بسم الله الرحمن الرحيم

Sudan University of Science and Technology

College of Graduate Studies

Residual Effect of Folimat 800 (Organophosphate) and Icaros Pesticides on Soil Fertility and Carrot Growth

اثر متبقي مبيدات الفوليمات (الفوسفات العضوي) ومبيدات الاكاروس في خصوبة التربة ونمو نبات الجذر

A thesis submitted to the Sudan University of Science and Technology in partial fulfillment of the Requirements to the Degree of master of Science in Agriculture.

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الآية

(فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ أَنْ يُقْضَى إِلَيْكَ وَحْيُهُ وَقُلْ رَبِّ زِدْنِي عِلْمًا).

صدق الله العظيم

سورة طه الآية (١١٤)

Dedication

'Every challenging* work *needs self efforts as well as guidance of elders especially those who were very close to our heart.

23y humble effort I dedicate to my sweet and loving

'Father & Mother,
sister and brother

Whose affection, love, encouragement and prays of day and night make me able to get such success and honor,

Along with all hard working and respected
Teachers

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Dr .Alsamowal Mohamed , laboratory staff at the college , kind gestures and friendly zienab during this study for their help and support, and my family for their endless support, kind and understanding spirit during our case presentation . to all relatives friends and others who in one way or another shared their support either normally financially and physically thank you. Above all to the great almighty the author of knowledge and wisdom for his countless love. I thank you

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Abstract

An experiment was carried out at Shambat Agricultural Farm (North), College of Agricultural Studies, Sudan University of Science and Technology, 4 December 2014 one season to study the effect of Folimat and Icaros pesticides residues on soil and carrot growth. Both pesticides were added at concentrations of 1.92 Kg/ha (recommended dose) and 2.88 Kg/ha (excessive dose) for folimat , but for Icaros 249.2 ml/ha (recommended dose) and 371.8 ml/ha (excessive dose) in addition to a control to evaluate their effect on plant and soil. Measurements taken are plant height/plant, leaf area, and fresh and dry weight.

pH, total nitrogen(%),phosphorus(ppm), organic carbon (%), soluble cations (Meq/L) :$Ca^{++}, Mg^{++}, Na^{+}, K^{+}$, soluble anions (Meq/L): CO_3, $HCO_3, Cl, CaCO_3$, *soil particle size analysis* (%)*and CEC (Meq/100g soil) and electrical conductivity of the saturation* extract EC_edS/m. *The two pesticides applied one month after plants.*

The results revealed that, both chemicals affected positively carrot vegetative growth at the recommended dose , but negatively at the excessive dose. Both pesticides reduced the measured soil characteristic.

The effect of pesticides on soil microorganism was used by serial dilution method and clearly observed at the recommended dose and at the excessive dose .

Key Words: Icaros, Folimat, Pesticides, Residues.

ملخص البحث

أجريت التجربة بكلية الدراسات الزراعية جامعة السودان للعلوم والتكنولوجيا (شمبات) خلال ديسمبر ٢٠١٤ م وذلك بهدف معرفة تأثير متبقيات مبيدي الفوليمات والاكاروس علي نمو الجذر وخصوبة التربة .

تمت إضافة النوعين من المبيدات بتراكيز مختلفة جرعة موصي بها (1.92كجم/هكتار) وجرعة زائدة ٥٠% ٢.٨٨ كجم/هكتار بالنسبة لمبيد الفوليمات. أما مبيد الأكاروس فهو ٢٤٩.٢ مل/هكتار جرعة موصى بها و ٣٧١.٨ جرعة زائدة ٥٠% على التوالي ثم بعد ذلك تم تقييم التأثير على النبات والتربة مقارنة مع الشاهد وتم تطبيق نوعين من المبيدات بعد شهر من زراعة الجذر.

تم اخذ قياسات النبات وهي طول النبات (سم)،الوزن الرطب والجاف(جم)،ومساحة الورقة (سم٢). وبالنسبة للتربة تم قياس الأس الهيدروجيني ،ونسبة النتروجين الكلي(%)، والفسفور(جزء في المليون)، حجم حبيبات التربة (الرمل ،السلت ،الطين%) ،التوصيل الكهربي في عجينة التربة المشبعة(دسم/متر) والسعة التبادلية الكاتيونية (ميليمكافي/١٠٠جرام تربة) ونسبة الكربون العضوي(%) وكذلك الكاتيونات الذائبة (ملمكافئ/لتر)، (الصوديوم والبوتاسيوم والكالسيوم+مغنزيوم) والانيونات الذائبة(ملمكافئ/لتر) (الكربونات والبيكربونات والكلور)، النسبة المئوية لكربونات الكالسيوم(%) .

وأوضحت النتائج ان المبيدات المستخدمة لها تأثير ايجابي علي نمونبات الجذر وخصوبة التربة عند إضافة الجرعة الموصي بها مقارنة مع الشاهد ولكن أكثر وضوحا في التركيزات العالية حيث ينقص طول النبات وقل الوزن الرطب والجاف وكذلك قلت مساحة الورقة.

كما أوضحت النتائج نقص خواص التربة عند قياسها عند الجرعة الزائدة. كذلك أثرت هذه المبيدات علي ميكروبات التربة عند قياسها بطرقة التخفيف المتسلسل بأنها قللت من أعداد الميكروبات في التربة عند الجرعة الزائدة من المبيدين مقارنة مع الجرعة الموصي بها.

الكلمات المفتاحية : إكاروس، فوليمات، مبيدات، متبقيات.

CHAPTER ONE

INTRODUCTION

The pollution has become a major problem given a lot of interest in view of the negative effects of human life. Contaminants up to the human body in the air we breathed in the water which we drinks and food that is eaten in the voices heard, not to mention the effects of eminent caused by pollutants property rights and resources different environment. The depletion of environmental resources renewable and non-renewable, it is an issue that threatens the lives of future generations (Zaki, 1978).

It is unfortunate that most of the factors causing the pollution is man-made factors, and have grown more serious with industrial progress, and with the huge expansion in the use of energy, increased economic development projects, especially those that ignored the environmental issue and neglected environmental protection and conservation.

The agricultural environment can support a variety of unwanted organisms that reduce the yield and value of crops. Modern agriculture must use measures to control the population density of these pests to remain economically viable. Thus herbicides, insecticides, fungicides, nematocides, and biocides, collectively called pesticides are used to kill weeds, insects, fungi, nematodes and everything respectively. Unfortunately leaching into the soil, run-off, and volatilization move these chemicals into ground and surface waters, and into the atmosphere (.Merrington *et al* ,2002). Detection of trace levels of pesticides throughout the environment concerns about their impact on humans and other non-target organisms, pesticides and other organic chemicals in soil and water can be degraded by photolytic, chemical and biological mechanisms. Photolytic degradation can occur when a pesticide molecule is irradiated by sunlight. Chemical degradation occur when the

molecule is chemically unstable in the conditions of its environment (Edward 1997).

Pesticides have become an integral part of modern farming with most crops receiving at least one and usually many more applications. Pesticides are a cause of pollution, affecting land and water in particular. The problem is huge and growing.

Pesticides cause pollution by running off agricultural fields and from horticultural land and domestic gardens, too. Rain water washes the chemicals into nearby water sources (Mohamed,1979). The pesticides used in the study are Folimat 800 and Icaros.

Dirk *et al*, (1997) stated that the concept of soil as environment for microbial life is based on a number of truisms and on a number of traditional but unsupported assumptions. Among the truisms are that soil is complex habitat and that it has a high solid/liquid ratio which distinguishes it from most other natural habitats.

Among the unsupported assumptions are that soil is an unfavorable environment for microbes and that the ecology and species diversity of microbes in soil.

On the basic of a cursory and superficial overview soil should be a bad habitat for microbes as it is generally poor in available nutrients (specially in available carbon and energy sources, although limitations in other nutrients may be as or more restrictive), and it is constantly exposed to the vagaries and extremes of the environment conditions that are conductive to microbial growth (e.g. available water, temperature, radiation, nutrients, osmotic pressure).

Some of these species are present in low numbers, probably because the condition for their survival and growth are restricted to discrete sites in which

the nutritional and other physicochemical environmental factors necessary for their establishment, growth, and survival are located. Consequently in terms of the number and diversity of microbes in soil it appears to be a good habitat for microorganisms despite the apparent limitations for their survival and growth probably because microbes indigenous to soil are well adapted to this austers environment .

Carrot (Daucus carota L) is a biennial crop grown as annual for its root. It is one of most important vegetable crop that grown for nutritional and economic values. The area under carrot production is Sudan is increased annually. The expansion of the production is challenged by many slow growing and lack of competitiveness with weed early in the season. Pests has significant impacts in both yield quantity and quality. Pesticides are used for controlling the pest.

Based on the above mentioned. This study was in eated to study the effect of two pesticides in Carrot growth a vegetable group and soil fertility.

1.1 The research problem

The excusive used of pesticides effect on soil fertility and carrot plant growth

1.2 Objectives:

1. To study the effect of pesticides folimat and Icaros on carrot plant growth.
2. To study the effect of pesticides folimat and Icaros on soil fertility.
3. To study the effect of pesticides folimat800 SL and Icaros on soil microorganism.

1.3 Hypothesis:

A. pesticides decrease soil fertility and microorganism and affect the growth of carrot plant.
B. pesticides use to kill pest but also they have their effect on soil and plant growth.

CHAPTER TWO

LITERATURE REVIEW

2.1 Carrot

Plant used in the study was Carrot (Daucus carota L) Family: Apiaceae/Umbelliferae vegetative growth. Ben-Erik *et al* . (2011) said that Carrot have been grown around the world for thousands of years, but the common orange varieties have only been in favour in relatively recent times.

There are many varieties of carrots available, the soil type is the major factor. Long-rooted varieties are best suited to light, friable soil; which the heavy clayey, shallow or doesn't drain well, short-root types. Carrots are a root vegetable, storing food reserves underground and are very hardy. The best time for sow they is in spring to early summer (September-January). For a continuous harvest, plant a few rows of carrots every 4-5 week.

2.1.1 :Origin and distribution

Carrot is believed to have originated in Afghanistan which remains the centre of diversity of D. carota. They were known to the Greeks and the Romans and their early use was mainly medicinal, to cure stomach problems and treat wounds, ulcers, and liver and kidney ailments.

The greatest development and improvement of the original wild carrot that had thin, long roots took place in France. Carrots are now a popular vegetable grown all over the world (Ben-Erik *et al* , 2011).

The carrot is an erect, biennial plant, 30-100 cm in height , the root is the edible part and it is basically a swollen base of the tap root that also includes the hypocotyls. It is conical and its length varies from 5 to 25 cm the colour of the roots varies from white, yellow, orange-yellow, light purple deep red to deep violet, the stem consists of a small plate-like 'crown, Leaves are

produced in the first season. They have long petioles and are pin- nately‹ compound , the inflorescence is a terminal compound umbel, subtended by pin natifid bracts. The flowers of the umbel are white except for the central ones which are either red or purple. Flowers are produced in the second year, Like flowers, seeds are produced in the second year. Carrot seeds contain essential oils, Carrots don't like transplanting - direct seeding is the best option. Carrot seeds are very small, but to give them the best chance (and to save yourself time later), plant them as thinly as possible. The seeds are directly sown in the field on ridges or raised beds. Row planting is preferred to broadcast sowing. To help with this, try mixing the seed with sand, or try planting carrot and radish seeds together - radishes mature first and harvesting automatically thins the carrot crop.

Make a trench 2-3 cm deep and plant seeds about 2-5 cm apart, covering the seeds once planted. This helps with thinning, weeding and mulching later (Simon, 2010).

Carrots take 10-14 days to germinate and in this time their soil needs to be kept moist. A piece of shade cloth over the area is often used to retain moisture until the plants germinate. A light layer of dry grass clippings is

an alternative, The carrot is a cool weather crop and it also does well in warm climates. The optimum temperature for growth is between 15 to 20 °C. Temperatures below 10°C cause longer, more slender and paler roots. Shorter, thicker roots are produced at higher temperatures. Extended periods of hot weather can cause strong flav our and coarse roots. Development is also slower in winter than in spring and summer, Carrots require a steady supply of moisture and it must be maintained at above 50 % of available moisture throughout growth. Generally, carrots require approximately 25 mm of water per week but under warm, dry conditions will be required 50 mm, The trick to success with carrots is in the soil, they prefer a light, loose, fertile soil and a sunny spot.

.

Start preparing your soil in late winter or early spring until it has a fine crumbly texture. It's best not to add organic material as it makes the soil too rich for the seeds. If you really need to, make sure it's evenly applied and incorporated well before planting. Deep, loose, well-drained sandy to loamy soils, not subject to capping, with a pH of 6.0 to 6.5 are ideal for carrot production. The crop produced in humus rich soils tends to increase in foliage excessively and forms forked and hairy carrots. The roots also tend to be more rough and coarse on the outside.

Black soils should also be avoided as carrots are very sensitive to saline soils. The soil should never be allowed to dry out. Too much moisture causes short carrots with light colour and a larger diameter. The field should be irrigated lightly immediately after sowing. Irrigation water should be applied once or twice a day using a solid-set sprinkler system. Watering should gradually be reduced to prevent longitudinal splitting of the roots when the crop approaches maturity. Water stress during root development also causes cracking of the roots, which also become hard, Carrots are consumed fresh as a salad crop or cooked. They are also processed either alone or mixed with other vegetables. The juice is extracted and used as a drink.Tender roots are pickled or made into jams and sweetmeats in some countries. Carrot cake and carrot pudding can also be made.

Carrots are said to be rich in ß-carotene, dietary fibre, antioxidants and minerals (Mohamed,2001).

2.1.2: The importance of carrot

Need for preface before to out line important:

- Vitamin A
- Article carotene

- A high proportion of carbohydrates (starches: such as bread and rice , and potatoes , and pasta), which consists mainly of (sucrose and glucose and fructose in addition to cellulose and Alljugintin and other materials Pectic),
- Needless materials protein , amino acids,
- Contains a large amount of influence alkaline salts salts of potassium and a small quantity of salts of sodium , calcium , boron , iodine , etc.,
- And contains many vitamins, including: (a) b - b 2 - 6 b - c - d f
- Characterized by a high proportion of vitamin PP, which is rarely found in other vegetables .

Vegetables play a key role in human nutrition and the time required for the vital activity daily energy where vegetables occupies an excellent position among other foods in all environments and times due to the extreme importance to the life and safety and human health.

And vegetables and a natural source of cheap and accessible to people with limited income they provide some human daily food needs. In Sudan, we find that the average annual per capita consumption of vegetables is estimated at 43 kg, a little Makorn rate if the average annual per capita in the Arab world, which is estimated at 136.8 kg in 1997.

Where vegetable consumption in the Khartoum area and central Sudan annual per capita consumption rate of vegetables to60-65 kg respectively, while we find that per capita consumption in the Darfur region is currently only 10 kg and attributed the variation in per capita consumption in different regions of the variation of per capita income and the varying pattern of food, so care must be taken to increase production and food awareness (Abdella *et al* 2003).

2.1.3: Factor effect of vegetables growing

Soil is the foundation for growing plants. Plants will thrive in a good soil and struggle in a poor soil. In order to treat your soil well, you need to learn as much about it as possible. One of the best ways to learn about your soil is by testing it.

Soil testing can provide information about the soil pH, nutrient levels, ability to hold nutrients organic matter content, and soluble salt levels.

Using the unique results from your soil test recommendations are provided for adjusting pH and nutrient levels, depending on who performs the soil testing.

2. 1.3.1: Adjusting Soil pH

Soil pH is a measure of how acidic or alkaline a soil is. In general, vegetables grow best with a soil pH between 6.0 and 6.5. Soil test results may indicate a need for a liming material if the pH is lower than 6.0. Whenever possible, apply a liming material during fall before planting to provide several months for these materials to begin reacting with soil particles.

2. 1.3..2: Organic Matter Content

The organic matter content of a soil can be analyzed as an additional test when submitting a soil sample through Penn State. Most vegetables grow best in soils with organic matter contents between 2 and 5 percent.

2.1.3.3: Soluble Salt Levels

A soil's soluble salt level can also be analyzed as an additional test. High soluble salt levels (beginning at below 0.40 ds/m per centimeter for some salt-sensitive vegetables) can be harmful to plants.

2.1.3.4: Adjusting Soil Nutrient Levels

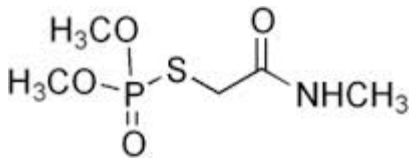
You will need fertilizers or soil amendments to replenish nutrients depleted from a soil. Vegetables remove nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), and magnesium(Mg) from soil in quantity. You will most likely need to replenish these favorable nutrients .

2.1.3.5: Exposure to Sunlight

Vegetables need sunlight in order to grow well and produce large yields. A good site receives a minimum of 6 hours of full sun each day with 8–10 hours being ideal. Consider shading from buildings, fences, trees, and shrubs when selecting your garden site. Vegetables do not compete well with trees or other plants for sun light, moisture, and nutrients. When selecting a garden site, avoid the vicinity of large trees even if the vegetables would not be shaded to any great extent. Sites with southern exposures are generally warmer than those with northern exposures.

2.2. FOLIMAT 800 SL

fOLIMAT 800 SL (Omethoate)



Omethoate ($C_5H_{12}NO_4PS$) is a systemic organophosphorous insecticide and acaricide available as a soluble concentrate. It is used to control insects and mites of sucking and chewing pests of vegetable, fruit, field forage and ornamental grops, etc, in horticulture and agriculture, as well as in the home garden.

It is an irritant to the skin and mucous membranes. Omethoate is known to be fatal or debilitating to warm blooded animals.

Its toxicity and hazard potential are still under review because of concerns about its safety.

http://en.wikipedia.org/wiki/Omethoate

2.2.1 :Chemical Characterisation

O,O-dimethyl-S-(N-methyl-carbamoylmethyl)-phosphorothioate.

Hazard classification :1b.

2.2.1.1: Chemical Group: Organophosphate

2.2.2: Physical Description/Properties

soluble liquid , light brown , aromatic ,

2.2.2.1: Boiling Point: 146°C at 100kPa (solvent)

2.2.2.2: Freezing/Melting Point: No specific data. Liquid at normal temperatures.

2.2.2.3: Volatiles: No specific data. Expected to be low at 100°C.

2.2.2.4: Density (kg/L): Specific gravity approx. 1.19 to 1.32 at 20 degrees Centegrate.

2.2.2.5: Vapour Pressure: 0.3x10Exp-4 mm Hg (active constituent) at 20 degrees Centegrate.

2.2.2.6: Viscosity: not established

2.2.2.7: Vapour Density: 4.6 Kg/L

2.2.2.8: Specific Gravity: 1.2 approx at 20°C

2.2.2.9: Solubility in Water: soluble . readily soluble in alcohols, aceton,and many hydrocarbon. Slightly soluble in diethyl ether. Almost insoluble in petroleum ether.

2.2.2.10: pH Value: 2.8-3.8 (1% in water)

2.2.2.11: color: yellowish

A number of phosphate and thiophosphate esters are of limited thermal stability and undergo highly exothermic self-accelerating decomp reactions which may be further catalyzed by impurities ... /Phosphorus esters/

2.2.3: Health Effects:

Major Health Hazards: toxic if swallowed, danger of cumulative effects, harmful in contact with skin, eye irritant, possible skin sensitiser. Signs and symptoms associated with mild exposures to organophosphate and carbamate pesticides include: headache, fatigue, dizziness, loss of appetite with nausea, stomach cramps and diarrhoea; blurred vision associated with excessive tearing; contracted pupils of the eye; excessive sweating and salivation; slowed heartbeat, often fewer than 50 per minute; rippling of surface muscles just under the skin.

These symptoms may be mistaken for those of flu, heat stroke or heat exhaustion, or upset stomach. Moderately severe organophosphate and carbamate insecticide poisoning cases exhibit all the signs and symptoms found in mild poisonings, but in addition, the victim: is unable to walk; often complains of chest discomfort and tightness; exhibits marked constriction of the pupils (pinpoint pupils); exhibits muscle twitching; has involuntary urination and bowel movement. Severe poisonings are indicated by incontinence, unconsciousness and seizures.

2.2.4: Personal Protective Measures

Product and spray are poisonous if absorbed by skin contact, inhaled or swallowed.

Repeated minor exposure may have a cumulative poisoning effect or may cause allergic disorders. Avoid contact with eyes, skin and clothing. Do not inhale spray mist.

*www.fedpest.com/fedweb/health.../**Folimat**%20800_MSDS_0907.pdf*

2.2.5: Flammability

Protection Against Fire: Product is stable. Avoid strong oxidising agents. Not flammable under normal conditions of use.

2.2.6: Storage

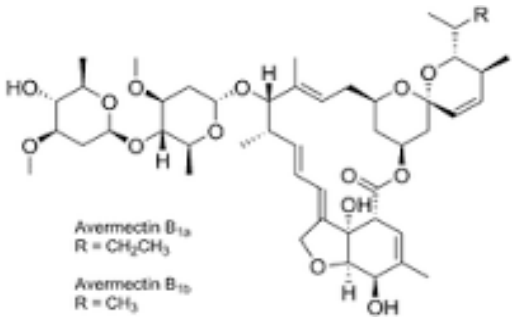
Keep out of reach of children. Store in the tightly closed original container in a dry, well ventilated area, as cool as possible. Do not store for prolonged periods in direct

sunlight. Do not store near any material intended for use or consumption by humans or animals.

*www.fedpest.com/fedweb/health.../**Folimat**%20800_MSDS_0907.pdf*

2.3. Icaros 1.8% EC

Icaros (Abamectin) is a widely used insecticide and anthelmintic



2.3.1: How it works (Mode of Action)

Abamectin attacks the nerve system of insects and mites, causing paralysis within hours. The paralysis can not be reversed.

Abamectin is active once eaten(stomach poison) although there is some contact activity. Maximum mortality occurs in 3-4 days. It Controls mites, leafminers, pear psylla, cockroaches, and ants.

Abamectin is a mixture of avermectins containing more than 80% avermectin is it aB1 and less than 20% avermectin B1b. These two components, B1a and B1b have very similar biological and toxicological properties. The avermectins are insecticidal and antihelmintic compounds derived from various laboratory broths fermented by the soil bacterium *Streptomyces avermitilis*. Abamectin is a natural fermentation product of this bacterium.

*en.wikipedia.org/wiki/**Abamectin***

2. 3.2: Activity and use

Abamectin is an insecticide as well as an acaricide and a nematicide.

is used to control insect and mite pests of a range of agronomic, fruit, vegetable and ornamental crops, and it is used by homeowners for control of fire ants. Abamectin is also used as a veterinary antihelmintic. Resistance to abamectin-based antihelmintics, although a growing problem, is not as common as to other classes of veterinary antihelmintics. The benzoate salt emamectin benzoate is also used as an insecticide.

For optimum control, apply abamectin when the leaves are young to allow better absorption into leaf tissue. This will extend the residual control period.

As leaves age and harden off they lose the ability to take up abamectin and residual control is greatly reduced. *en.wikipedia.org/wiki/**Abamectin***

2.3.3: Environmental Considerations

Rapidly degraded in soil, Immobile in soil and unlikely to leach or contaminate groundwater, Rapidly degraded in water, Abamectin is stable at water at pH's of 5, 7 and 9, Plants do not absorb abamectin from the soil and

Toxic to fish, non-target insects and wildlife; follow label instructions for applying near aquatic and sensitive terrestrial habitats.

www.agf.gov.bc.ca/pesticides/infosheets/abamectin**.pdf**

2.3.4: Restrictions

Do not apply by air, Follow label instructions for frequency and number of applications per year or crop, Do not apply through irrigation systems, Do not apply within 35 metres upwind of aquatic areas or when wind speed is above 13 kph, Do not use during a temperature inversion and It is a violation of the Pest Control Products act to use this product in a manner inconsistent with its labeling .

*www.agf.gov.bc.ca/pesticides/infosheets/**abamectin**.pdf*

2.4. Pollution

Pollution is the introduction of contaminants into the natural environment that cause adverse change. Pollution can take the form of chemical substances or energy, such as noise, heat or light. Pollutants, the components of pollution, can be either foreign substances/energies or naturally occurring contaminants. Pollution is often classed as point source or nonpoint source pollution.

http://en.wikipedia.org/wiki/Pollution

2.4.1: Type of pollution

- Air pollution: the release of chemicals and particulates into the atmosphere. Common gaseous pollutants include carbon monoxide, sulfur dioxide, chlorofluorocarbons (CFCs) and nitrogen oxides produced by industry and motor vehicles. Photochemical ozone and s mog are created as nitrogen oxides and hydrocarbons react to sunlight. Particulate matter, or fine dust is characterized by their micrometre size PM_{10} to $PM_{2.5}$.

- Light pollution: includes light trespass, over-illumination and astronomical interference.
- Littering: the criminal throwing of inappropriate man-made objects, unremoved, onto public and private properties.
- Noise pollution: which encompasses roadway noise, aircraft noise, industrial noise as well as high-intensity sonar.
- Soil contamination: occurs when chemicals are released by spill or underground leakage. Among the most significant soil contaminants are hydrocarbons, heavy metals, herbicides, pesticides and chlorinated hydrocarbons.
- Radioactive contamination: resulting from 20th century activities in atomic physics, such as nuclear power generation and nuclear weapons research, manufacture and deployment. (See alpha emitters and actinides in the environment.)
- Thermal pollution: is a temperature change in natural water bodies caused by human influence, such as use of water as coolant in a power plant.
- Visual pollution: which can refer to the presence of overhead power lines, motorway billboards, scarred landforms (as from strip mining), open storage of trash, municipal solid waste or space debris.

- Water pollution: by the discharge of waste water from commercial and industrial waste (intentionally or through spills) into surface waters; discharges of untreated domestic sewage, and chemical contaminants, such as chlorine, from treated sewage; release of waste and contaminants into surface runoff flowing to surface waters (including urban runoff and agricultural runoff, which may contain chemical fertilizers and pesticides); waste disposal and leaching into groundwater; eutrophication and littering soil pollution. http://en.wikipedia.org/wiki/Pollution

2.4.2: Pollutants

A pollutant is a waste material that pollutes air, water or soil. Three factors determine the severity of a pollutant: its chemical nature, the concentration and the persistence.

http://en.wikipedia.org/wiki/Pollution

Various pollutants and their harmful effects on the environment are as under. (Khitoliya, 2004).

1.Organic wastes enter the soil pores and decompose. Pathogenic bacteria spread infection. Hookworm and helminthes also cause diseases.

2. Compounds containing arsenic, mercury, chromium, nickel, lead, cadmium, zinc and iron are toxic of life. Fluorides also affect the plant development.

3. Excess use of Na, Mg, Ca, K, S, Zn, Fe in the form of fertilizers and pesticides inhibit plant growth and reduce crop yield. The need is to keep the dosage at an optimal level.

4. Water logging and salinity increase the dissolved salt content in ground water and also the soil. Some plants are very sensitive to soil pH and salinity. Thus land becomes unfit for irrigation due to such conditions.

2.5. Agricultural pollution

Agricultural pollution refers to biotic and abiotic byproducts of farming practices that result in contamination or degradation of the environment and surrounding ecosystems, and/or cause injury to humans and their economic interests. The pollution may come from a variety of sources, ranging from point source pollution (from a single discharge point) to more diffuse, landscape-level causes, also known as non-point source pollution. Management practices play a crucial role in the amount and impact of these pollutants. Management techniques range from animal management and housing to the spread of pesticides and fertilizers in global agricultural practices.(Gmerrington *et al*, 2002).

2.5.1: Some studies showed that a pollutant is a substance including

Deliberately introduced into the environment (e.g. pesticides, fertilizers, genetically modified crops and sewage sludge), Produced by agricultural processes as wastes (e.g. silage effluent and livestock slurry) and

Produced by the enhancement of natural processes in the course of agricultural activity (e.g. increased nitrous oxide emissions from cultivated soil or soil erosion) (Roy,1976).

Quality of natural resources, notably the physical, biological and chemical condition of soil, water and air.

Composition and functioning of terrestrial, aquatic and marine ecosystem including issues of biodiversity and habitat quality and Other environmental impacts such as public nuisance caused by odurs from livestock production.

The occurrence of pollution in agricultural system is well documented (Isherwood, 2000; EFMA, 2001) and the precise effect on the natural environment is mediated by the interaction between environmental factors and farm management

2.5.2: Sources of pollution

1/ Pesticides. According by (Gue etal 2006 and Gullan and cranston (2010)).

2/ Fertilizers.

3/ Organic contaminations. According by (Panagos 2013)

4/ Heavy metals. According by (Ganje, 1966).

5/ Land management.

A / Tillage and nitrous oxide emissions. According by (MacKenzie, 1998)

B / Soil erosion and sedimentation. According by (NAP, 1993 and Dudal, 1981 and Hangsleben, and Suh,2006).

2.5.3. Pollution Effects On Plants and Trees

Although there are so many effects on humans, animals, plants and the environment by pollution, we only discuss the effects of pollution on plants and trees. Some of them are outlined here as follows:

2.5.3.1 Air Pollution

- Acid rain can kill trees, destroy the leaves of plants, can infiltrate soil by making it unsuitable for purposes of nutrition and habitation
- Ozone holes in the upper atmosphere can allow excessive ultraviolet radiation from the sun to enter the earth causing damage to trees and plants

- Ozone in the lower atmosphere can prevent plant respiration by blocking stomata (openings in leaves) and negatively affecting plants' photosynthesis rates which will stunt plant growth; ozone can also decay plant cells directly by entering stomata.
- *www.forestrynepal.org › ... › Environmental (locality) factors › Pollution*

2.5.3.2 Water Pollution

- May disrupt photosynthesis in aquatic plants and thus affecting ecosystems that depend on these plants
- Terrestrial and aquatic plants may absorb pollutants from water (as their main nutrient source) and pass them up the food chain to consumer animals and humans
- Plants may be killed by too much sodium chloride (ordinary slat) in water
- Plants may be killed by mud from construction sites as well as bits of wood and leaves, clay and other similar materials
- Plants may be killed by herbicides in water; herbicides are chemicals which are most harmful to plants.
- *www.forestrynepal.org › ... › Environmental (locality) factors › Pollution*

2.5.3.3 Soil Pollution:

- May alter plant metabolism and reduce crop yields
- Trees and plants may absorb soil contaminants and pass them up the food chain.
- *www.forestrynepal.org › ... › Environmental (locality) factors › Pollution*

2.5.4 The Effects of Pollutants on Plant Structure

Pollution enters the environment from diffuse sources. The causes can be outright, such as the emissions from a coal-burning power plant. Other times, the source may be hard to identify, such as nonpoint source pollution (NSP), where there can be several contributors contaminating surface water.

Pollutants can be substances, like pesticides, that do not naturally occur in the environment. Naturally occurring substances also carry risks by disrupting the chemical balance in the air or water. A pollutant, therefore, is any substance that can cause harm. The effects of pollutants can easily be detected on plant structure.

*smallbusiness.chron.com/**effects-pollutants-plant**-structure-17119.html*

2.5.4.1 Leaf Structure

Pollutants such as ground-level ozone physically damage leaves by causing chlorosis, or an abnormal yellowing of the leaves, resulting from a deficiency of chlorophyll. Chlorophyll is vital for photosynthesis. This molecule fuels the food-making process by capturing energy from the sun. Without chlorophyll, a plant cannot manufacture food or energy. In areas with high concentrations of ozone, parts of the leaf will die as a result of exposure.

*smallbusiness.chron.com/**effects-pollutants-plant**-structure-17119.html*

2.5.4.2 Delayed Flowering

Exposure to vehicle exhaust impacts plant structure by delaying the flowering of exposed plants, as reported in a study published in the journal "Environmental Pollution." A stressed plant will not flower but, rather, will use its resources to survive the threat. The study also noted an increase in senescence or plant aging. Because of the concentration of emissions, plants in urban environments were identified to be at the greatest risk.

*smallbusiness.chron.com/**effects-pollutants-plant**-structure-17119.html*

2.5.4.3 Root Damage

Whether the source is acid rain caused by sulfur dioxide emissions or acidic mine drainage from abandoned mines, acidic soils create a complex scenario that results in plants' failure to thrive. Acidic conditions mobilize aluminum

ions, normally present in a non-harmful form in the soil. The mobilized aluminum damages root systems and prevents calcium uptake. The result is an overall slowing of plant growth from a lack of nutrients. Aluminum and other heavy metals can further impact plant structure by reducing soil bacteria. A reduction in soil micro-organisms prevents the breakdown of organic matter, resulting in a reduction of available nutrients.

*smallbusiness.chron.com/**effects-pollutants-plant**-structure-17119.html*

2.5.4 .4 Stomata Damage

Stomata are the tiny pores found on leaves. Their function is to act as sites of gas exchange between the plant and the atmosphere. Carbon dioxide is taken up through the stomata and oxygen released during photosynthesis. Pollution negatively impacts this plant structure by reducing the size of the stomata, as reported in a 2005 study published in the journal "Cellular and Molecular Life Sciences." When gas exchange is compromised, photosynthesis slows. *smallbusiness.chron.com/**effects-pollutants-plant**-structure-17119.html*

2.6. Agricultural soil contamination

2.6.1: The concept of agricultural soil contamination

- Agricultural soil pollution depends on the type of contamination, recipes ground, weather conditions and factors be immediate, such as earthquakes, volcanoes or imperceptibly such as the use of pesticides and mineral fertilizers and re-use of wastewater to irrigate the land(Ahmed ,1993).

- Contaminants that mixes agricultural soil lose fertility as cause killing bacteria responsible for the analysis of organic material in the soil and nitrogen fixation element out. But the soil may contain

biological components may be pathogens of bactria and fungal and viral protozoa and micro-organisms.

- Soil may contain sources of infection of intestinal worms eggs and larvae, which may reach the soil directly by humans or through irrigation water contaminated with sewage water and some of these worms cause serious diseases such as anemia and liver disease, kidney and intestines.

- Maintain soil from pollution and degradation of the imperative necessities of the times they relate to health and human existence.

- The environmental awareness is the most important ways to keep the soil from pollution is achieved by raising the educational and cultural level and teach people how to deal with the soil so that it becomes part of the individual's behavior where The preservation of soil pollution is a collective responsibility that requires full conviction responsibility of individuals to the soil so that it maintained a reality (Article , 2013).

2.6.2: pollution and its effect on the environment

Many researches is the would stated important facts about

Pollution is one of the biggest killers, affecting more than 100 million worldwide and more than 1 billion people worldwide don’t have access to safe drinking water and 5000 people die every day as a result of drinking unclean water.

Pollution kills more than 1 million seabirds and 100 million mammals every year.

People who live in high-density air pollution area, have 20% higher risk of dying from lung cancer, than people living in less polluted areas.

Every year around one trillion gallons of untreated sewage and industrial waste is dumped in the U.S water.

More than 3 million kids under the age of 5 years die every year due to environmental factors like pollution.

Almost 80% of urban waste in India is dumped in the river Ganges.

Acidification of the ocean is the worst type of pollution. Oceans are becoming more acidic due to green house emissions from fossil fuel.

Livestock waste majorly contributes to soil pollution. During monsoon, water runs over the fields carrying dangerous bacteria from the livestock into the streams.

More than 100 pesticides in any medium- air, water or soil can cause birth defects, gene mutation and cancer.

There are more than 500 million cars in the world and by 2030 the number will rise to 1 billion. This means pollution level will be more than double.

Around 1000 children die in India every year due to diseases caused from the polluted water and in India, the Ganges water is gradually becoming septic, especially due to dumping of half burnt dead bodies and enshrouded babies.

Scientific research has proven that carbon dioxide emissions are lowering the pH of the ocean and are acidifying them even more.

Americans buy more than 29 million bottles of water every year. Only 13% of these bottles are recycled every year.

Tsunami in Japan during the year 2011, has created a debris of 70 miles, which consists of cars, plastic, dead bodies and radioactive waste.

Cadmium is a dangerous pollutant that kills foetus' sex organ cells. It is wide spread in many things that we eat and drink.

Pollution in China can change the weather in United States.

World Health Organization (WHO) estimates 6400 people die every year in Mexico due to air pollution.

A single person in United States produces 2 kilograms of garbage every day.

The UAE is one of the biggest waste producer and water consumer.

Most of the hazardous pollutants that are discharged in the atmosphere each year are released to surface water, ground water, and land.

Approximately 3 billion people without proper shelter and healthcare cook and heat their homes using open fires and leaky stoves, thus contributing more towards pollution and global warming. World Health Organization (WHO).

If you think that you don't smoke and you will be spared by lung cancer, just remember that your lungs or heart may be similarly damaged simply from exposure to ozone and particulate matter.

Places which are near to high traffic roads, seaports or rail yards are dangerous place to live or work as they contain more concentrated levels of air pollution.

In cities, where there is huge traffic and vehicles run bumper-to-bumper, the pollutants in the air can seep into your car making the air you breathe inside your car up to 10 times more polluted than typical city air.

Public transportation and car pooling can help you to reduce air pollution and save money up to a great extent.

Reduce soil fertility, productivity and plant growth.

*www.conserve-energy-future.com/various-**pollution-facts**.php*

2.7. Pesticides in the soil

The soil is not only important for food production; it performs other essential environmental functions, including acting as a carbon-sink، breaking down atmospheric pollutants, and maintaining the natural cycling and recycling of nutrients. Agricultural use can have significant positive and negative impacts on the soil, and the use of fertilisers in particular has reduced our dependence on natural soil processes. Some pesticides (certain herbicides and fungicides, for example, and a small number of products used to control potato elworm) can persist in the soil, where they may affect organisms that play a part in these processes. Effects on 'indicator' soil organisms are assessed as part of the regulatory process, but the overall effect of pesticide use on soil functions is a subject of ongoing research.

Plants on which we depend for food are under attack from insects, fungi, bacteria, viruses rodents and other animals, and must compete with weeds for nutrients. To kill unwanted populations living in or on their crops, farmers use pesticides.

2.7.1: Pesticides and pollution of the soil

pesticides affect soil quality Pesticides decrease biodiversity in the soil because they do not just kill the intended pest; they often kill many of the other small organisms present.

When life in the soil is killed off, the soil quality deteriorates and this has a knock-on effect upon the retention of water. This is a problem for farmers particularly in times of drought. At such times, organic farms have been found to have yields 20-40% higher than conventional farms.

Soil fertility is affected in other ways, too. When pesticides kill off most of the active soil organisms, the complex interactions which result in good fertility break down.

Pesticides not only bring toxic effect on human and animals but also decrease the fertility of the soil. Some of the pesticides are quite stable and their bio- degradation may take weeks and even months.

Pesticides in soil and ground water (Harold and Mary, 1982).

2.7.2: The effect of pesticides on soil

A bdel Muntalab,(2007)Soil is the center where the plant, one of the surrounding components of the environment such as temperature, humidity, light, and other factors are considered factors which affect one way or another on the plant, the soil susceptible to contamination with toxins, especially insecticides and fungicides as well as herbicides that link to it directly or indirectly.

These materials may lead to loss of soil and natural chemical properties and biological and then become non-cultivation and therefore face a lot of attention to the study of soil contamination in the near term and long term by a very large number of researchers in the field of pesticides where ate the

impact of pesticides on the soil as well as the impact of this soil on the one hand other pesticides behavior has included some researchers study follows:

1. The accumulation of pesticides in the land as a result of the accumulation of use year after year.
2. Phenomenon of adsorption of pesticides from their solutions processed in organic solvents by some of the diluted material was found from the study that no adsorption of pesticide Aluxavin in various solvents with a kaoline and Badra, talc and calcium carbonate and calcium sulfate while carcol succeeded in adsorption of toxaphene from ethanol, propanol and Alaivibrobanul and acetone, benzene and normal hexane and Alaathel acetate In all cases, the occurrence of equilibrium after one hour and did not Itathermadl adsorption prolong the time until 24-28 hours while the effect of the private pesticide user a large concentration factor has been the amount of toxaphene adsorbed increased with increasing the amount of pesticide.
3. Stated that the use of ratios recommended rare Matsal concentrations in the soil at more than 2.3 ppm with a homogeneous mixing of the depth of 5 cm hypothesis.
4. The presence of contamination, especially in the surface layers of soil and this pollution include pesticides DDT and organochlorine pesticides.

2.7.3: The effect of pesticides on the plant

A bdel Muntalab, (2007) It has been shown that most of the pesticides that are used on the plants occur its impact after it implemented through the plant tissue where transmitted through the plant members and then intervene in the representational activity of the plant resulting in changes in the chemical composition of the plant and the effect varies depending on the type and nature of the pesticide user as well as the type of plant laboratories and has caused some phosphorous pesticide effects harmful to plant cotton also

caused some herbicides distortions plants not treated mainly (untargeted) has said scientists study follows:

1. Occurrence of serious effects on plants result of the transaction with pesticides.
2. Noted that the installers Alaakatan and parathion cause a marked decrease in transpiration and photosynthesis construction.
3. Nitrogen to accumulate in the cotton plant after treatment Baldpetrkouhaamad Uthovosforak I have found large amounts of securities in total Altroyjan treatment effects did not occur in any transactions while increasing potassium content of phosphorus.
4. The treatment bed nets led to a severe shortage in the concentration of zinc, manganese and copper elements while activation occurred in the element potassium.

2.7.4: Effects of Pesticides on Soil Micro-Organism

- Micro-organisms are organisms that are too small to be seen with the human eye. They live on the top-most layer of soil. There are many micro-organisms which live in the soil including Bacteria, Fungi

  Algae and Protozoa.

Micro-organisms are responsible for the decomposition and recycling of organic materials in the soil. They aid in the plant's absorption of essential nutrients. An example of this is the nitrogen fixing bacteria, *Bradyrhizobium*, which lives in a nodule on the soybean plant. It provides nitrogen to the plant and boosts growth.

The effects of pesticides on soil micro-organisms can cause a ripple effect that can last for years. Micro-organisms are essential to healthy soil. Without them, your plants will not reach their true potential.

2.7.4.1:Biopesticides

Biopesticides are micro-organisms that can help a plant defend it self against pests. These micro-organisms include antimicrobial metabolites, antibiotics and extracellular enzymes. The potential of these biopesticides has not been fully examined by scientists. It is hopeful that science will be able to re-produce the effects of the biopesticides, which will help to eventually eliminate the need for harmful chemical pesticides.

Unfortunately, many pesticides can kill more than just their intended targets, namely the necessary micro-organisms in the soil. When chemicals are used for a period of time on plants in an area, they will eventually leach into the soil. Once in the soil they can kill the micro-organisms living in the soil that break down organic material and aid in plant growth. It can take years before micro-organisms can once again live in soil that has had toxic chemicals applied to it.

Many believe that pesticides do not affect objects highly dangerous in the field of logic narrow vision of the components of the soil, while some see the gravity of the arrival of pesticides to the soil on the equilibrium that exists between natural and chemical components and biological direct link area between these components, fertility and productivity in the end.

In one of the studies done - Ain Shams University start stated, the importance of pesticides type and concentration became apparent, as well as the period of post-treatment in determining the pesticide stability of phosphorous used in the study have resulted in soil treated nets Aldrospan and Gardona to activate the activity of microbes in general and stabilizers nitrogen pneumatic Alahoaúah as well as bacteria Altazt which affects the fertility of the soil and pesticides has led phosphorescent fungi as well as increasing private group with Gardna and Alchorakron and Alseulen .athert pesticides on private salts dissolved cations and anions.

2.7.4.2: Effect of herbicides on the overall activity of the microbes in the soil

- Assess the impact of agricultural chemical pesticides on invertebrates missing in the soil and through the use of female-bearing and young louse wood used Alapet Alswmuthion as insecticides and penicillin as a fungicide and thus contrasting difference in the preparation of births resulting from females exposed to the pesticide and the high rate of young death proliferating females exposed to a pesticide happened.
- Acetate use of mercury in the soil when used at concentrations caused a severe shortage of decomposing fungi cellulose.

2.7.4.3: Soil Microorganisms in Biodegradation of Pesticides

Pesticides are the chemical substances that kill pests and herbicides are the chemicals that kill weeds. In the context of soil, pests are fungi, bacteria insects, worms, and nematodes etc. that cause damage to field crops. Thus, in broad sense pesticides are insecticides, fungicides, bactericides, herbicides and nematicides that are used to control or inhibit plant diseases and insect pests. Although wide-scale application of pesticides and herbicides is an essential part of augmenting crop yields; excessive use of these chemicals leads to the microbial imbalance, environmental pollution and health hazards. An ideal pesticide should have the ability to destroy target pest quickly and should be able to degrade non-toxic substances as quickly as possible.

The ultimate “sink” of the pesticides applied in agriculture and public health care is soil. Soil being the storehouse of multitudes of microbes, in quantity and quality, receives the chemicals in various forms and acts as a scavenger of harmful substances. The efficiency and the competence to handle the chemicals vary with the soil and its physical, chemical and biological characteristics (Jan et al 1997).

2.8. Soil contamination

2.8.1: Soils Overview

Soils are formed by the decomposition of rock and organic matter over many years. Soil properties vary from place to place with differences in bedrock composition, climate, and other factors. At times, the amounts of some soil elements and other substances may exceed levels recommended for the health of humans, animals, or plants. Certain chemical elements occur naturally in soils as components of minerals, yet may be toxic at some concentrations. Other potentially harmful substances may end up in soils through human activities.

In some regions of the United States, naturally occurring concentrations of certain chemicals may be higher than those in other areas. For example, typical levels of arsenic in the soils of some regions of New York State can exceed recommended values. At times this results in groundwater arsenic concentrations above US Environmental Protection Agency (USEPA) limits for drinking water, requiring treatment to ensure a safe water supply. In New York State, the naturally occurring concentrations of potentially toxic elements in soils are otherwise generally not a problem(Hannah etal,2009).

Soil properties are affected by past land use, current activities on the site, and nearness to pollution sources.

Human activities have intentionally added substances such as pesticides, fertilizers and other amendments to soils. Accidental spills and leaks of chemicals used for commercial or industrial purposes have also been sources of contamination. Some contaminants are moved through the air and deposited as dust or by precipitation (Hannah etal,2009).

Soil contamination or **soil pollution** is caused by the presence of xenobiotic (human-made) chemicals or other alteration in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals, or improper disposal of waste. The most common chemicals involved are petroleum hydrocarbons, polynuclear aromatic hydrocarbons (such as naphthalene and benzo(a)pyrene), solvents, pesticides, lead, and other heavy metals. Contamination is correlated with the degree of industrialization and intensity of chemical usage.(Panagos, *et al* 2013).

The concern over soil contamination stems primarily from health risks, from direct contact with the contaminated soil, vapors from the contaminants, and from secondary contamination of water supplies within and underlying the soil(2004). Mapping of contaminated soil sites and the resulting cleanup are time consuming and expensive tasks, requiring extensive amounts of geology, hydrology, chemistry, computer modeling skills, and GIS in Environmental Contamination, as well as an appreciation of the history of industrial chemistry.

http://en.wikipedia.org/wiki/Soil_contamination

2.8.2: What is soil contamination?

Soil contamination, degradation and pollution mean different things even though we often use these terms to mean one thing. Here is the difference:

2.8.2.1: Soil pollution is when humans introduce harmful objects, chemicals or substances, directly or indirectly into the soil in a way that causes harm to other living things or destroys soil or water ecosystems.

2.8.2.2: Soil contamination is when the concentration of chemicals, nutrients or elements in the soil becomes more than it normally or naturally is, as a

result of human action. If this contamination goes on to harm living organisms, we can call it soil contamination.

2.8.2.3: Soil degradation is when the soil looses its value (in terms of nutria nts, chemical make-up etc) as a result of over-farming, over-grazing or erosion. For example, if a bush fire wipes out the vegetation on a piece of land there by exposing the soils, and nutrients in the soil gets dissolved by rain water run-off, the ability of the soil to support plant life is reduced. We can call this soil degradation.

Soil pollution is caused by addition of chemical which reduced its productive capacity. In addition to urban solid wastes several hazardous chemicals are also dumped into land. The toxic substances from these dumps leach out and percolate through the soil layer below to contaminate the groundwater. Construction and mining activities result in loss of land for agricultural production.

In rural areas more of fertilizers and pesticides are used in agricultural operations and the residual chemicals remain in the top layers of soil. Addition of fertilizers, nutrients and organic matter may increase the soil fertility. Toxic insecticides kill useful soil bacteria favorable for plant growth. Land acts like a filter in removing the impurities in water and waste waters. But toxic residual chemicals from the soil reach human beings through fruits, vegetable and other food items. In fact the concentration of chemicals increases en-route and is more dangerous (Bolt and Brwggenk, 1976).

Industrial discharge liquid and solid wastes with or without adequate treatment which get deposited on the land or in water bodies are source of soil pollution. Thus soil and water resources become polluted.

2.8.3: What soil Contaminants?

Once contaminants are in soils, where they go and how quickly they travel depends on many factors. Some organic (carbon-based) contaminants can undergo chemical changes or degrade into products that may be more or less toxic than the original compound. Note that chemical elements (such as metals) cannot break down, but their characteristics may change so that they can be more or less easily taken up by plants or animals (Panagos, *et al* 2013).

Alina *et al* , 2000 observed that, soil is a very specific component of the biosphere because it is not only a geochemicals sink for contamination. But also act as a natural buffer controlling the transport of chemical elements and substances to the atmosphere ,hydrosphere, and biota. Trace elements originating from various sources may finally reach the surface soil, and their further fate depends on soil chemical and physical properties. Although the chemistry of soil contamination recently has been the subject of many studies our knowledge of the behavior of polluting trace elements is far from complete.

The persistence of contaminants in soil is much longer than in other components of the biosphere , and contamination of soil especially by heavy metals, appears to be virtually permanent. Metals accumulated in soils are depleted slowly by leaching, plant uptake, erosion, or deflation.

The trace metals concentrations in surface soil are likely to increase on global scale with growing industrial and agricultural activities. There are several indications that the composition of surface soil may be influenced by both local contamination and long-range transport of pollutants. (Purves,1977) concluded that the extent of soil contamination in the urban environment is now so great that it is possible to identify most soil as urban or rural on the

basis of their content of a few trace metals that are known to be general urban contaminants.

The regional contamination of soil, as reported most commonly, occurs mainly in industrial regions and within centers of large settlements where factories, motor vehicles, and municipal wastes are the most important source of trace metals.

In addition to aerial sources of trace pollutants, fertilizer, pesticides, and all sewage derived materials have added to the trace element pool in soils. The mobilization of heavy metals from smelter and mine spoil by transport with seepage water or by windblown dust may also be an important source of soil contamination in some industrial regions.

http://www.conserve-energy-future.com/causes-and-effects-of-soil-pollution.php

The hazardous concentration in soil of Cd is limited by allowable Cd in rice which should not exceed 1 ppm. It should be emphasized, however that all the allowable limits need to be related not only to the given plant –soil system, but also to ratios between single elements as well as to their total burden in soil (Abdel Hamid,1989).

A high heavy metal content of sludges in the most important hindrance of their use in agriculture. Although purves634reported that in practice the concern with using sludges commonly is only their phytotoxicity due to excesses of Zn, Cu, and Ni , their content of Cd in particular, as well as of Pb andHg should be of concern as serious health risks (Dennis , 1999 and Abdel Hamid, 1989) .

Soil contaminated with heavy metals can produce apparently normal crops that may be unsafe for human or animal consumption. It can be expected that

the contents of these metals in human diets will not exceed weekly tolerable intakes established by FAO/WHO(Kloke, 1979).

Permissible levels of trace elements, particularly heavy metals, used on farmland can be calculated based on several factors. It is most important however to evaluate acceptable application rates in relation to:

1. Initial trace element content of soil.
2. Total amount added of one element and of all heavy metals.
3. Cumulative total load of heavy metals.
4. Heavy metal does limitation.
5. Equivalency of trace element toxicity to plants.
6. Threshold values of trace element concentrations in soil.
7. Relative ratios between interacting elements.
8. Soil characteristics ,e.g, pH, free carbonates, organic matter, clay content, and moisture.
9. Input-output balance.
10. Plant sensitivity.

2.8.4: types of Soil Pollution acording to Hannah *et al* ,(2009) include:

• Agricultural Soil Pollution

i) pollution of surface soil

ii) pollution of underground soil

• Soil pollution by industrial effluents and solid wastes

i) pollution of surface soil

ii) disturbances in soil profile

• Pollution due to urban activities

i) pollution of surface soil

ii) pollution of underground soil

2.8.5: Causes of soil pollution:-

Soil pollution is caused by the presence of man-made chemicals or other alteration in the natural soil environment. This type of contamination typically arises from the rupture of underground storage links, application of pesticides, percolation of contaminated surface water to subsurface strata, oil and fuel dumping, leaching of wastes from landfills or direct discharge of industrial wastes to the soil. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals. This occurrence of this phenomenon is correlated with the degree of industrialization and intensities of chemical usage.

A soil pollutant is any factor which deteriorates the quality, texture and mineral content of the soil or which disturbs the biological balance of the organisms in the soil.

Pollution in soil has adverse effect on plant growth.

Soil pollution can be caused by the following according to by Nihal and Akbar (2008):

- Accidental Spills
- Acid rain
- Intensive farming
- Deforestation
- Genetically modified plants
- Nuclear wastes
- Industrial Accidents
- Landfill and illegal dumping
- Agricultural practices, such as application of pesticides, herbicides and fertilizers

- Mining and other industries
- Oil and fuel dumping
- Buried wastes
- Disposal of coal ash
- Disposal of munitions and agents of war.
- Drainage of contaminated surface water into the soil
- Electronic waste

The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead, and other heavy metals.

http://en.wikipedia.org/wiki/Soil_contamination

2.8.6: Different contaminants to

♦ End up in water held in the soil or in the underlying groundwater (by leaching through the soil);

♦ Volatilize (evaporate) into the air; or

♦ Bind tightly to the soil.

2.8.7 Important soil characteristics that may affect the behavior of contaminants include

♦ Soil mineralogy and clay content (soil texture).

♦ pH (acidity) of the soil.

♦ Amount of organic matter in the soil.

♦ Moisture levels.

♦ Temperature.

♦ Presence of other chemicals.

2.8.8: Distributed of contaminants Soils

The distribution of contaminants released to soils by human activities is related to how and where they are added. For instance, the amount of contaminants in the soils of an industrially-contaminated site may vary depending on the activities conducted on the site. The movement of air and water will also affect how soil contaminants move throughout a site. Chemicals may be carried by winds and deposited on the surface of soils; tilling can then mix these surface deposits into the soil.

The movement of groundwater or surface water may also affect how contaminants spread from the source.

Many pesticides and soil amendments used for agricultural, industrial, or commercial activities may be found in residential soils. This could happen if former industrial or agricultural lands are later used for residential properties, and contaminants remain in the soil.

Spills, runoff , or aerial deposition of chemicals used for agriculture or industry can also result in contamination of the soils of residential sites.

For example, arsenic and lead were once used as pesticides on a number of crops, including orchards, throughout the United States. Sodium arsenate was also commonly used on potato crops in eastern Long Island. Therefore, old orchards, farms, and adjacent areas are places where testing for arsenic and lead might be advisable. Within an orchard, the distribution of these contaminants may be very spotty since individual trees may have been treated, resulting in higher residues under each tree. Collecting multiple soil samples from such an area would help to determine the pattern of contamination.

There are many ways of soil pollution such as Seepage from a landfill,

Discharge of industrial waste into the soil Percolation of contaminated water into the soil, Rupture of underground storage tanks, Excess application of pesticides, herbicides or fertilizer and Solid waste seepage.

- chemicals involved in causing soil pollution are Petroleum hydrocarbons, Heavy metals, Pesticides and Solvents.

2.8.9: Effects of Soil Pollution

Agricultural Area include Reduced soil fertility, Reduced nitrogen fixation, Increased erodibility, Larger loss of soil and nutrients**,**

Deposition of silt in tanks and reservoirs, Reduced crop yield, Imbalance in soil fauna and flora . and while **Industrial Area include** Dangerous chemicals entering underground water, Ecological imbalance, Release of pollutant gases, Release of radioactive rays causing health problems, Increased salinity, Reduced vegetation and while **Urban Area include** Clogging of drains, Inundation of areas, Public health problems, Pollution of drinking water sources, Foul smell and release of gases and Waste management problems.

Pollution runs off into rivers and kills the fish, plants and other aquatic life,

Crops and fodder grown on polluted soil may pass the pollutants on to the consumers, Polluted soil may no longer grow crops and fodder, Soil structure is damaged (clay ionic structure impaired) , Corrosion of foundations and pipelines, Impairs soil stability, May release vapours and hydrocarbon into buildings and cellars, May create toxic dusts and May poison children playing in the area.

2.8.9.1: Health effects

Contaminated or polluted soil directly affects human health through direct contact with soil or via inhalation of soil contaminants which have vaporized;

potentially greater threats are posed by the infiltration of soil contamination into groundwater aquifers used for human consumption, sometimes in areas apparently far removed from any apparent source of above ground contamination.

Health consequences from exposure to soil contamination vary greatly depending on pollutant type, pathway of attack and vulnerability of the exposed population. Chronic exposure to chromium, lead and other metals, petroleum, solvents, and many pesticide and herbicide formulations can be carcinogenic, can cause congenital disorders, or can cause other chronic health conditions. Industrial or man-made concentrations of naturally occurring substances, such as nitrate and ammonia associated with livestock manure from agricultural operations, have also been identified as health hazards in soil and groundwater("www.chromatography-online.org").

Chronic exposure to benzene at sufficient concentrations is known to be associated with higher incidence of leukemia. Mercury and cyclodienes are known to induce higher incidences of kidney damage, some irreversible. PCBs and cyclodienes are linked to liver toxicity. Organophosphates and carbomates can induce a chain of responses leading to neuromuscular blockage. Many chlorinated solvents induce liver changes, kidney changes and depression of the central nervous system. There is an entire spectrum of further health effects such as headache, nausea, fatigue, eye irritation and skin rash for the above cited and other chemicals. At sufficient dosages a large number of soil contaminants can cause death by exposure via direct contact, inhalation or ingestion of contaminants in groundwater contaminated through soil (Jump up 1997).

The Scottish Government has commissioned the Institute of Occupational Medicine to undertake a review of methods to assess risk to human health from contaminated land. The overall aim of the project is to work up guidance

that should be useful to Scottish Local Authorities in assessing whether sites represent a significant possibility of significant harm (SPOSH) to human health. It is envisaged that the output of the project will be a short document providing high level guidance on health risk assessment with reference to existing published guidance and methodologies that have been identified as being particularly relevant and helpful. The project will examine how policy guidelines have been developed for determining the acceptability of risks to human health and propose an approach for assessing what constitutes unacceptable risk in line with the criteria for SPOSH as defined in the legislation and the Scottish Statutory Guidance.

http://en.wikipedia.org/wiki/Soil_contamination

2.8.9.2: Environmental Long Term Effects of Soil Pollution

When it comes to the environment itself, the toll of contaminated soil is even more dire. Soil that has been contaminated should no longer be used to grow food, because the chemicals can leech into the food and harm people who eat it.

If contaminated soil is used to grow food, the land will usually produce lower yields than it would if it were not contaminated. This, in turn, can cause even more harm because a lack of plants on the soil will cause more erosion, spreading the contaminants onto land that might not have been tainted before.

In addition, the pollutants will change the makeup of the soil and the types of microorganisms that will live in it. If certain organisms die off in the area, the larger predator animals will also have to move away or die because they've lost their food supply. Thus it's possible for soil pollution to change whole ecosystems.

2.8.10: Control of soil pollution

The following steps have been suggested by Khitoliya (2004) to control soil pollution. To help prevent soil erosion, we can limit construction in sensitive area. In general we would need less fertilizer and fewer pesticides if we could all adopt the three R's: Reduce, Reuse, and Recycle. This would give us less solid waste (Khitoliya, 2004).

2.8.10.1: Reducing chemical fertilizer and pesticide use

Applying bio-fertilizers and manures can reduce chemical fertilizer and pesticide use. Biological methods of pest control can also reduce the use of pesticides and thereby minimize soil pollution.

2.8.10.2: Reusing of materials

Materials such as glass containers, plastic bags, paper, cloth etc. can be reused at domestic levels rather than being disposed, reducing solid waste pollution.

2.8.10.3: Recycling and recovery of materials

This is a reasonable solution for reducing soil pollution. Materials such as paper, some kinds of plastics and glass can and are being recycled. This decreases the volume of refuse and helps in the conservation of natural resources. For example, recovery of one tonne of paper can save 17 trees.

2.8.10.4: Reforesting

Control of land loss and soil erosion can be attempted through restoring forest and grass cover to check wastelands, soil erosion and floods. Crop rotation or mixed cropping can improve the fertility of the land.

2.8.10.5: Solid waste treatment

Proper methods should be adopted for management of solid waste disposal. Industrial wastes can be treated physically, chemically and biologically until they are less hazardous. Acidic and alkaline wastes should be first neutralized; the insoluble material if biodegradable should be allowed to degrade under controlled conditions before being disposed. As a last resort, new areas for storage of hazardous waste should be investigated such as deep well injection and more secure landfills. Burying the waste in locations situated away from residential areas is the simplest and most widely used technique of solid waste management. Environmental and aesthetic considerations must be taken into consideration before selecting the dumping sites.

Incineration of other wastes is expensive and leaves a huge residue and adds to air pollution.

Pyrolysis is a process of combustion in absence of oxygen or the material burnt under controlled atmosphere of oxygen. It is an alternative to incineration. The gas and liquid thus obtained can be used as fuels. Pyrolysis of carbonaceous wastes like firewood, coconut, palm waste, corn combs, cashew shell, rice husk paddy straw and saw dust, yields charcoal along with products like tar, methyl alcohol, acetic acid, acetone and a fuel gas.

2.8.10.6: Natural land pollution

Land pollution occurs massively during earth quakes, land slides, hurricanes and floods. All cause hard to clean mess, which is expensive to clean , and may sometimes take years to restore the affected area.

These kinds of natural disasters are not only a problem in that they cause pollution but also because they leave many victims homeless.

CHAPTER THREE

MATERIALS AND METHODS

An experiment was conducted on 4 December 2014 at Shambat Farm, College of Agricultural Studies (380m) above sea level in Sudan University of Science and Technology , Khartoum North-Sudan . Dry and semi dry climate, Latitudes 150 ° 40° N and Longitudes 22° 32 °E .

Carrot (cv. Royal chantenay) seeds were sown by hand on mid December. As two rows on ridges of 60 cm apart and with intra-row spacing of 5 cm. The crop was thinned to one plant per hill. Cultural practices were done as recommended by the ARC. Folimat and Icaros were applied one month after sowing, as aqueous spray, using a knapsack sprayer at a volume rate of 120 L per fed. Untreated control was included for comparisons. The plots received 4 hands weeding, at biweekly interval, starting from sowing. Sub-plot size was 7 x 2.4 m. The treatments were arranged in a randomized complete block design with 3 replicates.

Urea and phosphorus fertilizers were used at the rate of 150 kg/ha and 120Kg/ha respectively. The pesticides were sprayed one month after plants. Plots were separated by sacks to prevent lateral movement of the pesticides. The whole plants are pulled and then washed for different measurements, soil samples were taken before and after plants 30 cm depth for all measurements.

3. 1 measurements of plant :

For all treatments measurements of plant height (cm), shoot fresh and dry weight(g) and leaf area /plant(cm^2) .

Measurements taken were high plant (cm), leaf area Cm^2 and shoot fresh and dry weigh (g).

3. 2 Soil analysis

3. 2.1Preparation of soil samples:

The disturbed samples collected from surface soil by auger methods , were dried under shade by spreading on sheets of stout paper placed inside wooden trays.

Each sample was then divided into two unegual portions. The smaller portions were stored in polythene bags. The major portions were sieved (2mm). the fine earth of each subsample was thoroughly mixed and placed inside labeled glass jars with screw tops.

3. 2.2 The chemical characteristics determined on samples were as follows:

-

Chemical analyses were carried out for soil . EC_e (dS/m) by EC meter of the saturation extract , pH by pH meter of the saturation extract, Total Nitrogen (%) by Kejldhal method, Phosphorus (ppm) by Spectrophotometer, Organic Carbon(%) using Walkley black method by titration by ammonium ferrous sulfate, Soil Particle Size (%), Cation Exchange Capacity(CEC) (Meq/100g soil) by using Bower method ,Soluble Sodium and Potassium (Meq/L)by Flame Photometer, Calcium Carbonate (%) by Calcimeter, Carbonate and Bicarbonate (Meq/L)by titration of Hydrochloric acid ,Calcium +Magnesium (Meq/L) by titration of EDTA, and Chloride (Meq/L) by titration of AgNO_3 .

3.3 microorganism analysis:

The effect of the two pesticides on soil microorganism in soil was also determined by Serial dilution methods.

3.3.1 Fill a test tube 1 with 10 milliliters (mL) of a solution.

Fill a second test tube 2 with 9 mL of a buffer. This buffer will serve to dilute the original solution. The buffer is frequently distilled water, but this actually depends on the composition of the solution in test tube A.

Soil samples were taken from a depth of 10 cm and stored in a refrigerator and then was one gram weight of all samples and put them in the first tube and has a 9 ml water.

3.3.2 Dilute the solution. Draw 1 mL of solution from test tube 1 with a pipette and transfer it to test tube 2 and mix thoroughly. The solution that originally had a volume of 10 ml now has a volume of 1 mL in test tube B. The solution, therefore, has been diluted by a factor of 10.

3.3.3 Fill a test tube 3 with 9 mL of buffer. Move 1 mL of the solution in test tube 2 to test tube C using the technique described previously and thoroughly mix the contents of test tube 3. The solution in test tube 3 has been diluted by a factor of 100.

3.3.4 Examine the effects of serial dilution. The solution in test tube 2 has 1/10 the concentration of the solution in test tube 1 and the solution in test tube 3 has 1/10 the concentration of the solution in test tube 2. The solution in test tube C, therefore, has 1/100 (1/10 x 1/10 = 1/100) the concentration of the solution in test tube A

3.3.5 Extend this procedure to perform longer serial dilutions. This process may be repeated as many times as necessary to achieve the desired solution. In an experiment involving concentration curves, use serial dilution to create a series of solutions with dilutions of 1, 1/10, 1/100, 1/1,000. Then perform an experiment on each dilution to measure how the behavior of a particular solution changes with concentration.

Until it arrives tube No. 9
Sprouting from dilution $10^4 and 10^8$ In Petri dishes

Then calculate the micro-organisms in general (bacteria, fungi and Actinomaycetes) developing in the dishes and taking action when dilution and her Averages.

CHAPTER FOURS

RESULTS AND DISCUSSIONS

Table 4. 1 and 4.2 showed the effect of folimat 800 SL and Icaros 1.8% Ec pesticides on the vegetative growth (plant height, shoot fresh and dry weights ,leaf area\ plant), of carrot growth.

Table 4.3 showed the effect of folimat and Icaros on the soil.

Table 4. 4 showed the effect of folimat 800 and Icaros pesticides on soil microorganism showing that the increase and decrease of the number of different microorganism.

The addition of two pesticides Icaros and Folimat in two concentrations, (recommended dose and excessive dose 50%). Lead to the reduction of many parameters in soil and carrot plant growth as show in table 1and 2.

4.1 and 4.2 show an increase in plant high and shoot fresh and dry weight as well as leaf area compared with the control, recommended and excessive dose.

The result revealed that when the concentrations of the two pesticides increase to 50% (excessive dose)the different parameters decreased generally.

Table 1: Effect of Folimat 800 LS on the vegetative growth of carrot (plant height, shoot fresh and dry weights ,leaf area).

Treatment	Plant height(cm)	Leaf area (cm^2)	Shoot fresh weight(g)	Shoot dry weight(g)
Untreated control	16	15	39	7
Recommended dose(1.92)kg/ha	19	11	50	9
Higher dose (2.88)kg/ha	14	7	37	5
LSD %	6.175	7.6566	17.48	4.859

Table 2: Effect of Icaros 1.8%Ec on the vegetative growth of carrot (plant height, shoot fresh and dry weights, leaf area).

Treatment	Plant height(cm)	Leaf area (cm^2)	Shoot fresh weight(g)	Shoot dry weight(g)
Untreated control	17	16	44	8
Recommended dose(0. 0048)kg/ha	15	12	36	6
Higher dose (0.0072)kg/ha	12	9	33	4
LSD %	3.696	8.916	23.244	2.923

The results showed that plant height generally decreases with increasing dose for recommended dose in the case in two pesticides (Table 1 and 2) that's compatible with the scientist Younis (1979) who recorded that the two pesticides affected the growth of carrot productivity, but the growth decrease at the excessive dose which was found before on the lettuce which attributed to the effect of the foliar fertilizers.

The increasing in dose resulted in reducing of plant growth in general, where was founding plant high increasing in the recommended dose for folimat pesticides which was 19 cm and reduced to only 14 cm in excessive dose an the same were obtained from Icaros as it 15 cm and12 cm for recommended and excessive dose respectively.

The fresh weight was 50, 37, 36, 30 for recommended dose, excessive dose in folimat the recommended dose resulted in 50 g fresh weight compared to only 37 and 36, 30 for excessive dose of folimat and Icaros respectively . Also the dry weight was affected it decrease for 9g for recommended dose to 6g for excessive dose of folimat and from 6g to 4g for Icaros. The excessive doses affected plant carrot growth as indicated in leaf area which decreased from $11cm^2$ to only $7cm^2$ for folimat and from $12cm^2$ to 9 cm^2 for Icaros these resulted were compatible with zaki (1978).

The decreased was due to the contamination of pollution of the soil which affect the growth of carrot and soil productivity. Table 3 showed that the decrease in soil properties especially when the concentration of the two pesticides increased in (excessive dose). This decrease of soil properties affect the soil productivity and fertility because it reduce the uptake and distribution of soil nutrients through plants parts Gafer (2012) stated that there is a decrease in all soil parameters due to the heavy clay soil and ionic effect of both pesticides which hinder the uptake of soil nutrients and their distribution through the carrot roots.

Table 3: Effect of Folimat 800SL and Icaros 1.8%Ecpesticides on soil planting with carrot in shambat at 2014

Pesticides does	Depth(cm)	pH paste	EC_e dS/m	Na^+ Meq/L	K^+ Meq/L	Ca+Mg Meq/L	CO_3 Meq/L	HCO_3 Meq/L	Cl Meq/L
Befor planting	0 - 30	7.9	1.2	1.2	0.08	14	-	0.2	4.5
Control	0-30	7.9	1.3	4.3	0.03	12.7	-	0.4	4.1
Folimat 800									
Recommended does	0 - 30	7.8	1.6	1.9	0.11	15	-	1.3	4.4
Excess does	0 - 30	8	1	0.9	0.03	9	-	0.8	4.2
acaros									
Recommended does	0 - 30	7.9	1.4	1.2	0.03	13	-	1.1	2.5
Excess does	0 - 30	7.9	1.4	1.1	0.03	10.3	-	0.9	2.2

Continue

Pesticides does	Depth(cm)	$CaCO_3$ %	TotalN %	P ppm	O.C %	Texture			CEC Meq/100g soil
						Clay %	Silt %	Sand %	
Befor planting	0 - 30	3.6	0.03	2	0.5	53.2	22	24.8	53
Control		4.7	0.02	1.3	0.4	57.9	16	26	55.4
Folimat 800									
Recommended does	0 - 30	3.8	0.02	1.9	0.3	57.2	10	32.8	54.2
Excess does	0 - 30	3.6	0.01	1.3	0.2	60.5	8.5	34	58.3
Acaros									
Recommended does	0 - 30	3.7	0.016	2.2	0.2	65.9	18.0	34.8	57.6
Excess does	0 - 30	3.5	0.014	1.6	0.1	59.9	5.3	16	63.5

The results also showed that increasing the dose also lead to the reduction of the physical and chemical properties of the soil, as well as soil fertility, as shown in (Table 3), where the soil pH increases with excessive dose of folimat pesticide from 7.8 to 8 and not affected in the case of Icaros pesticide where the pH is 7.9 stable.

All soil cations and anions decreased with excessive dose. soil salinity with folimat pesticide decreased from 1.6 ds/m to 1.4 ds/m and was not affected in the case of Icaros pesticide (1.4dS/m). Soluble sodium (Na^{+}) decreased from 1.9 Meq/L to 0.9 Meq/L with folimat pesticide and 1.2 Meq/L to 1.1 Meq/L in Icaros pesticides. Soluble potassium(K^{+}) from 0.11 Meq/L to 0.03 Meq/L in the case of folimat pesticide and not affected when the icaros pesticide is used 0.03 Meq/L (=stable).

As well as calcium and magnesium($Ca^{+2} + Mg^{+2}$) effect became

15 Meq/L to 9 Meq/L in folimat pesticide and 13 Meq/L to 10.3 Meq/L in the case of Icaros pesticide ,also bicarbonate(HCO_3) decreased from 1.3 Meq/L to 0.8 Meq/L in case on the folimat pesticide and 1.1 Meq/L to 0.9 Meq/L in case on icaros pesticide. Chlorine(Cl^{-}))from 4.4 Meq/L to 4.2 Meq/L in folimat and 2.5 Meq/L to 2.2 Meq/L in icaros.

Calcium carbonate decreased from 3.8% to 3.6 % in folimat pesticide and 3.7% to 3.5% the Icaros pesticides. All those increase and decrease of soil parameters due to the effect of soil contaminations it my be.

We revealed that effect of pesticides on soil fertility reduced is noticed is in all soil parameters of nitrogen, phosphorus and organic carbon, a decrease of total nitrogen ratio (N%) 0.02 % to 0.01% for folimat pesticide and 0.016 % to 0.014 % for Icaros. Phosphorus (P ppm) 1.9 ppm to 1.3 ppm for folimat and 2.2 ppm to 1.6 ppm for icaros , as well as lower organic carbon ratio (O.C%) from 0.3% to 0.2 % in the case of folimat pesticide and 0.2 % to 0.1% for Icaros which concise with Gafer (2012) whose stated that

pesticides lead to the reduction of all the soil properties due to the heavy clay soil, as well as other effect of soil pollution.

These pesticides have affected the cation exchange capacity (CEC)of the soil, which decreased from to 58.3 meq/100 g soil to 54.2 meq/100 g soil in the case of foilmat pesticide and 63.5 meq/100 g soil to 57.6 meq/100g soil in the case of Icaros pesticide.

Also the soil texture was negatively affected by soil pollution which was decrease in all soil parameters. The clay from60.5 % to 57.2% , silt from 10% to 8% and 32.8% to 32% (folimat pesticide).

In case of Icaros pesticide, clay from 65.9% to 59.9% , silt from 18% to 5.3% and sand from 34.8% to 16%.

The soil microorganism also affected pesticides which will lead to its decrease or increase as shown in table 4.

Table 4. 4: Effect of Folimate 800SL and Icaros 1.8%Ec pesticides on soil microorganism

Pesticides does	Depth (cm)	Bacteria		Fungi		Actinomycete	
		D.F		D.F		D.F	
		10^4	10^8	10^4	10^8	10^4	10^8
Befor planting	0-30	Uncountable (TMTC)	3	1	Nil (Not found)	10	1
Control	0-30	34.7	0.7	1	0.3	6	1.7
Folimat 800							
Recommended dose	0-30	Uncountable (TMTC)	0.3	1.7	Nil (Not found)	4	Nil (Not found)
Excess dose	0-30	19.7	1	0.7	0.7	0.7	1
Icaros							
Recommended dose	0-30	63	1.7	0.7	0.3	5.3	0.7
Excess dose	0-30	Uncountable (TMTC)	0.7	3	0.3	6.3	Nil (Not found)

D.F : Dilution Factor.

TMTC: Too Much To Count.

Also the effect of soil microorganism increased or decreased when was two pesticide were added in the soil. Sometime the pollution killed the soil organism as shown in Table 4.

bacteria decreased from uncountable with the excessive dose to 19.7 in addition of folimat, but increased when Icaros pesticide from 63 to uncountable at 10^4dilution.

In the case of 10^8 dilution increased from 0.3 to 1 in folimat, and decreased for Icaros pesticide from 1.7 to 0.7.

Fungus decreased from 1.7 to 0.7 in addition of folimat but increased when Icaros pesticide from 0.7 to 3 at 10^4dilution .

In the case of 10^8 dilution increased from not found to 0.7 in folimat pesticides but non affected when icaros pesticide at the same dilution. Actinomycetest decreased from 4 to 0.7, in addition of folimat pesticide and increased when icaros pesticide from 5.3to 6.3 at 10^4dilution .

$In\ case\ of$ 10^8 dilution increased from not found to 1 folimat pesticide but when icaros pesticide completely absent to 0.7.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 conclusion

The two pesticides affect negatively the soil fertility and plant productivity.

Both folimat 800 SL and Icaros1.8% EC pesticides can be applied safety when recommended dose rules are followed and common sense is used. The effect of soil microorganism can be managed.

Soil pollution has occurred from the use of pesticides and it takes years and sometimes decades for some of these chemicals to break down. Luckily there are many organic chemicals that are just as effective.

The effects of pesticides on soil micro-organisms are less invasive when organic pesticides are used.People need to break the habit of using harmful pesticides and switch to using organic ones that break down quickly in the sunlight and in the soil. The faster a chemical breaks down, the sooner the soil can return to a healthy state. Most organic pesticides are also safe to use around people and pets. They can easily be washed from fruits and vegetables making them healthier for you and your family to eat.

5.2 Recommendation

1. To reduce the chemicals pesticides effect on agriculture of soil use the agricultural properly on scientific bases and Use the recommended dose safty.
2. used the type microorganism from to maken on degradation of pesticides.
3. Use the methods of removal of pesticides on soil wisely .
4. Government policy aims to minimise the use of pesticides, and consideration has been given to the reduction of a pesticides tax. To avoid the possibility of a tax, the crop protection and farming industries have developed a programme of voluntary measures (known as the Voluntary Initiative) which they believe will achieve the same aim by encouraging standards of best practice.
5. Prevent the use of the most toxic pesticides that cause harm to humans, animals and plants

Practical steps for wise use of the pesticides:

Pesticide use in general can be made safer for the environment by:

- Training users and advisers to high standards, backed-up by Certification.
- Using alternative methods of control (although these too can involve environmental risks), or combining these with chemical methods.
- Where two or more pesticides may be of equally effective, select the one that is likely to involve least environmental risk
- Use a crop management plan based on proper risk assessments and cautious decisions.
- Using the most appropriate application technique and regularly checking and calibrating equipment.
- Disposing of containers and unused products correctly.

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