

## Impact of pesticides on Sustainable Agricultural Development

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**Abstract-***the term pesticide includes a wide range of ingredients including such preparations as insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, plant growth regulators, etc. Their negative impact is associated with the disappearance of a large number of wild flora and fauna and the change of the function of ecosystems whose rehabilitation needs to be done through biodiversity-based services such as biological control of pests that will also bring minimal doses of different pesticides. The most important negative consequences are the reduction of genetic variability of living systems, eutrophication processes of freshwater and marine species as well as the chemical and physical and biological changes of the soil. In addition, high chemical fertilization also results in cycles of elements (carbon, nitrogen, phosphorus, etc.) that are the delicate mechanisms for maintaining biological and chemical-physical balances in an ecosystem, and between ecosystems and biosphere. Various scholars have identified many variables in this problem, such as loss of landscape elements, increased surface cultivation, etc. however little is known about their positive and negative effects on biodiversity. The purpose of this article is to analyze the negative and positive effects of pesticide use in terms of the intensification of agriculture and modernization of human society, which is accompanied by the use of a larger quantity of pesticides with the main purpose of increasing yield and improving their trading value. The United Nations Food and Agriculture Organization defines pesticides as any substance or mixture of substances intended for the prevention, destruction or control of any disease or pest. In a study conducted in eight countries in Western and Eastern Europe, significant negative impacts of the intensification of agriculture on the diversity of wild plants, bird species and the potential for biological pest control have been determined, with a negative effect higher than the use of insecticides and fungicides.*

**Key words:** Pesticides, ecosystem, biodiversity, dose use, environment.

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### History of pesticide use in the world

Various countries of the world date different time of production and use of pesticides. Their use in agriculture is one of the fundamental investments in cultivation technology. Worldwide, pesticide use has been and remains indispensable to ensure high yields and sustainable production. Historically, since 2500 BC, mankind has used pesticides to protect plants. Even natural compounds or natural extracts such as tobacco extract, red pepper, etc. have been used since ancient times as insecticides. The first pesticide that has been recognized is elemental dust sulfur. Since the 15th-century toxic chemicals have been used, such as arsenic (As), mercury (Hg), and lead (Pb). Also in the 17th century, it was used as nicotine sulphate insecticide, which was extracted from tobacco

leaves. In 1939, Paul Müller discovered that DDT was a very effective insecticide. In 1940 synthetic pesticides began to be produced and after the Second World War, their production became widespread throughout the world. Since 1950 the use of pesticides is increased fifty times more. A number of insecticides (organochlorine insecticides) that were successfully used before the 1960s to identify typhoid and malaria disease after 1960 began no longer be used or restricted in many parts of the world. Also, after the 1960s were introduced synthetic insecticides (organophosphates, OP), carbamates were introduced in the 1970s and piretroids were introduced in the 1980s. The use of pesticides put under control many illnesses and pests of agricultural crops, increasing not only their yield but also their trade values. In Albania up to the 1990s, there were products for plant protection

products, such as insecticides mainly of carbamate (Sevin) and chlorogenic (Lindane) chemicals, up to 5% formulations for soil and dust treatment plants, Zineb 20% fungicides and sulfur powder, which are used with dusting as well as borderless paste and calcium polysulfur by spraying plants. The social, economic changes that occurred after the 1990s were associated with the destruction of some chemical companies which resulted in a reduction in the quantity of pesticide production. The largest decline in the production of the chemical industry in the country after the 1990s was mainly found in the sulfuric, nitric, phosphoric, caustic soda (sodium hydroxide), sodium (sodium carbonate), superphosphate, nitrogen fertilizers, oil and gas production, SiO<sub>2</sub>, glycerin, SO<sub>2</sub>, CO<sub>2</sub>, etc. The pesticide production industry belongs to the post-communist system, but its wastes continue today, causing great concern to the communities in these areas, who do not feel endangered only by these industrial wastes but also by other pollutants different physical-chemical, which have caused various problems with water, air, and soil, becoming not only a local but also a global problem for their own distribution. As a result of numerous national and international efforts, Albania has become part of the policies, plans, programs, and projects for the identification of polluted areas and their rehabilitation based on sustainable development practices. A good part of these hotspots have already been rehabilitated but continues to identify and operate in other less critical areas.

### **Characteristics of pesticides**

Pesticides are characterized by certain physical and chemical characteristics, which also determine their interaction with the environment. Knowing these characteristics is related to making the best decisions about their active ingredient to be used or not in a given situation and taking preventive measures to mitigate their adverse effects on people's health and environment. The use of pesticides is a source of poisoning and health risks among the exposed population (Das et al., 2006). They can be in a variety of physical forms, such as

dust, dirt, liquid or emulsifiable concentrate and distributed to the environment by physical sedimentation, absorption and volatilization processes depending on the composition or formulation of pesticides. Their solubility depends on many factors, such as pH, hydrogen bonding, molecular size, and so on. which is also related to their permeability to deeper layers of the earth. Thus, organic potassium-based (Ka) and nitrogen (N) compounds are more easily soluble and decomposed, which may pass from the upper layers of the soil to the deepest layers, while phosphorus-based compounds (P) exceptionally, with intense conception and special climatic conditions of the soil (low pH). Phosphorous insecticides go up to 2.5 months. organic chlorine insecticides have a durability of up to 20 months in the soil, and herbicides 17-25 months (G & G group, May 2006). The formulation or the way in which the active ingredient is given is another indication of their breakup.

### **Benefits of using pesticides**

The modernization of human society brought not only the production of a larger quantity of products but also the increase of their trading value. Before such a reality, there was the need to use a large number of pesticides, which was accompanied by primary and secondary effects. Primary effects result in primary benefits, which are mainly related to health, income, and healthy environment. Various studies on the use of pesticides show that there is a mutual relationship between product and productivity, where productivity increases have been due to several factors such as the use of fertilizers, the best cultivars and the use of technology, while pesticides have been an integral part of the process by reducing losses from weeds, diseases, and pests (Oerke EC, Dehne HW, 2004). Different researchers determine that they play an important role in the treatment of bad weeds, which bring a drop in yield by up to 40%. Also, disease control and pest control strategies are very important for other living things, such as birds, invertebrates, etc. who play an important role in the natural equilibrium of ecosystems. Insecticides are

often the only practical way to biologically control insects spreading deadly diseases, such as malaria, where the death toll amounts to about 5,000 deaths each day (Ross G. 2005).

### **Dangers of pesticides**

Sprays of pesticides can directly affect non-target vegetation. Studies about the amount of pesticide waste are scarce, as it is known that a large amount of spraying is lost because it is dispersed in undesirable areas. In addition to the direct effect of increasing the effect of pesticides on increasing the yield of agricultural crops by combating diseases and different pests, they negatively affect people's health thanks to the toxic waste accumulated on the soil and on the products we consume. In order to determine the possible adverse effects on the environment and health, it is important to take into consideration the toxicity of the active ingredient as well as the other ingredients in the formulation that can be used to understand the basic distribution basis in the non-target target. It should be emphasized that more studies are needed because many harmful pesticides are not monitored, such as DDT, endosulfan, heptaklor, lindane and their TP. Most of them are now banned in agriculture, but their residues are still present, such as polar pesticides, which are mainly represented by herbicides, such as: carbamates, fungicides and some inorganic organophosphates. .... Heavy soil treatment with pesticides can affect soil fertility by reducing the populations of its beneficial microorganisms, especially bacteria and fungi, without which the soil degrades (Dr. Elaine Ingham). Herbicides affect different ways, such as triclopyr that prevents soil bacteria from transforming ammonia into nitrate, 2,4-D that reduces nitrogen fixation from bacteria living in plant roots, etc. Using chemical products increases the risk of affecting many diseases such as cancer, high blood pressure, heart disease, diabetes, stroke and other chronic diseases (Lewis et al., 2005). No segment of the population is fully protected from exposure to pesticides, resulting in serious health effects. Numerous studies show that some of these chemicals pose a potential risk to humans and other

forms of life as well as adverse side effects to the environment. Worldwide deaths from chronic diseases and pesticide poisoning are around 1 million per year (Environews Forum, 1999). High-risk groups exposed to pesticides include production workers, formulators, sprayers, chargers and farm workers. Also, OC compounds can pollute the tissues of almost any form of life on earth, air or water. The use of pesticides also has serious consequences for groundwater and groundwater contamination, causing serious risks to the quality of drinking water, reflected in the quality and hygienic values of water, such as translucency, color, wind, microbial content, etc. Pollution of groundwater with toxic chemicals due to pesticides is a worldwide problem where cleaning can be very costly and complex, but not impossible (Waskom 1994, O'Neil, 1998, US EPA, 2001). Pesticides are often considered as a quick, easy and inexpensive solution for the control of weeds, diseases, and pests of different environments. The worldwide use of pesticides in agriculture results in common residues in the environment where the extreme toxicity of most of these chemicals affects not only targeted pests but also many other species of organisms, albeit at varying degrees (Sanchez-Bayo et al., 2011). Unproductive use of pesticides causes economic and environmental costs. These costs are related to the time of use, the amount, the mode of degradation after use, as well as the number of treatments made. The effects of the special effects on flora and fauna are difficult to determine if the qualitative assessment of environmental destruction is relatively easy. Also, the use at high doses of agrochemicals with the main purpose of increasing the yield of agricultural crops has also modified the cycles of carbon, nitrogen, phosphorus, etc., which are delicate mechanisms for maintaining ecosystem balances and thus also of the biosphere. The main cause of rising costs lies in increasing the resistance of pests to pesticides (creating more aggressive species), which also increases the pesticide dose. This results in an increase in administered doses and the design of new pesticides. But the negative effect of pesticides cannot be localized only with the above effects. All these substances, at certain concentrations, may be harmful to

agricultural crops and present toxicity risks to the consumer. Also, the overflow of mineral fertilizers favors a fast metabolism of the organic matter present in soil from microorganisms. Pesticides cause effects on the structure and functions of ecosystems by changing: populations of certain species, normal animal behavior, stimulation or obstruction of animal and plant growth and increase or decrease of animal reproductive performance. Also, many natural predators of pests of agricultural crops have disappeared due to pesticide treatments. Various studies on the spread, transformation, and accumulation of plant and animal tissues used in agricultural processes suggest the very complex negative effects they cause: changing the structures and functions of ecosystems, collecting carcinogenic toxins in human and animal fatty tissues, soil contamination, groundwater and groundwater contamination, and so on. Knowing that contact with pesticides can be direct through contact, breathing, food, etc. the consequences also vary depending on the way of contact and the nature of the components themselves.

### **Pesticide care measures**

The consequences of the use of chemical compounds in agriculture vary depending on the way of contact or receipt of these products by man, and on the basis of the different nature of the components themselves. First, there are risks from workers' exposure to the compound chemical production industry and to farmers when exhibiting them during use in agriculture. Second, there are risks to the consumer, through the food chain, who can take these chemicals out of plant and animal foods. The consume assimilates pesticides not only through food and water but also through the airways and through the skin. Studies so far have shown that it is difficult to determine the degree of action of different pesticides in different people or their degree of action when coming into contact with the environment as compared to the laboratory conditions of their production. The relative perception of the risks arising from pesticides is also related to physical and chemical properties, formulation, the active ingredient, sustainability,

etc. The public perception of relative risks that come from the environment can result in some risks becoming more important than others. However, the main measures for the protection of human health and the environment should focus on:

1. Recognizing legislation on pesticide types, active ingredients, dissolution method and protective measures against them.
2. Respect agricultural and environmental practices on pesticides to prevent pollution levels of non-target facilities.
3. Continuous training of pesticide producers and users.

**Conclusion:** The main cause of rising costs lies not only in costs due to cases of acute and chronic poisoning of humans, but also in increasing the capacity of resistance to pesticides, which is associated with increased administered doses and designing new pesticides. However, given that data on risk assessment studies as a result of the use of pesticides are scarce, generation of descriptive epidemiological data based on area profiles, development of intervention strategies designed to reduce the incidence of acute poisoning and periodic surveys on high-risk groups are very much needed. These studies should determine the correlation coefficient of the impact of different pesticides in the environment and the community, as it is known that the pesticide field illustrates a certain ambiguity in situations where people are exposed to lifelong exposure. Also, there is a need to convey the message that preventing adverse health effects because health promotion is a lucrative investment for employers and employees as a support to a sustainable development of the economy. Therefore, there is every reason to develop health education packages based on knowledge, trends, and practices and disseminate them within the community in order to minimize human exposure to pesticides. One of the main tasks is the continuous monitoring of environmental pollution parameters, training of farmers in the fields of intensive agriculture, assessment of social and environmental costs, and the selection of

diseases resistant to pests and diseases, thus reducing the number of pesticides used. Our approach to pesticide use should be based on scientific judgment and not commercial considerations. The main challenge is the management of pesticide use with the main aim of reducing environmental pollution and risk in non-target species, which requires that everyone is trained and recognized consistently with his or her degree of risk. In addition, the best way to reduce the negative effects is the use of safe, non-chemical methods of pest and disease control and the use of modern agrotechnical methods ranging from: selection of uninfected seed, the deep working of land, the use of organic fertilizers, etc. However, the purpose of this article is to analyze some of the challenges faced by communities in different countries as a result of the pesticide-free use of: pesticide-level monitoring of hazardous pesticide concentrations, a dose of contamination, an assessment the risk of exposure, the impact on the loss of land-producing properties and the development of microgranites and the impact on human health.

### Bibliographical references

- i. APHA/AWWA/WPCF. (1995): "Standard Methods for the Examination of Water and Waste Water" 19th Edition, American Public Health Association.
- ii. APHA (1998): "Standart methods for examination of water and wastewater".
- iii. Babel, S. and D. del Mundo Dacera, "Heavy metal removal from contaminated sludge for land application": a review. *Waste Management*, 2006. 26(9): p. 988-1004.
- iv. *Environews Forum*, 1999 "Environmental Health Perspectives", 107, 188–190.
- v. *FlyBaseReferenceRepor: Das et al.* 2006, *J. Cel Biol.*175(2): 325.
- vi. Jansz Pawlyszyn, Barbara Pawlyszyn, Michall Pawlyszyn; "Solid phase microextraction. The chemical educats" .Vol.2. Nr.4. 1997.
- vii. Stephan J. Crook. "The application of solid phase microextraction to pesticide residue analysis". *The Royal Societyof Chemistry. Chromatography .Monograph. Rogar M. Smith series editor.* 1999.
- viii. Kim, M., et al., "Comparison of seven indicator PCBs and three coplanar PCBs in beef, pork, and chicken fat." *Chemosphere*, 2004. 54(10): p. 1533-1538.
- ix. Nuro,A., Marku, E., Shkurtaj, B., Shehu, M., Mucollari, N., "Study of levels of organic chlorine contaminants with the GC / ECD technique in seawater samples". *Scientific Journal of "Ismail Qemali" University. No.1 Vol.2-2013.*
- x. Lewis et al. 2005: "Statin Use and the Risk of Incident Dementia.The Cardiovascular Health Study". *Arch Neurol.* 2005;62(7):1047-1051.
- xi. Nasreddine L,Parent- Massin D, *Toxical Lett.* 2002 Feb 28; 127(1-3); 129-41), "Food contamination by metals and pesticides in the European Union. Should we worry"?
- xii. Oerke E.C, Dehne H.W., "Safeguarding Production – Losses in Major Crops and the Role of Crop Protection. *Crop Protection*". 2004;23:275.
- xiii. Ross G. "Risks and benefits of DDT. *The Lancet*". 2005; 366(9499):1771.
- xiv. Sanchez-Bayo, et al. 2011; "Impacts of Pesticides on Honey Bees - Birds decline, insects decline and..." *Environ Monit* 2011; 13(6): 1564–8.
- xv. Waskom R. "Best management practices for private well protection".1994, 25-28; 152-156. *Colorado State Univ. Cooperative Extension (August)*