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The Effects of Pesticides on Humans and the Environment

Moises da Silva Martins[1], Helena Cassia de Oliveira[2]

[1]martinsmoises@bol.com.br
[2]Agribusiness Technologist, helena.oliveira01@fatec.sp.gov.br

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***Keywords*— Environment, Agrochemicals, Agriculture.**

***Abstract*—** *This article highlights the use of chemical agents in agriculture, which undoubtedly causes a series of environmental impacts when used improperly and puts health and human life at risk. In a methodological, qualitative, bibliographic and exploratory way, with research in magazines and books specialized in the subject, it shows the bottlenecks of pesticides, in addition to highlighting possible problems that the ecosystem faces in the face of the indiscriminate use of these products. The article also seeks to show the serious consequences that the indiscriminate use of agrochemicals can bring to the environment, when used without information and knowledge, showing in the conclusion the importance of having environmental awareness. The present study brings a review of scientific reports of impacts of pesticides on the environment and human health. Human beings are subject to direct and daily exposure to these chemical compounds in the areas of production, treatment and storage of products, and indirectly, but with no less serious consequences for being exposed to residues found in the environment and in products consumed, so in a clear and objective way environmental preservation and education are fundamental.*

I. INTRODUCTION

Work in agriculture can be considered a practice with some dangers. Among the various occupational hazards, agrochemicals/pesticides that are related to intoxication of living beings and various other environmental damages stand out. This work seeks to bring information to people about the importance of the correct use of agrochemicals and environmental awareness since the indiscriminate and often incorrect use of agrochemicals in Brazil, as well as in other countries, results in severe levels of environmental pollution and intoxication. human life causing major health and food safety problems. For Azevedo (2016), pesticides are products and agents of physical, chemical or biological processes, intended for use in the production sectors, in the storage and processing of agricultural products, in pastures, in the protection of forests, native or planted, and of other ecosystems and urban, water and industrial environments, whose purpose is to change the composition of flora or fauna, in order to preserve them from the harmful action of living beings considered harmful, as well as substances and products used as defoliants, desiccants , stimulators AND growth inhibitors, also states that when used correctly, it helps and not destroys. The concern in this article is to confront information, with an exploratory methodology, in order to, in the final conclusion, show the possibility of using and strengthening the proper use of pesticides / agrochemicals.

1.1 Types of pesticides

Pesticides can be classified according to the pests they control, the chemical structure that composes them or the damage they cause to nature and human health. According to the type of pest controlled, pesticides are classified into:

- Herbicides → control invasive plants.
- Insecticides → control insects.

- Fungicides → control fungi.
- Bactericides → control bacteria.

1.2 Toxicological classification

Figure 1 below shows the toxicological classification according to the National Health Surveillance Agency (ANVISA) which classifies pesticides into four classes of harm to human health: slightly toxic, moderately toxic, highly toxic and extremely toxic. On the labels of these products, in addition to the colors that represent each class, the lethality doses of each are also indicated.

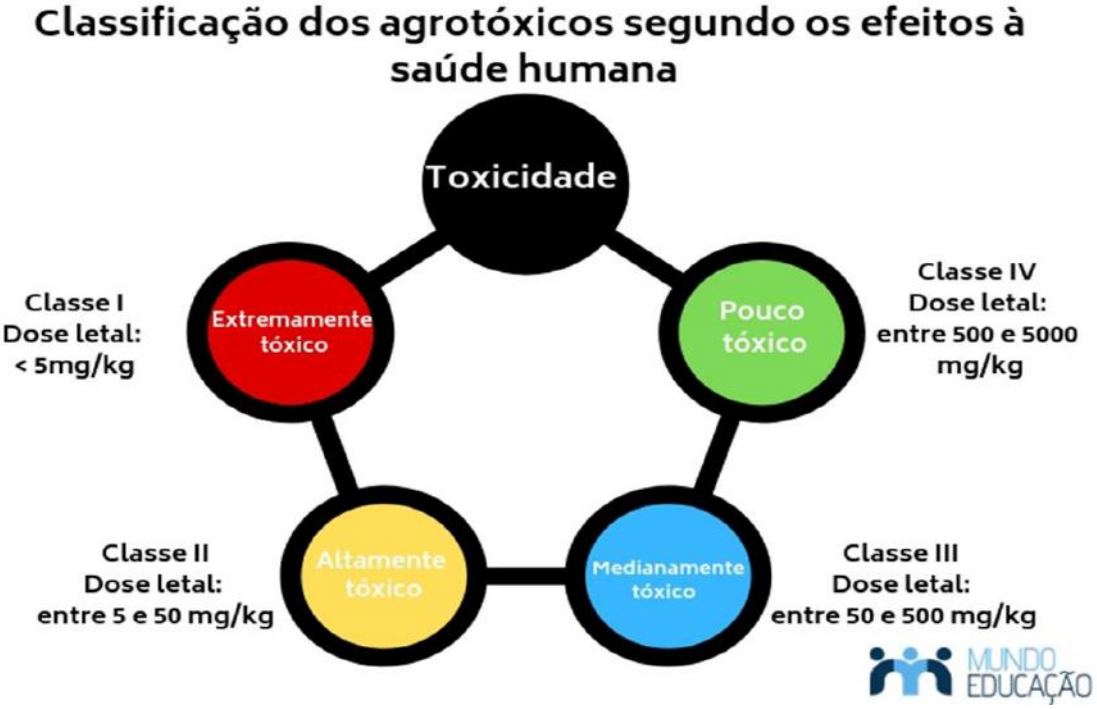

Fig.1: Shows the classification of the effects of pesticides on humans

Source: World of Education, 2009

1.3 Effects with the use of pesticides / agrochemicals

Parts of farmers are unaware of the risks posed by these products, consequently, they neglect some basic standards essential for safety at work, from that point onwards this work aims to show the importance of the correct use of these agrochemicals for the preservation of the environment and human health.

According to Azevedo (2016), agrochemicals can cause great economic and environmental damage to society. When used incorrectly, it causes contamination of water and soils, as it travels in the environment, through winds and rainwater to places far from the applied site. It can still be responsible for the high intoxication rates observed among rural producers and workers, in addition to causing food contamination.

The use of agrochemicals in the field primarily affects rural workers, who handle and apply these compounds. The World Health Organization estimates that around 4 million acute poisonings caused by these compounds occurred worldwide by 2000, with about 220,000 deaths per year. About 70% of the registered cases occurred in developing or underdeveloped countries (JEYARATNAM, 1990, p.207).

The use of suitable protective equipment by the farmer can reduce exposure by up to 100% (BONSAL, 2015, p.13). However, due to economic, cultural or lack of information about the risk, the use of this equipment is often precarious or non-existent.

Also, according to Bonsal (2015), Some interrelated factors act as determinants of the amplification and reduction of the impact that the use of agrochemicals can have on the health of human populations, such as: a) low level of education; b) the lack of a more efficient monitoring/technical advice policy; c) the exploratory practices of advertising and sales, by the industries producing and distributing pesticides; d) lack of knowledge of alternative and efficient cultivation techniques; e) the little attention given to the disposal of tailings and packaging; f) the continued use/exposure of pesticides; g) the eminently technical content of the information material available to rural populations; h) communication difficulties between technicians and

farmers; i) absence of efficient government initiatives to provide continued technical assistance to rural workers; and j) the lack of efficient government strategies to control the sale of pesticides.

II. DEVELOPMENT

Man has been learning since prehistory to practice agriculture in a more productive way in order to ensure his livelihood. However, he coexists with the problem of pests that destroy plants, crops and stored food, usually in large quantities. The fight against pests is old. The Chinese, about 1,000 years ago, already used arsenic compounds such as arsenic sulfide for this purpose. So, in order to protect their harvest, man developed agrochemicals also called pesticides, pesticides or agricultural pesticides, among others. These chemicals, or a mixture of these, are intended for the use, storage and improvement of agricultural products, in pastures, in the protection of forests and other urban, water and industrial ecosystems, in order to preserve them from the harmful action of living beings considered harmful, also used as defoliating substances and products, desiccants, stimulators, growth inhibitors and fertilizers for plants. For Rigoto (2014) its indiscriminate application causes numerous problems, both for the health of applicators and consumers, as well as for the Environment, contaminating the soil and water, leading to the death of plants and animals.

Brazilian agriculture has increasingly made use of these chemical inputs, mainly pesticides, and this causes a series of ecological problems.

According to Ferrari (1985, p.110) "until the 1950s, agricultural activities were directed towards the generation of products (coffee and cotton, mainly) for the self-consumption of the population residing in rural areas and a few urban centers", but with the increase in urban population, there was a need to increase agricultural production to supply urban centers, using pesticides to combat pests even without knowing the consequences that could be generated by these products.

Also, according to Ferrari (1985, p.111) food contamination, river pollution, soil erosion and desertification, intoxication and death of farmers and extinction of animal species, are some of the most serious consequences of industrial chemical agriculture and of the indiscriminate use of pesticides widely stimulated in the last 25 years.

Due to environmental contamination and pesticide residues in food, we can also estimate that populations living close to cultivation areas and urban dwellers are also significantly exposed to the harmful effects of these chemical agents (CARVALHO et al, 2005, p 223).

2.1 The environmental impact

The consumption of pesticides generates a vicious circle: the more they are used, the greater the imbalances caused and the greater the need to use, in more intense doses, increasingly toxic formulations.

Fauna and flora are also largely affected by the use of indiscriminate chemical inputs. According to Ferrari (1985, p.112), the land carried by the rainwater takes pesticide residues to rivers, lakes and dams, compromising the aquatic fauna and flora, in addition to compromising the waters captured for the purpose of supply.

They can also cause an increase in pests instead of fighting them, because as chemical inputs are used, the pests become more resistant, requiring increasingly stronger pesticides, thus further harming the environment, decimating even the own natural predators of the pests.

Industrial Agriculture, labeled modern and advanced, based on economics and immediate results in protecting cultivated plants against the action of pests, pathogens and invasive weeds, has constantly failed.

For Industrial Agriculture, the objective is merely productivity, leaving aside ecological balance, such as: stability of agricultural systems: conservation of natural resources (water, soil and air) and food quality.

2.2 Contamination of water resources by excess water applied

Excess water applied in irrigation returns to rivers, through surface and surface runoff or goes to underground deposits, by deep percolation, dragging with it residues of fertilizers, pesticides, herbicides and other toxic elements, called soluble salts. Water resources thus contaminated require appropriate treatment when destined for the supply of potable water.

Contamination of surface waters, especially rivers and streams, is rapid and occurs immediately after irrigation. There have been serious problems arising from the application of herbicides in flood irrigation; in furrow irrigation, the applied water carries, in addition to herbicides, fertilizers, pesticides and sediments. It can also occur more slowly, through the subsurface water table, which receives fertilizers, pesticides and herbicides dissolved in the applied water. This contamination can be aggravated if there are soluble salts in the soil, because, when infiltrating, the water already containing the salts applied in the crop, will still dissolve the salts in the soil, becoming more harmful.

Groundwater contamination is much slower. The time required for percolation to the groundwater table increases with decreasing soil permeability and water table depth. To reach a water table situated at about 30 m deep, depending on the permeability of the soil, it may take from 3 to 50 years. Therein lies a serious problem, because it is only a long time later that it will be known that groundwater has been polluted; this problem worsens pollutants are dissolved salts, nitrates, pesticides and heavy metals.

A previous geological study can reveal the concentration of soluble salts in the soil profile and indicate the most favorable areas, that is, with less potential for contamination of water resources. The greater the percolation and surface runoff losses in irrigation, the greater the chances of contamination of springs and groundwater. It is increasingly necessary to dimension and manage irrigation systems with greater efficiency, as well as correctly dose fertilizers, herbicides and pesticides.

2.3 The bias

Intoxications caused by pesticides in Brazil are second only to those caused by narcotics, misused medicines and homemade cleaning products, mainly, as observed by Azevedo (2016), who has also pointed out in his works that the use of transgenic plants in agriculture drastically reduced the use of pesticides. It also states that the genetic improvement of plants is a powerful technical-scientific force for the success of agribusiness, in the way of a substantial increase in the production and productivity of cultivars, in addition to enabling environmental protection, reduction of the application of pesticides, fertilizers and correctives, considering precision agriculture.

2.3 Pesticides in Brazil

The use of pesticides in Brazil is related to climatic factors especially. Brazil is a tropical country, with no winter periods in some regions for the pest cycle to be interrupted, as occurs in temperate and subtropical climates. Another reason is linked to the evolution that took place in the field. The technology currently used in agriculture has allowed for an increase in production. Not to mention monoculture, widely practiced in Brazil, which also favors the cycle of pests. These factors may explain the need to use agrochemicals.

It is also worth mentioning that the National Agricultural Development Plan (PNDA) encouraged the use of pesticides and offered investments to farmers who used them, as well as to industries that produced them.

In the country, the registration, safety of pesticides and the feasibility of using pesticides are attested by bodies such as the Ministry of Agriculture, ANVISA and IBAMA (agriculture, health and environment sectors) in order to guarantee the safety of the population regarding the use of pesticides. same. The commercialization of pesticides can only be carried out upon presentation of a prescription issued and prescribed by an agronomist, and the product must present on its label the indications of use and safety.

Currently Brazil, in addition to being considered one of the largest agricultural powers, is also one of the countries that consume the most pesticides in the world. According to Revista Pesquisa Fapesp, this market moves around US$ 10 billion a year in Brazil. Data from the agricultural census indicate that there was a 20% increase between 2006 and 2017 in rural producers who use pesticides in their crops.

But it is necessary to say that although Brazil is among the biggest consumers of pesticides in the world, this consumption in relation to the cultivated area is relatively low. Thus, despite the reports pointing to an increase in the consumption of pesticides, at the same time there was an increase in productivity. According to SINDAG (National Union of Agricultural Aviation Companies) Brazil produced more food with less pesticides.

Brazil occupies the leadership of the world pesticide consumption ranking (BRASIL, 2015). It does not seem to do justice, as it should, to Law No. 7,802/89 (BRASIL, 1989) (regulated by Decree No. 4074/02), which provides for rules related to the pesticide chain (research, experimentation, production, packaging and labeling, transport, storage, commercialization, commercial advertising, use, import, export, final destination of waste and packaging, registration, classification, control2e, inspection and inspection).

There are reports that demonstrate the harmful effects of pesticides on the environment and human health, but despite this, of the various active ingredients banned in the European Union, still in the 1990s, few were banned in Brazil, and they were banned very recently, in last two or three years. However, some of these compounds are still freely traded. The Brazilian Association of Collective Health (ABRASCO) states that, of the 50 products most used in Brazilian crops, 22 are banned in the European Union and in other countries (DOSSIÊ..., 2012a). Although some active ingredients are banned in Brazil, their residues are still found in food. On the other hand, the indiscriminate use of pesticides, even with authorized use, has resulted in foods with high levels of contamination, above the maximum allowed (ANVISA, 2011).

One of the factors that further boosted the use of pesticides in Brazilian crops was the advent of genetically modified organisms. Transgenic crops, so called, end up contributing to the reduction of biodiversity (SIQUEIRA et al., 2004).

The artificialization system of nature causes the imbalance of ecosystems, promoting the emergence of new pests, which require the application of new pesticides, which can lead to the selection of those more resistant. These pests, in turn, will need more impactful pesticides, e.g. according to scholars on the subject, the use of transgenic causes a vicious circle from which agriculture cannot break free (LONDON, 2011). Thus, the Brazilian scenario is worrying, because behind the scenes of each production record, at the same time, there can be a great environmental impact caused by phytosanitary products, since agroecology and sustainability are interests of few.

2.4 Flexibility of the pesticide law in Brazil

The use of pesticides in Brazil is regulated by the Agrochemicals Law (Law No. 7.8022, of 1989). In 2018, a proposed project was approved by the Chamber of Deputies that provides for the release of the use of pesticides by the Ministry of Agriculture without the interference of bodies such as IBAMA or ANVISA. The project revokes the 1989 law and promotes changes to the rules for the production, marketing and distribution of pesticides, making it more flexible.

This approval was the reason for intense debates between environmentalists, who defend the non-use of these chemicals, and ruralists, who say that it is inevitable not to use them, since Brazilian productivity in the agricultural sector depends on these substances.

In 2019, the Ministry of Agriculture approved the registration of highly toxic pesticides. Data from ANVISA reveal that Brazil is currently one of the main destinations for pesticides banned in several countries, such as the United States, China and European Union countries. In Brazil, at least ten products banned in these countries are used.

2.5 Advantages and disadvantages of using pesticides

Below we have some advantages and disadvantages, according to Azevedo, 2014, for the use of pesticides.

2.5.1 Advantages

- Pesticides, when used according to the recommended dose, act in the control of pests and diseases that harm plantations;

- By controlling possible damage to crops, pesticides ensure increased productivity;

- The prices of products with pesticides are cheaper than the prices of organic products.

2.5.2 Disadvantages

- The use of pesticides is associated with several chronic problems, such as chromosomal alterations, cancer, liver diseases, respiratory diseases, among others;

- Incorrect use of pesticides can cause damage to the environment, such as contamination of soil and water resources;

- The use above the allowed in food can bring risks to the health of consumers;

- There are risks of intoxication by workers who handle pesticides;

- Some pesticides are persistent in the environment, that is, they remain in them for a long time.

III. CONCLUSION

With this research it is concluded that all the impacts caused by the incorrect use of pesticides result in direct or indirect damages to man. The contamination of soils, air, water, fauna and flora caused by its incorrect use brings numerous problems both for the environment and for the health of living beings.

Based on the above, it is evident the need and importance of an efficient environmental education of information for the general public, in the sense that the correct use of pesticides has its large and important part in the formation of an adequate cultural attitude of the users. Also, it is concluded that pesticides when used correctly can even be beneficial to man and the environment, but when used without knowledge it becomes the worst enemy of the human being.

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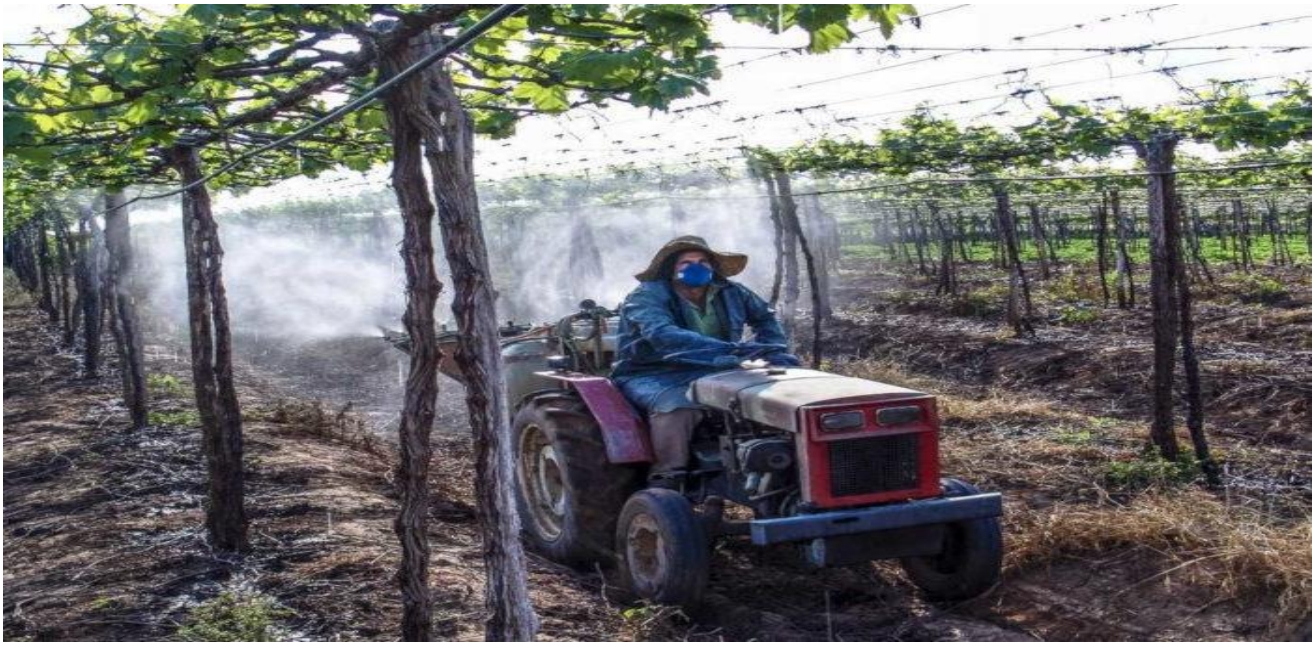

Despite being harmful to health, pesticides are widely used in Brazil and worldwide to combat pests and diseases in plantations.*

Photo and post by: Rafaela Sousa (2018)