the personal hygiene measures with 30.33 responses followed by the use of protective clothing 27,83. The group with the lowest average responses are the health habits. The items classed under this are those referring to drinking, smoking, and eating which the respondents may believe them to be remote in causing ill effects to them. They may have overlooked the implication of these practices to good health and they may not be too conscious of their health status and factors that may affect it.

5. Effects of Pesticide Use on Health of the Gardeners

The last part of the instrument gathered data to determine the effects of the pesticides on the health of the gardeners. Using the system approach, signs and symptoms and a few diseases were listed down and the respondents checked either or both the blanks to indicate if the problem was experienced before or after working as a gardener. Although occurrence of such signs and symptom may also be possibly attributed to some factors, the researcher delimits such situation to the possible effects of the pesticides.

Dermatology. The effects to the gardener under this aspect were classed under the column. All four items were given responses. As could be seen in Table 5, darkening of the skin got the highest score of 23; redness has 18 responses; itchiness with 15 and rashes has 9. Darkening of the skin as an after effect may be also attributed to excessive exposure to sunlight. His goes concomitant with the second ranked item of redness of the skin. The scorching heat of

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the sun may be responsible for this condition although the effects of pesticides could not be overruled. Itchiness and rashes were identified as the least experienced skin problems.

Dermal exposure happens when your skin is exposed to pesticides. This can cause irritation or burns. In more serious cases, your skin can absorb the pesticide into the body, causing other health effects. (Potential Health Effects of Pesticide, n.d.). During mixing, loading and application of pesticides, the skin is the most likely body surface to come into contact with the product. Many pesticides can be absorbed through the skin into the blood, and can cause toxic effects. The amount of pesticide absorbed through the skin (percutaneous absorption) may be enough to produce severe toxic reactions including death. In addition, pesticides can also injure the skin directly, a process known as cutaneous toxicity. Skin irritation and skin rashes produced by irritating chemical substances are a very noticeable type of chemical toxicity. Skin infections by fungi (ringworm, athlete's foot, etc.), bacteria, or parasites are also very common medical problems and often have the same symptoms as skin irritation caused by chemical exposure. The degree of inflammation is a direct result of the degree of chemical or physical irritation (dose-response). If the damage is great enough to cause cell death, then the response will be much more severe, and can result in areas of the skin becoming "denuded" (loss of the layers, with the deeper layers being exposed to the surface). Because the response of the skin to many different physical and chemical irritants is similar, the causes of skin irritation must usually be diagnosed by a physician who specializes in skin problems (a dermatologist (Extension Toxicology Network, n.d.).

Respiratory. As could be seen in Table 5, the respondents were previously experiencing some respiratory problems before they worked as gardeners. Eighteen of them were affected by colds, seven by cough and three had asthma. These identified respiratory conditions could occur to any person. As figures revealed, however there was an increase in the incidence after working as gardeners. Twenty-two of them complained of colds, thirteen had cough and still the same three were having asthmatic attacks.

According to the World Health Organization, chronic respiratory diseases, including asthma and chronic obstructive pulmonary disease (COPD), were the leading cause of total world morbidity (6.2%) and the third leading cause of all global deaths (7.1%) in 2008. Asthma is the most common chronic disease, affecting ~14% of children in the world, and its prevalence has been increasing for several decades.

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In addition, respiratory diseases are the most common causes of death among children under 5 years of age. It is now accepted that, besides viruses and bacteria, environmental agents can induce or exacerbate airway inflammation, which can be a predictor of chronic respiratory diseases. Some environmental risk factors are now well known, such as allergens, tobacco smoke, gaseous or particulate air pollutants, and exposure to certain chemicals, such as pesticides (Mamane A. , 2015).

Some individuals tend to cough, wheeze, or sneeze when exposed to pesticide sprays. Some individuals react to the strong odor and irritating effects of petroleum distillates used as carriers in pesticide products. One symptom is that the eyes, mucous membranes of the nose, and even the sensitive linings of the mouth and back of the throat feel raw and scratchy. This symptom usually subsides within a few minutes after a person is removed from the exposure to the irritant. However, a reaction to a pesticide product that causes someone not only to sneeze and cough but also to develop severe acute respiratory symptoms is more likely to be a true hypersensitivity or allergic reaction. Symptoms of a true allergic reaction range from reddening and itching of the eyes and skin to respiratory discomfort often resembling an asthmatic condition. (Potential Health Effects of Pesticides, 2013)

Gastrointestinal. As regards to health problems of the gastrointestinal system, it could be observed in the same table that eight of them having episodes of diarrhea while nine were suffering from hyperacidity. There was an increase in these figure after five years of working as gardeners. Aside from the increase there were two additional health problems as claimed by the respondents. Thirteen complained of hyperacidity, six experienced diarrheas, four had vomiting and two had problem of feeling nauseated.

Pesticides usually enter the gastrointestinal tract accidentally through mouth. Oral entry results from eating and swallowing the poison. Pesticides may be taken in by mistake while casting or drinking during or immediately after the application of pesticides. Poisoning occurs when pesticides, which have been stored in food or soft drink containers, are mistakenly eaten or used in cooking and food preparation.

Central Nervous System. Some of the complaints of the respondents referring to the central nervous system were headache, dizziness and blurred vision as given by seven, six and three of them respectively. After working in the gardens these number was increased to eight, nine and five with additional of three of them who are experiencing numbness of the extremities.

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Table 6
Effects of Pesticides on Health of Gardeners

Health Problems	Before			After		
	F	%	R	F	%	R
Dermatology						
Rashes				9	13.85	4
Redness				18	27.69	2
Itchiness				15	23.08	3
Darkening of the skin				23	35.38	1
				65	100.00	
Respiratory						
Cough	7	25.00	2	13	33.33	2
Colds	18	64.28	1	22	56.41	1
Asthma	3	10.72	3	4	10.26	3
	28	100.00		39	100.00	
Gastro-intestinal						
Vomiting				4	16.00	3
Diarrhea	8	47.06	2	6	24.00	2
Nausea				2	8.00	4
Hyperacidity	9	52.94	1	13	52.00	1
	17	100.00		25	100.00	
Central Nervous System						
Dizziness	6	37.50	2	9	36.00	1
Headache	7	43.75	1	8	32.00	2
Blurred Vision	3	18.75	3	5	20.00	3
Numbness of Extremities				3	12.00	4
	16	100.00		25	100.00	

The CNS consists of brain and spinal cord. It controls all the body functions. Sensory receptor channel sends all the information to CNS and impulses through motor neuron. Neurotoxins are the poisonous chemical substances that may be destructive to nerve tissues. They can interfere with the activity of CNS. They may have adverse effect on CNS and can damage the brain cells. Neurotoxicity can be termed as destruction of nerve cells due to some chemical, physical and biological agents. Many substances act as neurotoxic agents such as metals, industrial chemicals, natural toxins, pesticides, alcohol and other chemicals that can affect the function both developing and mature nervous system. All body systems can be affected but the brain is very sensitive to toxicity. Some neurotoxins may have immediate affect and last for few hours for example alcohol and fumes. Others may have long lasting effect for years such as effect on breathing rate and neuro degenerative disorders. The processes like replication, migration, differentiation, myelination of neurons, and synapse formation that occur in nervous system are more susceptible to neurotoxic chemicals. Neurotoxic agents may cross the blood brain barrier and manifest qualitatively and quantitatively in developing functions of brain. (Malik, 2018).

6. Proposed Measures to Minimize effects of Pesticides to One's Health

A set of proposed strategies to minimize if not to eliminate the ill effects of pesticides on the health of the users was prepared in the form of a flyer as shown in Appendix A. Important

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guides and reminders about pesticides used are included. Information were presently in very simple ways so that these could be easily understood.

CONCLUSION

The following conclusion were drawn from the findings presented:

1. The gardeners working in the ornamental nurseries in Daraga, Albay are generally male, single with average educational attainment.

2. Because of their educational attainment, consequently, they also possess average level of knowledge about pesticide utilization, having the highest knowledge on the nature and components of pesticides and the least knowledge on the ill or side-effects of pesticides.

3. The extent of pesticide utilization among them varies.

4. They are not totally practicing all necessary preventive measure against the ill effects of pesticide use.

5. They experience health problems secondary to pesticide use.

6. Precautionary and safety measures may assist the gardeners in minimizing the ill effects of pesticide use.

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