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Problems of Chemical Control in Agriculture: A Social Perspective

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Agriculture is fundamental for society, being important in the production of food to meet the demand of the population that has been growing, using various methods to improve the productivity of agricultural crops. To ensure that the crop has its production, adequate crop management must be carried out, and the control of pests, diseases and weeds, for this, one of the methods used today, is chemical control.
Aims: The objective of this work is to carry out a brief review of the literature on chemical control problems in agriculture, a social perspective, describing its importance in the agricultural sector.
Literature Review: Chemical control brought many benefits and allowed agriculture to gain a boost in its production, due to the benefits provided by its use in the control of pests, diseases and weeds, but it caused some problems with its use, in the social, environmental and in the agricultural sector. These problems had many consequences, and over time, by adopting sustainable rural development, seeking sustainable production, the objective was to reduce the use of agrochemicals, by using alternative means of pest, disease and weed control. The means of control mainly used are biological and cultural control, associated with the awareness of the

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population, which together favors the reduction of the need for chemical control in crops, reducing costs, maintaining the sustainability of the agricultural sector, ensuring that plant can produce, and enabling a more sustainable production.
Final Considerations: Using alternative means of control, social awareness, and following sustainable development, agriculture is becoming more suitable in all aspects, whether social, environmental and economic, helping the development of society as a whole, providing agriculture with less use of chemical control, and a more sustainable model.

Keywords: Agrochemicals; alternative control methods; crop productivity.

1. INTRODUCTION

Society is composed of many components, and each component is essential to be able to maintain a balance in society, for this, all components must have their sectors acting correctly, providing conditions for the population to survive [1,2].

One of the essential sectors is the food sector, which depends on many sectors. One of its is agriculture, which is responsible for producing essential food for human consumption, ensuring survival and social development.

Related to agriculture, since the beginning of civilizations, human have been most responsible for the transformations in nature due to its evolution and the ever evolving search for space and food, thus always seeking solutions to increase food production, with technological innovations, practices, management, use of agrochemicals, among others, which directly contributed to the high productivity and quality of agricultural products [1,3].

Within the management, more specifically, the use of agrochemicals, its use was derived from the need for food production, as the population increase, in agricultural management, the use of agrochemicals is triggered by an increase in population and food needs, thus, its use in agriculture has become greater, ensuring at least part of the population with food [4].

According to FAO [5] and ONU [6] the growth of the world population remains constant, and in 2050 the population is forecast to be 9.8 billion, 29% more than the current number (7.6 billion inhabitants), so food production must be increased up to 70%.

In this population scenario, food insecurity occurs, in which one in nine people in the world (or about 805 million people) are unable to obtain enough food and live a healthy and active life [7].

To overcome this food insecurity and meet the population's food demand, it is necessary to use technologies and techniques that favor the increase in crop production and productivity, with the use of various methods to help increase production [8,7,9].

In the search for producing and guaranteeing agricultural sustainability in the use of chemical products, it is essential to seek sustainable agricultural production and other solutions to combat diseases, pests and weeds that cause damage and reduce crop production [10,11].

Linked to sustainability, production systems follow the guidelines of sustainable rural development, which is a production process that involves the social, economic and environmental sectors, with a focus on economic, social development and environmental sustainability, maintaining yield and the productive capacity of the agroecosystem over time [12, 13, 14,15].

Thus, based on sustainable rural development, system sustainability, and increased productivity in a sustainable way, it is necessary to control pests, diseases and weeds with other alternative methods, which should be carried out because of the increase in its presence in crops, less resistant varieties, soils, imported pests and diseases, insects, pathogens and plants resistant to agrochemicals, and also due to the lack of natural enemies [16-19].

Thus, using correctly control methods, the best use of agrochemicals, and following sustainable rural development, aiming for higher yields by minimizing damage from pests, diseases and weeds, will enable the supply of food and will ensure survival of the population and society as a whole [20,21,10].

To control pests, diseases and weeds, one of the most efficient and used methods is chemical control, and its use has caused problems in the environmental sectors, agriculture and society, requiring a correct use of the products in the agricultural sector.

The objective of this work is to carry out a brief review of the literature on chemical control problems in agriculture, a social perspective, describing its importance in the agricultural sector.

2. LITERATURE REVIEW

2.1 Chemical Control in Agriculture

To meet the population's demand for food, and because of the constant increase in population, it was necessary from the beginning of agriculture to use chemical control in agriculture to control pests, diseases and weeds, to guarantee the production of food for society.

According to Pignati et al. [22] and Leão et al. [23], Brazil is the largest consumer of pesticides in the world, and this occurred due to several factors, such as: Green Revolution Policy, increase in "pests" in crops, subsidized agricultural credits, transgenic crops and exemption from tax taxes, facilitating the purchase and use of chemicals in the agricultural sector.

According to IBAMA [24], the sales volume of agricultural pesticides increased more than 2.5 times between the years 2006 and 2017, from 204.1 thousand tons to 541.8 thousand tons of active ingredient, noting the visible increase in agrochemical use in agriculture.

This increase in agrochemicals in agriculture has affected many sectors, and their use was and still is essential for the cultivation of crops, keeping crops protected from damage, to produce and meet the demand of the population, demonstrating their need for use in agriculture for the crop management.

Pesticides are chemical products that aim to contribute to agricultural production processes, on a small and large scale, acting as agents of biological, chemical and physical processes [25].

According to Barbosa et al. [21], regarding the definitions, agricultural pesticides, chemical pesticides, pesticides, agrochemicals, pesticides are names used for the group of chemical substances applied in agriculture in the management of pests, diseases and weeds.

The control of pests, diseases and weeds is essential for a crop, as they cause damage to the crop, and in extreme cases the loss of production, reporting the need to use chemical control, due to the increase in their presence in crops, pests and imported diseases, insects, pathogens and weeds resistant to agrochemicals, due to soils, less resistant varieties, and the lack of natural enemies that were killed or do not exist in the production environment [16-19].

For society, chemical control is essential to improve the social aspect for the population, with the development of cultures and increased productivity, provides the production of food, which will serve for consumption, survival and development of the population, and will enable improvement of society as a whole.

2.2 Benefits of Chemical Control

Chemical control is a method used for a long time in agriculture as an effective management to control pests, diseases and weeds, and due to the demand for food for the population, its use was intensified.

The use of chemical control brings benefits such as: Less labor, hits the harmful target of the crop, the application even in rainy seasons, enables the adoption of minimum cultivation or direct planting of crops, allows for faster control compared to other means of alternative control, and can control pests, diseases and weeds in their different moments and stages [26, 27, 28,21].

Due to the various benefits of its use, it has been widely used in agriculture, presenting itself as one of the most used methods for the control of weeds, pests and diseases, with a faster control, in addition to other qualities, but providing a production more effective compared to other control methods.

Chemical control brings improvements in social, environmental and economic aspects through the control of pests, diseases and weeds, and through its control model carried out, supplying the food sector.

2.3 Problems Caused by the use of Chemicals

Despite its importance, the use of chemical control has had consequences, in agriculture, in the environmental and social aspects, causing bad effects for the development of society.

The use of chemicals in agriculture caused: loss of soil fertility, selection of weed biotypes, pests and diseases, exclusion from family farming, reduction of labor, water pollution, erosion process, among other problems [29, 17,30].

In the environmental sector, it caused problems such as: contamination of soils and water sources, the destruction of the biodiversity of microorganisms and insects beneficial to the culture, and caused an imbalance in the fauna and flora of the environment [26,31].

In food, it caused their contamination with chemical residues present in direct application and in water, in the bioaccumulation in the food chain of animals, which finally reaches human consumption [25, 32].

The use of chemical products in agriculture brings problems to human health, such as the development of cancer, mental, neurological, endocrine, renal, auditory, respiratory and autoimmune diseases, in addition to genetic damage, biochemical alterations and serious intoxications. Direct and prolonged exposure to agrochemicals, rural workers and the entire population are subject to immunological, neurotoxic, teratogenic, mutagenic, endocrine, carcinogenic, fertility and developmental effects, among other problems related to human health [31, 23, 33].

Thus, the use of chemical control in the social aspect must be carried out rationally, with awareness, with the preparation of applicators and with information to farmers, because even with the need for food production and the demand of the population, chemical control brings with it many social problems such as poisoning, contamination, among others. In the pursuit of sustainable rural development, greater productivity and a better society, rational use is essential, adopting other forms of pest, disease and weed control.

2.4 Solutions in the use of Chemical Control

Several solutions can be used to minimize the use of chemical products in agriculture, and thus provide a better social environment, maintaining the sustainability and productivity of the agricultural culture. One of it is the rational issue, referring to the conscious use, planning, of concepts and innovative practices to ensure the best efficacy of the product [32,1].

Thinking about the social aspect, solutions such as raising and developing the awareness of the population about food insecurity, consumption, population growth, problems related to the excessive use of agrochemicals, food waste, hunger, among others, helping the population to act as a solution to reduce the use of agrochemicals in culture [25, 2, 34, 35].

Regarding alternative methods to minimize the use of chemical control, the most used are cultural and biological control, which has been one of those responsible for minimizing the use of chemical products in agriculture, ensuring production in a more sustainable way.

The method of cultural control is based on good agricultural practices, with the manipulation of pre-planting conditions and plant development, favoring the growth and development of the crop, in relation to the pathogen, agricultural pest and the weed [36, 37,17].

Biological control is based on the regulation of the number of plants and animals through natural enemies, which are agents of biotic mortality, since all species of plants and animals have, by ecological nature, enemies throughout their biological development, which provide the regulation of the biotic system, being composed of microbial agents and plant extracts [38].

Thus, by using the integrated of solution can be obtained in reducing the use of agrochemicals, because, with rational use, awareness of society, and alternative methods of pest, disease and weed control, they will favour better management and less need for the application of agrochemicals, providing the sustainability system, crop productivity, food supply and social development.

3. CONCLUSION

Society depends on agriculture, to meet their food sufficiency, so that it is necessary to modernize agriculture and use agrochemicals to control plant pests.

Regarding the solutions to minimize the use of agrochemicals, already highlighting the benefits and problems of the use of chemical control, it is necessary the joint action of all aspects, social, environmental and agriculture in the economic part, in order to adopt methods and practices.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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