Soil Pollution - Causes and Effects

Suaad Hadi Hassan Al-Taai

University of Baghdad, College of Education Ibn Rushd for Humanities, Department of History
suaad.hadi@ircoedu.uobaghdad.edu.iq

Abstract

The study of soil pollution has occupied the attention of a large number of researchers because of its continuity and effect on humans, animals and plants alike. Soil pollution occurs as a result of the entry of elements that change the composition and organism of the soil, and reduce its fertility, making it more vulnerable to drought, and unsuitable for agriculture. The research addresses the most important soil pollutants before radioactive uranium pollution, pollution by industrial and household waste, volcanic eruptions, forest fires, and others. Most of the agricultural lands are irrigated by rivers polluted with factory wastewater. Also, the research discusses the most important sources of pollution represented by pesticides and chemical fertilizers that contain toxic substances and seep into the soil to remain for a long time, and contribute to eliminate soil fertility. The research deals with the impact of logging the desertification of agricultural areas and their transformation into a vast desert that is unsuitable for agriculture, and pollutes the soil with hydrocarbons. The research refers to the method of soil protection and agricultural lands from pollution by using organic agriculture, fertilizers, organic and bio-pesticides, and forest planting.

Key words: water, pests, plants, fertilizers, pesticides, weeds, irrigation.

1. Introduction

The study of soil pollution is very important to a large number of researchers and those interested in the environment, due to the great impact that the pollution of agricultural lands has on the lives of humans and animals alike. The chemical and physical changes in soil composition are caused by the entry of foreign bodies. Also, the use of pesticides and chemical fertilizers in large quantities, the fall of acid rain, as well as the dumping of solid and liquid waste from factories and others, contribute to the loss of soil fertility and organic materials.

The research addresses several important topics, including the definition of environmental pollution, emphasizing soil pollution. It also sheds light on the most important soil pollutants, such as radioactive contamination. Radioactive pollution is one of the most important global pollutants due to the negative effects of radioactive materials on soil, plants, humans and animals. The research focuses on industrial and household waste pollution. Most of the factories are located near residential areas and rivers. Also, volcanoes, fires and mining contribute significantly to soil pollution and losing its organic matter and fertility. Pesticides,
fungicides and chemical fertilizers affect soil and agricultural crops. The use of untreated wastewater to irrigate agricultural lands causes soil pollution through the growth of harmful insects and plants.

Environmental pollution is all the undesirable changes that occur in the environment, whether partial or total, due to the whole types of human activities. It is also known as the atmosphere that results from changes in the ecological environment created by humans, Environmental pollution can be considered as the cause of inconvenience, damage, disease, or death [1]. Soil pollution can be defined as the entry of foreign bodies into the soil that leads to a change in the chemical and physical composition. This often results from the use of pesticides and fertilizers, and acid rain that changes the pH of the soil, throwing off radioactive unions and others [2].

Also, it can be defined as the destruction that affects the soil layers causing a change in the natural characteristics of the main environmental elements due to the leakage of complex chemical compounds or artificial radioactive materials that raise the radioactive level in the soil, and impede its analysis. Pollution of agricultural land is defined as the corruption that affects agricultural land, and changes its natural, chemical or biological characteristics and properties. It makes it negatively affect, directly or indirectly, on the person, animal or plant living on its surface. Agricultural soil pollutants include agricultural residues such as plant residues and their weeds, roots left over from burning the ground, vegetable residues, crop stems, tree leaves, and fallen fruits before they ripen [3].

The problem of soil pollution differs from other pollution because it is a long-term problem. It can be completely eradicated and eliminated by reducing the causes of the disease before identifying the treatment[4]. Despite the importance of soil to humans, there is no legislation in the European Union that targets soil protection specifically. Various policies have addressed water, waste, chemicals and industrial pollution. In this regard, the European Commission adopted an objective strategy to protect the soil, which has become widespread in Europe [5].

2. Soil Components

Mainly, the soil consists of:

1- Inorganic materials: They constitute the bulk of the soil. They are materials that result from the disintegration of the various rocks that make up the earth's crust, such as igneous, sedimentary and metamorphic rocks by chemical and mechanical factors. Nitrogen, phosphorous, potassium, manganese, lead, copper, zinc, iron, aluminum, sodium and potassium salts are the necessary elements for plants that determine the quality of the soil whether it is calcareous, saline, iron, or neutral [3].

2- Organic materials: These materials consist of plant and animal wastes such as animal excrement (such as feces, blood, skins, roots and remains of plants, leaves, stems, carcasses of dead animals, etc.) They are broken down and transformed over time into humus. Humus is one of the main fertilizers of soil. Soil is a mobile world that contains Large and microscopic organisms. They are part of the biosphere. They contribute to the aeration of the soil and change its chemical composition. Bacteria absorb nitrogen and fix it in the soil to absorb it by the plant because plants are unable to absorb it from the air directly. Therefore, the soil must be preserved and not polluted [3].
3. Soil pollutants

1- Radioactive pollution: It can be considered as one of the forms of pollution of a global impact. It occurs when humans are exposed to industrially radioactive materials such as fallout from nuclear bombs, and the industrial and military use of nuclear energy and other radioactive materials such as uranium. This requires the collection of war remnants by sound scientific methods and a comprehensive radiological survey [6].

2- Industrial and household wastes pollution: Industry pollution is one of the main sources of pollution for the three elements of the environment, especially water resources, because most industries are designed in terms of choosing their sites or disposing of their waste without taking into account the environmental conditions near rivers. The recovered water recovered is characterized by high concentrations of pollutants, most of which are discarded into rivers without treatment [6]. The unprogrammed industrial development, devoid of safety measures, urban and random population development, and the increasing consumer demands that lead to an increase in solid waste, exacerbate the problem of soil pollution and increase its damages. The best solution to this type of pollution is to establish advanced factories in all governorates to burn waste, or crush them. Also, environmental laws have to be enacted to compel every company or factory to bear the full cost of collecting, transporting and treating waste [6].

3- Natural phenomena such as volcanic eruptions or forest fires pollute the culture, because it releases many toxic elements into the environment [7].

4- Mining has greatly affected soil, water and living organisms since ancient times. The smelting of minerals and the release of mining facilities, huge quantities of heavy metals, and others have led to the introduction of many pollutants into the soil [7].

5- Desertification: The phenomenon of desertification is the process of soil loss of fertility and natural vegetation cover. It is exposed to air erosion and the transformation of agricultural lands, pastures, and other areas, to deserted areas. Many natural and human factors combine to desolate it. It has dire environmental, economic, social and civilizational consequences. Particularly, the loss of productive lands, and the movement of sand dunes, severe sand, and dust storms cause air pollution. Desertification can be classified according to its density, and affectivity. The encroachment and expansion of the desert, at the expense of agricultural lands and insufficient programs of combatting desertification, lead to a direct decrease in the amount of arable land involved in agricultural production [6].

Other factors of desertification, including forest degradation, result from extensive clearing, pastoral pressure, burning and military operations. This leads to increased water erosion and the disappearance of the fertile layer of soil, which negatively affects the storage capacity of dams and irrigation efficiency and enlarged costs. Therefore, the degradation of forests and other vegetation has become an important factor in environmental degradation and its tendency towards drought [6].

4. The pollution of agricultural soil

A- Pesticides and their impact on the agricultural environment: They are toxic compounds used to kill and combat insects and fungi that transmit various diseases to humans or animals. Also, they are considered as materials that contribute greatly to control diseases that affect crops. However, their use leads to the elimination of agricultural pests. Wrong practices,
unauthorized use of them, and failure to follow the necessary prevention measures, expose the composition of agricultural land properties to a huge number of negative effects. The problem lies in the imbalance of the ecological balance, and the pollution of the various elements of the environment such as soil, water, air, plants and animals [8].

Pollution by insecticides and fungi is one of the most important forms of soil physical pollution and agricultural production at the beginning of the second half of the twentieth century. It has been used as a means of controlling pests and diseases that affect plants. In 1920, the use of airplanes to spray them in the vast cultivated areas helped to spread them to a great extent in different regions of the world. Despite the role these pesticides play in reducing the risks of infection with pests that affect agricultural plants, insects and parasites that transmit various diseases to humans and animals, they are one of the main agricultural production elements that cannot be completely dispensed with. They are means of controlling pests and insects that destroy the cultivated crops. There are millions of plant insects and diseases in addition to weeds that can infect crops and agricultural plants. However, the excessive use and lack of proper knowledge of the concentration of the pesticide causes a lot of damage to human and animal health, plant, and agricultural soil itself. Therefore, many international organizations identify warnings and demands to limit the use of many of these pesticides, especially an old pesticide known as DDT [9].

Destructive herbicides are chemicals used to remove harmful weeds that grow in harmful crops. These pesticides have great negative effects, especially when they are used to resist a certain type of weed. So, their effect is not only on the bush and weeds, but on the crops grown. It leads to poor growth in addition to its effect on soil properties and pollution [3]. Fungicides cause heavy loss of agricultural crops. So, farmers will create some chemicals that eliminate them, such as compounds that contain copper. Using them for long years leads to copper pollution of the soil. Accordingly, it is affected by the biological plant environment. For example, adding some fungicides leads to increase plant disease instead of reducing it [3].

Pesticides include arsenic, and their compounds are still used by ants, fungi, weeds, mice, locusts and grasshoppers. They are used in the manufacture of dyes, ceramics, and others, including arsenic trioxide, as well as copper stearate (coppe2 arsenete) called green of Paris and others. It has many brand names such as zinc fuside which is in the form of a blackish-brown powder. It is widely used at homes, fields and farms as a repellant to mice and rats - and this leads to human poisoning by eating food contaminated with poison. This pesticide that is reacted with hydrochloric acid present in the stomach to form phosphite gas, which is a toxic gas [3].

One of the most important dangers of these chemical pesticides is their elimination of beneficial insects, including parasites, predators, and many wildlife, such as honeybees, tamarins, fish in the sea, poultry and agricultural crops. Consequently, its effect is transmitted to humans, directly or indirectly, due to the presence of a large number of these pollutants in the soil, air and water. The cumulative effects of chemical primers appeared due to their chemical stability and the difficulty of their degradation. This helps to find highly resistant and immune insect strains and pests that spread in areas far from the areas of use. Humans and other animals carry high quantities of these harmful pesticides in their fatty tissues. Some pesticides accumulate inside or outside plants and are transferred to humans, and directly or indirectly to animals. Poultry is exposed to the effects of chemical pesticides through the plant
fodder that they eat in their sheds and places of culture. Some harmful rodents have developed immunity to chemical pesticide toxins [4].

The most prominent negative effects that result from the excessive use of insecticides are the following:

1- The excessive use of chemical pesticides leads to absorb part of these pesticides and store them in their tissues, roots and leaves, causing harm to humans and animals that directly eat them. It causes indirect harm to humans by eating animal products contaminated with pesticides (eggs, milk, meat ... etc.) [9].

2- Spraying agricultural crops with chemical pesticides leads to the elimination of microorganisms in the soil (decomposition elements such as nitrogen-fixing bacteria and streptococcus bacteria). This contributes to the analysis of organic matter in the soil, known as humus, which affects the fertility of agricultural soil [9].

3- The excessive use of these chemicals leads to an imbalance in the existing natural balance between pests and their natural enemies. The use of insecticides helps to eliminate these natural enemies. On the one hand, it increases the chances of pests spreading, and the costs of controlling them. Perhaps the disappearance of a bird known as Abu Guerdan and the paddock from the Egyptian countryside is a good evident [9].

4- The excessive use of pesticides and their use for long periods of time lead to the acquisition of many insects and pests of immunity against the pesticides used. This increases the intensity of the war between humans and insects. Scientists are forced to produce other new types of pesticides that are more effective and more toxic to overcome insect and pest resistance. This increases the degree of risk and harm to human and animal health [9].

5- Many pesticides keep their effects for a long time in agricultural soil. In fact, this leads to the persistence of its negative impact on plants, animals and humans for a period of time that may last for several years. For example, studies indicate that Egyptian agricultural lands still retain the remnants of the pesticides that were used in Egypt more than twenty years ago. Its percentage ranges between 1-10% of the percentage of the pesticide used [9].

6- The negative effects of pesticides do not stop at this point. Rather, their impact extends to the foreign trade of agricultural commodities and products, especially those affected by these chemicals such as vegetable and fruit crops in many countries of the world (especially developing countries). The excessive use of chemicals in general and pesticides in particular harm the policy of exporting agricultural crops to these countries when the pesticides exceed the permissible limit of the importing countries. Its rejection causes a great loss in the national income of the exported countries due to contamination of their food products. Perhaps what happened to Egyptian exports of potatoes in recent years is a good example of that [9].

The major role of the responsible organizations for managing pesticides must be mentioned. It includes the following [4]:

1- Pesticides must have a high degree of effect on pests and less impact on humans and the environment.
2-Pesticides that are highly toxic to humans and animals, and lead to the accumulation of a high percentage of residues on plants and environmental elements must be prohibited.

3-Firm application of legislation and procedures of importing, classifying, packaging and trading of pesticides have to be applied.

4-The application of international laws issued by the World Health Organization, the International Food and Agriculture Organization and governmental bodies concerned with environmental protection must be taken into consideration.

5-Research efforts that have made tangible progress in the context of biological control should be encouraged by using predatory or intrusive organisms to fight pests without using common environmental toxins. In order to reach the generalization of biological control methods, we must use chemical pesticides cautiously and follow the instructions to preserve human life and the safety of the environment.

B - Chemical fertilizers and their impact on the agricultural environment:

The increasing demand for food and clothing is a result of the continuous increase in population numbers on one hand, and the limited arable land and its fertility decline on the other hand. People have resorted to using different types of agricultural fertilizers to increase soil fertility and increase its production of different agricultural crops [9].

There are many types of fertilizers that are made from chemical compounds. Nitrogenous and nitrogenous fertilizers, phosphate and potassium fertilizers are the most important types which lead to the contamination of vegetables and fruits with harmful chemical compounds. Consequently, it moves to the human body through food chains, causing anemia in children, and pharyngeal and bladder cancer in adults. These fertilizers cause the formation of a non-porous layer during heavy rain, adversely affecting the roots of plants. It causes its inability to absorb some of the nutrients in the soil that the plant needs. When its quantity exceeds the plant’s need, it causes severe damage to the elements of the environment surrounding the soil [8].

It is well-known that the agricultural fertilizers that humans use in agricultural production are divided into two main types: Organic fertilizers that are produced from animal, bird and human waste, and chemical fertilizers that result from the manufacture of certain chemical elements needed by plants and soil (nitrogen - phosphorous - potassium) [9].

In fact, despite the importance of agricultural fertilizers in increasing agricultural production to lands that lack basic organic matter, humus, overuse, especially chemical ones, they have a negative impact on the components of the agricultural environment, plant, animal, soil, and people who are the main consumers of agricultural production [9].

The most prominent of those negative effects that result from the excessive use of fertilizers in agriculture are the following:

1-The excessive use of chemical fertilizers quantities that exceed the plant’s need leads to their accumulation in the tissues, roots and leaves of cultivated plants. This accumulation changes the natural and chemical properties. The excessive use of nitrogenous fertilizers leads to the accumulation of large amounts of nitrates in the leaves and roots of vegetable and fruit crops. Due to the large quantities, plants become tasteless and colorless. Also, the excessive
use of nitrates beyond the normal rate (15 mg per kilogram of a person's weight per day) leads to human infection with many dangerous diseases such as cancerous tumors and others [9].

2- The excessive use of chemical fertilizers leads to the formation of a non-porous layer between the soil particles. It has a negative effect on the agricultural soil. It leads to a rise in the ground water level, a higher level of salinity, and its effect on aeration of the soil. It also leads to the death of the roots of the cultivated plants. Excessive quantities may lead the plant to be unable to absorb the nutrients in the soil that it needs for its growth. It converts nutrients into substances that the plant cannot absorb. This leads to a lack of plant growth. Studies have proven that the excessive use of phosphate fertilizers leads to precipitation of some rare minerals such as copper and turns them into substances that plants cannot absorb and benefit from [9].

3- Many chemical fertilizer compounds are prepared in stable compounds that cannot be disposed of easily. Their effects remain in the soil for a long period of up to 5-50 years as phosphorous compounds. This means that their impact on the soil will extend for a long period of time [9].

4- The effect of chemical fertilizers does not stop at this point. The excessive quantity will lead to the accumulation of a high amount in the soil. This accumulated part will dissolve in the irrigation water and seep into the groundwater and contaminate it. It may leak into agricultural drains and waterways adjacent to agricultural lands, which are a source for human drinking, and the livelihood of some living organisms such as fish. It causes severe damage to both humans and living organisms in waterways [9].

5- The excessive use of organic fertilizers leads to the spread of insect and Qatari diseases, the demolition of soil humus, and the loss of its fertility and its ability to produce [9].

C- Other pollutants of agricultural soil: In addition, the chemical pollution of agricultural soil by using pesticides and chemical fertilizers, human excess in the use of irrigation water, and the inability of the agricultural drainage network to rid the soil of excess water, have led to an increase in the level of land water and salinity in the soil. It may adversely affect aeration and soil temperature. This has been reflected in the productive efficiency of the lands used for the production of agricultural crops [9].

The operations of planting the crop more than once in the land and neglect of farmers to serve the land before planting have led to a severe shortage of many nutrients in the soil. This was reflected in a significant deterioration in the productivity of various agricultural crops. A scientific study proves that the deficit in the trace elements in the Egyptian soil, for example, after the establishment of the High Dam in 1960 amounted to about 80% in the iron, about 83.4% in the manganese, about 80.2% in the zinc, and about 76.5% in the copper element. It highlights the extent of the decline in the fertility of the Egyptian soil and its productive capacity [9].

D-The use of wastewater in irrigation operations: Some agricultural areas depend on rain and wastewater for irrigation. This leads to the accumulation of mud and reduce the speed of water flow and the growth and spread of water weeds, which creates a suitable environment for the reproduction of snails and insects, especially mosquitoes. One of the modern agricultural methods is the use of treated wastewater to irrigate lands for different types of crops. However, there are caveats about its frequent use and excessive amounts of irrigation.
(such as the flooding method). It leads to the inadequacy of the soil as a suitable medium for plant growth and to an increase in its salts, and thus poor agricultural production [8].

It is necessary to treat sewage water before its use in irrigation, to avoid the spread of diseases transmitted to humans through the polluted water. This is used to irrigate fruitless agricultural crops and to preserve the fertility of the soil [4].

E - Logging and overgrazing: People find in the forests an outlet from city pollution. It is the main store of carbon on the earth. Destroying large areas of it, especially by burning it, adds large quantities of carbon dioxide to the atmosphere. Tropical forests are among the richest in the world for their biodiversity. Any process of destruction and removal will have a negative impact on the species of living organisms and the biological diversity itself. It also destroys the physical, chemical and biological characteristics of agricultural lands due to their exposure to erosion and sand encroachment processes [8].

F- Industrial solid waste: A person consumes goods and cleaning materials to take care of himself, his clothes, or his tools. They contain phosphates, which increase the cleaning ability of the industrial detergent. They have a toxic effect on both humans and animals. The proximity of plants to factories, especially the cement industry, leads to the fading of green leaves, stopping their growth and delaying their fruits. Car exhaust also affects agricultural lands on the sides of asphalt roads because they are subject to the accumulation of large levels of lead. In many cases, acid rain pollutes natural waterways, and negatively affect soils and other agricultural crops. Many countries suffer from the problem of soil pollution. Many of its lands are threatened by pollution with dangerous toxic and radioactive materials that occur as a result of improper disposal or storage of these materials. Thermal pollution occurs as a result of the power plants discharging of large amounts of hot water into the sea as part of the cooling process, which affects all elements of the environment surrounding humans, animals and plants [8].

G - The effects of air pollution on plants: The plant space is exposed to various forms of pollution, such as air pollution. The rains dissolve the pollutants in the air and carry them to the soil to reach the plants and dissolve in their cellular fluids and destroy their tissues. Some plant leaves are sensitive to some pollutant gases. Also, the increased level of pollution often leads to leaf fall and death of trees [1].

H –The contamination of the soil with hydrocarbons: The soil of the stored and distributed centers of petroleum products is contaminated as a result of several activities, including disposal of waste results from cleaning petroleum storage tanks, leaks that occurred during the irregular filling process of freight cars, which distribute petroleum products between centers and stations, and the mixing of water. The filling yards shall be cleaned from petroleum products, their runoff, and their leakage to the surrounding environment. This pollution affects air, water and soil. It affects the air through fumes from hydrocarbons that cause cancerous diseases and chronic pneumonia for workers in the center and neighboring facilities. They affect the water when petroleum materials seep into the groundwater and the wells used as a source of drinking water and irrigation of agricultural lands. It also affects the soil. Pollution occurs with water carrying hydrocarbons and seeping into soils through groundwater movement. This results in harming these lands and leaving them out of the scope of investment [10].
It is worth noting that hydrocarbons are a group of compounds obtained from petroleum distillation that are classified as hydrogen coals. These fall into two categories: saturated compounds and unsaturated compounds. Unsaturated compounds are characterized by the possibility of bonding with different elements due to the presence of free bonds in their atoms. Petroleum distillation produces light compounds (natural gas and gasoline), medium compounds (kerosene) and heavy compounds (lubricants, diesel and fuels). The density of these compounds affects soil pollution and choosing the most appropriate method for soil treatment [10].

I- The introduction of pollutants into the soil through many paths after the deliberate disposal of solid or liquid waste in piles or waste basins is one of the most obvious types of soil pollution. Municipal or industrial wastes, mines, sediments, or soil contaminated with pits may contain a wide range of contaminants including metals, cyanides (CH), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), asbestos and methane (CH4), ammonia (NH3), and hydrogen sulfide (H2S). These materials pose a threat to the surrounding unpolluted soil. Pollutants are dispersed from disposal sites through sustainable site isolation. There are many past dump sites that trigger accidental releases of industrial pollutants such as road accidents or accidental spills of industrial facilities. Liquid materials in particular can easily contaminate large amounts of soil, because they easily penetrate the soil and disperse it. Soil, in military training areas and battlefields, is contaminated with ammunition, explosives, fuel, and scrap metals containing substances such as PAHs, lead and depleted uranium [11].

Soil is also affected by pollutant inputs, and the atmosphere such as deposition of acidic compounds from power plants, chemical plants and traffic (such as sulfur dioxide (SO2), nitrogen oxide (NOx), which turns into sulfuric acid (N2SO4) and nitric acid (NNO3). Through atmospheric reactions, they are converted to nitric acid in the soil. Before the introduction of unleaded fuel, traffic was an important source of lead contamination. Yet, traffic is still a source of atmospheric deposition of benzene and PAHs. De-icers and rubber tire particles contain heavy metals, and contribute to soil pollution in the vicinity of roads. Atmospheric emissions, subsequent sedimentation to soil, and burning of waste produce heavy metals, nitrogen oxides, and polycyclic aromatic hydrocarbons, and polychlorinated biphenyls [11].

5. The use of microorganisms to test soil contamination

The large part of soil in this universe is mixed with the necessary microorganisms in the processes of demolition, and the analysis of organic matter, especially toxic ones. It is the main factor in the cycle of carbon, nitrogen, phosphorous and sulfur in nature because it maintains the continuity of these elements in the soil in a sufficient amount for the life of plants and animals. There are many bacteria and fungi that play an important role in the continuity of soil fertility. Treating soil biologically by using microorganisms requires a careful scientific effort so that the functions of the remaining organisms are not affected and harms the natural composition of the soil [12].

There are several methods to measure pollution in the soil due to chemicals, including: Measuring the rate of soil respiration (production of carbon dioxide by soil organisms) and the enzymatic activity of the soil, such as the decomposition of urea with urease and phosphatase compounds. Measuring the degree of contamination by a microorganism requires

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the choice of a sensitive organism to contamination such as nitrifying bacteria. It is responsible for the oxidation of ammonia into nitrate. There are several methods mentioned in the ISO program (ISO 14238). Also, there are laws to regulate the effect of pollutants on soil organisms [12].

6. The use of sophisticated plants to test soil pollution

Plant roots are one of the most active biological surfaces. Several international methods have been tried to measure the toxicity of pollutants on advanced plants. These methods are (ISO 1129 & OECD 208). Commonly, in these two methods, the degree of pollutant influence is measured by the delay in root growth and inhibition of the germination process and the emergence of seedlings above the ground. Testing soil pollution take into account the use of crops characterized by rapid growth such as beans, grapes, lettuce, turnip, wheat, radish, etc. There are cultivars of the genus Brassica sp that complete their life cycle in 35 days. It allows the researcher to calculate the speed of germination, growth velocity, seed yield, and degree of seed fertility [12].

7. Preventive methods to protect soil and agricultural natural resources

The organic farming method is one of the most important technological methods that have recently starts to spread in many countries of the world, especially in the developed countries. It aims to protect soil and agricultural production from the dangers of pollution arising from the use of chemicals (fertilizers and pesticides). Organic agriculture is a production system that avoids the use of chemicals in agriculture in order to produce safe and clean food for humans and to preserve the natural properties of the soil and not to degrade it. It also preserves the surrounding environment [9]. Organic agriculture has three different effects, which are the following [9]:

The first effect: It increases the productivity and obtained agricultural production (the supply side).

The second effect: It obtains an agricultural product that is accepted by the individual consumer (the demand side).

The third effect: It improves the surrounding environment (agricultural soil and its components) and preserve it from degradation and decrease.

In fact, the method of organic farming depends on two main axes:

The first: Agriculture should be far from chemical fertilizers or pesticides. This can be achieved by the use of biological and organic fertilizers instead. This procedure is done by relying on the crop rotation system (agricultural cycle), using crop residues and animal waste on the other hand, and resorting to leguminous crops and organic waste for the farm. These organic and biological fertilizers improve the chemical, natural and biological properties of soil, which is reflected in the productivity and production of crops. It also increases the ability of agricultural soil to resist some plant diseases inherent in it. In addition, it reduces the costs associated with producing agricultural crops by reducing the quantities of chemical fertilizers and pesticides[9].

The second: Organic agriculture is represented in the safe disposal of pathological pests by using safe control methods that eliminate pests with high efficiency. At the same time, it does
not have side effects, whether on humans, animals, plants and agricultural soil [9]. This clause depends on many methods. The following methods are the most prominent [9]:

1-The use of biological pesticides that are based on bacteria, fungi, and viruses (microbial pesticides).

2-The introduction of genetic engineering technology in the field of pest control by producing varieties or plant strains that have the ability to resist various pests and diseases.

3- The use of dietary inhibitors is essential. They are compounds that do not kill the insect or repel it, but rather prevent it from feeding and this leads to its death. At the same time, it has no side effects.

4-The use of attractive resources and insect repellants, and attractive materials (pheromones) push insects into special traps through which they can be collected and eliminated. Repellents are non-toxic and non-friendly to insects. Its use repels the insects away from the cultivated crops.

5-Natural treatment for pests should be used in combating harmful insects without the support of insecticides.

Organic farming is an ancient method that the ancient Egyptians used for thousands of years. They used municipal fertilizers in their cultivation. Nevertheless, with the growth of population and the increase in humanitarian needs, food gaps have emerged for many agricultural commodities and products. Man was forced to use chemical fertilizers in plant nutrition and combating harmful pests and diseases to maximize production. However, the excessive human use of these means in a random and uncontrolled manner has led to expose the components and elements of the surrounding environment (water, air, land) to pollution. This incited many international organizations, led by the World Health Organization and the Food and Agriculture Organization, to warn and demand to limit the use of these industrial compounds and to return to nature to produce and provide safe and clean food for the community's population [9].

After the establishment of the World Trade Organization (GATT), the method of organic agriculture has recently become an urgent necessity for all countries of the world, especially developing ones. It leads to the use of the comprehensive quality management system (ISO) in controlling the movement of international exports and imports and comparing them to the maximum limits globally permissible. This made a clean agriculture free of chemicals and basis for trade exchange among countries of the world. This led the markets to reject agricultural product that are treated by chemicals [9], as a way of prohibiting deforestation, encouraging afforestation, and organizing the establishment of educational programs in the fields of agriculture, and the appropriate and safe disposal of nuclear waste [13].

Due to the negative impact of hydrocarbon pollution of soils, global interest has been noted to continue developing methods for treating these soils and making use of them. The different treatment methods aim to reduce pollution rates to the limits that do not pose a threat to human health and the environment. Depending on the use of the site, treatment methods are divided into two types: in-site and off-site methods. These methods include landfill, fume extraction, biological treatment, soil tillage, natural decay, heat treatment, and soil washing. In order to apply treatment methods inside the site, energetic centers should be far from the
site, as sources of surface water or wetlands, and polluted soils are reserved for human activities. In the absence of any of these conditions, the soil must be treated off-site [10].

8. Conclusion

The Article has attained a number of important results. The following are the most prominent:

1- Soil pollution occurs as a result of the entry of foreign bodies that change its chemical and physical composition and render it unfit for agriculture.

2- The problem of soil pollution is characterized by the fact that it lasts for a long time until it is addressed or identified.

3- Soil pollutants are multiplied and varied. The most important of them is the radioactive pollution that occurs as a result of nuclear radiation such as uranium and others. In addition, smelting minerals introduce many pollutants to the soil.

4- One of the most important soil pollutants is throwing industrial and household waste into it, since most factories are built near residential and agricultural areas and rivers.

5- Desertification and overgrazing are among the most important pollutants of the soil, as it exposes it to the loss of its fertility and natural vegetation cover. Soil is exposed to erosion and then turns into sandy desert areas. Deforestation contributes to exposing the soil to an increase in water erosion and a loss of its fertility.

6- The most important source of agricultural soil pollution is the use of pesticides in large quantities. Pesticides contain large amounts of chemical toxin that contribute to soil loss and drought. Some of them contain arsenic, which causes the pollution of agricultural crops and eliminates the role of beneficial insects.

7- The use of large quantities of chemical fertilizers such as nitrogen, phosphate and potassium leads to the pollution of agricultural crops and the formation of a porous layer that causes the inability of plant roots to absorb important nutrients.

8- The use of untreated wastewater contributes to soil pollution through the accumulation of silt, and the availability of insects and harmful water weeds.

9 - One of the most prominent preventive methods to protect the soil and agricultural lands is the adoption of organic and biological agriculture, and biological pesticides such as beneficial bacteria and fungi beneficial.

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