

INDIRA GANDHI NATIONAL OPEN UNIVERSITY (IGNOU)

SCHOOL OF CONTINUING EDUCATION

**AN ASSESSMENT OF THE UTILIZATION OF PESTICIDES AND SAFETY PRACTICES OF THE
FLORICULTURE INDUSTRIES: THE CASE OF THREE FLORICULTURE FARMS AT SEBETA
TOWN, OROMIA REGION, ETHIOPIA.**

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DECLARATION

I hereby declare that the dissertation entitled **AN ASSESSMENT OF THE UTILIZATION OF PESTICIDES AND SAFETY PRACTICES OF THE FLORICULTURE INDUSTRIES: THE CASE OF THREE FLORICULTURE FARMS AT SEBETA TOWN, OROMIA REGION, ETHIOPIA.**

Submitted by me for the partial fulfillment of the M.A in Rural Development to Indira Gandhi National Open University, (IGNOU) New Delhi is my own original work and has not been submitted earlier either to IGNOU or to any other institution for the fulfillment of the requirement for any course of study. I also declare that no chapter of this manuscript in whole or in part is lifted and incorporated in this report from any earlier work done by me or others.

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Acronyms

ASP.....	African Stockpile Program
CoC.....	Code of Conduct
CSR	Corporate Social Responsibility
EHPEA.....	Ethiopian Horticultural Producers and Exporters Association
EUREP.....	European Retail Organization
FAO.....	Food and Agriculture Organization
GAP	Good Agricultural Practice
ILO	International Labor Organization
IPM.....	Integrated Pest Management
MoA	Ministry of Agriculture
MPS.....	Milieu Project Sierteelt
SQ	Socially Qualified
MOLSA.....	Ministry of Labor and Social Affairs
MRLs.....	Minimum Residue Levels
PCBs.....	polychlorinated biphenyls
PIC	Prior Informed Consent
POPs.....	Persistent Organic Pollutants

PPDPersonal Protective Device
PPEPersonal Protective Equipment
UNEP.....United Nations Environmental Program
USEPA.....United States Environmental Protection Authority
WHOWorld Health Organization Program

ABSTRACT

This thesis attempts to explore in describing the safe working conditions exercised in pesticide handling, mixing, spraying and disposal mechanisms by the three floriculture farm workers located in Oromia region, Sebeta town administration. The study used a cross sectional descriptive design and primary data collection was made from 28 respondents between August 04-11, 2011 from Tal flowers Plc. Saron Rose Agro farm Plc. and Ethio-Passion Agro Plc. Interview schedule and observation were used as major data collection tools from the respondents and semi-structured questionnaires were also prepared to collect relevant information from different stakeholders including the farm managers of the three farms.

Different safe working practice indicators that ought to minimize the exposure of risk factors to pesticide danger in areas of: the proper use of personal protective equipment's, the availability of washing facilities, the re-entry interval to green house, working hour to provide adequate period of rest, knowledge of workers on pesticide management and handling, provision of trainings on pesticide management, medical health care and checkup provision to the workers, chemical waste disposal mechanisms were all descriptively analyzed and besides the self-reported health symptoms of the workers were also described.

The overall study result indicates, though there were efforts to minimize the exposure risk of workers from chemicals through the provision of different safe working conditions, there has to be a way and mechanism by way of controlling the different hazard exposure risk in particular the re-entry time interval management, medical health provision, provision of quality and standardized PPE and awareness raising of the workers under risk through different trainings.

CHAPTER ONE

1. INTRODUCTION

1.1. Back Ground and Justification of the Study

Several sub-Saharan Africa countries depend heavily on exporting agricultural products. Many of them often rely largely on a single Agricultural commodity (such as, coffee, cocoa, and cotton) for their merchandize export revenue (Mulu, 2009). In order to reduce the exposure to price volatility in the international markets, Ethiopia like any sub-Saharan African countries is also on the way to diversify the export base with a view to gaining new sources of income from the booming floriculture industry. The pace of growth of this industry is at a faster rate where the country stands second-largest producer of roses in Africa, with Kenya leading and sixth in the world after Holland, Colombia, Ecuador, Kenya and Israel within this short period of time (Mulugeta 2009, Girma 2007).

Floriculture which began in the late 1800's in England continues to advance since that period throughout the world. The present day floriculture industry is very dynamic and fast growing. The floriculture industry changes rapidly as a result of globalization. The global trade of floriculture products few years ago was confined within borders. Presently, the world has become a global village and all borders and world market expanded due to improved and efficient air transport (Abu, 2010).

Floriculture is the newest of Ethiopia's export industries, having grown very rapidly over the past five years to become the country's fourth largest export industry. The Ethiopian floriculture industry began in the 1980's when state-owned farms started exporting cut flowers to Europe. Up to 1991 there were only two active enterprises, Horticultural Development Enterprise and Upper Awash Agro-Industry Enterprise, both state-owned (John, 2010). These pioneer farms faced some difficulties because of insufficient experience

and knowledge about the business and moreover, governmental support was so minimal in supplying suitable land, financing and transporting of flowers to the market (Bedada, 2011).

According to the information generated from EHPEA web site (www.ehpea.com), currently, there are about more than 120 floriculture farms in the country, of which about 88 of them are members of the Ethiopian Horticultural producers and exporters association. The cluster of the majority member farms are closely located around Addis Ababa where 27 of them are in the western route (Holeta), 3 North Eastern route (Sendafa Chafe), 3 North western route (Sululta), 20 South Western route (Sebeta-Welkite) and 35 Eastern and Rift Valley Route (Debre- Zeit, Ziway, Awash, & Awasa).

The modern Ethiopian flower industry took off in 2005 when a number of foreign firms (mostly flower producers from Kenya) and local businesses began production, encouraged by the government's aggressive promotion of the industry (John, 2010). This rapid growth is due to different factors like suitable climatic and natural resources, high level of support by the government, favorable investment incentives, proximity to the global market, efficiency of the transport system and availability of abundant and cheap labor (Embassy of Japan in Ethiopia 2008, Mulugeta 2009).

Running a cut-flower project is a labor- and management-intensive process. Caring for the plants requires regular spraying, budding, pruning, watering and monitoring for disease and other problems (Robert, 2000). The flower industry growers resort to fertilizers to increase yields and improve quality, and to pesticides and fungicides to control spider mites, caterpillars, and other pests which invade the flower crop (Girma, 2007). The widespread use of agrochemicals in agriculture worldwide poses serious health risks to employers, workers and the general public. Sound management of chemicals and the

deployment of the full hierarchy of controls are needed to minimize occupational exposures (ILO, 2010).

Chemicals used in floriculture could cause damage through the exposures of absorption, inhalation, and ingestion. Absorption through the skin is the primary route of exposure for most widely used insecticides, fungicides, and herbicides. At normal exposure levels, skin damage or other symptoms may not be noticed, so absorption occurs without the worker's knowledge. Exposure can occur to the whole body during spraying. Exposure to the hands occurs in nearly all cases. Forearm, torso, and facial exposure are common during mixing, loading and hand spraying. Exposure to the torso is likely when workers carry chemicals on their backs, as with backpack sprayers. Exposure to the legs can occur through contact with recently treated foliage, as is common in greenhouses or in fields with minimal spacing between crop rows. Intensity of skin exposure will be determined by the frequency of contact or activity, and by the pesticide-active ingredient concentration in the applied material and whether equipment, including Personal Protective Equipment, is being used correctly. Inhalation is also an important route of exposure when working with volatile compounds or in enclosed spaces such as greenhouses. Gases and vapors are readily inhaled and absorbed in the respiratory tract. Small particles including water droplets can also be inhaled. Pesticides can volatilize from treated leaves and soil, posing a hazard to re-entry workers. Ingestion is another route of exposure for pesticides, and can be a significant contributor to dose if food or cigarettes are handled after contact with pesticides and prior to washing (ILO, 2010).

Pesticide residues may remain on plant surfaces and in surface soil for extended periods of time following application. Skin contact with these residues or inhalation of volatilized residues can result in exposures to workers who enter treated areas after application. Repeated contact with acutely toxic pesticides such as organophosphorus or carbamate insecticides on plants and soil during normal work activities can result in serious

intoxications requiring first aid or hospitalization. Early re-entry workers are likely to have contact with plants, soil and equipment surfaces with relatively high pesticide residues. Hence, early re-entry workers should wear protective equipment consistent with label requirements for pesticide handlers when entering treated areas. Early re-entry workers should receive the same training as other workers, and special training related to the hazards of contacting pesticide residues and the particular tasks they will be conducting in treated areas (ILO, 2010).

Waste management, chemical and water usage, occupational safety and employment conditions are coming under increasing scrutiny in markets. International labelling programmes encourage farmers to meet environmental and ethical guidelines for cut-flower production (Robert, 2000). Until recently, flowers have not been held to the same ecological or health standards that pertain to edible agricultural products where Minimum Residue Levels (MRLs) have been set. However, following the flower campaigns in Switzerland and Germany in the 1990's, environmental awareness and the ethical concerns of consumers in developed countries grew. Consumers recognized the potential health risks and human rights violation that workers in the flower industry are exposed to and on account of which, they along with trade unions, started putting pressure on the global floriculture industry to develop and conform to codes of conduct for workers' health and safety as well as compensation of workers' efforts (Mary, 2006).

The International Code of Conduct for the Production of Cut-flowers, which was presented by NGOs and trade unions in August 1998, aims to guarantee that flowers have been produced under socially and environmentally sustainable conditions. The Code which is based on the core ILO standards, the universal human rights standards, and basic human rights standards: states the minimum labor, human rights and environmental standards for the international cut-flower industry. The main areas covered by the Code include:

- Freedom of association and collective bargaining,
- Equality of treatment,
- Payment of living wages,
- **Acceptable working hours,**
- **Satisfactory health and safety procedures,**
- **Adequate control of the handling and disposal of pesticides and chemicals,**
- **Protection of the environment,**
- Security of employment and
- No use of child or forced labor.

On health and safety issues, the codes cover the requirement for employers to provide a safe and healthy working environment, employees to receive health and safety training; adequate medical services should be available for workers. Emphasis is put on having systems and procedures in place for working safely and at the same time aimed at controlling and reducing environmental degradation (Robert 2000, Nathalie et.al 2007).

In now days, the Ethiopian Horticultural producers and Exporters Association (EHPEA) Code of Practice was developed and introduced as a sector initiative to guide the farms in the implementation of sustainable production practices that give due regard to responsible use of resources, protection of the environment and the safety and welfare of employees. Standards were developed by farm and stakeholder representatives and give consideration to the Law of Ethiopia, good agricultural practices, protection of the environment and the major concerns of the international market and the local community (Glenn, 2011). The code of practice enables the Ethiopian floriculture sector to achieve the highest performance standards in order to obtain and safe guard its continuous improvement and sustainable development thereby improve competitive position. The association consists of three levels of excellence by which Ethiopian flower and ornamental plants can be rewarded with i.e. bronze, silver, and gold levels. For instance, compliance with the

requirements of the bronze level which is said to be the minimum level enable Ethiopian farmers to put a basic management system in place that ensures the planning, monitoring and evaluation of key sustainability issues. Compliance at the bronze level ensures that the farm documents and evaluates every month its performance on water consumption, pesticide use, fertilizer use, waste management, energy consumption, completion of an Environmental Impact Assessment as a pre-requisite for the allocation of land and investment license, safe pesticide use and storage, personnel related to pest control activities etc. (EHPEA, 2007).

Theoretically all agree to the management of environmental and to guard against the threatening of the human life in an environmentally friendly manner, so that natural resources viz. vegetation, water body, soil and as a whole the biodiversity and the human life could be well maintained. However, the practicability of this issue and concern is minimal and weak in many development oriented projects. In order for the proper use of the potential opportunities mentioned that the country possesses, there has to be an Environmental and human health protection for the sustainable use of resources without compromising the futures generation particularly from the alarming use of chemical pesticides.

This study was only focusing to the limited issues of the following main areas: status of training on health and safety issues, Proper usage of pesticides, Provision of protective gear to workers, provision of washing facilities, re-entry periods, and the assessment of the self-reported symptoms and perceived challenges to the workers due to the problems mentioned above.

1.2. Statement of the Problem

Flowers are emerging as a stable and very marketable international crop, earning up to five times per acre what fruit crops bring in (Girma, 2007). Flowers are luxurious products with high social value and rarely used for food. The demand for these luxurious products has increased in the international market in recent years (Mulugeta, 2009). This fast-growing intensive flower cultivating sector brings tax-income to the Ethiopian government and employment to the inhabitants. This strong positive economic aspect may overshadow the possible hazardous effects on the environment. Fears exist in Ethiopia about the possible hazardous effects on nature, employees, and residents in the vicinity (Amera & Aklilu, 2008; Hengsdijk & Jansen, 2006; Obole, 2008; Zenebe, 2006: cited in Willem, 2010). While development of floriculture in developing countries has opened labor and market opportunities, it has also threatened workers' health and safety and jeopardizes the environment as a whole. Thus, the rapid growth has its costs, i.e., environmental as well as human (Girma, 2007).

Due to the growth of the industry, environmental concerns are indeed growing. Environmentalists are raising many concerns in relation to the expansion of floriculture in Ethiopia in relation to the use of pesticides and chemical fertilizers, disposal of waste materials, and the protection of water bodies. The industry uses too much pesticides and chemical fertilizers which damage the environment (Mulugeta, 2009).

While benefits of pesticides to boost agricultural production are apparent, evidence of their negative impacts on the environment and public health have increased in the past few decades. Deaths and illness from pesticides remain high in many developing countries, mainly amongst those involved in application where proper precautions and protective gear are not available or used. Even worse is, little is known about the long term and

indirect effects of pesticide on rural and urban communities or on local and national food production systems (Dereje, 2007).

Florists who handle flower producing using pesticides and other toxic chemicals have been known to develop dermatitis on their hands. Floral workers, particularly the sprayers and handlers, suffer the brunt/burden of the pesticide use. Studies made in Latin America reported that in Ecuador, nearly 60% of flower workers surveyed showed poisoning symptoms, including headaches, dizziness, hand-trembling and blurred vision. In Costa Rica over 50% of respondents had at least one symptom of pesticide poisoning, such as headache, dizziness, nausea, diarrhea, skin eruptions or fainting. Two-thirds of Colombian flower workers suffer from headaches, nausea, impaired vision, rashes, and asthma as reported by Pesticide Action Network North America. This network noted that researchers from the Colombian National Institute of Health studied pregnant flower workers in 1990; they found a higher-than-average rate of miscarriages, premature births, and congenital malformations among their off springs (Girma 2007, David 2002:As cited in Malefia 2009, Restrepo 1990 and David 2002: as cited in Sisay 2007).Deaths and illness from pesticides remain high in many developing countries, mainly amongst those involved in application where proper precautions and protective gear are not available or used (Sisay, 2007).

To revert and minimize these hardships and challenges to the environment and human life, in Europe, environmental organizations have put pressure on producers to reduce the usage of these chemicals, and environmental regulations have been strengthened. Flower growers in Europe have had to examine their production processes in order to meet increasingly stringent regulations. Growers who export their flowers to Europe have also had to meet consumer demands. The industry now has several special labels by which to identify produce which has been produced in an environmentally and socially acceptable manner (Robert, 2000).

Hence, this study also focused to assess and analyze the major safety precautions provided to the workers of the floriculture in their work conditions on one hand and the challenging problems posed to them on the other, so that human risks were identified and corrective actions could also be taken in the future by decision makers.

1.3. Definitions of Important Terms

There are different important terms used in this study title which have to be clear enough for understandings of the subject matter under study.

Floriculture Activity -can be defined as cultivation/production and marketing of flowering and foliage plants, garden-bedding plants, cut flowers and greens produced both under conventional methods and controlled conditions mainly for export. Floriculture products mainly consist of cut flowers, pot plants, cut foliage, seeds bulbs, tubers, rooted cuttings and dried flowers or leaves.

<http://www.answers.com/topic/floriculture#ixzz1GiWqlbV1>

Safe Work Practices -are generally written methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes which should be developed as a result of completing a hazard assessment and should closely reflect the activities most common in the company's type or sector of construction. All safe work practices should be kept in a location central to the work being performed and readily available to the workforce.

http://www.csa.org/health_and_safety...practices/practices.htm

Though the term safe working practice in the above definition is broader in context, in this research it is limited to the avoidance /minimization of exposures of pesticide risks in the

floriculture industry particularly from those working on pesticide handling, mixing and spraying through the exercises of the different local, national, and international acceptable rules, regulations and code of practices by way of: strengthening of the knowledge of the workers on the handling and care of pesticides through different trainings, supply of standardized personal protective equipment's, provision of washing facilities, proper re-entry interval managements, safe and acceptable working hours and provision of medical services.

Pesticide- means any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, Agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport (FAO, 2002).

1.4. Objectives of the Study

Global concerns given to the environmental/human threat mitigation and control measures gets on increasing, so that different international conventions had also been ratified to secure the human life and the environment in which we are living. Hence, to address this sensitive issue of the concern of the floriculture challenges, this study was aimed to have a general objective of assessing the proper provision of major occupational safety working conditions and consequent encountering challenges posed due to floriculture pesticide utilization.

The specific objectives of the study were as follows:

1. To assess the safe handling and management practices of pesticides made by the workers of the floriculture industry;
2. To assess the major provisions of occupational safety facilities provided to the workers during the work conditions;
3. To assess and examine the encountering challenges posed to workers due to pesticides based on self-reported symptoms of workers in the floriculture industry;

1.5. Research Questions

In order the objective of the study to be achieved and understood, research questions of the following general nature were critically questioned and examined, by way of seeking answers to the following Research questions:

1. How were the knowledge, awareness and understanding of the workers in the handling and management of the pesticides in the floriculture industry?
2. What were the major occupational safety provisions made and available to the workers who were directly exposed in the handling and management of the pesticides in the floriculture industry?
3. What were the encountering challenges and problems posed to the workers in their working area due to pesticides in the floriculture?

1.6. Structure of the Document

This final report of the thesis was managed under five chapters. The first chapter included introductory issues which had tried to define background of the study, statement of the problem, objectives of the study, and research questions to be answered. The second chapter "Literature of Review" had tried to discuss the different subject studies, guidelines, regulations and etc. made available that were all ought to significantly contribute to the study conducted. The third chapter accommodates Research Methodologies followed in conducting the study which have included study design, sources of data, data collection

methods and the analysis of the data's collected. In the fourth and fifth chapters results and discussions found from the study **and** conclusions and recommendations were presented respectively.

CHAPTER TWO

2. REVIEW OF LITERATURE

2.1. Constitutional support, Frame Works & Code of Practices towards labor issues

There are several national and international frameworks, guidelines, and constitutional supports to help guarantee the rights and conditions that will ensure the well-being of employees. Among the several national and international frame works that have been designed to guarantee the labor rights and occupational health of employees are: the international labor standards, various human rights and labor standards decreed, significant international sector initiatives like EUREPGAP and MPS to safe guard the work conditions of workers and the likes among to be mentioned. Ethiopia had ratified 23 International Labor Organization conventions and most of them have been translated into national laws.

2.1.1. Major Ethiopian Legislations supporting Labor Issues

Ethiopia's Constitution contains a full chapter on fundamental rights and freedoms, which includes the right to equality without discrimination, the rights of women and children, the right to access to justice, and economic, social, and cultural rights. It also covers the "Rights of labor", including the rights of workers to form associations to improve their conditions of employment and economic well-being, the reasonable limitation of working hours, to remuneration for public holidays and to a healthy and safe working environment. The Labor Proclamation No. 377/2003 is the principal national legislation on labor issues. The Proclamation covers all establishments with one or more worker and addresses a wide range of issues such as employment relations and contracts, obligations of employers and workers, wages and working time, working conditions and occupational safety and health, occupational injuries, labor disputes and conciliation. The occupational safety and health directive, which was adopted in July 2008, was also a significant piece of recent legislation related to workers (ILO, 2009).

Other related policies and proclamations that highlight on the need for precaution measures with regard to hazardous chemicals and pesticides include the environmental policy of Ethiopia, the Proclamations on Environmental Impact Assessment (Proclamation 299/2002), and the Proclamation on Public Health (Proclamation 200/2000). The most relevant provisions with regard to pesticides and hazardous wastes in the Environmental Policy of Ethiopia are:

- To maintain an up-to-date register of toxic, hazardous and radioactive substances, and to make the information available on request;
- To establish a system for monitoring compliance with land, air and water pollution control standards and regulations, the handling and storage of hazardous and dangerous materials, mining operations, public and industrial hygiene, waste disposal, and water quality;
- To create by-law, an effective system of control, distribution, utilization and disposal after use or expiry of chemicals, biological organisms or fragments of organisms that could be hazardous but are required for use; and
- To foster better understanding of the dangerous effects of chemicals and organisms and their fragments through the provision of information in a form understandable to users, and provide or enforce the provision of information on the appropriate methods and technologies for the treatment and disposal of wastes (Dereje, 2007).

Floriculture industry in Ethiopia shows a growing trend in the past 5 years and its related labor force is increasing from time to time. Currently, the industry gives for more than 50,000 employment opportunities directly and 150,000 employees indirectly (Taylor, 2010: cited in Bedada, 2011). Labor issues are growing over through time to time in the industry (Friends of Ethiopia 2007). The issue of safe working conditions and work practices exercised under the floriculture farms which use different pesticides has also got a great attention and concern in the current human and environmental safeguarding's. However,

as cited in Willem (2010) study, the amount of pesticides used in Ethiopia is extremely hard to estimate (Van der Brink, 2006; Verhaegh, 1996). Many Ethiopian environmental activists still argue that environmental policies or standards, and labor regulations are not implemented by many companies within the industry as per the standards provided by the government. These concerns are related to labor rights (working conditions) and environmental issues like applying too much inorganic fertilizers, chemicals especially pesticides that can harm the workers and environment (Belwal, 2008).

Governments have the overall responsibility to regulate the availability, distribution, and use of pesticides in their countries and should ensure the allocation of adequate resources for this mandate. It seems, however, to be a problem for many governments to implement and reinforce the international treaties, conventions, and even their own national laws, be it due to lack of resources, contradicting interests or lack of conscience about the dangers of pesticide use (Erik, 2004). According to ILO (2009) effective labor inspection is vital for good governance and economic progress. It helps to improve working conditions and safety and health of workers, making decent work a reality at the enterprise level, and thus enhances employment and productivity, contributing to sustainable economic development.

2.1.2. Ethiopian Horticultural Producers and Exporters Association (EHPEA)

Code of Practice

According to Mulugeta (2009), the code defines all member flower farmers are required to show their commitment and meet the standard level and even those who are not members are also encouraged to comply. Upon verification from an independent international accredited verification body for proven compliance of the code, flower farms will be awarded EHPEA Code Accreditation. The structure of EHPEA Code of Practice takes consideration of production management, environmental, labor and human resources management; and community management for highest performance and maintenance of

the sustainable development under the sector. In addition, the code also includes sub-topics on the major concerns of:

i. Monitoring and Evaluation of the Use of Inputs

In this section the code sets water consumption, pesticide use, fertilizer use, waste disposal, and energy consumption. Instead of setting the amount to be used, this section only requires farmers to have a written procedure on these matters and a clear and traceable record of it.

ii. Environment Management

In this section the code sets requirements for fertilizer storage, pesticides transportation and storage, and waste disposal management. Pesticides are given a more emphasized standard which includes like the storage material type, equipped safety placement and contact with employees, following national and international transport regulations and usage of agro-chemical products registration. In addition, waste disposal management including more detailed procedures for toxic wastes are treated under this section of the code.

iii. Personnel Labor Human Resource Management

This section requires accident prevention and emergency procedures for its employees, particularly for those who handle chemical needs training on safe handling and the employment practice under the national labor proclamation.

Nathalie *et.al*, (2007), pointed that the codes of conduct have brought considerable improvements in occupational health and safety particularly with respect to the safe use of chemicals and the provision of protective clothing, toilets, washing facilities and drinking water.

2.1.3. Corporate Social Responsibility (CSR)

Corporate social responsibility (CSR) is a very broad concept which has almost unlimited potential to embrace important issues and to promote work on improvement of the three P's (people, planet and profit). Corporate social responsibility (CSR) is an approach that will

make a company more sustainable. It will ensure that you work in a balanced manner on economic, social, and environmental aspects within your company and interaction with interested parties outside your company. The Ethiopian Corporate social responsibility guideline developed by the Ministry of Agriculture (MoA) also specifically defines employment conditions in practice through the aspects of minimum age of workers, issue of salary, security of employment, freedom of organization, the position of pregnant women, working hours, safety at work through the use of personal protective devices/equipment's of high quality standards which is compulsory for workers who apply Agro-chemicals. With respect to the use of pesticides, the guideline defines international standards to offer as a good starting point for the responsible use of pesticides in an environmentally friendly manner.

2.1.4. Milieu Project Sierteelt (MPS)

As mentioned in Mulugeta (2009), 'Milieu Project Sierteelt' (MPS) or 'Floriculture Environmental Project' is the certification standard applied for floricultural products; established by the Dutch auctions. Currently it is an international organization active in more than 50 countries. MPS focuses on a series of certificates in the areas of quality assurance, the environment, and social aspects both for growers as well as traders and auctions. MPS gives growers a modular construction of certification of which the best known is environmental management system MPS-ABC with optional modules for social qualification MPS-SQ and MPS-GAP. There are different kinds of MPS Certificates/Labels:

i. MPS-ABC: "Registration and qualification" are environmental registration certificates. The qualifications MPS-A, B and C are awarded to MPS participants who record their usage of crop protection agents, fertilizers, energy and waste over four week periods.

ii. MPS Socially Qualified (SQ): "Healthy and Safe Working Practices" is a certificate that allows growers to demonstrate that their products are cultivated under good working

conditions. MPS-SQ includes requirements on health, safety and terms of employment, and respect for universal human rights, the codes of conduct of local representative organizations, and International Labor Organization (ILO) agreements. This certificate is becoming a pre-condition for entry into the market system in some nations now, and will likely be used by many in the future.

- iv. **MPS-GAP:“ Meeting the requirements of retail”** is a label with which you can anticipate the retail market demands. The MPS-GAP certification scheme is based on criteria formulated by the European retail organization EUREP for safe, sustainably-cultivated, high quality and traceable products. These criteria are expressed in Good Agricultural Practice (GAP). MPS-GAP is benchmarked with the EUREPGAP flowers and plants scheme.

2.1.5. Global Conventions

Major Global concerns about the challenges posed by chemicals management has resulted in numerous international agreements, protocols, conventions, and activities all geared towards minimizing the adverse effects of these chemicals on human health and the environment. Among the major ones according to PAN Nigeria (2007) are:

- i. **The Stockholm Convention on Persistent Organic Pollutants**

The Stockholm Convention establishes measures for the control and elimination of twelve Persistent Organic Pollutants (POPs) known as the dirty dozen: eight of them are pesticides (Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Mirex and Toxaphene), and the others include industrial products referred to as polychlorinated biphenyls or PCBs (insulating oils used primarily in the electrical industry) and substances, particularly Dioxins and Furans, that are unintentionally produced during combustion and the manufacture of chemical compounds containing primarily chlorine.

ii. The Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The Rotterdam Convention was adopted in 1998 and became legally binding in 2004. The prime objective of this convention is to protect human health and the environment from specified hazardous chemicals by promoting shared responsibility and cooperation among Parties in respect to their international trade and environmentally sound use.

iii. The International Code of Conduct on the Distribution and Use of Pesticides

The objectives of this code was to establish voluntary standards of conduct for all public and private entities engaged in or associated with the distribution and use of pesticides, particularly where there is inadequate or national legislation to regulate pesticides.

iv. The African Stockpile Programme (ASP)

It is a programme to give solution across the African continent, where an estimated 50,000 tons of obsolete stockpiles of having accumulated over the past 40 years, pose serious threats to the health of both rural and urban populations, especially the poorest of the poor, and contribute to land and degradation.

2.2. Pesticide Handling, Storage, and Disposal

The wide spread use of agrochemicals in agriculture worldwide poses serious health risks to employers, workers and the general public. Sound management of chemicals and the deployment of the full hierarchy of controls are needed to minimize occupational exposures, through proper storage, handling, and disposal systems.

The amount of pesticides used in Ethiopia is extremely hard to estimate (Van der Brink, 2006; Verhaegh, 1996: cited in Willem 2010). It is believed that the floriculture sector usually uses more pesticides than conventional ones. E.g. Data from Ethiopian Agricultural research Institute show that “18 of the 96 insecticides and nematicides imported by the

flower farms were not on the MPS-code list (the list of pesticides registered in Ethiopia) and similarly for 19 of the 105 fungicides.” (Ecologist 2009: cited in Bedada 2011). Sisay (2007) also mentioned that according to the Ministry of Agriculture of Ethiopia, Crop Protection Department, and Quarantine Office; Ethiopian floriculture industries use more than 300 chemicals as pesticides (insecticides, Fungicides and nematocides) and growth regulators. Maggy Marphy (2009) also pointed out that one hundred and twenty chemicals are used in Ethiopia’s floriculture industry, of which fifteen are classified as carcinogenic by the World Health Organization. These chemicals can cause lasting damage to brain cells and the immune system and have been known to bring about miscarriages in pregnant women’s.

As can be seen from these reports, the amount of pesticides used in the country without considering the obsolete once that had posed a serious health and economical problem for damping looks a lot that needs an attention of concern in the proper management and handling.

Douglas et.al (2010) warns about pesticides management as “When using any pesticide product, it is important to follow label directions. The label provides important instructions for obtaining the greatest benefit from the product and minimizing its environmental impact. Label directions include proper mixing and application, as well as pesticide storage and disposal. More pesticide spills happen while measuring and mixing pesticides than in any other phase of application. Besides, Proper disposal of pesticides and their containers is an important phase of pesticide management. An improperly disposed product can be hazardous to people and the environment”.

2.2.1. Pesticide Storage

Safety is the key element in pesticide storage. The safest approach to any pesticide problem is to limit the amounts and types of pesticides stored. It is also important that the storage facility (cabinet, room, building, etc.) can be locked and can limit access to only those individuals who are properly trained in the use of pesticides. An existing or proposed area should be carefully evaluated to determine its suitability for pesticide handling and storage. In particular the potential harm to human health and the environment due to spills, contaminated runoff, or fires should be assessed. If possible, the area should be located at least four hundred feet (preferably downhill or down gradient) from any public or private drinking water supplies and two hundred feet (preferably downhill or down gradient) from surface water. The site location should be accessible in the event of an emergency situation. The pesticide storage area should be located away from direct sunlight, freezing temperatures and extreme heat. Where practical, the mixing area should be located close to the storage facility to minimize the distance that chemicals are carried. Pesticides should be stored away from fertilizer, food, feed, potable water supplies, veterinary supplies, seeds and personal protective equipment to avoid contamination (Douglas et.al, 2010).

2.2.2. Pesticide Mixing

Mixing should be avoided in areas where a spill, a leak, or overflow could allow pesticides to get into water systems. The mixing and/or loading of pesticides should not occur within four hundred feet of any private or public drinking water supply or two hundred feet of surface water. No pesticide application equipment or mix tank should be filled directly from any source waters unless a back siphon prevention device is present. Mixing should not occur on gravel or other surfaces that allow spills to move quickly through the soil. Appropriate personal protective equipment (PPE) should be worn before opening a pesticide container. PPE should include chemical resistant gloves, shielded safety glasses or goggles should be worn. When pouring any pesticide from its container, container and pesticide should be kept below face level. A respirator will ensure protection against dusts

or vapors. If the pesticide user should splash or spill pesticides on his body, he should stop the operation, wash thoroughly with a mild liquid detergent and water, put on clean PPE and clean up the spill (Douglas et.al.,2010).

2.2.3. Washing and Rinsing Operations

Washing and rinsing of pesticide residues from application equipment, mixing equipment or other items used in storing, handling or transporting pesticides should occur on a pad. In order to reduce the need to frequently wash the application equipment and to avoid cross contamination, application equipment should be dedicated for use for certain types of pesticides. An improperly disposed product can be hazardous to people and the environment. Rinse liquid pesticide containers three times when emptied: fill the containers about one-third full and swish it around. Allow the containers to drain well between each rinse (30 or more seconds). The rinse material should be poured into a spray tank and applied to a registered site. Triple-rinsed containers are considered non-hazardous and should be disposed of according to recommendations (Douglas et.al, (2010). As cited in willem(2010) study, Morris (2006) reported the bad conditions under which the Ethiopian companies store their chemicals and criticizes the way the water used to clean spray equipment is treated.

2.2.4. Pesticides Containers Disposal

Unless empty pesticide containers are managed correctly, they are hazardous to both mankind and the environment. There is a danger that empty containers could be reused for storing food and water, which could result in pesticide poisonings. Containers abandoned in the environment can lead to pesticide pollution in soil and groundwater. The safety of pesticide users and the public is of paramount importance when designing a container management scheme (FAO, 2008).

2.3. Pesticides and the Challenges to Environment and Health

Human beings are at the center of concern for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

“Principle 1 of the Rio-declaration on Environment and development, 1992”

Every minute, 5 children in developing countries die from malaria or diarrhea. Every hour, 100 more children die as a result of exposure to indoor smoke from solid fuels. Every day, almost 3000 people in low- and middle-income countries die from road traffic injuries: in the poorest countries most of these deaths are among pedestrians. Every month, nearly 19 000 people in developing countries die from unintentional poisonings, often as a result of exposure to toxic chemicals and pesticides in their work or home environments. A dearth/deficiency of institutional resources, human capacity, and "enabling" legal frameworks impedes adequate assessment of the complex links between health, environment, poverty, and development options. Agricultural chemicals can be used constructively to increase yields, but they also can kill or maim farm workers and children, and infiltrate water sources, when chemical regulation and education is inadequate (WHO-UNEP 2005).

The symptoms of pesticide poisoning can range from a mild skin irritation to coma or even death. Different classes or families of chemicals cause different types of symptoms. Individuals also vary in their sensitivity to different levels of these chemicals. Some people may show no reaction to an exposure that may cause severe illness in others. Because of potential health concerns, pesticide users and handlers must recognize the common signs and symptoms of pesticide poisoning. The effects, or symptoms, of pesticide poisoning can be broadly defined as either topical or systemic. Topical effects generally develop at the site of pesticide contact and are a result of either the pesticide's irritant properties (either the active and/or inert ingredient) or an allergic response by the victim. Dermatitis, or inflammation of the skin, is accepted as the most commonly reported topical effect

associated with pesticide exposure. Symptoms of dermatitis range from reddening of the skin to rashes and/or blisters. Some individuals tend to cough, wheeze, or sneeze when exposed to pesticide sprays. Symptoms of a true allergic reaction range from reddening and itching of the eyes and skin to respiratory discomfort often resembling an asthmatic condition. Systemic effects are quite different from topical effects. They often occur away from the original point of contact as a result of the pesticide being absorbed into and distributed throughout the body. Systemic effects often include nausea, vomiting, fatigue, headache, and intestinal disorders. In advanced poisoning cases, the individual may experience changes in heart rate, difficulty breathing, convulsions, and coma, which could lead to death (FDRE, 2006).

As mentioned in a study conducted by Nathalie (2007), one of the characteristics of the flower industry is its use of agrochemicals, which can be dangerous to human health and the environment. Around Lake Naivasha in Kenya, there are serious concerns about the impact of chemical use on the water quality of the Lake and Environmentalists and fisher folk fear that the chemicals washed into the lake end up in the food chain. He also indicates, serious problems persist, with workers complaining about health problems related to pesticide use (coughs, sore chests, skin irritation, and dizziness). A study report by Rakesh Bewal and Meseret Chala (2008), On catalysts and barriers to cut flower export: A case study of Ethiopian floriculture industry cited use of toxic pesticides and fungicides has caused work-related health problems—including skin rashes, respiratory problems, eye problems, and miscarriages—affecting over half of Colombian flower workers. On a similar study in Colombia, according to the Victoria International Development Education Association, problems are due to working with freshly sprayed plants, working unprotected in the greenhouse while chemicals were sprayed or entering greenhouses before re-entry times have expired.

While pesticides have increased agricultural production and improved public health, evidences in the last few decades have shown that they could also be detrimental to human health and the ecosystem. The real impacts of pesticides are not easily mapped in most circumstances. The impacts of pesticides in Ethiopia are likely to be aggravated by the limited knowledge among users on toxicological and chemical properties of these substances and the fact that labels on pesticide containers were in a language which cannot be understood or missing. Little is known about the long term and indirect effects of pesticides on rural and urban communities as well as on local and national food production systems (Tadesse, 2008).

2.4. Strategies to Minimize the Hazards of Pesticides

The health hazards with handling, storing and applying pesticides depends on for example the classification of the chemical, the handling practices, and the amount of time exposed to the chemical. It is important to have strategies to avoid putting people at risk of exposure. Worker Protection Standard (WPS) which is a regulation aimed at reducing the risk of pesticide poisonings and injuries among agricultural workers and pesticide handlers containing requirements for pesticide safety training, notification of pesticide applications, use of personal protective equipment, restricted entry intervals following pesticide application, decontamination supplies, and emergency medical assistance and etc. has to be in place to minimize the risks of pesticide exposure (Malin, 2004).

There are certain techniques, substances, and equipment's that minimize the risks mentioned due to pesticides. Among others are:

2.4.1. Knowledge, Certification and Training

In order to protect the health and safety of workers and handlers, employers are responsible for training them in the safe use of pesticides. Certification and training regulations require pesticide applicators to meet certain training and/or testing

requirements before they use or supervise the use of pesticides labeled "restricted use." In addition, the pesticide label indicates how a pesticide may be used and what protective clothing or other measures may be necessary for maintaining workers safety (Douglas et.al, 2010).

In spite of these guide lines and protective knowledge based training to be provided to workers who work on pesticides, studies indicate the low level of attention given to train workers. Among which, (Megara, 1999: cited in Misiganu, 2007) indicates that workers rarely know the health hazards of the chemicals they are handling. Another study of ILO working Paper from the year 2000 on the Tanzanian cut flower industry reports on low labor standards, identifying illnesses associated with the use of chemicals, long working hours, unpaid overtime, casual work and low wages as the main problems, and basically most field workers in the flower farms are uninformed about the harm of the chemicals (Semboja et al. 2000: cited in Bedada, 2011).

Rakesh Bewal and Meseret Chala (2008), on catalysts and barriers to cut flower export: A case study of Ethiopian floriculture industry cited, an ILO survey found that only 22% of Ecuadorian flower companies trained their workers in the use of chemicals. A similar study conducted in Tanzanian found that flower workers were unaware of inherent dangers, ignorant of the identity and hazards of the chemicals used, and had no access to the standard material safety data sheets. Workers did not have first aid information on dealing with splashes and spillages. A report on Fact sheets pesticide news 82-2008, in Colombia confirmed a similar situation where workers are often not given appropriate PPE or training on how to use protective gear that is provided; nor are they educated about the types of pesticides being used, how to handle the pesticides properly, and potential risks.

2.4.2. Personal Protective Device (PPD)

PPD is the equipment needed to prevent poisoning in pesticide application. It includes boots, overalls, trousers (that flow over the boots), oro-nasal masks, gloves, and goggles. The protective equipment should be kept in good condition and cleaned after it has been used; otherwise contaminated protective devices can instead of protecting put the user under exposure (Malin, 2004). The MPS Socially Qualified Certificate demands that workers wear protective clothing at all times when dealing with pesticides and fertilizers with high toxic content but reports suggest this guideline is rarely followed (Maggy, 2009).

According to Bedada (2011), negligence of employee's safety, health and their right is an issue, where workers are exposed to hazardous pesticides without wearing any kind of protecting materials. A study made by (David 2002: as cited in Misganu, 2007) showsthe conditions in the greenhouses exacerbate the poisoning effects of pesticides. Companies usually provide equipment to protect fumigation workers. Masks, boots, gloves, waterproof trousers, and jackets are rotated around the sprayers usually men who complain that the equipment is often old and damaged, allowing the pesticides to seep in.

2.4.3. Washing Facilities

There should be washing facilities available with water and soap or something similar. If pesticides splash on a person's skin, they should immediately be washed away. Before breaks, meals and such, it is important to wash one's hands and take off one's protective clothes and foodstuff and drinks should be kept in a safe way in the field. However, in a study made by (Megara, 1999: as cited in Misganu, 2007) Showers are rarely provided for workers, who end up washing their work clothes.

2.4.4. Re-Entry Intervals

Pesticide residues may remain on plant surfaces and in surface soil for extended periods of time following application. Skin contact with these residues or inhalation of volatilized

residues can result in exposures to workers who enter treated areas after application. Appropriate restricted entry intervals (i.e. time after application when workers are prohibited from entering treated areas) should be established for all pesticide/crop combinations based on risk assessments conducted by national authorities or based on criteria specified in national or international standards. Pesticide-treated areas should be identified for the duration of the restricted entry interval with hazard signs or symbols that can be easily understood by all persons, including workers and bystanders. Information regarding applications, pesticide toxicity and restricted entry intervals should be posted in the workplace or otherwise made available to workers. However, certain agricultural tasks require that workers enter treated areas before the restricted entry interval had expired. Early re-entry workers are likely to have contact with plants; soil and equipment surfaces with relatively high pesticide residues. Early re-entry workers should wear protective equipment consistent with label requirements for pesticide handlers when entering treated areas (ILO, 2010).

The USEPA recommends that workers remain outside the greenhouses for between 24 and 48 hours after fumigation. Nevertheless, workers in Madrid said often they would return after 20 minutes, and resume their jobs with the pesticide-drenched flowers, while the acrid smell of chemicals hung in the air. Sometimes other workers would not leave the greenhouse at all when fumigators were spraying (Megara, 1999: cited in Misiganu, 2007). A similar study conducted in Colombia as reported on Fact sheets pesticide news 82-2008, shows Greenhouse workers would dust and spray pesticides in these enclosed spaces. Interviews indicate that it is common to expect other workers to remain at work during spraying, or return before a safe re-entry period. On the same study report in Colombia confirmed a survey of 84 farms between 2000 and 2002, found only 16.7% of its members respected pesticide manufacturer recommendations to prevent workers for 24 hours from re-entering greenhouses sprayed with the most toxic of pesticides. Another

study made by Robert Davis (2000) noted on the issue floriculture of industry in Zimbabwe that, Re-entry periods — the minimum amount of time that must lapse between spraying chemicals and workers entering the greenhouse — was an issue that Zimbabwean producers must consider. The minimum guidelines lay down by labelling programmes included re-entry periods of between 12 and 36 hours depending on the toxicity of the chemicals used. This was completely impractical, and many growers refused to comply with such restrictive regulations. Currently minimum re-entry periods vary from 2 hours to 24 hours, and growers have become more tolerant of these guidelines.

2.4.5. Working Hours

Long hours of work, particularly intense manual labor, contribute to workers' fatigue, and lead to accidents on the job. Daily and weekly working hours should be arranged so as to provide adequate periods of rest which, as prescribed by national laws and regulations, or approved by labor inspectorates or collective agreements, where applicable, should include: (a) short breaks during working hours, especially when the work is strenuous, dangerous or monotonous, to enable workers to recover their vigilance and physical fitness; (b) sufficient breaks for meals; (c) daily or nightly rest of not less than eight hours within a 24-hour period; and (d) weekly rest of at least a full calendar day (ILO, 2010).

2.4.6. Medical and Health Surveillance of Workers

Medical surveillance includes, where appropriate, pre-assignment and periodical medical examinations. It also includes, where appropriate, medical examinations following an incident, when workers report symptoms of poisoning, upon resumption of work after a prolonged absence for health reasons, and upon and after termination of work involving exposure to chemicals. Health surveillance should also include, where appropriate, simple techniques for the early detection of effects on health. These could include examination and questioning about health complaints. Those who regularly work with organophosphates and carbamates should consider having periodic cholinesterase tests. The blood

cholinesterase test measures the effect of exposure to organophosphate and carbamate insecticides (ILO, 2010).

According to Maggie Murphy's study of 2009, in Sher Ethiopia farm around Ziway, the town's first hospital, opened in December 2007 was also built by the flower farm to ensure its workers had adequate and affordable access to healthcare. It has since opened its doors to the wider community too. The farm is on its way to acquiring the internationally respected Socially Qualified Certificate from the Dutch organization, MPS, which acts as proof that employees enjoy good working conditions and that the farms fulfill specific criteria on health, safety, and terms of employment, based on International Labor Organization requirements. Maggie also had indicated on the same study, the work condition of Ethiopian floriculture regarding employees' health inspections, shows some studied farms indicated not having their own clinic, but that they nevertheless ensured that a regular medical checkup for its employees in general and those working directly in the farm compound in particular be done in intervals of six months at the nearest hospital. Other farms revealed that no regular health check-up for workers was made, but that they offered the possibility to seek free medical checkup if necessary.

2.4.7. Promotion of Integrated Pest Management (IPM)

A group of net works, environmental justice foundations, and others promote the total elimination of pesticide and promoting ecological methods of farming. While on the other extreme pesticide producers' organizations, governments, salesmen and farmers claiming that the world's need for food cannot be met without the use of pesticides, advocating for a "safe use concept" instead of banning pesticides. A more balanced viewpoint is presented by FAO and others promoting Integrated Pest Management (IPM) methods (Erik, 2004). Integrated Pest Management is the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that

are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms (FAO, 2008).

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. The Study Area and General Farm Conditions

The area where the study took place was in Oromia special zone surrounding Finfinne in Sebeta town 24 km south west of Addis Ababa on the route way to Jimma. Sebeta town was very well known to its concentration of industrial projects and the floriculture farms. There are 12 floriculture farms in the town in two cluster village areas of Dima and Furi, of which this study was conducted on three selected floriculture farms.

The study targeted a group of three farms which were selected at random from the lists of the 12 floriculture farms in Sebeta town Administration: Namely Tal flowers Plc., Ethio-passion Agro Plc., and Saron Rose Agro farm plc., where the former two are owned by foreigners and the later one owned by Ethiopian citizen. Tal flower produces flowers of Gypsophila, Dubium, and Renanculus while the remaining other two farms produce only roses. All the three farms were established in 2005 and during the time of this data collection, the total land allotted for the three farms were 20 ha each for both Saron and Tal flowers and 15 ha for Ethio-passion. From the farm land possessed by the farm owners land under flower production were 15.2 ha for Tal flowers, 7.5 ha for Saron rose and 10 ha for Ethio-passion Agro Plc. The three farms had contributed in the significant employment generation of the skilled and unskilled labor force of 814 employees which were recruited on contract and Permanent bases. The majorities are female workers accounting to 78.6% and the remaining 21.4% were male workers. However, the people engaged in this study research were all males.

Table 1: General information of the farms

Name of the farms	Year of establishment	Owners	Total land possessed	Land under flower farm	Total No. of employee by sex		Total employees by recruitment status			
					M	F	Permanent		Contract	
							M	F	M	F
Tal lowers Plc.	2005	Foreigner	20	15.2	82	272	37	19	45	253
Ethio-passion Agro plc.	2005	Foreigner	15	10	34	245	31	224	3	21
Saron rose Agro farm plc.	2005	Ethiopian	20	7.5	58	123	31	12	27	111
Total			55	32.7	174	640	99	255	75	385

All the three farms were members of the Ethiopian Horticulture Producers and Exporters Association (EHPEA) and have obtained an accreditation of bronze level code of practice.

3.2. Study Design

A cross sectional descriptive design was used to assess the working conditions of floriculture farm workers and to examine the subsequent challenges and risks faced due to pesticide application by floriculture farm workers.

3.3. Sampling Techniques

The selection of the floriculture farms were done primarily through random sampling from the lists of the 12 available floriculture farms in Sebeta town. The department/ section of the study was purposely selected in order to identify those working on pesticide handling and management. Hence, the sampling frame constitutes employees who have direct contact with pesticides for at least six months. After the list of the workers was obtained from the registry of the farms, a sample was drawn representing the population, based upon Krejcie and Morgan (1970) sample size determination. Hence, 28 respondents were selected from the total of 30 workers who were responsible to handle, manage and spray pesticides in the three farms. This sampling technique was selected in order to get the maximum number of respondents from the limited total population, due to the fact that the

nature of work of pesticide management and handling requires a relatively smaller population as compared to other sections of the floriculture farms.

3.4. Research Instruments for Data Collection

Different data gathering instruments were employed to collect the data to be used in the study. Interview schedule's containing both open and close ended questions were deployed to address the target respondents of the floriculture farms and to observe certain real-life situations of farm workers activities/exercises. Interview guides using semi-structured questionnaires were used to collect data from different key stakeholders of governmental institutions in Sebeta town land and environmental office, Sebeta town labor and social affair office, Sebeta-Hawas woreda Agricultural office, Sebeta Hawas-woreda land and environmental protection office, Bureau of land administration and environmental authority of Oromia region and the three floriculture organizations.

The entire data gathering processes were undertaken by the researcher himself as different qualitative and observational study needs care and close attention and critical examination.

3.5. Nature of Data's Collected

The data's used in this research were both qualitative and quantitative in nature. Both categories of primary and secondary data were collected. The primary data were first hand information collected from individual respondent and the secondary data were collected from secondary sources, such as books, published and unpublished documents, internet access, and other official reports of relevant topics and the likes.

The major content of the primary data collected from respondents consisted of personal information, pesticide usage, work practices, work conditions, risk factors associated with pesticide exposures and the different self- reported health challenges encountering the workers.

3.6. Data Processing and Analysis

Processing and analysis of data involves editing the collected data to ensure that the data are orderly arranged. The coding was done first through preparing a code book and later entering the coded data's using a computer program, SPSS version 17.0. Statistical tools like ratios, ranges, percentages, and arithmetic means were employed in condensing the data for interpretation and descriptive results were expressed as frequencies and percentages.

The analysis of the processed data was also done based on the interview schedule framed as: personal and demographic data analysis, Knowledge about pesticides, risk of pesticide exposure, duration of spraying pesticides, re-entry interval, , safety practices in relation to pesticide knowledge, self-reported health effect symptoms among the farm workers, time and Frequency of Pesticides spraying, trainings given on pesticides and the environmental safeguard mechanisms of the farms on residue of chemicals and containers disposal.

3.7. Ethical Considerations

The selected farms were communicated to cooperate in the study by a formal supportive letter from Oromia Regional Government President's Office and Bureau of Land Administration and Environmental Protection of the region. Respondents of the farm workers were also contacted through the manager of the floriculture farm organizations. The study participants were also asked for verbal consent. Data were collected after their full consent with agreements of confidentiality.

CHAPTER FOUR

1. Socio-Demographic characteristics of the study population

Age and sex characterization

The sample population comprises 14 respondents from Ethio-passion flower farm, and seven respondents each from the other two Saron and Tal flower farms. The respondents were all male with different age category, a minimum of 18 years and a maximum of 46 years (Table 2).

Table 2: Distribution of the respondents by age

Age group	Frequency	Percent (%)
15-19	5	17.9
20-29	16	57.1
30-39	3	10.7
40-49	4	14.3
Total	28	100

The mean age of the participants was 26.75 years and the median 22.5 years indicating that the work force was young and active.

Work Experience and Labor Division of the respondents

The respondents were engaged in different activities where 4 respondents (17.8%) were engaged in mixing pesticides, 3 (10.7%) on store management, 8(28.57%) engaged in both spraying and mixing and the majority 13(46.42%) constituting workers engaged in spraying of chemicals on plants. During off time respondents were engaged in water channel maintenance, digging of farm land, maintenance of poly-carbonate sheet of the green house, and the likes.

The period of exposure of the respondents ranged from less than a year (six months) to 5 years in the farms studied. However, there were workers who had worked in other floriculture farms for certain number of years before joining these farms. These work force had a relatively short period of experience in the studied floriculture farms where 13 (46.4%) had stayed within the farms for less than a year, 7(25%) for 1-2 years, 5(17.9%) for about 2-3 years and the remaining 3(10.7%) stayed for a period of more than 3 years.

Education

Results related to the educational level of the respondents showed that a quartile (25%) couldn't read and write (were illiterate). Those who completed primary and secondary schools were equal four each in number, level of education representing 14.3% of the total respondents. The majority of the respondents 13 (46.4%) had attained high school level education (Table 3).

Table 3: Educational status of the respondents

Educational status	Frequency	Percent (%)
Couldn't read and write	7	25.0
Primary (1-4 class)	4	14.3
Secondary (5-8 class)	4	14.3
High school (9-12)	13	46.4
Total	28	100

2. Major chemicals and spraying equipments used by the three farms

The lists of the different major chemicals used in the three farms studied as per the report of the sprayers, store handlers, mixers and the farm managers were listed as below.

Table 4: Lists of major chemicals used in the farms

No	Tal Flowers Plc.	Ethio-Passion Agro Plc.	Saron Rose Agro-farm Plc.
1	Abamactin	Acet	Dimethomorph +Mancozeb
2	Blud buss/ BB-5	Adona	Aminogold
3	Lambda cyhalothrin	Agri-bat	Profenofos "Q"
4	Dicholofos	Aligator	Imidacloprid
5	Bisenazate	Aminogold	Peduconazole
6	Acetamidird	Abamactin	Dodemorph acetate
7	Polyxin Al	Samoxate/Cymoxamin	Buprimate
8	Polyxin B	Sulphur	Mancozeb
9	Lusenuron	Dodemorph acetate	Senarimol
10	Mancozeb	Mancozeb	Sulphur
11	Sulphur	Preosenofos +cytermethrin	
12		Oxymeprin	
13		Senhexamid	

In addition to the above mentioned chemicals, Ethio-passion flower frequently uses milk way (*locally named as Dhama in Afan Oromo and Aggat in Amaharic*) the end result of a processed milk to control powdery mildew protection which was thought not to have human and environmental threatening problems.

The spraying of pesticides were done with the use of spraying hose fitted at the tip with plastic connected to the central mixing room through a pipe line up to the green house. In this system of spraying respondents express that there was accidental bursting of the tube when they spray. The researcher had seen this happen on one occasion during the data collection when the worker's face was over flooded by chemicals and immediately trying to wash with water. Sometimes, the farms also used a knapsack spraying for spot application when certain diseases were observed on spots of the flower farms.

3. Risks of pesticide exposure

Knowledge of Chemical name listing

The respondents were asked to list the five top chemicals to assess their level of knowledge in differentiating the different chemicals used in the farms. The result showed that 16 respondents (57.1%) didn't know the names of the major pesticides they were spraying. Two respondents (7.1%) could have listed (named) at least 2-4 names of the major five chemicals they frequently spray, while the remaining 10 (35.7%) could have listed and named correctly the chemicals they were using for spraying.

Table 5-respondents knowledge of chemical naming

Chemical naming category	Frequency	Percent
Didn't know name of chemicals sprayed	16	57.1
Listed 2-4 chemicals name	2	7.1
Listed five top chemicals	10	35.7
Total	28	100

Knowledge on the effects of chemicals on health and environment

The perception of respondents' knowledge on the effect of pesticides on human health and on the environment showed that 12 respondents (42.9%) expressed as they know as chemicals either have a harmful effect or negative consequence to both the human health and the environment. About 7 respondents (25%) only knows the health effects of pesticides and the remaining 9 (32.1%) responded as they don't have any knowledge of the pesticides they spray for their environmental and public human health implications and/or problems, they simply spray or mix as per the instruction by their immediate supervisors (Table 6). This study result was similar to the one made by (Megara, 1999: cited in Misganu, 2007) which indicated that workers rarely know the health hazards of the chemicals they are handling.

Table 6: Respondents knowledge of the effects of chemicals on health and environment

Respondents knowledge category	Frequency	Percent
Knows effects of chemicals both on health and environment	12	42.9
Knows only the health effect of chemicals	7	25.0
Didn't know any health and environmental effect of chemicals	9	32.1
Total	28	100

Trainings and awareness given on chemicals

Most pesticides by their very nature are harmful to human health and the environment unless they are properly handled through knowledge based management which could be developed through training and awareness development to the handlers. A large portion of the respondents 19 (67.9 %) have responded that they had received training/have had information about pesticides either from the organization and/or the company that sells the chemicals and/or the EHPEA. The contents of the trainings provided were broad on the subject issues of re-entry period, safety issues, the disposal of pesticides, and other procedures. While the remaining 9 (32.1%) respondents didn't take any training on chemicals and were working simply based on what they have seen from their supervisors and/or colleagues with whom they work. Hence, still the workers who have not taken training on use of chemicals is nearly one third of the total work force.

This study result, even though the percentage figure differs was similar to that of an ILO survey as cited in Rakesh Bewal and Meseret Chala (2008), which reported that only 22% of Ecuadorian flower companies trained their workers in the use of chemicals. Further, the study was also similar with a report on Fact sheets pesticide news 82 (2008) in Colombia, where workers are often not given appropriate PPE or training on how to use protective gear that is provided; nor are they educated about the types of pesticides being used, how to handle the pesticides properly, and the potential risks. It is also similar with the study of ILO Working Paper conducted from the year 2000 on the Tanzanian cut flower industry

which showed that most field workers in the flower farms are uninformed about the danger of the chemicals (Semboja et al. 2000: cited in Bedada, 2011).

Table 7: Provision of training for respondents on chemicals

Respondents category	Frequency	Percent
Those who received trainings on chemicals	19	67.9
Those who didn't received trainings on chemicals	9	32.1
Total	28	100

Time and duration of pesticide application

The time of pesticide application by the three farms was more or less similar where workers get to the greenhouse and wear their protective clothing's at nearly around 6:30-7:00 am in the morning and start to spray around 7:00 am. The mean total spraying time was 7.6 hours, the maximum being 9 hours and the minimum 6 hours. All workers work for 6 days a week. What is typically different and important was that 14 respondents (50%) doing a spraying work on a continuous spraying time from morning to late afternoon without any break or rest even for lunch and the remaining 50% have a rest for lunch time. This study result was different from the guideline of an ILO (2010) for better management of the workers which indicates daily and weekly working hours should be arranged so as to provide adequate periods of rest for short breaks during working hours, especially when the work is strenuous, dangerous or monotonous, to enable workers to recover their vigilance and physical fitness; and get sufficient breaks for serving of food.

As per the response of the respondents, there was a provision of milk to workers or payment of cash to the spraying team by farms as a substitute for the milk, though there was a big difference in amount of provision. In one of the farm, workers were supplied with about 5 liters of milk under the condition that they have all complete or spray 3000

liters of pesticides per day. In the one other farm a corresponding payment is only 3 birr/day/individual as compensation for milk.

Re-entry interval

Re-entry interval time is one of the most critical concerns for minimizing the exposure of either spraying workers of spray or others who pick flowers after spray application. The time for re-entry into the greenhouse is mostly determined by the atmospheric condition, whether the foliage part of the flower dries up within short period or not, and the level of hazards of the chemicals used. According to the respondents, chemicals of red and yellow labeled relatively takes long time for re-entry and the remaining green and blue labeled once take a relatively shorter period of re-entry time. According to the farm managers and supervisors, the current re-entry period is determined on the basis of recommendations of the companies/manufacturer’s of the pesticides and the Ethiopian code of conduct practice guideline where the minimum time lapse being 4 hours for the green labeled and maximum of 12 hours for more toxic ones. However, workers who spray pesticides responded to the theoretical re-entry time interval as per the training they took and what they have heard from others which was about 12 hours for red labelled pesticides, around 4 hours for yellow and 1-2 hour for green and blue labelled pesticides. Here also one can see the gap in the knowledge of workers and the understanding of the managers (Table 8).

Table 8: Response of Re-entry to green house after application

Response	Frequency	Percent (%)	Average re-entry(Minutes)	
			Maximum	Minimum
Re-entry after a certain limited time	18	64.2	240*	10*
Immediate re-entry	7	25.0	Immediately after spraying	
Didn't know time of re-entry	2	7.2	They didn't know the time	
No defined time of re-entry	1	3.6	No defined time of re-entry	

The result of this study is more or less similar with the study made by Robert Davis (2000), who noted that in the floriculture industries in Zimbabwe, in most cases guidelines and rules are not respected. The minimum guidelines laid down by labelling programmes included in the re-entry periods of between 12 and 36 hours, depending on the toxicity of the chemicals used. This was completely impractical, and many growers refused to comply with such restrictive regulations. According to Robert, currently minimum re-entry periods vary from 2 hours to 24 hours, and growers have become more tolerant of these guidelines.

A similar study made on workers in Madrid showed that, they would return after 20 minutes, and resumes their jobs with the pesticide-drenched flowers, while the smell of chemicals hung in the air. Sometimes other workers would not leave the greenhouse at all when fumigators were spraying (Megara, 1999: cited in Misiganu, 2007). Another study conducted in Colombia, as reported on Fact sheets pesticide news 82 (2008), shows Greenhouse workers would dust and spray pesticides in these enclosed spaces. Interviews indicate that it is common to expect other workers to remain at work during spraying, or return before a safe re-entry period. On the same study report in Colombia confirmed a survey of 84 farms between 2000 and 2002, found only 16.7% of its members respected pesticide manufacturer recommendations to prevent workers for 24 hours from re-entering greenhouses sprayed with most toxic pesticides.

Washing Facilities and Clothing

In the three floriculture farms, all respondents replied that they have access to and washing facilities showers for both male and female worker in the farms, though limited in number. After an application of pesticides, 18(64.3%) workers reported that they wash/bath at the end of every day and the remaining 10(35.7%) take shower as convenient to them within 2-3 days interval. The underlying problem and gap for not taking shower regularly was

due not to miss the transportation service at the end of the day. However, they at least wash their hands and face at the end of every spraying.

With regard to access and availability of clothes for spraying, though all workers were provided with spraying clothing, 46.4% responded that they were issued with one extra reserve cloth for spraying by the farms and the remaining majority 53.6% was only provided with only one special cloth required for spraying without any reserve.

Safety Practices and the Provision of PPEs

Floriculture business requires an intensive use of chemicals and pesticides and it is for this reason that occupational safety in cut-flower projects has become a major concern. Handling of pesticide and application of diluted formulation requires the use of appropriate personal protection equipment (PPE) as a precaution against pesticide exposure, so that free and appropriate protective clothing provision to employees was a critical area to be provided by the floriculture farms. In the three farms studied, the most commonly used protective clothing's during pesticide handling, mixing and spraying were goggles, rubber boots, masks, and hand gloves.

Table 9: Responses of workers on PPE provision (N=28)

PPE provided	Frequency	Percent (%)
Goggle	20	71.4
Rubber boots	28	100.0
Masks	28	100.0
Hand gloves	21	75.0

As can be seen from the above table, the provision of PPE by the three farms was not adequate in the two items i.e. goggles and hand gloves. Though there seems to be a relatively good trend in the provision of other safety materials, the quality of the materials

was found to be poor, where most of them easily torn and damaged. Out of the provided PPE, 35% of the goggles, 7.1% of the rubber boots, 23.6% of gloves and 7.1% of the masks were damaged, and probably expose workers to risk of chemicals.

A similar study made by David (2002) as cited in Misganu (2007) shows the conditions in the greenhouses exacerbate the poisoning effects of pesticides. Companies usually provide equipment to protect fumigation workers. Masks, boots, gloves, waterproof trousers, and jackets are rotated around the workers usually men, who complain that the equipment is often old and damaged, allowing pesticides to seep in.

Medical Health Provision and health checkups

When the employees were asked to comment of their overall general health medical provisions, the majority of the respondents (67.9%) indicated that they had not experienced and did not have the provision of medical services by their employers and only the remaining (32.1%) responded that they got the medical services.

What was surprising on this result was that, there is not a clearly defined reason for the provision of medical services to few workers and not to others. With regards to the checkup for cholinesterase level of the workers, it was found that 18 (64.3%) had been checked and the remaining 10 (35.7%) were not checked for cholinesterase level. On the bases of workers, though the checkup for cholinesterase had to be conducted every six months, out of the total 18 respondents who had been checked, 12 respondents (66.7%) had been checked only for one time, 5 respondents (27.8%) had been checked for two times and only one respondent (5.6%) had been checked for three times. Thus, one can see the gaps in the general medical provision and the checkup for cholinesterase that had to get the attention of regulatory bodies.

The study result was similar with that of Maggie Murphy's (2009) report, which indicated that the working condition of Ethiopian floriculture, regarding employees' health inspections, shows that some farms were not having their own clinic, but that they nevertheless ensured that a regular medical checkup for its employees in general and those working directly in the farm compound in particular be done at intervals of six months at the nearest hospital. Other farms revealed that no regular health check-up for workers was made. However, positive trends and work conditions were observed by the largest floriculture farm of the country, at Sher Ethiopia Farm around Ziway. The town's first hospital was opened in December 2007, which was built by the flower farm to ensure its workers had adequate and affordable access to healthcare.

4. Self-reported health symptoms among farm workers

A great number of informants (53.6%) reported that they have had accidental incidence due to pesticide exposure. The remaining respondents (46.4%) stated that they didn't have so far accident since they started to working with pesticides. Out of the total case accidents 11 (73.3%) respondents had encountered during spraying, 3 respondents (20%) during mixing and the remaining 1 respondent (6.7%) was during store management.

There were also self-reported health symptoms and discomfort feelings by 20 (71.4%) respondents since they started working with pesticides in the floriculture industry, and the remaining 8 (28.6%) didn't have any discomfort feeling so far (Table 10).

Table 10: Perceived health symptoms of the respondents

Symptom's	Respondents
Abdominal cramp	11
Dizziness	11
Headache	9
Skin irritation	8
Blurred vision	8
Eye irritation	7
Vomiting	4
Loss of Appetite	1
Redness of eye	1
Coughing	1

Note: The number of symptom's reported and the total number of respondent's didn't much equally due to the fact that there were respondents who may have had the feeling of more than one symptom's at a time.

The most frequent self-reported symptoms complaints associated with pesticide use were Abdominal cramp, dizziness, headache, skin irritation and blurred vision, eye irritation, vomiting, loss of appetite, redness of eye and coughing all were also reported, though not commonly.

A study made by Nathalie *et.al*, (2007) also indicates similar results; serious problems persist, with workers complaining about health problems related to pesticide use coughs, sore chests, skin irritation, and dizziness. Similarly, as cited on the study report by Rakesh Bewal and Meseret Chala (2008), also confirms the use of toxic pesticides and fungicides has caused work-related health problems—including skin rashes, respiratory problems, eye problems, and miscarriages—affecting over half of Colombian flower workers.

5. Chemical Disposal Practices

In the study of assessing the disposal practices of the containers and residuals of chemicals after rinsing by the three farms, it was revealed that farms utilize soak-pits sized about 4m³ where a 40cm layer from the base was filled with charcoal/coal, and then sand gravel course was layered and sealed with cement. Though the rinsing mechanism for the central systems was using the soak pit systems, the rinsing of the chemical residues from the green house after each of the spraying activities didn't seem properly treated in the three farms. In practical visual observation, the researcher had seen during the data collection period when workers from the green house directly rinse at the open field.

All the three farm managers had stated that they conduct water or soil tests on their farms for detecting residues on yearly basis. However, as the interview response of one of the farm managers, the intention of the test was for the sake to estimate the nutrient level of the soil for flower production alone than any consideration of the effects to the environmental implications. All three farms didn't have an environmental impact assessment approved by government institutions except the feasibility study conducted at the beginning during farm establishment.

The absence of a central site for disposal or incinerator for expired products and to discard on regular bases in order to bring an environmentally friendly manner management system was a problem complained by the farm managers which seeks institutional government body responsible to address this challenge. All three farms under this study store their pesticides in a separate place specified for pesticide storage. After the use of the pesticide containers, all farms exercise empty pesticide containers be collected and burnt in an incinerator, though still there seems not to have a full protection of the environment as the incineration process was in an open field releasing burnt gases to the air.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATIONS

5.1. CONCLUSION

The Ethiopian booming floriculture is the country's greatest potential for job creation to citizens and source of foreign economic earning. However, the major area of concern was the safety of the working condition and the cleanness of the environment which were affected by massive use of pesticides in the floriculture industries.

As clearly known, floriculture industries are both labor and input intensive, particularly in the intensive use of pesticides. In the current level of development, the use of production inputs including pesticides to boost production is becoming important. However, the concept of organic production system with minimum risk to the human and environment including integrated pest management system in floriculture farms was getting more attention in the context of global markets.

Pesticides have the potential to be harmful to humans, other living organisms, and the environment as a whole if used incorrectly and inappropriately. Given the nature of pesticides, these hazards can never be prevented by improving the situation, ranging from knowledge capacitating through trainings to using better, and properly functioning application equipment ought to minimize the potential risk of pesticides.

Occupational safety is concerned with protecting the health, and welfare of people engaged in the work place to foster a safe working environment. As the study of the three floriculture farms indicate, to fulfill the minimum requirement of the bronze level code of practice given by EHPEA, the farms were on the way of improving the working conditions with regards to safeguarding workers through the provision of protective equipments and

washing facilities. However, there are conditions still needing due attention as claimed by respondents on the quality of protective equipment's provided to them.

The knowledge level of the respondents on pesticides, the health and environmental impacts and the consequences were also found to be low. The majority couldn't even read the instructions on how to use and apply chemicals. The technical capacity of the workers must be improved through the integration and involvement of government sectors with producers and the community. Besides, the general medical provision made to the workers and the checkup of the workers for cholinesterase level testing were still all an area to be closely monitored to assess workers' health by farm owners on one hand and the different government regulatory bodies on the other for effective implementation of the rules.

Under the current condition, the effort made by EHPEA in knowledge and awareness creation in order to minimize the environmental and health effects is encouraging. This would help the farms under competitive global international markets through launching and providing guidance to the farms by way of trainings, implementation of chemical residue disposal mechanisms using incineration practices, soak way pit development and management systems were highly supported and strengthened by concerned government institutions. If the current effort was supported by other stakeholder's involvement, the gradual implementation can successfully limit the dangers and brings the floriculture farms internationally competitive in fulfilling the human and environmental minimum requirements.

Above all, the role of the local government institutions in giving support and in inspecting the farms for safety and environmental factors were weak.

5.2. RECOMMENDATIONS

Based on the study made on the three floriculture farms, the following recommendations are forwarded to improve the safety of pesticide application to human being and the environment.

- Most floricultural workers engaged in the handling, mixing and spraying of pesticides in the three farms had **low level of knowledge** regarding pesticide use in particular, even seemed to be unaware of real pesticide risks on health and environment. Hence, different concerned government institutions at the grass root level in collaboration with the farms can significantly arrange a training program to workers.

- Though it seems that farm workers were provided relatively with basic safety personal protection measures of rubber boots, masks, goggles and respirators the **quality of the materials was very poor**. Therefore, it is strongly recommended to initiate the implementation of quality and standardized personal protective measure; which to decrease direct exposure of farm workers to pesticide spraying.

- In using PPE, it should not be seen from the side of the employers alone, rather there has to be a **forced sanction through regulation** for both the employee and employers in the use of protection equipment's during a spraying time.

- The provision of **washing facilities** has to be with sufficient supplies of soaps to wash contaminated clothes. Besides, spare clothes for spraying and mixing has to be available to all workers at all times

- After application of pesticides, the time required for entry into the green house varies with the type and condition of the pesticides. A strict regulation must be imposed to safeguard the health of all working in the farm.
- Efforts must be exerted by the floriculture farms to arrange **laboratory based tests** to all working with pesticides for regular medical checkup and cholinesterase level determination.
- Regular **soil and water analysis** should be made for chemical analysis to determine the content of harmful chemical residue accumulation.
- As the state of accumulated obsolete pesticides in the country gets high and the cost incurred for dump off is increasing better agricultural practice based on reduced use of pesticides like the promising **integrated pest management** initiative be exercised in certain competitive floriculture farms to scale up operation.
- Efforts exerted by **EHPEA** for minimum bronze level code of conduct should strongly be upgraded to silver and gold level through national award system by the government in line with motivational incentives to the farms.
- **Research institutions and universities** have to be encouraged to conduct research on pesticide-related health and environmental problems.
- The involvement of government bodies on grass root level for those floriculture farms were low except the role played by the social affair offices in regulating the working conditions for employees as per the safety directives of the country.

Hence, the collaborative and integrated effort of all stakeholders in the overall management can have a significant contribution.

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ANNEXES

ANNEXE-1

INTERVIEW SCHEDULE FOR FLORICULTURE WORKERS

Date:

SECTION-1- PERSONAL INFORMATION

- 1. Name of respondent.....
- 2. Age
 - 1.15-19, 2. 20-29, 3. 30-39, 4. 40-49, 5. 50-59, 6. Above 60
- 3. Sex
 - 1. Male, 2. Female
- 4. Educational category:
 - 1. Unable to read and write. 2. 1-4 class 3. 5-8 class
 - 4. 9-12 class 5. Above 12
- 5. How long have you been working in this farm?
 - 1. 1yr 2.2 yrs 3.3 yrs 4.4yrs
 - 5. 5 yrs and above
- 6. Are you a permanent or seasonal worker?
 - 1. Permanent 2. Seasonal
- 7. What are your major current duties?.....

SECTION-2- PESTICIDE STORAGE, HANDLING & WORK PRACTICES

- 8. List the major top five chemicals frequently sprayed.
.....

3. Mist blower,

4. Hand spray guns,

Others

24. What do you do with empty pesticides containers?

1. Sell it to the market

2. Dispose of it by burying in the soil

3. Other

(Specify)

25. What is the common time of spraying?

1. Early morning,

2. Mid-day

3. Late afternoon,

4. Depends on other factors

SECTION-3-CHALLENGES/RISK CONDITIONS

26. Do you have knowledge of health problems that may be caused due to the exposure of working on pesticide application or preparation?

1. Yes,

2. No,

27. Did you have any pesticide incident so far?

1. Yes,

2. No,

28. If yes, to the above question, when?

1. During store management

2. During preparation/mixing

3. During application (Spraying)

4. Others (Specify)

29. Have you ever felt discomfort/illness after pesticide application?

1. Yes,

2. No,

30. If yes, to the above question, what was your feeling?

1. Nausea/ Vomiting

2. Head ache

3. Skin irritation

4. Eye irritation

5. Dizziness.

6. Abdominal cramp

7. Blurred vision

8. Others (Specify)

31. Does your employer provide medical care for you?

- 1. Yes,
- 2. No,

32. How frequent do you undertake clinical blood test for the presence of pesticide in your body?

33. From whose health facility do you receive this health care?

- 1. Companies health institute
- 2. Public
- 3. Private
- 4. Other, Specify

ANNEXE-2

INTERVIEW GUIDES ON GENERAL CONDITION OF THE FARM

Date:

1. Name of the farm:
2. Location/kebele.....
3. Ownership:
 1. Ethiopian
 2. Foreign
 3. Joint
4. Year when the farm was established:
5. Total land holdingha, land under flower farm.....ha.
6. Current condition of workers:
 - By sex category: Total..... Male.....Female.....
 - By recruitment status: 1. Permanent.....
(Male.....Female.....)
 - 2. Seasonal.....
(Male.....Female.....)
7. What types of flowers does your farm grow? List the major ones.....
.....
8. How many rounds do you cultivate (produce)/year?.....
9. What has been your average productivity?
 - Yield (stems/ha).....
 - Yield (stems/round).....
10. What have you put in place to maintain/improve the quality of your flowers?
.....

Please provide detail information.

18. Is your farm member of Ethiopian Horticulture Producers and Exporters Association (EHPEA)?

- 1. Yes,
- 2. No.

If yes, since when.....

19. Has the farm adopted any of the Codes of Practice?

- 1. Yes,
- 2. No,

20. If yes to the above question, which ones?

- 1. MPS (Milieu ProgrammaSierteelt)
- 2. Others (specify).....

21. Have you informed the workers about the implementation of the codes on this farm?

- 1. Yes,
- 2. No, since when.....

22. Does the continued implementation of the codes provide the company with any extra advantage?

- 1. Yes,
- 2. No,

If yes, explain how.....

.....

23. What have been the greatest costs involved in the implementation of the codes of practice?

.....

24. Does the farm have approved Environmental Impact Assessment document?

- 1. Yes,
- 2. No,

If yes, which competent authority approved the document?

.....

If no, how the farm manages the prevailing environmental problems?

.....

25. How often does the farm conduct soil and water tests to determine the levels of pesticide and chemical residues in the areas around the farm?

.....

26. What are the main current Problems & Issues that impede/prevent progress in the disposal of pesticides or hazardous wastes?

.....

ANNEX-4

List of Registered Pesticides as of October, 2007

by

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

Crop Protection Department

Modified from the document

AN ASSESSMENT OF THE PESTICIDE USE, PRACTICE, AND HAZARDS IN THE ETHIOPIAN

RIFT VALLE

BY:

TADESSEAMERA (MPH) ANDASFERACHEW ABATE (PhD)

February, 2008

List of Registered Pesticides (Insecticides)

No	Trade Name	Common Name	Approved uses
1	Actellic 2% dust*	Pirimiphos-methyl	For the control of storage pests on cereals and pulses
2	Actellic 50 EC*	Pirimiphos - methyl	For the control of aphids in cotton
3	Actellic 50 EC	Primiphos methyl 50% EC	For the control of mosquitoes (<i>Anopheles arabiensis</i>)
4	Adonis 12.5 UL*	fipronil 12.5% ULV	For the control of locusts
5	Agro- Thoate40%EC*	dimethoate 40% EC	2. For the control of beanfly (<i>Ophiomyiaphaseoli</i>); Bean aphid (<i>Aphis fabae</i>); Thrips (<i>Taenothrips spp.</i>) ABW (<i>Helicoverpaarmigera</i>) on french beans. 3. For the control of aphids (<i>Myzuspersicae</i>) and ABW (<i>Helicoverpaarmigera</i>) on tomato 4. For the control of cabbage Aphid and various aphids on cabbage and potato, respectively
6	Akito 2.5% EC	beta cypermethrin	For the control of stalk borer on Maize
7	Apron Star 42 WS	thiamethoxam 20% + metalaxyl - 20% + difenoconazole 2%	For the control of Russian wheat aphid on barley (To be used as seed treatment pesticide)
8	Basudin 600 EW*	diazinon	for the control of armyworm and other pests on cereals.
9	Baythroid 050 EC*	cyfluthrin	For the control of shootfly, aphids, fleas and stockborer on sorghum
10	Bestox 7.5 ULV*	alphacypermethrin	For the control of African bollworm on cotton
11	Celphos	Aluminiumphosphi de56% table	for the control of maize weevil (<i>sitophilusspp</i>) and flour beetle (<i>Tribolium spp</i>) on stored maize

12	Cruiser 70 WS	For the control of Russian wheat aphid on barley (To be used as seed treatment pesticide)	
13	Cruiser 350 FS	thiamethoxam 35% FS	For the control of Russian wheat aphid on barley (To be used as seed treatment pesticide)
14	Cybolt 2.5 ULV*	flucythrinate 2.5% ULV	For the control of whitefly in cotton
15	Curacron 250 EC/ULV**	profenofos	For the control of white fly on cotton.
16	Cymbush 1% Granule****	cypermethrin	For the control of stalk borer in maize and sorghum
17	Cymbush 25% EC***	cypermethrin	For the control of cotton pests on large scale farms
18	Danitol 10% EC	fenopropathrin	For the control of African bollworm on cotton
19	Deltacal0.2DP*	deltamethrin0.2%D P	For the control of maize weevil on stored maize
20	Decis 0.5 EC/ULV*	deltamethrin	For the control of African bollworm and leafhoppers on cotton
21	Decis 0.6 ULV*	deltamethrin	For the control of African bollworm and leafhoppers on cotton
22	Decis 2.5 EC*	deltamethrin	For the control of African bollworm and leafhoppers on cotton.
23	Delicia *	aluminium phosphide 56.7%	For the control of storage pests on cereals and pulses.
24	Deltanet 200 EC*	furathiocarb	For the control of aphids on cotton
25	Detia Gas-Ex-T*	aluminium phosphide 56.7%	For the control of storage weevils and beetles on cereals and pulses.

26	Devicyprin 25	cypermethrin	For the control of stalk borer on maize
27	Diazinon10%G	diazinon	For the control of stalk borers on maize and sorghum
28	Diazinon 60% EC	diazinon	For the control of armyworm on cereals
29	Diazol10G*	diazinon	For the control of stalk borer on maize and sorghum
3®	Diazol 60 EC*	diazinon	For the control of pests of cereals, vegetables and oil seeds
31	DiptrexSP 95*	trichlorofon 95%	For the control of shootfly on cereals
32	Dursban 240 ULV*	chloropyrifos-ethyl	For the control of armyworm, locusts, and grasshoppers on cereals and pastures
33	Dursban 48% EC*	chloropyrifos-ethyl	For the control of armyworm, locusts and grasshoppers on cereals and termites.
34	Ethiolathion 5% Dust	malathion	For the control of maize Weevil (Sitophiluszeamays) on stored maize
35	Ethiozinon 60% EC	diazinon	For the control of maize stalk borer (Busseolafusca) and sweet potato butterfly (Acraeaacerate) on maize and sweet potato respectively.
36	Ethiozinon 60% EC	diazinon	-For the control of termite damage in hot pepper
37	Ethiolation 50% EC	malathion	For the control of sweet potato butterfly (Acraeaacerata) on sweet potato
38	Ethiothion 50% EC	fenithrothion	For the control of sweet potato butterfly (Acraeaacerata) on sweet potato
39	Ethiosulfan25% ULV	endosulfan	For the control of African bollworm (Helicoverpaarmigera) on cotton
40	Ethiothoate 40% E.C	dimethoate	1. For the control of Aphids on field pea 2. For the control of Russian Wheat Aphid (DiuraphisNoxia) on barley
41	Fastac 7.5 g/l ULV*	alphacypermethrin	For the control of African bollworm in cotton

42	Fullongphos	Aluminium phosphide	For the control of maize weevil and other storage pests on stored maize
43	Fyfanon 50% EC*	malathion	For the control of armyworm, locusts and grasshoppers on cereals
44	Gastoxin	aluminium phosphide 57% tablet	For the control of maize weevil and other storage pests on stored maize
45	Gaucho 70 WS	imidacloprid	For the control of Russian wheat aphid (diuraphisnoxia) on barley
46	Helerat 5% EC	lambda-cyhalothrin	For the control of boll worm on cotton.
47	Helmathion 50 Ec	malathion 50% EC	1. For the control of Aphids and leaf hoppers on maize 2. For the control of storage insect pests in storage structures
48	ICONET (Icon 2.5 EC)	Lambda-cyhalothrin 2.5 CS	For the control of mosquitoes (Anopheles arabiensis) as a bed net impregnation
49	ICON 10 WP	Lambda - cyhalothrin	For the control of mosquitoes (Anopheles arabiensis)
50	K-O Tab.*	deltamethrin 25% m/m	for the control of mosquitoes as a bed net impregnation
51	KOthrine Moustiquaire* SC 1%	deltamethrin 1%	For the control of mosquitoes as a bed nets impregnation
52	Karate 0.8 ULV*	lambda-cyhalothrin	For the control of cotton pests on large scale farms
53	Karate 5 EC*	lambda-cyhalothrin	for the control of cotton pests on large scale farms
54	Lamdex 5% EC	Lambda-cyhalothrin 5% EC	For the control of maize stalk borer (Busseolafusca Fuller)
55	Malathion 50% EC*	malathion	For the control of armyworm, locusts and grasshoppers on cereals and pastures.
56	Marshal 20 UL	carbosulfan	for the control of locust and grasshoppers
57	Marshal 25% EC*	carbosulfan	for the control of aphids on cotton

58	Marshal 25% ULV*	carbosulfan	for the control of aphids on cotton
59	Marshal/Suscon	carbosulfan	For the control of termites of Eucalyptus trees (Eucalyptus camaldulensis; E. citriodora and E. saligna) and Leucena trees (Laucenaleucocephala)
60	Medopaz*	white oil	for the control of red scale (Aonidiellaaurantii); Orange scale (Chrysomphalusdictyospermi); Purple scale (chrysomphalusaonidum) and Black scale (Parlatoriazizyphus) on citrus alone or in combination with some organophosphate insecticides
61	Metasystox R 250 EC*	oxydemethon-methyl	for the control of shootfly, aphids, fleas, and stalk borer on sorghum
62	Neoron 500 EC*	bromopropylate	For the control of spider mite on cotton
63	Nimbicidine	neem	For the control of thrips on onion
64	Nuvacron 40 SCW*	monocrotofos	For the control of spider mite on cotton.
65	Phostoxin 56% Tab.*	aluminium phosphide	For the control of storage pests in warehouses.
66	Polo 500 SC	Diafenthiuron 500 SC	For the control of Aphids (Aphis gossypii) on cotton
67	Polytrin C 220 ULV	profenofos + cypermethrin	For the control of locust and grasshoppers
68	Pyrinex 24 ULV*	chlorophyrifos-ethyl	For the control of armyworm on cereal and pasture
69	Pyrinex 48 EC	chloropyrifos-ethyl	For the control of armyworm on cereals and pasture
70	Pyrinex	Chlorpyrifos 48% EC	For the control of Termites on hot pepper

71	Quickphos*	aluminium phosphid e56% W/W Tablets	For the control of storage pests
72	Rimon	novaluron	IGR to control stalk borer on maize
73	Ripcord 5% ULV*	cypermethrin	For the control of African bollworm, leaf worm and thrips in cotton
74	RovralAqauflo 500 SC	lprodione	For the control of botrytis and alternaria on Flowers
75	Selecron 720 EC*	Profenofos "Q" 720g/l	For the control of maize stalk borer on maize
76	Sevin 85% WP*	carbaryl	For the control of armyworm, grasshoppers Wellobush cricket on cereals & pasture
77	Success Bait	Spinosad	For the control of Fruit fly on guava.
78	Sumithion 50% EC****	fenitrothion	For the control of armyworm & locusts on cereals & pastures, Grasshoppers under the supervision of extension agents
79	Sumithion 96% ULV*	fenitrothion	For the control of armyworm and locusts on cereals and pastures
80	Sumithion 95% ULV*	fenitrothion	For the control of armyworm and locusts on cereals and pastures
81	Suprathion 40 EC*	methidathion 400 g/l	For the control of scale insects on citrus
82	Talstar 20 ULV*	bifenthrin	For the control of whitefly and red spider mite on cotton
83	Thiodan 25% ULV*	endosulfan	For the control of bollworm on cotton, maize and sorghum
84	Thiodan 35% EC*	endosulfan	For the control of African bollworm on cotton, maize and sorghum
85	Thionex 25% EC/ULV*	endosulfan	For the control of African bollworm on cotton maize, sorghum & tobacco
86	Thionex 25% ULV*	endosulfan	For the control of African bollworm on cotton, maize and sorghum
87	Thionex 35% EC*	endosulfan	For the control of African bollworm on cotton, maize, sorghum and

			tobacco
88	Ultracide 40 EC*	methidathion	For the control of scale insects on citrus
89	Winner 0.8 ULV	Lambda cyhalothrin	For the control of African boll worm on cotton

List of Registered pesticides (Herbicides)

No.	Trade Name	Common name	Approved Uses
1	Agro-sate 48 SC*	glyphosate 360 g/l A.E	For the control of broad spectrum of weeds in coffee and citrus
2	Agro- 2,4-D amine 720g/l A.E*	2,4-D 720 g/l A.E	For the control of broadleaf weeds in wheat, barley, teff, maize and sorghum
3	Alanex 48% EC*	alachlor 480 g/l	For the control of annual grass and some broadleaf weeds in maize and soyabeans.
4	Alazine 350/200 SE*	alachlor 350 + alazine 200	For the control of grass and some broadleaf weeds in maize
5	Atrametcombi 50 SC*	atrazine 25% + ametryne 25%	For the control of grass weeds in sugarcane
6	Banvel P	dicamba + mecoprop	For the control of broadleaf weeds in wheat and barley
7	Brittox 52.5 EC ****	bromoxynil + ioxynil + mecoprop	For the control of broadleaf weeds in wheat and barley
8	Calliherbe Super*	2,4-D 720 g/l A.E	For the control of broadleaf weeds in cereal crops and sugarcane
9	Codal 600 EC**	prometryn + metolachlor	For the control of broadleaf weeds and grass weeds in cotton

10	Desormone liquid*	2,4-D 720 g/l A.E	For the control of broadleaf weeds in cereals (wheat, barley, teff, maize & sorghum)
11	Derby 175 SC	flurasulam 75 G/L + flumetsulam 100 G/L SC	For the control of broadleaf weeds in cereals
12	Dicopur 720 SL*	2,4-D 720 g/l A.E	For the control of broadleaf weeds in cereal crops
13	Dicopurpp 600 SL	Mecoprop 600 G/L Aqueous concetrated	For the control of broad leaf weeds in cereals (wheat, barely and teff)
14	Dual Gold 960 EC	s-metolachlor	For the control of broad leaf weeds on haricot bean
15	Folar 525 FW**	terbuthylazine + glyphosate	For the control of broad leaf weeds in coffee
16	Fuca 75 EW	Phenoxaprop-p-ethyl	For the control of Avena Spp. And Phalarisparadoxa on wheat
17	"Fusilade" Super 12.5% EC	fluzifop-p-butyl	For the control of grass weeds in cotton and fababean
18	Gesapaxcomb i 500 FW*	ametryne + atrazine	For the control of various weed spp. in sugarcane
19	Gesaprim 500 FW*	atrazine 500g/l	For the control of complex weeds in maize and sorghum
20	Glyfos 360 SL	glyphosate 36 SL	For the control of sedges and perennial grass weeds in coffee
21	Gramaxone 20% EC*	paraquate	For the control of complex weeds in coffee plantation
22	Granstar 75 DF *	tribenuron methyl	For the control of broadleaf weeds in wheat

23	Glyphogan T	glyphosate + terbuthylazine	For the control of broad-leaved weeds on coffee
24	Glyphogan 480 SL	Glyphosate 480 G/L SL	For the control of coffee weeds such as Cyprus spp, cynodonspp, Digitariaspp, Hydrocotyle American, Echnocloaspp, Bidenspilosa, Ageratum conyzoides, Galinsogaparviflora and conyzaalbida
25	Hellosate 48 SL	Glyphosate 48 SL	For the control of annual and perennial weeds in citrus plantations
26	Illoxan 28% EC*	diclofop-methyl	For the control of wild oat and grass weeds in wheat and barley
27	Kalach 360 SL*	glyphosate 36% SL	For the control of pernnial grasses, sedges and broadleaf weeds in coffee
28	Lasso 480 EC	alachlor 480 G/L EC	For the control of broadleaf weeds in haricot bean
29	Lasso/Atrazin e 55% SC*	alachlor 35% + atrazine 20%	For the control of annual weeds in maize, soybean and sugarcane
30	Litamine 72 SL	2,4-D	For the control of broad leaf weeds on wheat
31	Mamba 360 SL	glyphosate	For the control citrus and coffee weeds
32	Mustang	(XDF 6.25 G/L + 2,4-D 300 G/L) Suspo- Emulsion (S.E)	For the control of broadleaf weeds in cereals
33	Primagram 500 FW*	metolachlor + Atrazine	For the control of broadspectrum broadleaf and grass weeds in maize
34	Puma super 75 EW*	fenoxaprop-p-ethyl 6.9%	For the control of grass weeds in wheat

35	Primagram Gold 660 SC	(s-metolachlor 290 g/l + Atrazine 370 g/l) SC	For the control of broadleaf and grass weeds in maize
36	QISH- Fordat	2,4-D	For the control of broadleaf weeds on wheat
37	Roundup 36 SL*	glyphosate 360 g/l	For the control of complex weeds in coffee
38	Sanaphen D 720 SL	2,4-D 720gA.E/L,SL	For the control of Broad leaf weeds in wheat
39	Starane M 64% EC*	fluroxypyr + MCPA	For the control of broadleaf weeds in wheat
40	Stomp 500 E*	pendimethalin	For the control of rooboelia weed in maize
41	Topik 080 EC*	cladinafop-propargyl	For the control of grass weeds in wheat
42	U-46 KV fluid 600***	mecoprop	For the control of broadleaf weeds in wheat and barley
43	U-46 D fluid 72% EC*	2,4-D 720g/l A.E	For the control of broadleaf weeds in cereal crops and sugarcane
44	Velpar 75 DF*	hexazinone 75% DF	For the control of broadleaf and grass weeds in sugar cane
45	2,4-D PA****	2,4-D 720 g/l A.E.	For the control of broad leaf weeds in wheat and teff
46	Weedkiller	2,4-D 72 Acid Equivalent	For the control of broadleaved weeds in teff and wheat
47	Zura Herbicide	2,4-D 720 g/l A.E	For the control of broad leaf weeds on maize.

List of Registered pesticides (Fungicides)

No.	Trade Name	Common name	Approved Uses
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1	Agro-Laxyl	mancozeb + metalaxyl	For the control of Early blight on tomato and Late blight on potato
2	Ardent 50 SC	kresoxim	For the control of powdery mildew on pepper
3	Bayleton 25 WP*	triadimefon 250 g/l	For the control of rust diseases on wheat and barley
4	Benlate 50 WP****	benomyl 50% WP	For the control of bean anthracnose on haricot beans
5	Bumper 25 EC*	propiconazole 25%	For the control of leaf and stem rust on wheat
6	CRUZATE R WP	cymoxinil + copper oxychloride	For the control of late blight on potato and downy mildew on grape
7	Daconil 2787 W 75*	chlorothalonil 75% WP	For the control of coffee berry disease
8	Helcozeb 80 WP*	mancozeb 80% W/W	For the control of cercospora leaf spot on statice flowers
9	Indofil M-45	mancozeb 80% WP	For the control of late blight on potato
10	Kocide 101*	copper-hydroxide	For the control of late blight on potato
11	Kumulus DF	sulfur	For the control of Powdery mildew on Flowers
12	Mancolaxayl 72 %	Mancozeb + metalaxyl	For the control of late blight on tomato
13	Mancozeb 80 WP	mancozeb	For the control of Downey mildew, Botrytes, Black spot and rust on Flowers
14	Matco	Metalaxyl 8% + Mancozeb64%WP	For the control of late blight disease (phytophthora infestans) on potato and tomato and downy mildew (peronospora destructor) on

			onion
15	Nimrod 25 EC	buprimate	For the control of powdery mildew on peper
16	Noble 25 WP*	Triadimefon	For the control of leaf and stem rust on wheat
17	Odeon 82.5 WDG	chlorothalonil	For the control of Late blight on Potato
18	Orius 25 EW	tebuconazole	For the control of rust on flowers
19	Penncozeb 80 WP*	mancozeb 80% WP	For the control of lateblight on tomato
20	Privicur Energy SL 840	Propamocarb hydrochloride	For the control of downey mildew on flowers
21	Ridomil5G*	metelaxyl	For the control of fungus spp. on pepper, tomato, oranage& apples
22	RidomilMZ 63.5 WP*	metalaxyl/mancozeb	For the control of fungus spp. on potato, tomato, pepper & onion
23	Ridomil Gold MZ 68 WG	Metalaxyl-M 68% WG	For the control of downy mildew on grape
24	Rova 500 FW*	chlorothalonil 50% FW	For the control of coffee berry disease on coffee
25	Rova 75 WP*	chlorothalonil 50% FW	For the control of coffee berry disease on coffee
26	Ridomil Gold MZ 68 WP	metalaxyl - M 4% + mancozeb 64%	For the control of downy mildew on grape
27	Sancozeb 80% WP*	mancozeb 800 g/kg WP	For the control of chocolate sport and rust on faba bean
28	ThiramGranufl o 80 WP*	thiram 80% WP	For the control of seed decay and damping off disease; on maize and sorghum

No.	Trade Name	Common name	Approved Uses
29	Tilt*	propiconazole	For the control of fungus spp. on teff wheat and barley.
30	Unizeb 80 % WP	Mancozeb	For the control of late blight on potato
31	Agro-Laxyl	Mancozeb + metalaxyl	For the control of Early blight on tomato and late blight on potato

No.	Trade Name	Common name	
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Rodenticides

1	Klerat pellets*	brodifacoum	For the control of rats in large stores and in the field for out breaks control under the supervision of an expert.
2	Lanirat Bait 0.005%****	bromadiolone	For the control of field and storage rodents
3	Storm*	flocoumafen 0.005% pellet	For the control of storage and field rodents
4	Zinc phosphide	Zinc phosphide 80% Technical	For the control of field rats as a finished bait 4% zinc phosphide. Zinc phosphide 80% technical can not be sold to the user unless it is formulated to 4% zinc phosphide by the registrant
5	Ratol*	Zinc phosphide 80% Techical	For the control of field rats as a finished bait 4% zinc phosphide. Zinc phosphide 80% technical can not be sold to the user unless it is formulated to 4% zinc phosphide by the registrant

1	Mercur 500 SC	diafenthuron	
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2	Mitigan18.5EC *	dicofol	
3	Calypso SC 480	Thiacloprid	For the control of spider mite, aphids and thrips on Flowers
4	Mitac*	amitraz	For the control of red spider mite and whitefly on cotton
5	Oberon SC 240	spiromesifen	For the control of spider mite on flowers
1	Queletox UL 600*	fenthion	
1	Mocap GR 10	ethoprophos	
1	Pix 50 EC*	mepiquat chloride 50 g/l or 5%	
2	Citowetto	alkylaryl polyglycol 100%	
No.	Trade Name	Common name	
1	Baygon	Propoxur 1% + Cyfluthrin 0.04% + Dichlorvos 0.5%)	

		Aerosol	
2	Hardy	Cypermethrin 0.03% + Dichlorvos 0.99%	for the control of common housefly (<i>Muscadomestica</i> aerosol)
3	Kilit*	dichlorvos 0.7% + tetramethrin 0.14%	for the control of cockroaches, mosquitoes and house flies
4	Knoxout 2 FM	Diazinon 23% W/W	For the control of cockroaches
5	Mobil insecticide*	tetramethrin = neopnamin 0.20%+ pynamin forte = d - allethrin 0.250% + Sumithrin = d- phenothrin 0.120%	for the control of flying household insects
6	Roach killer*	fenithrothion + cypermethrin+bioalleth rin 2.3%	For the control of cockroaches, mosquitoes and ants
7	Super shelltoxF.I.K+	d-phenothrin 0.05% + teramethrin 0.25%	For the control of flies, mosquitoes and other flying insects
8	Super shelltoxC.I.K+	cypermethrin 0.25% + teramethrin 0.15%	For the control of cockroaches, ants and other insects in kitchens, rooms offices, etc.

Annex-5

Approved Project Proposal

PROFORMA FOR SUBMISSION OF M.A. (RD) PROPOSAL FOR APPROVAL

Signature:

Name and: **Dr. Mengistu Huluka**

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Enrolment No. : 089132459

Date of Submission: 02/08/2011.

Name of Study Centre: - Indira Gandhi National Open University, St. Mary's
University College. Addis Ababa, Ethiopia.

Name of Guide: **Dr. Mengistu Huluka**

Title of the project: **AN ASSESSMENT OF THE UTILIZATION OF PESTICIDES AND SAFETY PRACTICES OF
THE FLORICULTURE INDUSTRIES: THE CASE OF THREE FLORICULTURE FARMS AT SEBETA TOWN,
OROMIA REGION, ETHIOPIA.**

Signature of the Student:

Approved/Not Approved

Date:

INTRODUCTION

Several sub-Saharan Africa countries depend heavily on exporting agricultural products. Many of them often rely largely on a single Agricultural commodity (such as, coffee, cocoa, and cotton) for their merchandize export revenue (Mulu, 2009). In order to reduce the exposure to price volatility in the international markets, Ethiopia like any sub-Saharan African countries is also on the way to diversify the export base with a view to gaining new sources of income from the booming floriculture industry. The pace of growth of this industry is at a faster rate where the country stands second-largest producer of roses in Africa, with Kenya leading and sixth in the world after Holland, Colombia, Ecuador, Kenya and Israel within this short period of time (Mulugeta 2009, Girma 2007).

The history of the Ethiopian floriculture industry dates back to 1980, when state farms started to export flowers to Europe. A modern, export oriented and private sector based floriculture industry began to emerge in Ethiopia in the late 1990s. The rapid growth of floriculture in Ethiopia is due to different factors like suitable climatic and natural resources, high level of support by the government, favorable investment incentives, proximity to the global market, efficiency of the transport system and availability of abundant and cheap labor (Embassy of Japan in Ethiopia 2008, Mulugeta 2009).

Running a cut-flower project is a labour- and management-intensive process. Caring for the plants requires regular spraying, budding, pruning, watering and monitoring for disease and other problems (Robert, 2000). The flower industry growers resort to fertilizers to increase yields and improve quality, and to pesticides and fungicides to control spider mites, caterpillars, and other pests which invade the flower crop (Girma, 2007). The widespread use

of agrochemicals in agriculture worldwide poses serious health risks to employers, workers and the general public. Sound management of chemicals and the deployment of the full hierarchy of controls are needed to minimize occupational exposures (ILO, 2010).

Chemicals used in floriculture could cause damage through the exposures of absorption, inhalation and ingestion. Absorption through the skin is the primary route of exposure for most widely used insecticides, fungicides and herbicides. At normal exposure levels, skin damage or other symptoms may not be noticed, so absorption occurs without the worker's knowledge. Exposure can occur to the whole body during spraying. Exposure to the hands occurs in nearly all cases. Forearm, torso and facial exposure are common during mixing, loading and hand spraying. Exposure to the torso is likely when workers carry chemicals on their backs, as with backpack sprayers. Exposure to the legs can occur through contact with recently treated foliage, as is common in greenhouses or in fields with minimal spacing between crop rows. Intensity of skin exposure will be determined by the frequency of contact or activity, and by the pesticide-active ingredient concentration in the applied material and whether equipment, including Personal Protective Equipment, is being used correctly. Inhalation is also an important route of exposure when working with volatile compounds or in enclosed spaces such as greenhouses. Gases and vapors are readily inhaled and absorbed in the respiratory tract. Small particles including water droplets can also be inhaled. Pesticides can volatilize from treated leaves and soil, posing a hazard to re-entry workers. Ingestion is another route of exposure for pesticides, and can be a significant contributor to dose if food or cigarettes are handled after contact with pesticides and prior to washing (ILO, 2010).

Pesticide residues may remain on plant surfaces and in surface soil for extended periods of time following application. Skin contact with these residues or inhalation of volatilized residues can result in exposures to workers who enter treated areas after application. Repeated

contact with acutely toxic pesticides such as organophosphorus or carbamate insecticides on plants and soil during normal work activities can result in serious intoxications requiring first aid or hospitalization. Early re-entry workers are likely to have contact with plants, soil and equipment surfaces with relatively high pesticide residues. Hence, early re-entry workers should wear protective equipment consistent with label requirements for pesticide handlers when entering treated areas. Early re-entry workers should receive the same training as other workers, and special training related to the hazards of contacting pesticide residues and the particular tasks they will be conducting in treated areas (ILO, 2010).

Waste management, chemical and water usage, occupational safety and employment conditions are coming under increasing scrutiny in markets. International labelling programmes encourage farmers to meet environmental and ethical guidelines for cut-flower production (Robert, 2000). Until recently, flowers have not been held to the same ecological or health standards that pertain to edible agricultural products where Minimum Residue Levels (MRLs) have been set. However, following the flower campaigns in Switzerland and Germany in the 1990s, environmental awareness and the ethical concerns of consumers in developed countries grew. Consumers recognized the potential health risks and human rights violation that workers in the flower industry are exposed to and on account of which, they along with trade unions, started putting pressure on the global floriculture industry to develop and conform to codes of conduct for workers' health and safety as well as compensation of workers' efforts (Mary, 2006).

The International Code of Conduct for the Production of Cut-flowers, which was presented by NGOs and trade unions in August 1998, aims to guarantee that flowers have been produced under socially and environmentally sustainable conditions. The Code which is based on the

core ILO standards, the universal human rights standards, and basic human rights standards: states the minimum labour, human rights and environmental standards for the international cut-flower industry. The main areas covered by the Code include: Freedom of association and collective bargaining, Equality of treatment, Payment of living wages, acceptable working hours, **satisfactory health and safety procedures, Adequate control of the handling and disposal of pesticides and chemicals**, Security of employment, Protection of the environment, No use of child or forced labour. On health and safety issues, the codes cover the requirement for employers to provide a safe and healthy working environment, employees to receive health and safety training; adequate medical services should be available for workers. Emphasis is put on having systems and procedures in place for working safely and at the same time aimed at controlling and reducing environmental degradation (Robert, 2000).

Theoretically all agree the management of environmental hazards from the ecosystem and threatening of the human life in an environmentally friendly manner, so that natural resources viz. vegetation, water body, soil and as a whole the biodiversity and the human life could be well maintained. However, the practicability of this issue and concern is minimal and weak in many development oriented projects. Under the aforementioned umbrellas of the code, different occupational health and safety at work of the floriculture industry could possibly be assessed in response to broader categories, and similarly basic internationally competitive code of practices on floriculture in Ethiopia were recently adopted. This study was only focusing to the limited ones on the following main areas: status of training on health and safety issues, Proper usage and storage of pesticides, Provision of protective gear to workers, provision of washing facilities, re-entry periods and the assessment of the perceived challenges to the workers due to the problems mentioned above.

STATEMENT OF THE PROBLEM

Flowers are emerging as a stable and very marketable international crop, earning up to five times per acre what fruit crops bring in (Girma, 2007). Flowers are luxurious products with high social value and rarely used for food. The demand for these luxurious products has increased in the international market in recent years (Mulugeta, 2009). While development of floriculture in developing countries has opened labor and market opportunities, it has also threatens workers' health and safety and jeopardizes the environment as a whole. Thus, the rapid growth has its costs, i.e., environmental as well as human (Girma, 2007).

Due to the growth of the industry, environmental concerns are indeed growing. Environmentalists are raising many concerns in relation to the expansion of floriculture in Ethiopia in relation to the use of pesticides and chemical fertilizers, disposal of waste materials, and the protection of water bodies. The industry uses too much pesticides and chemical fertilizers which damage the environment (Mulugeta, 2009).

While benefits of pesticides to boost agricultural production are apparent, evidence of their negative impacts on the environment and public health have increased in the past few decades. Deaths and illness from pesticides remain high in many developing countries, mainly amongst those involved in application where proper precautions and protective gear are not available or used. Even worse is, little is known about the long term and indirect effects of pesticide on rural and urban communities or on local and national food production systems (Dereje, 2007).

As cited in (Girma, 2007), florists who handle flower producing using pesticides and other toxic chemicals have been known to develop dermatitis on their hands. Floral workers, particularly the sprayers and handlers, suffer the brunt/burden of the pesticide use. Studies made in Latin America reported that in Ecuador, nearly 60% of flower workers surveyed

showed poisoning symptoms, including headaches, dizziness, hand-trembling and blurred vision. In Costa Rica over 50% of respondents had at least one symptom of pesticide poisoning, such as headache, dizziness, nausea, diarrhea, skin eruptions or fainting. Two-thirds of Colombian flower workers suffer from headaches, nausea, impaired vision, rashes and asthma as reported by Pesticide Action Network North America. This network noted that researchers from the Colombian National Institute of Health studied pregnant flower workers in 1990; they found a higher-than-average rate of miscarriages, premature births, and congenital malformations among their off springs. According to (Sisay, 2007) also deaths and illness from pesticides remain high in many developing countries, mainly amongst those involved in application where proper precautions and protective gear are not available or used.

To revert and minimize these hardships and challenges to the environment and human life, in Europe, environmental organizations have put pressure on producers to reduce the usage of these chemicals, and environmental regulations have been strengthened. Flower growers in Europe have had to examine their production processes in order to meet increasingly stringent regulations. Growers who export their flowers to Europe have also had to meet consumer demands. The industry now has several special labels by which to identify produce which has been produced in an environmentally and socially acceptable manner (Robert, 2000).

Currently the Ethiopian flower producers association has also developed a code of practice to its members to provide a mechanism that enables the Ethiopian floriculture sector to achieve the highest performance standards in order to obtain and safe guard its continuous improvement and sustainable development thereby improve competitive position. The association consists of three levels of excellence by which Ethiopian flower and ornamental plants can be rewarded with i.e. bronze, silver and gold levels. For instance, compliance with

the requirements of the bronze level which is said to be the minimum level enable Ethiopian farmers to put a basic management system in place that insures the planning, monitoring and evaluation of key sustainability issues. Compliance at the bronze level ensures that the farm documents and evaluates every month its performance on water consumption, pesticide use, fertilizer use, waste management, energy consumption, completion of an Environmental Impact Assessment as a pre-requisite for the allocation of land and investment license, safe pesticide use and storage, personnel related to pest control activities etc (Ethiopian Horticulture Producers and Exporters Association, 2007).

Studying the overall environmental implication of floriculture in general and the challenges due to pesticides in particular is a broad complex multi-dimensional issue, so that other researchers are also invited for further study and analysis of the status of the major natural environments like soil, water, air and other biodiversity impacts specifically on the waste disposal mechanisms of floriculture, the chemical analysis of the different contamination level of the biodiversity and etc which are all open to be further studied.

As floriculture makes intensive use of chemicals and pesticides, risk of pesticide poisonings and injuries among Agricultural workers and pesticide handlers is thought to be high. Besides, given the wide range of pesticides used in the emerging floriculture in Ethiopia and with the ground of the human threatening challenges justified in different flower producing countries, occupational safety in cut-flower projects has become a major concern. Flower label programmes stress the importance of providing a safe and hygienic working environment to workers, whereby farmers are expected to provide free and appropriate protective clothing to their employees. In addition workers should be consulted and trained on safety issues in the work place like on notification of pesticide applications, restricted entry intervals following

pesticide application, emergency medical assistance, and provision of washing facilities. Hence, this study also focuses to assess and analyze the major safety precautions provided to the workers of the floriculture in their work conditions on one hand and the challenging problems posed to them on the other, so that human risks are identified and corrective actions could also be taken in the future by decision makers.

IMPORTANT TERMS USED IN THE PROJECT TITLE

There are different important terms used in this study title which have to be clear enough for understandings of the subject matter.

FLORICULTURE ACTIVITY -can be defined as cultivation/production and marketing of flowering and foliage plants, garden-bedding plants, cut flowers and greens produced both under conventional methods and controlled conditions mainly for export. Floriculture products mainly consist of cut flowers, pot plants, cut foliage, seeds bulbs, tubers, rooted cuttings and dried flowers or leaves.

<http://www.answers.com/topic/floriculture#ixzz1GiWqlbV1>

SAFE WORK PRACTICES –in literary definition are generally written methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes which should be developed as a result of completing a hazard assessment and should closely reflect the activities most common in the company's type or sector of construction. All safe work practices should be kept in a location central to the work being performed and readily available to the workforce

(www.csa.org/health_and_safety...practices/practices.htm).

Though the term safe working practice is a broader context, in this research is limited to the avoidance /minimization of exposures of pesticide risks in the floriculture industry particularly to those working on pesticide handling, mixing and spraying through the exercises of the different local, national, and international acceptable rules, regulations and code of practices by way of: strengthening of the knowledge of the workers on the handling and care of pesticides through different trainings, supply of standardized personal protective equipment's, provision of washing facilities, proper re-entry interval managements, safe and acceptable working hours and provision of medical services.

PESTICIDE- means any substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, Agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport (FAO, 2002).

OBJECTIVES OF THE STUDY

As mentioned above, the global concern given to the environmental/human threat problem mitigation and control measures is on increasing, so that different international conventions had also been ratified to secure the human life and the environment in which we are living. Hence, to address this sensitive issue of our concern of the floriculture challenges, this study is aimed to have a general objective of assessing the proper provision of major occupational

safety working environments and consequent encountering challenges posed due to floriculture pesticide utilization.

The specific objectives of this study are as follows:

4. To assess the safe handling and management practices of pesticides made by the workers of the floriculture industry;
5. To assess the major provisions of occupational safety facilities provided to the workers during the work conditions;
6. To assess and examine the encountering challenges posed to workers due to pesticides in the floriculture industry and its implications;

RESEARCH QUESTIONS

In order the objective of the study will be achieved and understood, research questions of the following general nature are critically questioned and examined, by way of seeking answers to the following Research questions:

1. How are the knowledge, awareness and understanding of the workers in the handling and management of the pesticides in the floriculture industry?
2. What are the major occupational safety provisions made and available to the workers who are directly exposed in the handling and management of the pesticides in the floriculture industry?
3. What are the encountering challenges and problems posed to the workers in their working area due to pesticides in the floriculture?

RESEARCH METHODOLOGY

To conduct the research, the following research methodologies (study design, data sources and data collection methods, sampling techniques and data processing and analysis) will be undertaken as follows.

RESEARCH DESIGN

The design to be used for the study will be a cross sectional descriptive in nature, being designed to find out the practice of work conditions exercised by floriculture farm workers and also to examine the subsequent challenges and risks due to pesticides from a cross section of floriculture farm workers in floriculture industries as per the self- reports to be made by the respondents whom they are supposed to be directly involved in the handling and management of pesticides. The design will used to answer descriptive research questions during a single contact to be made with the respondents taking a cross-section of the study population which will involve observing and describing of the existing variables.

This design is selected on one hand, as it is simple in design where you decide what you want to find out, identify the study population, select sample and contact your respondents to find out the required information. On the other, as this design involves one contact with the study population, it is comparatively cheap to undertake. However, the biggest disadvantage is that the design cannot measure change, as to measure this it is necessary to have at least two data collection points on the same population (Ranjit, 2005).

To have a contact with the study population, the selected three farm officials will be communicated and the researcher will explain its purpose and relevance for the need to contact with the study population. Once permission is given by the officials, the study will be

carried out in the floriculture farm compound according to the interview schedule prepared during the time of working hours.

SAMPLING TECHNIQUE

The study will be conducted in three floriculture farms (Tal flowers plc.; Saron rose Agro Farm Plc.; and Ethio-passion Agro Plc.) selected at random located in Sebeta town administration from the 12 floriculture farms of the town. The target populations will be those directly involved in the handling, management and spraying of pesticides. Staff who had worked for about at least six months directly on pesticides will be interviewed. Hence, the sampling frame will be constituted by the workers who are directly working with the direct contact of pesticides in the three farms who had worked for about at least six months directly on pesticides. By taking the lists of the workers from the registry of the farms, the sample representing the population will be taken based on Krejcie and Morgan 1970 sample size determination. Accordingly, as the total number of workers working on pesticide in the three farms are pre- known 30 in number (Tal flowers 7, Saron rose Agro- farm 8 and Ethio-Passion farm 15), 28 respondents will be selected from the total 30 workers of pesticide handling and managing groups of the three farms. The selection of this sampling technique is to get the maximum number of respondents from the limited total population of the workers due to the fact that the nature of work of pesticide management and handling requires a relatively smaller working population as compared to other sections of the farms.

DATA COLLECTION: TOOLS AND PROCEDURES

Data sources/Types of data

The data's to be used in this research are both qualitative and quantitative data's to have sufficient and the nearest accurate information. Both categories of data's i.e. primary and

secondary will be collected. The primary data's which are information's of first hand will be collected from individual study population to be sampled in the floriculture farms and the secondary data's will be collected from secondary sources like use of reviewing books, documents of publications, unpublished study documents, internet access, other official reports of relevant topics and etc.

The major content of the data's to be collected consists of Personal information's, pesticide usage, work practices, work conditions, risk factors associated with pesticide exposures and the different self reported challenges encountering the workers are all major concerns to be admitted in the data to be collected.

Data collection methods

Different data gathering instruments will be employed to collect the data to be used in the study. The use of Interview schedule's containing both open ended and closed ended questions to address the target population of the floriculture farms on one hand and observation of certain real-life situations and events on the other are major data collection means's. The use of interview guides using semi-structured questionnaires with the different key stake holder's of governmental and the floriculture organization for additional information to strengthen and support the report writing will also be used.

The entire data gathering processes will be undertaken by the researcher as different qualitative and observational steps needs care and an attention of concern to be critically examined.

DATA PROCESSING AND ANALYSIS

In order to answer the research questions, understand and gain an insight from the collected data, processing and analysis of the data collected will employ an attention of critical concern taking time to ensure the qualitative and quantitative data in order to be free from inconsistencies and incompleteness. Thus, the collected data's will all requires data editing to ensure that the data's are clean. Besides, coding of the data will also follow considering the nature of the data collected either being qualitative or quantitative which further depends up on the measurement scale and the nature of a question (Ranjit, 2005). The data will be coded on a code book and then will be entered into a computer using a program (SPSS). Statistical tools like ratios, percentages, and arithmetic means will be employed in condensing the data for interpretation and descriptive results will be expressed as frequencies and percentages.

The analysis of the processed data will also be made based on the interview schedule framed as: personal and demographic data analysis and others under major categorical work practices, pesticide handlings and the challenges posed by pesticides as detailed in the interview schedule as: number of working days with pesticide; names of the most common pesticides used; disposal of the empty pesticide containers; wearing of protective clothes; reading and following label instructions; washing after pesticide application; re-entering recently sprayed areas and self reported toxicity symptoms associated with pesticide use are among others to be analyzed.

STRUCTURE OF THE DOCUMENT (CHAPTERIZATION)

The final report of the thesis will be managed under five chapters. The first chapter shall include introductory issues, the second chapter Literature of Review; and the third chapter

accommodates Research Methodology. In the fourth and fifth chapters results and discussions **and** conclusions and recommendations will be presented respectively.

PROPOSED TIME FRAME

The proposed time frame for the various operational steps needed to undertake the study against the time to complete the work will be as below attached..

Description of the Tasks	Months (2011)						
	Mar	Apr	May	June	July	Aug	Sept
Proposal writing	XX	XX	XX				
Instrument construction				XX	XX		
Data collection						XX	
Coding						XX	
Data analysis						XX	XX
Report/first							XX
Report/final							XX
Typing							XX