

## The Effects of the Environmental Pollution in Egypt

Soheir Mokhtar, Nagwa El Agroudy, Fatima Ahmed Shafiq and Heba Yassin Abdel Fatah

*Department of Agricultural Economics, National Research Centre, 33 El Bohouth St. (former El Tahrir St. )  
Dokki, Giza, Egypt. Postal Code: 12622.*

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### ABSTRACT

The problem is in studying environmental pollution in general, which the developed countries and the developing ones face alike. The study focuses on the problem of agricultural soil pollution by chemical pesticides in Egypt of about 100% loss, so this research aims to study the important causes of agricultural soil pollution in an attempt to set solutions in order to reduce the amount of its negative effects on agricultural production in Egypt.

The study showed that the percentage of carbon dioxide emissions in Egypt reached about 141.1% in 2010 in comparison with the percentage in 1990, which amounted to 75.5 million tons. It also showed that the most important factors and reasons of chemical fertilizers pollution are crop intensification, rainfall rate and irrigation, bacteria and microorganisms. As for the environmental damage of pesticide, most of them comes from slow decomposition annular compounds and some of them contain heavy elements with a high degree of toxicity to plant, the increase in the outputs of breakage increases the concentration and the accumulation of large quantities of the chlorine, phosphorus and nitrates elements above the allowable limit in the agricultural environment which affects animals or humans. Irrigation water is an indirect source to agricultural soil pollution as this comes from the re-use of agricultural drainage water or draining sewage and industrial water into water surface and waterways used in irrigating agricultural land which in turn contain heavy toxic metals, fertilizers and chemical pesticides that have an impact in agricultural soil pollution.

It is clear from the above the importance of the environmental safety principle which means seeking to maintain the integrity and nature balance through applying the principle of natural pest captivity and not focusing on chemical pesticides, the most important way to protect environment from pollution is organic farming.

**Key words:** Air pollution, water pollution, soil Contamination, organic farming.

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### Introduction

Environment, generally, is meant to be all the surroundings of human, which includes all aspects whether corporeal or incorporeal, and whether human or not human, it is the framework in which human lives with other organisms whether living or not living in interaction according to an accurate system.

The concept of Pollution is always associated with the concept of environment, since we cannot mention the concept of pollution in isolation from the environment in which it happens; we also cannot recognize an environment without referring to the pollution in it. Pollution is the result of an imbalance in environment or one of its elements and that leads to the weakness of the environment's ability in giving, as the environment is the place, which contains pollution in its places and airspace.

Man is the main cause of environmental pollution, as environment provides him with all what he needs from food, drink, clothing and housing to take his needs, but he leaves his wastes on it. As a result of versatility and accumulation of consumption, pressures occur on the environment which leads to instability in its balance, and this imbalance is the source of environmental pollution. We cannot say that there is in the whole world a 100% free pollution environment as long as man lives on it and try to provide himself with well living, security and to build a glorious civilization. The problem of environmental pollution is an international problem of life that has been exacerbated as a result of growing economic industrial activities used as sources of energy and becoming a threat to the environment.

The community suffered from the deterioration and destruction of many environmental resources as agricultural lands, the Nile, seashores and other natural resources as well as the spread of environmental pollution phenomenon due to industrial companies or private means of transportation especially cars, other sources of pollution, or different kinds of food contamination which are usually due to the use of pesticides and fertilizers.

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**Corresponding Author:** Nagwa El Agroudy, Department of Agricultural Economics, National Research Centre, 33 El Bohouth St. (former El Tahrir St. ) Dokki, Giza, Egypt. Postal Code: 12622.  
E-mail: nagwa\_agroudy@hotmail.com

We can say that the contamination of agricultural soil is the corruption of soil that affects its characteristics and its physical, chemical or biological properties in a negative way that may affect all the livings on its surface from Man, animals or plants directly or indirectly. The contamination of agricultural soil depends on the type of pollution, land characteristics, climatic conditions, and natural factors, it may happen suddenly due to earthquakes and volcanoes or may happen gradually because of using pesticides, mineral fertilizers, and reusing wastewater in irrigation.

**Research Problem:**

The problem is shaped in the study of environmental pollution, which the developed countries and the developing ones face alike. The study focuses on the problem of agricultural pollution caused by chemical pesticides in Egypt caused a loss of 100%.

*Research Objective:*

The research aims at studying the most important causes of agricultural pollution in environment, and in an attempt to develop solutions in order to reduce its negative effects on agricultural production in Egypt.

**Study Method:**

The study relied on the descriptive analysis of the subject of the study together with the scientific indicators, which illustrate the facts about agricultural environment pollution, as well as the studies about this topic.

**Results:**

The contamination of agricultural soil depends on the type of pollution, land characteristics, climatic conditions, and natural factors, it may happen suddenly due to earthquakes and volcanoes or it may happen gradually because of using pesticides, mineral fertilizers, and reusing wastewater in irrigation and the pollutants which mix with the soil causing the death of bacteria responsible for the analysis of organic substances in soil and install the element of nitrogen in it. The soil may contain biological components that may be the causes of diseases out of bacterial, fungal, viral and protozoa microorganisms. The soil contains the sources of infections of intestinal worms either its eggs or larvae, which could reach the soil directly through Man or through irrigation water contaminated with sewage, and some of these worms that cause fatal diseases such as anemia, diseases of liver, kidney and intestines.

*Sources of Soil Contamination in Egypt*

*First: Air pollution*

Air pollution is considered as the most dangerous and the most common type of environmental pollution in the industrial cities where carbon dioxide is the emission of burnt fuel with its harmful negative effects on plants in addition to the formation of toxic compounds such as nitrogen compounds, oxygen compounds and radioactive halogen.

**Table 1:** the amount of carbon dioxide emissions in Egypt and other countries of the world during (1990\_2010) The unit ( million tons equivalent)

Countries	1990	1995	2000	2004	2008	2010	Rate of change (1990-2010) %
America	4821.2	5209.1	5961.9	6049.4	6302.3	6104.2	26.6
England	579.7	569.6	580.1	587.3	590.2	591.6	2.05
Indonesia	214.0	303.0	365.6	378.3	381.4	434.5	103.04
France	364.0	351.1	357.7	373.7	378.5	380	4.4
Australia	278.6	312.4	337.7	336.8	341.7	356.6	28.0
Egypt	75.5	95.1	138.7	158.2	170.3	182	141.06
Morocco	23.5	30.3	34.3	41.2	44.2	46.1	96.2
Jordan	10.2	13.6	15.5	16.5	18.4	19.8	94.12

Source: [www.ar.wikipedia.org](http://www.ar.wikipedia.org)

It is clear from table (1) that Egypt occupies the first place among all the states mentioned in the table where the rate of increase in those emissions reached 141.06% in 2010 in comparison with 1990 in which it

amounted to about 75.5 million tons. The Ministry of State for Environmental Affairs and EEAA exert great effort to implement the Environmental Protection Law No.4 of 1994 concerning the agreement between the industrial buildings and its provisions to keep the air clean. There are also considerable efforts exerted in the field of reducing damages generated from vehicles exhaust, for example replacing leaded gasoline with unleaded gasoline, as well as the tendency to use compressed natural gas instead of using gasoline because gas is a clean fuel. Burning garbage is one of the most important causes of air pollution; therefore, the provisions of the Environmental Protection Laws have banned the act of burning garbage in residential places. Keeping the air clean from pollution is a shared responsibility between all institutions, civil associations and society members. The positive role of a citizen is shaped in adjusting car engine, using public transportation as much as possible, planting trees, maintaining green areas and rationalizing paper use.

**Table 2:** the proportion of emissions in Egypt for the world

Years	The amount of emissions in Egypt million tons equivalent of carbon dioxide	Ratio of the amount of emissions for the world
1990\1999	107	0.40%
2004\2005	150	0.55%
2005\2006	152	0.57%
2010\2011	388	1.08%

Source: Egypt and climatic changes- the unity of climatic change- the Ministry of State for Environmental Affairs- Arab Republic of Egypt 2011

*Second: Agricultural Chemical Pollution from Fertilizers and Pesticides.*

*1. The most Important Factors and Causes of Chemical Fertilizers Pollution are:*

(A). *Crop Intensification:* is used as a kind of vertical expansion due to the difficulty of a horizontal expansion( water scarcity and the high costs of reclamation) and this lead to a continuous depletion of nutrients in the soil, especially nitrogen, that necessitated the use of chemical fertilizers heavily and this has negative effects on crops which cause serious diseases to Man after eating it.

(B). *The rate of rainfall and irrigation:* leads to the loss of nitrogen fertilizers into the underground water and that may lead to its contamination or its participation with the agricultural drainage water in transferring it to the waterways and then harm the organisms and plants while reusing it for irrigation. As for the phosphate fertilizers are insoluble in water and the extravagant usage of them leads to the sedimentation of rare elements in the soil, the plant which needs these elements to grow, and transferring them into insoluble materials in water, where these elements are far from the roots of plants so the plants couldn't absorb them.

(C). *Bacteria and Microorganisms:* convert the nitrogen materials in these fertilizers into nitrate and this increases the risk of soil pollution by nitrates.

For an example of plants which store in its bodies and tissues high percentage of nitrate and small amount of nitrite ion which is produced from nitrite reduction in some kinds of legume, radish and carrot. As shown in the following table from which it is cleared that lettuce is considered as one of the top crops in storing nitrate as it reduce about 8.7 mg/kg followed by cucumber and radish within amount of 8 and 7.3 mg/kg on sequence.

**Table 3:** the plants store in its bodies and tissues a high percent of nitrates

N	Plant type	Nitrate(mg/kg)	Nitrite(mg/kg)
1			3.3
2	Beet	2134	1.5
3	Carrot	183	2.3
4	Cabbage	330	7.3
5	Radish	2600	0.7
6	Celery	1321	8.7
7	Lettuce	1361	3.2
8	Spinach	442	8.0
9	Cucumber	156	5.3
	Green beans	153	

Source: Ministry of Agriculture and Land Reclamation, Research Institute of Land and Water.

*2. Pesticide Contamination:* The term pesticide is called on each chemical material used for resisting insect pests, fungal or herbal pests and any other pest which devour necessary crops for Man in nutrition and clothing. The crops are sprayed with pesticides to abolish pests and insects, but they may take in other cases to spray the soil itself. The impact of pesticides on microorganisms that live in the soil shall perish some of them like ants, worms, some insects and organisms that are natural enemies to many crop pests.

From the chemical point of view, pesticides belong to different groups mentioning some of the most important and dangerous ones:-

1. Organic Phosphorus pesticides such as Parathion, Malathion, Dichlorodimethyl phosphorodithioic acid and Dyazevon are intense pesticides with a medium consistency in nature, which may lead to human poisoning.
2. Chlorinated hydrocarbon pesticides include insecticides such as Aldrin, Dieldrin, DDT compound, Dieldren, Kepone, Heptachlor, chlordane, and Jamsan. All of them are very persistent toxic pesticides soluble in fats and motivate cancer.
3. The Carbamate pesticides such as Sevin, Temik and Baygon have the same effect of organic phosphorus pesticides.
4. Rodenticides include Zinc Phosphate and clotting inhibitors that cause inflammation in the Human Respiratory System also the occurrence of bloody urine and bloody tumors.
5. A variety of other pesticides including lead arsenate, calcium arsenate, copper oxides and mercury pesticides, all of them are a highly toxic compounds.

The Environmental damage that comes from most of these pesticides is slow. decomposition cyclic compounds as some of them contain heavy elements with a high toxicity for plant as well as the excess in the outputs of their shattering that increases the concentration and accumulation of some quantities of the chlorine, phosphorus and nitrate elements in the agricultural environment above the allowable limit and that affects animals and human. The chances of a pesticide contamination increase in the protected crops because the greenhouse plants surrounded by an environment of a high temperature and a high humidity. Greenhouse environment encourages the rapid growth of plants and at the same time encourages the growth and proliferation of pests that force farmers to spray plants with insecticides on short periods. The chances of a pesticide contamination in soil and plants increase in the closed atmosphere of greenhouses than in the air as the greenhouse crops such as cucumber, tomato, zucchini, strawberries and cantaloupe are collected on frequent intervals and sprayed at the same time on frequent intervals. These crops are collected after short periods of being sprayed, so it may be heavily contaminated by the sprayed pesticide and often washing fruits doesn't make them free from pesticide but the pesticide becomes a part of the outer tissues of the crop.

### *Third: Water Pollution*

Water pollution is any physical or chemical change in water quality, either directly or indirectly, which negatively affects organisms and makes water unsuitable for desired uses. Water pollution has a great effect on the life of individual, family and community. Water is a vital requirement for humans and other organisms, water may be a major reason to terminate life on Earth if contaminated.

Water pollution is divided into two main types, the first is a natural one which appears in change in water temperature, salinity increase or the increase in the suspended solids, the other type is chemical pollution with its various forms such as sewage, oil spill pollution, agricultural waste pollution as pesticides, insecticides and fertilizers.

Irrigation water represents an indirect source to agricultural soil pollution, and this comes from reusing agricultural drainage water or letting sewage and industrial water on surfaces of waterways used in irrigating agricultural lands which contain heavy toxic elements, pesticides and fertilizer that have impact in agricultural soil pollution.

Underground water contamination with synthetic fertilizers and pesticides is considered a big problem in many agricultural areas. As for the use of these materials is prohibited in organic agriculture, so we replaced them with organic fertilizers as (Compost, animal manure and green manure), and through greater use of biological diversity (in terms of cultivated varieties and permanent vegetation), to enhance the soil strength and water leakage. The well managed organic systems characterized by the best ability to retain nutrients lead to a significant reduction in the risk of groundwater contamination.

This type of agricultural environment pollution is the most dangerous type on water resources, especially on drinking water, so technicians in water resources and drinking water institutions say that it is very difficult to clean water contaminated by chemicals as treatment of this type is complex and very expensive. Perhaps the other source which contribute in the contamination of some elements is that some olive presses owners get rid of peat water resulting from their facilities in the agricultural fields instead of carrying it into the allocated baths dedicated by the governorate to these roads, which leads to the accumulation of large amounts of organic material in those fields, it also leads to soil pollution and the deterioration of soil fertility. In the light of these data, the importance of monitoring the processes of pesticides and fertilizers spraying is to set rules and specific criteria to use it according to the required ratios and to prevent throwing peat water into agricultural lands which surround olive presses and migrate it to collecting basins or allocate it to the rest of farms in order to prevent the accumulation of organic materials in specific areas.

It is clear from the above the importance of the environmental safety principle which means seeking to maintain the integrity and balance of nature and that happen by applying the principle of natural pest control and

not focusing on the chemical pesticides, and the most important way to protect environment from pollution is organic farming which is known as an agricultural system to produce food and fibers as cotton, not only taking into consideration environment preservation besides giving attention to economic circumstances and society requirements, but also taking the natural ability of soil, plant and animal into consideration as a basis for food production with good qualities and high healthy value. Organic Agriculture puts a limit to the use of additives such as chemical fertilizers, pesticides and hormones, as well as genetic changes through genetic engineering. On the other hand, it encourages depending on the natural ability gained from disease and pests resistance.

Organic Production aims to:

- The production of food with high nutritional value and in sufficient quantities.
- Constructive interaction with all natural systems.
- Preservation with working on increasing soil fertility.
- Encouragement and activation of the vital activity in agriculture which include microorganisms, plants and animals.
- The use of renewable natural resources in agriculture.
- Working on the revitalization of the agricultural production in a closed system for organic wastes and nutrients.
- Providing appropriate conditions for the livestock fortune to practice normal activity.
- Avoiding pollution as a result of conducting agricultural operations.
- Maintaining genetic variations in the agricultural system and all around it including cultivated crops, natural and wild plants and microorganisms.
- Ensuring that producers in organic farming get their rights and the sufficient yield.
- Taking into consideration the environmental impact and the social dimension of the active agricultural system.

By following the intensive agricultural style, there has been a continuous drain of nutrients in soil especially nitrogen, and with the limited use of organic fertilizers and trending towards the use of chemical fertilizers especially the nitrogen ones that has led to pollution by nitrates. In addition to that, phosphorus compounds lead to the deposition of some trace elements found in agricultural soil which is needed by plants in growing and converting it into insoluble compounds in water.

Bacteria and other microorganisms in soil convert nitrogen materials in these fertilizers into nitrates and this increases the risk of soil pollution by nitrates. At the same time, the plant absorbs part of them, and the biggest part remains in soil and its water. There is an imbalance between the nutrients inside the plant, which leads to the accumulation of large amounts of nitrates in the leaves, and roots, resulting in a change in the taste of vegetables and fruits, and a change in their colors and smells.

### **Recommendations**

- The environmental awareness is the most important way to keep the soil from pollution and this is achieved by raising the educational and cultural level, and teaching individuals how to deal with the soil till it becomes a part of the individual's behavior as soil conservation from pollution is a collective responsibility requires the full conviction of individuals responsibility towards the soil till its reservation becomes a realistic matter.
- Environmental safety, which means seeking to maintain the integrity and balance of nature and this happens by applying the principle of natural pest fight and not focusing on chemical pesticides.
- Implementation of the Environmental Protection Law No.4 of 1994 concerning the agreement between industrial buildings and its provisions to maintain the cleanliness of air, as there are great efforts exerted in the field of reducing the damage generated from vehicle exhausts such as replacing the leaded gasoline with unleaded gasoline. As well as the tendency to use compressed natural gas instead of gasoline as it is a clean fuel. Burning garbage is one of the most important reasons of air pollution; therefore the provisions of the Environmental Protection Law banned burning trash in residential areas.
- Applying the principle of natural pest fight and not focusing on chemical pesticides, and the most important way to protect the environment from pollution is organic farming.

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