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THE ECONOMIC DETERIORATION OF AGRICULTURAL PRODUCTION RESOURCES RESULTING FROM ENVIRONMENTAL DAMAGE DUE TO PESTICIDES IN EGYPT BASED ON A CASE STUDY IN DAKAHLEYA GOVERNERATE

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ABSTRACT

The economic policy requires deep understanding to the etiology of the deterioration of environment, due to pollution in order to estimate the costs of pollution. Accurate evaluation of the etiology of environmental deterioration is quite awkward, due to the highly complicated interaction between the ecosystem and human activities.

Environmental pollution is a global catastrophe, that is directly related to scientific evolution. As well, it is defined as any physical, chemical, or, biological shift or even change that might lead to hazards to air, water and land or in other words, whatever that might be dramatically affecting human health and other living organisms. Moreover, it is responsible for a decline in the production process on an aggregate level, hence, massively hazarding economics.

This study aims at incorporation of ecological aspects while planning economic strategies in almost all agricultural processes, especially those that are incriminated as non friendly to environment. In addition to, emphasizing the significance of disruptions of ecosystem and its impacts on the gross economic level. Furthermore, to estimate the share by which environmental deterioration affects economic development.

The dilemma of environmental pollution in Egypt is because of neglecting and ignoring ecological aspects and considerations on handling agricultural plans, due to lack of integration of all involved members, and lack of a global consideration on making projects. Planning agricultural strategies must handle projects from an ecological point of view on planning macroeconomic strategies.

The basic objective of the study is evaluation the effect of using pesticides on cotton crops to estimate the cases of human and livestock intoxication

The results of the study illustrates the number of livestock intoxication cases in Bilqas and Manzala. The total number of intoxication cases is 1 death due to intoxication 14 male intoxication, 1 female. This is the result for 4 villages, Since, the number of Dakahleya's villages is 445 villages, population is 4,223,655 of about 15% of national population, since, these villages represent all villages, and if these results is applied for the whole governerate for they all survive the same circumstances, cultivating cotton, and using pesticides of the same quality. Therefore, the intoxicated cases are about death: 111, males: 1557, females: 111 Therefore, the intoxicated cases are 0.037% of Dakaheleya's population.

The total of 4 villages livestock is 55 animals, therefore each village has about 13.7 animal, as a result the Dakahleya's livestock may be assumed to be 5785. The average mortality rate/village in Dakahleya is 2.25. Assuming that all villages (445 village) use the same pesticides, at almost equal quantities, and qualities of pesticides. Therefore, the expected annual mortality rate is 1001 animal. Supposing that, the average price of each animal L.E. 1000. The expected Dakahleya's annual losses is estimated at about LE 1 million.

INTRODUCTION

Ecology is the scientific study of the processes influencing the distribution and abundance of organisms, the interactions among organisms, and the interactions between organisms and the transformation and flux of energy and matter. It can also be defined as the study of the relationship between organisms and environment, and the study of the distribution and abundance of organisms. Another literature defines it as the study of ecosystems.

After the Second World War, the consumption of agricultural pesticides increased to overcome the marked decrease of production that was about 1/3 of total agricultural production due to pests that was estimated at that time at 60 million / annually. Astonishingly, the more pesticides were used the more species of pests appear reaching about 432 species versus 450 kind of pesticides. About 50% of the used pesticides, accesses unwanted compartments of the environment causing a series of problems globally named as pollution.

The term "pesticide" is used to describe a very broad range of chemicals and biologic agents with diverse activity that are designed to control or eliminate unwanted plants or animals, including insects.

Pesticides include insecticides, herbicides and fungicides, that are designed to kill insects, weeds and diseases respectively. Using pesticides may be necessary at times, but in many cases there are alternatives that are often more effective in the long run and less harmful to the environment and the applicator.

Insecticides represent one group of pesticides that traditionally have been utilized in large quantities against a broad range of insect pests. Herbicides, the class of pesticide utilized to control unwanted plants and weeds. Fungicides, utilized to control diseases caused by fungi.

Egyptian cotton is considered as one of the most significant agricultural crops, due to its existence in all international markets as a normal sequel of its fine quality and its superiority over other types of cotton. It supplies about 70% of the world's demand of extra cotton.

The mean cotton cultivated area reached up to 836000 feddan in the last 5 years (1994-1998). This represents about 12% of total agricultural area.

The potential risks of pesticide use with regard to cancer needs to be considered in parallel with the potential benefits of pesticide use. Pesticide use leads to direct benefits including improved crop yields and lower food costs, and indirect benefits associated with increased consumption, particularly of fresh fruits, vegetables, and other dietary components rich in fiber. There is strong evidence that such a diet is associated with a reduced risk of chronic disease, including many cancers.

The economic benefits of pesticide use have been widely published. Some authors have argued that the absence of pesticides would result in substantial reductions in the domestic supply (both in Canada and the U.S.) of fresh and

processed fruits and vegetables. Reports suggest that if man-made pesticides were entirely eliminated, average yields would be reduced by up to 70%, and a reduction in pesticide use of 50% might result in a decline in yield of 37%. However, impacts are variable and will depend on crop, climate, integrated pest management programs, and application of the principles of sustainable agriculture. The economic benefits of pesticide use in the U. S. were estimated to be $10,900 million per year, balance against direct costs of approximately $2800 million attributable largely to resistance and loss of natural enemies. This 3-fold return to the producer is supported by other estimates that indicate a $3-5 direct return to the farmer for every dollar. Furthermore, declines in pesticide use also might lead to consumer rejection of products with poor appearance and quality, more perishability, return to more seasonal availability of fruits and vegetables, potentially increased soil erosion resulting from increased cultivation to control weeds, and a host of other adverse impacts otherwise difficult or impossible to measure.

Literature review

The study illustrates the hazards of pesticides use in combat of agricultural pests world wide. The use of pesticides in the form of land or air spraying affects humans, livestock and plants. Figure (1) illustrates the complications of pesticides.

Many of the pesticides and fertilizers used at farms can cause water quality problems miles away. Pesticides can pollute region's streams and rivers, harming fish, aquatic plants and animals, swimmers, and those who eat the fish they catch. Water from rain or irrigation carries pesticides and to soils. Once in the water, pesticides dissolve, dilute or combine with other chemicals to create harmful combinations that can kill fish and aquatic life, limit beneficial plants and animals and increase growth of algae. Excess algal growth causes light deficiencies for plants and depletes oxygen levels that fish need to survive.

Clean water is an essential part of our quality of life. It can help protect rivers, streams and lakes by rethinking and reducing use of pesticides and other household chemicals.

The natural mix of chemical pesticides and fertilizers, such as what occurs when agricultural chemicals seep into groundwater, may have a broad range of effects on human and animal health..

A published study, suggests that combinations of commonly used agricultural chemicals, in concentrations that mirror levels found in groundwater can significantly influence the immune and endocrine systems as well as neurological health.

In the series of experiments, when experimental animals were given drinking water laced with combinations of pesticides and nitrate, they exhibited altered immune, endocrine and nervous system functions. Those changes. It occurred at concentrations currently found in groundwater.

A curious finding of the study is that animals may be more vulnerable to the influence of such chemicals depending on the time of year: "Our current working hypothesis is that animals are seasonally vulnerable because of subtle modulation of natural seasonal variation in hormone levels

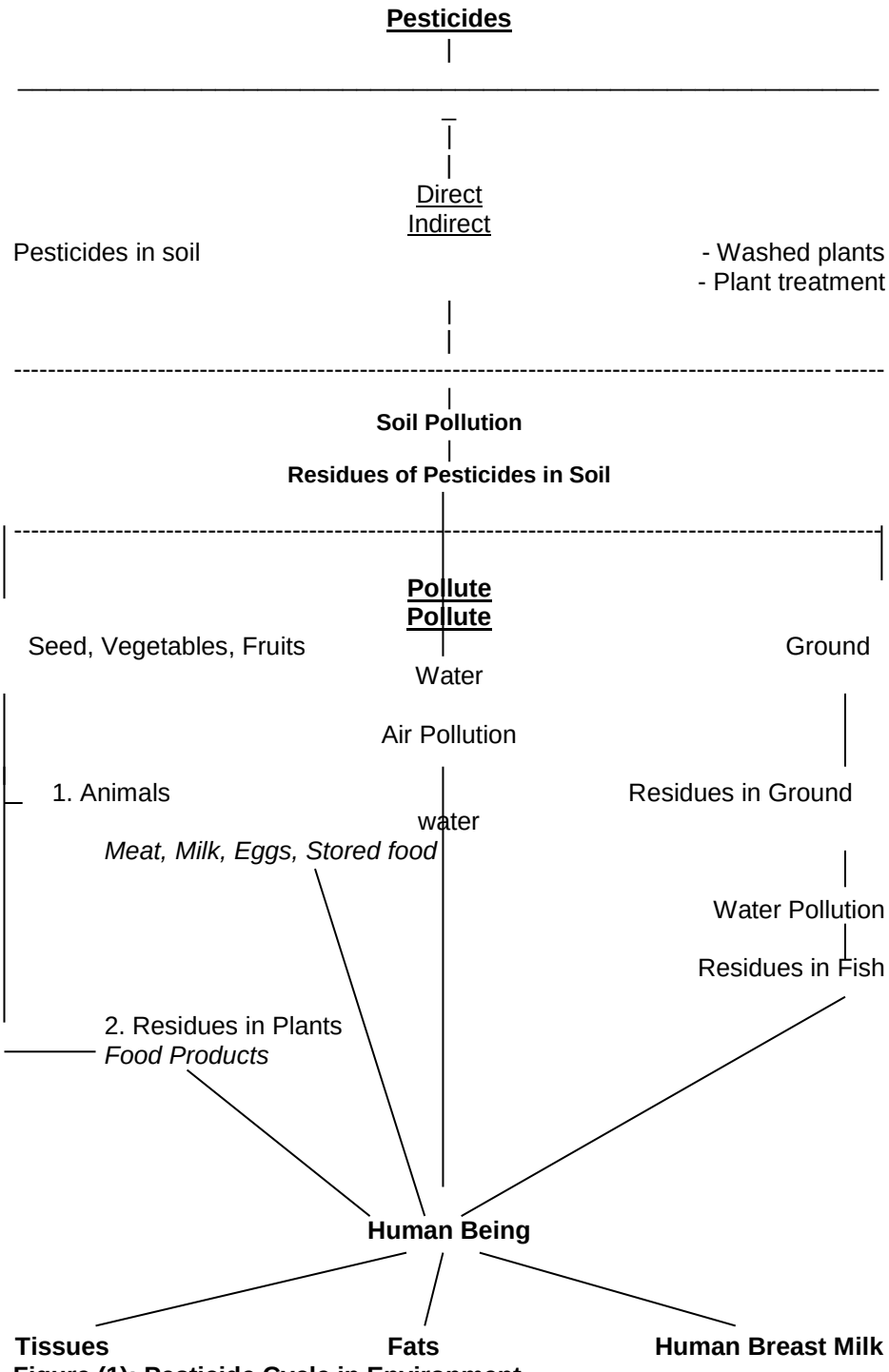

Figure (1): Pesticide Cycle in Environment

The World Health Organization (WHO) maintains and analyzes cancer mortality (death) data from 70 countries. WHO research shows that industrialized countries have far more cancers than countries with little industry (after adjusting for age and population size). One-half of all the world's cancers occur among people living in industrialized countries, even though such people are only one-fifth of the world's population. From these data, WHO has concluded that at least 80 percent of all cancer is attributable to environmental influences.

There is a positive relationship between pesticides on one hand, renal (kidney) failure and liver cirrhosis on the other hand. About 100 agronomist were suffering from the mentioned diseases.

Pesticides, which by their nature are biologically active compounds, continue to raise public concern regarding their possible role as important etiologic agents in the development of human cancer. To examine this potential role, the National Cancer Institute of Canada convened an Ad Hoc Panel on Pesticides and Cancer to examine the possible contribution of pesticide exposure, particularly in the general population, to the development of human cancer.

The Panel concluded that it was not aware of any definitive evidence to suggest that synthetic pesticides contribute significantly to overall cancer mortality.

There is a report linking phenoxy herbicide exposure to cancer of the prostate. 2,4-D has been the subject of animal lifetime cancer bioassays using rats, mice, and dogs; in general these studies have concluded a lack of evidence of carcinogenicity, at least under experimental conditions. The organochlorine pesticides, such as DDT, as well as the polychlorinated and polybrominated biphenyls have been tested extensively experimentally and have produced predominantly or exclusively liver tumors in rodents. However, it is interesting to note that DDT, which has been widely tested under different test conditions, has not been found to be carcinogenic in either the hamster or in non-human primates. A research noted that there has not been an increase in the incidence of liver tumors in the developed countries since the time of the introduction of DDT and other persistent pesticides.(Liver tumors in individuals in developing countries are considered to be predominantly caused by viral infections).

The contribution that compounds such as DDT may make to the etiology of human breast carcinoma currently is a topic of intense research interest. Breast carcinoma is a highly heterogeneous disease with an extremely complex and multi-factorial etiology. Known etiologic factors have been established to account for only approximately 30% of breast carcinomas. Many studies are suggestive of an increasing incidence of breast carcinoma, and there are important geographic differences in the incidence of the disease. A much lower incidence prevails in Japan and Asia than in Western countries.

A study carried out in Zagazig city, to prove the effect of pollution on plants by some pesticides that were originally sprayed on an adjacent cotton crop showed that concentration of Corcicorn 72%, Dorspan 38%, and

Somosden 20% in the first hour was very high in adjacent crops then it decreased after 14 days.The results are shown in table (1).

Table (1): The Pollution of vegetable crops cultivated adjacent to pesticides sprayed cotton fields p.p.m. (part per million)

	Corcicorn 72%	Dorspan 38%	Somosden 20%
Green Pepper			
After 1 hours	12.5	10.5	14.5
After 2 weeks	0.21	0.28	.....
Okra			
After 1 hour	14.03	11.9	3.9
After 2 Weeks	0.12	0.16	....
Cucumber			
After 1 hour	7.7	5.7	2.7
After 2 weeks	.....	.....	.....
Tomatoes			
After 1 hour	1.85	0.68	1.34
After 2 weeks	.....	.....	.....

Source: Ra'dy Abdel Rahman: environment pollution by pesticides Zagazig University: Faculty of Agriculture (Ph.D 1980)

In Canada, agriculture has been routinely monitoring agricultural food products since 1970 for all contaminants, including pesticides in plant products and veterinary drug residues in meat, eggs, and cheese.

A study performed in USA by sustainable cotton project shows the effects of cotton pesticides and herbicides on environment as shown in table (2).

Another study about air pollution in the industrial area of north Cairo with special reference to its effect on plants. The study deals with the presence and distribution of toxic heavy metals in Egyptian soil and the available vegetations grown around pollution at different sites such as Shobra el-Khaima. Also, atmospheric dust deposited over plant leaves was analyzed in both soluble and insoluble fractions. Plant samples were analyzed for lead, calcium, zinc, copper and nickel concentrations. According to edible parts of the six available cultivated plants. In 3 contaminated sectors and the control one away from pollution source. pH of soils in 30 sites of measurements were conducted through the time of investigation according to distance and depth from different emission sources.

Although there is no sharp classification of the different activities in the studied areas, the pH values of soil were measured downwind the investigated sites, also the organic carbon and organic matter in soil were measured. Similar behavior trends for the estimated heavy metals were absorbed, decrease of concentration with increasing soil depth and the distance from emission source in all the investigated sited for example the max. cadmium concentration of 50 □g/g detected in the surface soil samples around the agricultural sector while the min. cadmium concentrations of 16 □g/g detected in surface soil at distance 3 kilometer down wind the pollution source. Six different plants 3 edible *Brassica rapa* (Turnip), *Erucia sativa* (Arugula) and *Raphanus sativus* (Radish) and three cultivated crops *Triticum vulgare* (wheat), *Zea mays* (maize) and *Vicia faba* (beans).The heavy metals concentration in wheat seeds in contaminated area is compared to the

concentrations of heavy metals in the wheat seeds away from pollution in a distance difference about 60 Km as shown in Table (3)

Table (2) The Effect of Cotton Pseticides & Herbicides on Environment

Chemical Name	Agricultural Use	Intermediate toxicity	Long Term Toxicity	Environmental Toxicity
Chlorpynfos	Insects	Moderate/High	Brain and fetal damage, impotence, sterility.	Bees, birds, crustaceans, & mollusks.
Cyanazine	Weeds	Moderate/High	Birth defects, cancer.	Bees, birds, crustaceans, & fish.
Dicofol	Mites, & has insecticial properties.	Moderate	Cancer, reproductive damage, tumors.	Aquatic insects, birds, & fish.
Ethephon	Plant growth regulator	Moderate	Mutations.	Birds, bees, crustaceans, & fish.
Fluometuron	Herbicide.	Unknown	Blood, spleen.	Bees & fish.
Metam Sodium	Insects, nematodes, fungus, weeds.	Moderate/ High	Birth defects, fetal damage, mutations.	Bees & fish.
Methyl Parathion	Insecticide.	Very High.	Birth defects, fetal damage, reproductive & immune system.	Birds, bees, crustaceans, & fish.
MSMA	Herbicide.	Moderate/High	Tumors	Bees & fish.
Naled	Insecticide, & has miticidal properties	Very High	Cancer, reproductive damage, tumors	Amphibians, aquatic insects, bees, birds, crustaceans, & fish.
Profenofos	Insecticide & miticide.	High	Eye damage, skin irritant.	Birds, bees, & fish.
Prometryn	Herbicide.	Moderate/Hig.	Bone marrow, kidney, liver, testicular damage.	Bees, birds, crustaceans, fish, & mollusks.
Propargite	Miticide.	Moderate/Hig.	Cancer, Fetal & eye damage, mutations, tumors.	Bees, birds, crustaceans, & fish.
Sodium Chlorate	Leaf drop & weeds.	High	Kidney damage & methemoglobinemia	Birds & fish.
Tribufos	Leaf drop.	Moderate/Hig.	Cancer, tumors.	Birds & fish.
Trifluralin	Herbicide.	Low/Moderate	Cancer, fetal damage, teratogen, suspect mutagen.	Amphibians, aquatic insects, bees, birds, crustaceans, & fish.

Source: Cotton Pesticides and Herbicides Used in USA Sustainabble Cotton project

Table (3): metal concentrations in seeds of wheat in contaminated and non-contaminated areas

Metals	Wheat seeds contaminated area	Wheat seeds non-contaminated area
Lead (Pb)	1.3 □g/g.	0.06 □g/g.
Cadmium (Cd)	0.8 □g/g.	0.03 □g/g.
Zinc (Zn)	35.5 □g/g.	1.5 □g/g.
Copper (Cu)	5.97 □g/g.	0.2 □g/g.
Nickel (Ni)	5.9 □g/g.	0.1 □g/g.

Source: Yasser Hassan Ibrahim air pollution in the industrial area north Cairo with special references to its effect on plant (Ph.D Cairo university 2000)

Another important topic mentioned by the author is that plant tissue greatly affected the concentration of chlorophyll. Pollutants including deposited particles matter, fine suspended dust, Sulphur dioxide (SO_2) Nitorgen dioxide (NO_2) photochemical oxidants, ammonia (NH_3) and heavy metals. These resulted in the contamination by toxic heavy metals of cultivated soils and plants (leaves, roots, and seeds). Either edible or cultivated crops grown in the area this may represent a serious hazard to the health of humans and animals feeding on such agricultural products. The research recommends that this area needs an effective control plants do ablate pollution and hence to reduce the associated dangers.

Objectives:

. The objective of this study is to know the draw backs of pesticides and pollution and how it affects human beings, animals, plants. In spite of the potency of pesticides, yet, the abuse even the overuse is considered as dangerous. because of its economic and environmental side effects presented in the economic deterioration of agricultural production resources resulting from environmental damage due to pesticides. To fulfill this aim, the study analyzed the impact of pesticides on environment and economics. The researcher selected Dakahleya governerate to make the study there in Winter season 1997/1998

The sample was obtained from cotton crops only. The selection of this governerate was meant by the researcher for essential reason that is the high rank of Dakahleya among cotton producing governerates as it is in the first rank in cotton area cultivated. As the area cultivated reaches about 1250, 000 feddan represent about 16.9% of total cultivated land in Nile Delta that is 7395000 feddan . Also, it is about 9.5% from the total cultivated Egyptian land that is 13156 thousand feddan.

Besides, the quantity of pesticides used represent 15% of total consumed quantity in Delta, and 9% of total consumed quantity in Egypt during the period 1988-1997 (this period represents the integrated combat of cotton pests all over Egypt) this might make it a good representative to all the Delta governerates. Specifically, Bilqas & Manzala in Dakahelya were selected due to relative significance of the quantity produced and area cultivated in 1997-1998. For, Bilqas & Manzala are in the first and second ranks as regards area and quantity produced. Cotton area cultivated in Bilqas is about 30% and cotton production is 28% of the total area the governerate. 15% is cultivated in Manzala of 16% production of the total governerate. 2 Villages were selected from Bilqas for the questionnaire to be carried out. They are Demlash & Damayra. Manazala & Gawaber were selected from Manzala for the same purpose. 100 questionnaire for these 4 villages.

RESULTS AND DISCUSSION

To recognize the economic revenue during the period of integrated combat and evaluation of quantity of used pesticides with identifying the side effects of pesticides - in a study sample - on human beings and animals.

The Cotton cultivated area: In studying the cultivated areas growth, it is found that the cotton cultivated areas had a virtual decline statistical direction about 2.4% of decrease during the period of study.

The feddan productivity: In studying the growth of Cotton feddan productivity. It is found that productivity declined by decrease rate that is 7.9%.

Total production of Cotton: it was decreased by 0.4% annually during the period of the study

^

Yn = 1018.5 - 21.0Xn

Equation of Cotton Area During (1988-1997):

R = 0.67 R^2 = 0.45 *T*= - 3.7

Average percentage of change = -2.4

$\hat{Y}n =$ Estimated cotton area/100 unit

X_n= Years, *n= (1,2,3,.....10)*

Equation of Cotton Productivity During (1988-1997):

^

Yn = 5.41+0.1Xn

R = 0.44 R^2 = 0.20 *T*= 1.5

Average percentage of change = 1.6

$\hat{Y}n =$

Estimated cotton productivity/100 unit

X_n= Years, *n= (1,2,3,.....10)*

Equation of Cotton Production During (1988-1997):

^

Yn = 5546.3+21.9Xn

R = 0.09 R^2 = 0.01 *T*= -3

Average percentage of change = - 0.4

$\hat{Y}n =$ Estimated cotton production/100 unit

X_n= Years, *n= (1,2,3,.....10)*

In studying pesticide quantity used in Egypt's agriculture during the period (1988-1997), the data shows that there is an annual decline of the pesticides quantity. This matches with the global movement towards reduction of pesticides, because of its environmental hazards. The quantity of pesticides decreased from 17200 ton (1988) to 2250 (1997). This is due to the application of the integrated combat of Cotton pesticides. The demand function of Cotton pesticides is as follows:

^

Yn=14761.5+68202Xn

R = 0.75 R^2 = 0.70 *T*= 6.5

Average percentage of change =

$\hat{Y}n$ =

Estimated cotton pesticides demand / ton

X_n= *Years,* *n= (1,2,3,.....10)*

This means that Cotton pesticides quantity is decreasing at a level of 682 ton annually, and the change in the quantity of pesticides is about 0.70 due to the time factor implemented variables during the period (1988-1997).

The data given in table (4) points out the rise in costs of manual & biological control of cotton feddan starting from L.E. 43.1 in 1988 to L.E.27.24 for manual control and from L.E 9.45 / feddan to L.E 27.49. / feddan for biological control. On the other hand, the Chemical control costs declined from L.E 75/ feddan to L.E. 38 / feddan, during the period of the study.

Table (4): Costs of Cotton Pest Control (1988-1997) LE / feddan

Year	Manual	Biological	Chemical
1988	43.1	9.45	75
1989	49.02	8.40	80
1990	57.90	9.80	70
1991	27.30	9.80	120
1992	28.82	16.50	170
1993	27.55	22.24	182
1994	16.45	25.02	142
1995	75.58	26.0	77
1996	85.32	26.35	43
1997	70.24	27.49	38

Source: Ministry of Agriculture and Land Reclamation, archive files of Pest Control Department

Side effects of pesticides on the study sample:

The aim of this study is to evaluate the effect of using pesticides on cotton crops to estimate the cases of human and livestock intoxication.

First: The effect of pesticide use on human beings.

Out of table (5) that illustrates number of human intoxication cases in Dakahleya's centers and villages 1997, the following results were obtained.

Bilqas: intoxication cases of human beings due to cotton pesticides reached 8 cases, out of them 5 cases in Dimlash village and 3 in Damayera village, they were all males. Mortality, was one case in Dimlash.

Manzala: the cases of intoxication reached 6 cases, out of them 3 in Manzala village, 3 in Gawaber, all were males in addition to one female case.

By this, the total number of intoxication cases is 1 death due to intoxictaion 14 male intoxication, 1 female. This is the result for 4 villages, Since, the total number of villages in Dakahleya is 445, population is 4,223,655 of 7.13% of national population, since, these villages represent all villages, and if these results is applied for the whole governerate for they all survive the same circumstances, cultivating cotton, and using pesticides of the same quality. Therefore, the intoxicated cases is as follows

Deaths: 111

Intoxicated Males: 1557
Intoxicated Females: 111
Therefore, the intoxicated cases are 0.037% of Dakaheleya's pulation.

Table (5): Number of Human Intoxication cases in Dakahleya's Centers and Villages 1997

Center	Village	Intoxication cases		Death cases		Total
		Males	Female	Males	Females	
Bilqas	**Dimlash**	5	-	1	-	5
Bilqas	**Damayra**	3	-	-	-	3
Total		8	-	1	-	8
Manzala	**Manzala**	3	-	-	-	3
Manzala	**Gawaber**	3	1	-	-	4
Total		6	1	-	-	7
Total		14	1	1	-	15

Source: collected and calculated from Questionnaire in Dakahleya

Second: Out of table (6) - that illustrates number of livestock intoxication cases in Dakahleya's centers and villages 1997- the following results were obtained.

Bilqas: intoxication cases of livestock due to cotton pesticides, one buffalo died in Dimlash village, 1 buffalo, 1 calf, and one sheep died in Damayera village.

Manzala: the cases of intoxication reached 1 cow, 1 buffalo, and one sheep, in Manzala village. In Gawaber, 1 cow and one buffalo died.

By this, the total number of intoxication cases is 27 in 4 villages, as follows:

Dimlash: 5 intoxicated, 1 death
Damyera: 11 cases intoxicated, and 3 deaths
Manzala: 7 were intoxicated, and 3 died
Gawaber: 4 were affected, 2 died

The total of 4 villages' livestock is 55 animals, therefore each village's mean livestock is about 13.7 animal. As a result, the Dakahleya's livestock may be assumed to be 5785.Therefore, The average mortality rate/village in Dakahleya is 2.25.

Table (6): Number of Livestock Intoxication cases in Dakahleya's Centers and Villages 1997

Center	Village	Cow		Buffalo		Calf		Sheep		Camel		Total
		I.	D.	I.	D.	I.	D.	I.	D.	I.	D.	D.
Bilqas	**Dimlash**	1	-	2	1	2	-	1	-	-	-	1
Bilqas	**Damayra**	1	1	5	-	3	1	2	1	-	-	3
Total		2	1	7	1	5	1	3	1	-	-	4
Manzala	**Manzala**	3	1	2	1	-	-	1	1	1	-	3
Manzala	**Gawaber**	2	1	1	1	1	-	-	-	-	-	2
Total		5	2	3	1	1	-	1	1	1	-	5
T O T A L		7	3	10	2	6	1	4	2	1	-	9

Source: collected and calculated from Questionnaire in Dakahleya
I. stands for intoxication cases
D. stands for death cases

Assuming that all Dakahleya's villages (445 village) use the same pesticides, at almost equal quantities, and qualities of pesticides. Therefore, the expected annual mortality rate is 1001 animal. Supposing that, the average price of each animal is L.E. 1000. As a result, the expected Dakahleya's annual losses is about LE 1 million

CONCLUSIONS AND RECOMMENDATIONS

The quantity and quality of pesticides in use, must be monitored by laws that take into consideration the ecological aspects, as well as, health and sanitary considerations. Pesticides pollution is one of the factors deteriorating the production resources. There are also alternatives that are often more effective in the long run and less harmful to the environment and the applicator, due to the significance of such subject, for a study showed that every day, 1 million American children age 5 and under consume unsafe levels of a class of pesticides that can harm the developing brain and nervous system, according to a new analysis of federal data reports that peaches, apples, pears and grapes, are the most common sources of exposure to unsafe levels of organophosphate pesticides, or OPs, for young children. The report says the solution is not for infants, children and pregnant women to eat fewer fruits and vegetables, but to rid these otherwise healthful foods of the most dangerous pesticides.

Overexposed: Organophosphate Insecticides in Children's Food, is in response to the Food Quality Protection Act, passed unanimously by Congress in 1996, that requires all pesticides to be safe for infants and children. The law further stipulates that combined exposures to pesticides be considered when setting safety standards. The study recommends the following:

1. Concerns have been raised that pesticide exposure may be an important cause of cancer.
2. Phenoxy herbicides have been implicated in causing an excess of some cancers in farming populations and among pesticide applicators.
3. Some studies have implicated DDT, and its metabolite DDE, in the etiology of breast carcinoma. Although a causal relationship remains far from established.
4. The Panel agrees with the many published reports suggesting that a diet rich in fruits and vegetables is important in the reduction of cancer risk at various anatomic sites.
5. The exposure of the general population to pesticide residues is minimal and below those levels already deemed to be safe by government regulatory agencies.
6. Researcher encourages support for further research in this area.

Table (1): Cotton area, Net Revenue, Pesticide Quantity, Pesticide Real Price, Price of Exported Cotton total amount of pesticide, and percentage of cotton pesticide to total pesticide

Years	Cotton area / 1000 Feddan	Prduc-tion/ L.E.	Net Revenue / L.E	Pesti-cide Quanitiy Ton	Pesti -cide Real Price	Value of Exported Cotton L.E. Fed	Price of Exported Cotton L.E Kentar	Total amount of Pesticide Ton	% of cotton pesticide to total pesticide
1988	1014	612.9	205	6315	388	1204	199	17200	38
1989	1006	652.1	413	7230	350	1884	508	17990	40
1990	993	783.9	641	4910	451	4200	714	15100	35
1991	951	878.6	1048	4889	1010	3839	384	11700	33
1992	840	991.1	1768	2610	1025	3586	214	5394	48
1993	884	1386	1563	1788	1204	4158	153	4630	37
1994	721	1400	1899	1135	1310	3632	113	3298	34
1995	891	1480	1902	1017	1480	4110	127	3021	34
1996	921	1630	1867	713	210	3122	133	2299	32
1997	859	1537.3	1869	614	902	3532	142	2250	27

Source: computed from Ministry of Agriculture and Land Reclamation & CAPMAS statistical publications

Table (2): The Value of Cotton, Cotton wood and the national agricultural income during the period (1988-1997)

Years	Value of Cotton/ 1000 L.E.	Value of Cotton Wood / L.E. 1000	Total Value of Cotton and Cotton wood / L.E. 1000	National Agric. income/ L.E. 1000	Ratio of Cotton and cotton wood to National Agric. income/ LE 1000
1988	778473	51174	829648	11216000	18.7
1989	1075246	51057	1126303	13046000	15.3
1990	1369362	55166	1414528	15834000	13.0
1991	1164735	51111	1215846	20472072	10.3
1992	2268646	49152	2317798	20675000	13.7
1993	2292780	45963	2338743	23009210	12.2
1994	3079300	72100	3086510	24451000	13.7
1995	2806200	80810	2887010	26615210	15.0
1996	2913000	82890	2995890	32921211	13.0
1997	3178300	93760	2372060	32921211	15.0

Source: computed from Ministry of Agriculture and Land Reclamation & CAPMAS statistical publications

Table (3): The Relative Significance of Area, Productivity and Cotton Production in Dakahleya's Governerate

Center	Area/1000 feddan	Percen-tage	Mean productivity Kentar for feddan	Production Kentar for feddan	Percen-tage
Aga	5.96	4.6	5045	32.50	5.1
Bilqas	38.98	29.9	5.34	178.36	28.1
Dekurnes	1.20	0.9	5.09	6.12	1.00
Met-Suade	10.87	8.3	4.78	52.01	8.2
Simbellawane	7.69	5.9	4.91	37.77	5.9
Tamei-el-Amdid	5.68	4.4	4.77	27.09	4.3
Cherbuin	14.33	11.0	5.04	72.13	11.4
Talkha	14.71	11.3	4.86	71.49	11.3
Manzala	20.07	15.4	5.13	103.03	16.2
Mansura	4.61	3.5	5.13	23.66	3.7
Met-Ghamr	1.30	1.0	5.04	6.55	1.00
Menyet-el-Nasr	4.85	3.7	5.01	24.32	3.8
Dakahleya's Total	**130.27**	**100**	**4.87**	**635.03**	**100**

Source: Ministry of agriculture and Land Reclamation. Economic Affairs Sector. Agricultural Economic Central Administration

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التدهور الاقتصادي لعناصر الانتاج الزراعي الناتجة عن التلوث البيئي بسبب المبيدات في مصر (دراسة حالة بمحافظة الدقهليه)

أليس سامي فرج سعد

قسم السياسة الزراعية وتقييم المشروعات - معهد بحوث الاقتصاد الزراعي - مركز البحوث الزراعية

تتطلب السياسات الاقتصادية السليمة فهما عميقا لاسباب تدهور البيئة من جراء الآثار الناجمة عن مسببات التلوث وذلك لتحديد التكاليف اللازمة لإزالة وعلاج التلوث وتحديد أسباب التدهور البيئي أمراً في غاية الصعوبة بسبب التفاعل المعقد بين الطبيعة والنشاط الإنساني. ولقد أصبح التلوث البيئي ظاهرة عالمية واكبت التطور العلمي ويعرف التلوث بأنه أي تغير فيزيائي أو كيميائي أو بيولوجي مميز ويؤدي إلى تأثير ضار على الهواء أو الماء أو الأرض أو يضر بصحة الإنسان والكائنات الحية الأخرى كما يؤدي إلى الإضرار بالعملية الانتاجية كنتيجة للتأثير على حالة الموارد المتجددة.

تهدف الدراسة إلى حتمية إدراج الاعتبارات البيئية في التفكير الاقتصادي والأساليب الاقتصادية وإلى التأكيد على أهمية المشاكل البيئية بالنسبة للاقتصاد الكلي نظرا لأن مصروفات تخفيف التلوث تحسب كإضافات للدخل القومي وكذلك التعرف على المدى الذي يهدد به تدهور البيئة على النمو الاقتصادي

وترجع مشكلة التلوث البيئي في مصر الى اغفال عنصر البيئة عند وضع خطط التنمية وعدم توافر التوعية المناسبة في مجالات الصحة والأمن الغذائي وحتى تتمكن مصر كأحد الدول النامية من تحسين ادائها في عملية التنمية فكان لابد من التعرف على الآثار السلبية الناتجة عن تلوث الهواء والماء والتربة بفعل المبيدات (لأن المتر المربع من الأرض الزراعية في مصر يتلقى سنويا ما يقرب من ٤,٦ جرام من المبيدات الحشرية و ٢,٤ جرام من المبيدات الفطرية وهذا المعدل يفوق المستويات العالمية) وذلك حتى يمكن ان تدخل قضايا البيئة في برامج السياسات الاقتصادية لتحديد كيفية معالجتها.

وللتعرف على المدى الذي يهدد به تدهور البيئة على كل من الانسان والحيوان والنبات وقد قامت الدراسة بعمل استعراض مرجعي لنتائج الدراسات التي قامت بها منظمة الصحة العالمية والكثير من الجامعات بدول العالم المختلفة والتي أكدت على أضرار المبيدات على صحة الانسان حيث أنها تتسبب في أمراض الجهاز التنفسي والفشل الكلوي والسرطان واضطرابات الغدد الصماء والأورام الخبيثة بالمخ.

ولقياس التدهور الاقتصادي لعناصر الانتاج الزراعي المتمثلة في عنصري الارض والعمل نتيجة التلوث البيئي لكل الماء والهواء والتربة بسبب المبيدات المستخدمة في مجال الزراعة قامت الدراسة بعمل استبيان لدراسة أثر المبيدات المرشوشة على محصول القطن على كل من الإنسان والحيوانات المزرعية و قد تم اختيار القطن نظرا لأهميته النسبية في الدخل الزراعي حيث يمثل الدخل من القطن والحطب نحو ١٥% من اجمالي الدخل الزراعي عام ١٩٩٧ لان صادرات القطن تمثل نحو ٤٠% من اجمالي الصادرات الزراعية عام ١٩٩٧ كما أن كمية المبيدات المرشوشة على محصول القطن تقدر بنحو ٣١٢٢ طن تمثل نحو ٣٠% من اجمالي كمية المبيدات المستخدمة في الزراعة والتي تبلغ نحو ٨٢٧٨ طن عام ١٩٩٧ هذا إلى جانب ارتفاع سعر المبيدات والتي تكلف مصر نحو ٢٠٤ مليون جنيه سنويا أما قيمة المبيدات المستخدمة في القضاء على آفات القطن فأنها تبلغ ٧,٩ مليون جنيه ولقد تم الاستعانة بأسلوب البحث الميداني حيث اعتمد البحث على بيانات جرى تجميعها من خلال اجراء استبيان على عينة من الزراع تم اختيارهم من مركزين من مراكز محافظة الدقهلية كنطاق مكاني للمعاينة وقد تم اختيار هذه المحافظة وهذا المحصول بطريقة مقصودة لأسباب جوهرية تتعلق بالمكانة التي تحتلها محافظة الدقهلية بين المحافظات المصرية حيث تأتي في المرتبة الأولى من حيث نسبة المساحة المزروعة قطنا وقد وقع الاختيار على مركزي بلقاس والمنزلة بمحافظة الدقهلية وفقا للأهمية النسبية لمساحة انتاج القطن فيها عام ١٩٩٧ حيث يحتل مركز بلقاس ومركز المنزلة الأهمية النسبية الأولى والثانية لمساحة وانتاج القطن على الترتيب فقد بلغت المساحة المنزرعة قطنا بمركز بلقاس نحو ٣٠% من اجمالي مساحة القطن بالمحافظة وكان انتاج القطن يمثل نحو ٢٨% من جملة انتاج القطن بالمحافظة . أما المساحة المزروعة قطنا بالمنزلة فتمثل نحو ١٥ % من اجمالي مساحة القطن بالمحافظة في حين بلغ انتاج نحو ١٦% من جملة انتاج القطن بالمحافظة وقد تم اختيار قريتين بمركز بلقاس هم قريتي دملاش والدمايره وقريتين بمركز المنزلة هما المنزلة والجوابر وقد تم توزيع ٥٠ استمارة لكل مركز بواقع ٢٥ استمارة لكل قرية فأصبح الحجم الكلي للعينة ١٠٠ مزارع وتوصلت الدراسة للنتائج التالية:

بالنسبة لأثر استخدام المبيدات على العنصر البشري، أوضحت الدراسة أنه قد بلغ اجمالي عدد حالات الإصابة بالتسمم نتيجة تأثير المبيدات على العمالة الزراعية بمركز بلقاس بمحافظة الدقهلية نحو ٨ افراد ٥ حالات منهم في دملاش و ٣ حالات في الدمايرة وكان عدد الوفيات حالة ١ في دملاش. أما بخصوص جنس المصاب فكلهم ذكور وهذا راجع لكثرة تعرض الرجال للمبيدات داخل الحقول أثناء عمليات رش المبيدات. أما في المركز الثاني المنزلة فكان جملة عدد الحالات المصابة بالتسمم هو ٧ حالات منهم ٦ حالات ذكور وحالة واحدة من الإناث بواقع ٣ حالات إصابة في المنزلة و ٤ في الجوابر. وإذا كان عدد المتأثرين من العمالة الزراعية بفعل المبيدات قد بلغ ١٥ حالة في المركزين ولو جاز تعميم هذه النتيجة على مستوى محافظة الدقهلية والتي تضم ٤٤٥ قرية على أساس أن القطن يزرع بجميع قرى المحافظة ولو أن القرى كلها تستخدم مبيدات القطن لصارت النتائج هي ١٥٥٧ حالة تسمم للذكور نتيجة المبيدات و ١١١ للإناث و ١١١ وفيات بالنسبة أثر استخدام المبيدات على الثروة الحيوانية فقد تم حصر حالات تسمم الحيوانات وكانت النتائج كالآتي: ٢٧ حالة إصابة في مركزي بلقاس والمنزلة بفعل المبيدات و٩ حيوانات نفقت وإذا كان عدد الحيوانات المملوكة بهذين المركزين هو ٨٨ حيوانا وبهذا يمثلون نحو١٠ % من جملة عدد الحيوانات المملوكة بالمركزين وجاز تم تعميم هذه النتيجة على مستوى قرى المحافظة وعددها ٤٤٥ قرية لبلغ اجمالي عدد الحيوانات التي تأثرت بفعل المبيدات نحو ١٠٠٠ حيوان مزرعي وبفرض أن متوسط سعر الوحدة الحيوانية هو الف جنية في عام ١٩٩٧ فيمكن تقدير اجمالي قيمة الخسارة بنحو مليون جنية سنويا على مستوى محافظة الدقهلية

وتوصي الدراسة بإصدار تشريعات قوية تحد من استخدام المبيدات ومنع استخدام المبيدات شديدة السمية والتوسع في تصنيع المبيدات المستخرجة من نباتات طبيعية خاصة لمحاصيل الخضر والفاكهة ووضع معايير لتحديد نسب التلوث المسموح بها في البيئة مع العمل على تطبيق سياسة المكافحة المتكاملة هذا إلى جانب الاهتمام بإعداد نظم للمعلومات البيئية وتقييم لأولويات الأنشطة البيئية في مناطق مصر المختلفة خاصة المناطق الصناعية وفرض سياسات للحد من التلوث البيئي كفرض ضرائب على مسببي التلوث لتحقيق إيرادات تعتبر تمويل ذاتي لحماية البيئة هذا إلى جانب دور وسائل الإعلام وذلك حتى تصل مصر إلى بلوغ تنمية سليمة بيئية قابلة للاستمرار.