

Synthesis of a new potential herbicide



**ASSIGN
BUSTER**

CHAPTER 1

INTRODUCTION

1. Background of Study

Since the beginning of the world, every creature in the world consumes food in order to survive. They ingest creatures in the sea, animals on the ground, or even vegetables on the land. In the olden days, the vegetables that mankind intake is without adding of synthetic chemicals or in other words it is organic. The purpose of adding chemicals during the vegetation process in this era of modernisation is to overcome undesirable situation like remove unwanted plants and eliminating pest.

These chemical is known as pesticides. Pesticide is defined as chemical used for plant suicide. Generally, pesticide can be separate into four categories. There are insecticide, herbicide, fungicide and bactericides. Pesticides have cause pollution to the environment. It also has an impact towards animals, plant and mankind. Pesticide is a type of persistent organic pollutant to the environment because it is hard to degrade. The physical properties have disallowed degradation to occur. Examples of pesticide are paraquat, diquat, and DDT (Hafiza, 2014).

In order to produce food in high yield, weed control is used. It is to ensure the food produce is economical beneficiary. The most common weed control used is by the use of herbicide. It was because herbicide is easy to use and it is efficient (Lodovichi et. al., 2013; Pannell et al., 2004; Parsons et al., 2009). Herbicide can be categorised. Normally herbicide is categorised based on

mode of action. The herbicide normally work based on inhibition of enzyme or inhibit mitosis to occur (Fujiwara, 2014).

Mankind need to produce more food. It was because the world population will rise to 9.6 billion people (Fujiwara, 2014). The food mankind need is going to increase since everyone need food. Yet, there are still famine going on in this era of millennium. Just in Africa alone there are more than 18,000 people are starving. Just because of food shortage, most of the children die before them reaching at the age of 5 (Missionaries of Africa, n. d).

The need of food have cause human to use herbicide extensively. The extensive use of a single herbicide had cause the weed in the field to be herbicide resistant.

Herbicide resistant in weed will cause several implications. It will cause the need to change a brand new weed and crop management system, cost ineffective in weed management, reduce in herbicide choice and low productivity of crop (WSSA, 2011). Thus, mankind need to produce more food for the generation to come. Yet, a cheaper pesticide is need for weed control. However, the used of pesticide can alter the gene of weed and it will resist toward the herbicide and a new herbicide is needed.

The scope of study is synthesis a herbicide. The herbicide is a derivative from benzaldehyde, cyclohexanone and phenyl hydrazine. The synthesis of the derivatives it will then be test with thin layer chromatography (TLC). After, it will separate by using a silica column. Then, it is tested with nuclear magnetic resonance (NMR) to structural confirmation. At last but not the least, the synthesised structure is subjected to herbicide bioassay test.

<https://assignbuster.com/synthesis-of-a-new-potential-herbicide/>

2. Significant of Study

The significant of the study is to synthesis a new potential herbicide. The synthesis of the potential herbicide is to allow a new herbicide to be accomplished in the market with new mode of action. The last invention of herbicide is at 1980's (WSSA, 2011). Most of the researchers have ford see the future and synthesis a lot of brand new technology in a lot of area. However, the urgent development of a new herbicide to enhance food productivity and quality had been a concern.

Herbicide resistant had been a serious matter to the world as it will affect food productivity. In nationwide, there are approximately 80% of herbicide resistant crop due to extensively use of a single type of herbicide. In side of these 80% herbicide resistant crop there are more than 90% were glyphosate resistant while the remaining percentages glufosinate resistant (Duke, 2014). Thus, the urge of synthesis a new herbicide is needed to allow more choice of herbicide.

In a conclusion, the need to develop a new herbicide is needed. It is to overcome the problem of increasing need of food, to resolve famine in Africa and improve food quality.

3. Objective of Study

The Objective of study is as below:

1. To synthesised benzyldehyde, cyclohexanone, and phenyl hydrazine derivatives as potential herbicide
2. To develop a new herbicide to resolve the problem of herbicide resistant

3. To characterise benzyldehyde, cyclohexanone and phenyl hydrazine derivatives
4. To overcome the problem of herbicide resistance

CHAPTER 2

LITERATURE REVIEW

2. 1 Pesticide

Human have the greatest mind of all among animal range from bacteria to the largest animal in the world. Human is creative. Mankind likes to solve problem. When there is a problem mankind tends to find out the ways to resolve the problems. As an example, there is a species of pest in the house and human use pesticide to eliminate it.

Pesticide is not something trendy in this era. It have been used since century ago and the animal that mankind label as pest can be kill by using pesticide. The history of pesticide can ancient Romans lived. In that era of time, sulfur is burned to eliminate insect pest and weed is controlled by using salt. Later at the 16th century, the ant which mankind label as pest is killed by using the mixture honey and arsenic mixture. In the 16 century also, the Chinese uses nicotine to control plum curculio(Hassall, 1990). Then, human in the 19th century try to develop an effective pesticide. To control pest the farmer in the field in that century used sulphur, copper acetoarsenite, nicotine sulphate and calcium arsenate as pesticide. However, the effects are not that effective (John, 2010).

There a lot of chemicals was introduce at post-world war II. The chemicals included BHC, aldrin, endrin, dieldrin, DDT, and 2, 4 D (Muir, 2012). These chemicals use widely in that era. DDT is used as pesticide because of cheap, high effective and low toxicology (John, 2010). Where 2, 4-D(agent orange) is being used as a herbicide due to inexpensive, high effective and easy to apply. However, pesticide have cost a lot of problem nationwide. During the world war II America used this herbicide, agent orange to attack Vietnam. In 1960's, there is a book named slient spring whom author name Racheal Carson have raise the awerenes toward the usage of herbicide. In the book of silent spring, the author explains the bioconcentration, bioaccumulation and biomagnifications through the food chain.

Pesticide can be categorized into many categories. These included acaricide, antimicrobial, attractant, avicide, fungicide, herbicide, insecticide, molluscicide, nematicide, piscicide, repellent, redenticide, and synergist.

Different type of herbicide will target different type of pest group (Delaplane, 1996).

Type of Pesticide	Target Pest Group
Acaricide	Mites, Ticks , spiders
Antimicrobial	Bacteria, Viruses, other microbes
Avicide	Bird
Fungicide	Fungi

Herbicide	Weeds
Insecticide	Insects
Molluscicide	Snails and Slugs
Nematicide	Nematodes
Piscicide	Fish
Predacide	Vertebrate Predators
Repellent	Repel pest
Rodenticide	Rodents
Synergist	Improves performance of another pesticide

Diagram 1, Types of pesticide and it's target group.

Adopted from, Delaplane, K. S. in pesticide usage in the united states: history, benefits, risks and trends

The usage of pesticide is wide. It can be use in agriculture, public health, industry, household, personal application and material building.

Usage of pesticide in India

Area	Usage
------	-------

<https://assignbuster.com/synthesis-of-a-new-potential-herbicide/>

Agriculture	For control of pests, weeds rodents, etc
Public health	For control malaria, filariasis, dengue, japanese encephalitis, cholera, louse-borne typhus
Industrial	Control of vegetation in forests and factory sites; fumigation of buildings and ships
Domestic	Houshold and garden spray, control of ecto-parasites in animals and
Personal	Application of clothing and skin, control of ecto-parasites (beas, lice)
Material Building	Incorporation of paints, timbers, glues, plastic protection, sheeting, foundation of buildings, etc

Diagram 2, usage of pesticide in India

Adopt from, Gupta, P. K.(2004), Pesticide Exposure- Indian scene

2. 1. 1 Role of Pesticide in Agiculture

The widely used of pesticide has cause some benefits to the nation as well as world. It was because the crop production annually will drop when pesticide is not used. One research had been done that when pesticide is ban, the crop production in United State alone will drop 73 percent. The decreasing in the crop production of groundnuts, cotton and soybeans will lead to instability of crop. At the same time, the decrease in crop production will affect the price of food and the famine in the world will increase (Delaplane,

<https://assignbuster.com/synthesis-of-a-new-potential-herbicide/>

1996; Knutson et. al., 1990). It was because increases in food crop production, pesticide is use in most of the developed countries. The increase of food crop production is simply because the resistant for plant to grow is minimized. Weed growth, insect attack and fungi can affect the nutrient availability in the environment.

By using pesticide, control of weed, insect and fungi can be done. Thus increase nutrients availability in the soil and it could maximised the condition for crop to grow (Hassall, 1980).

2. 1. 2 Effect of Pesticide

Since the beginning of civilization, human want to enchanced their living condition. The enchancement of living included increase food production. The increase of food production can be enchanced by the used of pesticide. However, pesticide has cause serious problem (Gupta, 2004 ; Gupta, 1989). The amount of pesticide in the environment may be little but It may post a threat. In India between the years of 1958 to 1992, there are a total of eight cases of pesticide poisoning in food (Gupta, 2004). Pesticide also post threat toward marine and fresh water living organism (Edge, et. al., 2014).

There is a study in Tanzania shows that it is having a high concentration of pesticide. In this country, pesticide leak to the environement as a result from improper storage. It has cause pesticide to run off to the river. After the split, high concentration of pesticide is detected from soil (Mahugijia et. al., 2013; Kishimba and Mihale, 2004). However, after 15 years the concentration of pesticide is still high in that area after the cleaning up process and the degradation of pesticide is found to be insignificant (Mahugija at. al., 2013).

2. 2 Herbicide and It's Mode of Actions

Weed is defined as a wild plant growing where it is not wanted and in competition with cultivated plants (Soanes and Stevenson, 2009). The first man who use the term weed is Jethro Tull in his book name “ The New Horse Hoeing Husbandary” in 1773. Jethro define weed as plant grow out of place, undesired plant on field, unwanted plant grow where it is not suppose to be, or plants and vegetation that obstruct plant growth. Thus, weed is undesirable plant growth (My agriculture information bank, 2011).

The existence of weed will have impact toward crop. There is a case study in India that show interaction between weed and crop. The result shows a decrease in crop production. Whereby, wheat reduced by 15-30%, rice by 30-35%, maize, pulse, oilseed and sorghum reduces 18-85% each (Gupta, 2007; Mukhoppadhyay, 1991-92 Balyan and Malik, 1994, Rita et. al., 1995 and yadav et. al., 1995). Existence of weed is also troublesome in some area. When the weed is present on the field, it made the work hard for applying fertilizers and hard to harvest the crop. The present of weed in field may also provide shelter for pest to live and it will further reduce the crop productivity. Thus, the present of weed had cause

2. 2. 1 Amino Acid Sythesis Inhibitors

2. 2. 2 Photosystem II Inhibitors

2. 2. 3 Auxins Typerherbicides

2. 2. 4 Mitotic Inhibitors

2. 2. 5 Photosystem I Inhibitors

2. 2. 6 Cellulose Biosynthesis Inhibitors

2. 3 Herbicide Resistance

2. 4 Multicomponent Reactions

2. 4. 1 Ugi Reactions

2. 4. 2 Biginelli Reaction

2. 4. 3 Sakurai Reaction

2. 4. 4 Strecker Reaction

2. 4. 5 Mannich Reaction

2. 4. 6 Hantzsch Reaction

2. 4. 7 Application of Multicomponent Reaction

Chapter 3

Methodology

3. 1

3. 2

3. 3

3. 4

3. 5

3. 6

Chapter 4

Expected Result

4. 1