




Article

The Precautionary Principle and the Technical Environmental Evaluation: The Case of Fipronil and the Death of Bees in Colombia

Mauricio Luna-Galván¹, Iván Vargas-Chaves², Yogi Setya Permana³

¹ Ph.D. (Escuela Superior de Administración Pública). ORCID: 0000-0002-4594-4940. Email: mauricioj.luna@esap.edu.co

² Ph.D. (Universidade La Gran Colômbia). ORCID: 0000-0001-6597-2335. E-mail: ivan.vargas@ugc.edu.co

³ Ph.D. (Leiden University, Netherlands). ORCID: 0000-0002-2696-4890. E-mail: permana@kitlv.nl

ABSTRACT

The increasing use of pesticides for agricultural use attempts to enhance food security and improve crop production, however there is a growing debate on the arising problems for producing food, the loss of biodiversity and harvesting practices under the use of pesticides agrochemicals. This article analyzes the use of FIPRONIL and the death of bees in the case of Colombia, by integrating the precautionary principle with the international law and national legal-environmental frameworks with the approach of human security and food security which are pertinent and relevant under the increasing use of chemical pesticides for agricultural use, and also seeks to establish criteria and proceedings of the technical environmental evaluation that can be applied in the country. The article argues that the precautionary principle and measures are key to control and prevent hazardous and potential risks in human health and food security from agricultural production, and finally recommends strengthening the approach of food security and to raise the conceptual aspects of food security once again, especially instability, use, and availability of food that should be included in national and international law.

Keywords: chemical pesticides, precautionary principle, agriculture, international law, human security, food security

RESUMO

O uso crescente de pesticidas para fins agrícolas visa melhorar a segurança alimentar e a produção agrícola. No entanto, há um debate crescente sobre os problemas emergentes na produção de alimentos, a perda de biodiversidade e as práticas de colheita sob o uso de agrotóxicos. Este artigo analisa o uso do FIPRONIL e a morte de abelhas no caso da Colômbia, integrando o princípio da precaução com o direito internacional e os marcos jurídicos-ambientais nacionais, com a abordagem da segurança humana e alimentar, pertinentes e relevantes no contexto do uso crescente de pesticidas químicos na agricultura. Também busca estabelecer critérios e procedimentos de avaliação ambiental técnica que possam ser aplicados no país. O artigo argumenta que o princípio da precaução e as medidas de precaução são essenciais para controlar e prevenir riscos perigosos e potenciais à saúde humana e à segurança alimentar da produção agrícola. Por fim, recomenda o fortalecimento da abordagem da segurança alimentar e a retomada dos aspectos conceituais da segurança alimentar, especialmente a instabilidade, o uso e a disponibilidade de alimentos, que devem ser incluídos no direito nacional e internacional.

Palavras-chave: pesticidas químicos, princípio da precaução, agricultura, direito internacional, segurança humana, segurança alimentar.



Submissão: 03/06/2024



Aceite: 11/10/2024



Publicação: 14/11/2024





Introduction

The use of pesticides in agriculture has sparked a global debate around the impacts on health and the environment. Two main discussions and narratives justify its use, first, the use of pesticides aims to control the pests and eradicate harmful organisms in plants (Pickett, 2013) and on harvest to maintain and enhance food security (Carvalho, 2006). On the other hand, a higher yield on harvest entails a more competitive position for agri-business and more opportunities to open markets.

As the narrative underpins a positive justification for its use, a growing deal of evidence shows the consequences of the use of pesticides on health, food safety, and the environment. Therefore, growing national and international regulations are starting to emerge to establish levels of hazardousness and potential risks that pesticides might pose.

The precautionary principle of international law emerges when we have sufficient evidence of risk or by the lack of certainty about those risks, we must take appropriate precautions (Gómez-Rey et al., 2020). The principle evolves as new treaties articulate new measures of precaution in different contexts, there is a controversy over how to articulate or define it into law. In the case of the United States, food safety-related measures are some of the oldest and most successful around the world, but those fall short when evaluated from the unifying perspective of the precautionary principle (Walker, 2001; Botos et al., 2018)

Subsequently, the World Health Organization has increased regulations and applications for the use of pesticides if they cause damage to their exposure. Moreover, the European Union provides another perspective on the legal issues as has taken further steps regarding the regulation of food safety through more stringent laws (Tosun, 2013).

Another national-level case in Colombia, must comply under the Community of Andean Nations (CAN) to international standards to protect the legal interests of the environment, health, and food security. To comply with the legal aspects of the commercialization of pesticides, it requires going through a process of regulation including the technical reports, the environmental evaluations to obtain authorization, and the registration number to import and commercialization on behalf of the CAN.

This research, stemming from the academic experience of the main author as a professor at Escuela Superior de Administración Pública and the second author at Universidad Militar Nueva Granada, aims to address the relevance, justification, and application of the precautionary principle. The principle's application focuses on controlling and preventing potential and hazardous risks to health and food safety arising from agricultural production. To do so, it first discusses the scope of the precautionary principle in the national legal framework, furthermore, how this is intertwined with legal approaches at the international level and with the concepts of human security and food security, as it problematizes food production, the loss of biodiversity and harvesting practices under the use of agrochemicals.

Secondly, it dilucidated even further with the case of FIPRONIL and the death of bees through the application of the precautionary principle measures to guarantee food security. The approach of Human Security also presents an analytical tool as ways to understand and make the case for precautionary measures to provide elements to evaluation and registration for the use of pesticides to protect the environment and specifically on the bees.

By analyzing the case of the use of chemical pesticides and the death of bees in Colombia, the article makes the case for the application of the precautionary principle to control and prevent hazardous and potential risks to health and food safety from agricultural production. It further argues that the legal approaches at the national and international level are intertwined with the concepts of human security and food security, however, the use of agrochemicals also problematizes food production, the loss of biodiversity, and harvesting practices.

For such purpose, seeks to establish criteria and proceedings of evaluation that can be applied in the country, which is referred to as the technical Evaluation within the process of obtaining a national product registration number in the National Registry by contemplating them in terms of the legal aspects and interest of food security and the protection of bees.

Methods

As a rule, scientific research on legal knowledge starts from a qualification, in which laws and sentences are put under examination (Siems, & Mac Síthigh, 2012). The authors used a legal methodology based on the teleological interpretation of norms and sentences, to analyze the legal interest, which is the environment and the right to food, behind the identified problem.

According to Kravets (2019), this methodology allows, from a unique approach, to understand reality in general, and the legal reality in particular. In addition, this is an article with a constitutional-environmental orientation, so the teleological method helps to build interrelation bridges between key issues (for example, the need to apply the precautionary principle) and key problems (for example, the impact of use of agrochemicals). Through the above, environmental postulates in the Political Constitution (Vargas-Chaves et al., 2020) can be effectively addressed in legal practice.

This work used, as sources, the documents and normative instruments related to the application of the precautionary principle, to the regulation of agrochemical products in Colombia, and on food sovereignty and security in the agricultural production chain.

In particular, the authors used as primary sources: Resolution 1442 of 2008 of the Ministry of Environment and Resolution 1442 of 2008 of the Colombian Agricultural Institute. Also, it was necessary to collect the main regulations of Andean Community Law applicable in Colombia, especially Decisions 436/1998; 767/2011; 804/2015 and Resolution 630 of 2002.

As secondary sources, the work is based on the jurisprudence of the Constitutional Court, as the highest body of constitutional jurisdiction in Colombia. These sources helped characterize the judicial interpretation criteria to apply the precautionary principle in situations of potential environmental risk caused by anthropogenic activities.

Finally, as tertiary sources, the work was supported by articles in peer-reviewed journals, chosen by the authors after conducting a search in databases such as Scopus and Web of Science. To locate these documents, the authors used various keywords, including: 'Pesticides' 'honeybee toxicity' 'food security' 'pollinator conservation' or 'precautionary principle'. This guided the reflections and gave technical support to the proposals of the paper.

Results

Chemical Pesticides for Agricultural Use

The use of pesticides in agriculture has been a contentious issue for decades. One of the primary benefits of pesticides is their ability to increase crop yields. By controlling pests that would otherwise reduce productivity, farmers can produce more food per unit of land. This is particularly important in regions with limited arable land or growing populations. Furthermore, the timely application of pesticides can help to prevent economic losses caused by pest infestations.

Pesticides play a crucial role in modern agriculture by safeguarding crops from a variety of pests, including insects, weeds, and fungi. By preventing damage to plants, pesticides help to ensure stable food production and



protect farmers' livelihoods. Additionally, the use of pesticides can contribute to reducing food waste and limiting the spread of plant diseases. However, these pests include everything from rodents and insects to microorganisms that interfere or destroy things (Mustapha et al., 2019).

Likewise, the agrochemical use is understood to be any substance applied to crops before or after the harvest. It is destined to control whatever pest or species not desired of living things such as plants or animals that have the potential of causing any harm or interference in any of the phases of production or commercialization of food, agricultural products, or wood. (Comunidad Andina, Decisión 436 de 1998).

On the other hand, the Guide for Responsible Environmental Management of Chemical Pesticides for agricultural use in Colombia, refers to the chemical pesticides for agricultural use as active substances and products that can eradicate or combat harmful or unwanted organisms, such as pests, sicknesses, and weeds. Considering those uses and the potential impact that they can have both on human health and on the environment, international organizations such as the World Health Organization-WHO (2009) have recommended a classification according to the hazard level, admitting that there exists a need to regulate their production and application, given that they wreak havoc when there is an exposure to such pesticides in a relatively short time.

What those type of laws seeks is to establish criteria and proceedings of evaluation that can be applied in an equivalent manner in all countries, while the use of pesticides can alter biodiversity, and thus, worldwide food production and the guarantee of food security in many countries.

Therefore, food security has an important place in global agenda (Jalil et al., 2017), and Colombia is not the exception as a state member of the Community of Andean Nations (CAN), which ensures through its supranational law that all pesticides for agricultural use fulfill the international standards required for the activity of production and commercialization, securing the protection of the legal interests of the environment, health and food security.

The CAN through the Decision 436 of 1998 establishes the conditions and proceedings for registry and control of chemical pesticides for agricultural use, as well as a series of recommendations for the proper use of chemical pesticides for agricultural use to guard against and diminish the deterioration to health and the environment is permitted terms and to facilitate its commercialization in the country.

Although this Decision was the backbone of regulation of this type of pesticides, with time, it has been adjusted, suffering certain changes through Decision 767 of 2011 and Decision 804 of 2015, in the sense of promoting the betterment of agriculture in the member countries to be able to achieve an excellent level of food security for the country, also helping to update and integrate the policies and national plans of the member countries –Bolivia, Colombia, Ecuador, and Peru– in the matter of Pesticides for agricultural use.

The Process of Obtaining a Technical Environmental Evaluation

To integrate the concepts of food security and precaution through the use of the precautionary principle in the framework of the laws cited about chemical pesticides for agricultural use in Colombia, we refer to the technical Evaluation within the process of obtaining a national product registration number in the National Registry, to which all interested in introducing a new pesticide to the internal market must submit to.

With the topics that will be developed here, in the next part we will be able to make a special emphasis on the need to contemplate the precautionary principle and the protection of the legal interest of food security as the guide to granting a product registration number.



In the first place, the petitioner, who can be the same manufacturer, as well as the importer of a pesticide, must register in the Colombian Institute of Agriculture or ICA, which is the national authority, as established by the Andean Community's law, able to grant a product registration number in the National Registry.

The registration must be done before beginning its activities, presenting the form to ask for registration or authorization of activities before ICA. The ICA will then review that the form fulfills all the requirements. Its form must be accompanied by a favorable report from the ICA that guarantees the fulfillment of the required conditions for each member country, guided to diminish hazards to health and the environment.

Thirdly, other requirements and proceedings that are asked for by each member of the Andean Community must be fulfilled to be able to follow with the activities of interaction between the ICA and the respective national authorities in the agricultural, health, and environment sectors.

Additionally, the ICA will require the petitioner to obtain a copy of the environmental control and management tool given by the competent authority in Health and Environmental Law. In this case, a copy of the Technical Report on Toxicology and Hazard Evaluation for chemical pesticides for agricultural use given by the Institute of National Health and a copy of the Technical environmental evaluation given by the National Authority in Environmental Licenses.

It is important to emphasize that the National Product Registration addresses the activity of importation, fabrication, formulation, exportation, packaging, and distribution of chemical pesticides for agricultural use, according to the norms of the Andean Community (Ñaupari, 2017).

The process of the technical environmental evaluation is regulated by the Regulatory Decree 1220 of the 21st of April of 2005 and under Article 33 of Decision 436 of 1998, Resolution 1442 of the 28th of April of 2008. It was issued by which the procedure for the granting of a technical environmental evaluation was established, which alludes to the Andean Norm for Registry and Control of Chemical Pesticides for Agricultural Use.

Since this norm was established and with the regulatory decrees of title VIII of Law 999 of 1993, the authority to follow this procedure was assigned to the National Environmental License Authority – ANLA, who has as its duty to ensure the production, commercialization, and distribution of this type of pesticides.

It should be noted that said activity follows a special procedure, by which a tool of control and management is emitted, called a Technical environmental evaluation, which, the same as a permit license or environmental authorization, is submitted to an integral evaluation of the studies presented by the petitioner.

The petitioner or person interested in the technical environmental evaluation, to obtain a national registration number in the National Registry of Chemical pesticides for agricultural use must go to the National Environmental License Authority.

Afterward, The National Environmental License Authority will review the petition to see if it meets all the requirements. In the case that no further information is required, or once all additional information is submitted, the ANLA will emit the technical-environmental concept which will be used to elaborate the resolution by which the Technical environmental evaluation will be given.

Finally, it should be taken into consideration that a replacement can be made against the resolution by which the Technical environmental evaluation is given, which can be asked for according to the terms and conditions stated in Ley 1437 of 2011. Said resolution will be communicated to the ICA, for it to continue with the process of obtaining a product registration number in the National Registry.



The Precautionary approach in the Technical Evaluation

After having explained the reason, it exists and how the process works for obtaining a Technical Environmental Evaluation, we will proceed to show the need to maintain a precautionary approach in said process, and to maintain the line of approach of the article itself. To achieve this objective, first, we will explain the concept of the precautionary principle and its outreach, and then, we will study the application of the said principle in the case of the use of active ingredient FIPRONIL, of which scientific evidence shows the scenery of uncertainty in respect with the death of the bee species *Apis Mellifera*. (El Hassani Et Al. 2005; Holder et al, 2018; Mayer & Lunden, 1999; Gunasekara Et Al 2007; Vidau Et Al, 2011)

The precautionary principle is a principle whose implementation prevents a potential risk or grave and irreversible hazard to the environment, derived from the development of an activity, a process, or a product, that in virtue of the principle, is limited or restricted. Thus, the Constitutional Court in judicial Sentence T-080 of 2017, states that due to lack of absolute scientific certainty that the effects of an activity cannot be anticipated with precision, the precautionary principle is set in place.

It is mentioned for the first time in the ministerial declaration of the second International Conference for the protection of the North Sea in 1987, due to the problems of environmental contamination that affected the Nordic countries at that time. In it, an approximation to the precautionary principle was established, wherein the adoption of measures of control dealing with hazardous substances that could bring harmful effects to the North Sea; a potential risk that still had not been confirmed by the scientific world, but that was yet prevented from happening (Troncoso, 2010).

Yet, it was adopted by the German Federal Republic as 'Vorsorgeprinzip' – that translated means the precautionary principle – used to deal with the different problems of environmental contamination. Nonetheless, others say its first use was in the United States before the European legislative development, through certain judicial sentences in the health, security, and environmental fields.

It is also found in the Declaration of Wingspread, which was the result of a meeting held in January 1998 in Wingspread, Wisconsin, where it was established that when the environment and by extension, human health were endangered through an activity, measures of precaution should be put in place, even if no certainty of the possible damages could be derived specifically from that activity. (De Cózar, 2005).

The Convention on Biological Diversity, which took place in Rio de Janeiro in 1992, seeks the conservation and integrity of the environment by proclaiming “to protect the environment, States shall widely apply the precautionary approach according to their capability. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (Principle 15).

Now, of all that has been afore stated, and because of the application of the precautionary principle, an emphasis has been made in the objective to preserve the environment (Corte Constitucional, Sentencia C-293 de 2002). In fact, the importance of the environment's preservation has made way for the precautionary principle to be consecrated within the general principles of Law 99 of 1993 in its Article 1, section 6, which implies that, in the matter of environmental policy, Colombia will follow the precautionary principle.

The Precautionary Principle in Food Security

Considering all stated, it is important to clarify that the implementation of the precautionary principle has been extended to the field of public health and nutrition, which has been evidenced in cases in the European Community, where, implicitly, the precautionary principle was adopted given the importance of food products.



Particularly, the right to food implies for people, families, or communities to have access to food; to the production resources needed for them to feed themselves and of course, opportune nutrition in cultural, sanitary, and economic terms. In the same way, the obligations of respecting, protecting, and guaranteeing this right are pointed out, for they are obligations of the States. (Mechlem, 2004; Sage, 2014).

Some examples of its application have been made in countries such as Germany and Norway. In the first, the government invoked the precautionary principle to prohibit the entrance of beer with 'additives', because derived from this Law, and that they could be harmful to public health. In the second, something similar happened, since the authorities rejected the entrance of Kellogg cereals for its particularity that they are enriched with iron since there was uncertainty about the consequences for public health due to the fortified food, thus, the government took this measure because of the need to protect public health. (Troncoso, 2010).

Nonetheless, finally, the corresponding environmental authority decided that although the member countries had the faculty to fix the level of protection to public health in case of a legal loophole and scientific uncertainty, this faculty was under the power of the demands of the principle of free movement of goods and by the principles of proportionality, non-discrimination, transparency, and coherence. (Troncoso, 2010).

Necessarily, for true effectiveness of the policies of human security and according to the situation of each country, there is a need to advance to a real defense and protection of food security. Food security deals with the problems originated from the globalization of food, for example, the underselling of raw materials for the agricultural industry and the loss of food culture, which affects food security. (Carvalho, 2006; Pickett, 2013; Vargas-Chaves et al., 2020).

On the other hand, in France, the precautionary principle has been cited limitlessly concerning the environment, its implementation has been extended to other fields due to the circumstances of scientific and technical development since these have created a need for protection not only of the environment but also of other interests such as public health, where food security is a key element. (Troncoso, 2010).

For Troncoso, the role of the precautionary principle can be understood if one is conscious of the importance that it represents to take preventive measures in the face of a threat of serious harm, whose source of risk could not only generate the damage foreseen, but also other damage that is graver and not conceived. Therefore, the extension of its implementation is even more important in other aspects rather than the environmental, which represent significant importance to society, as are those of the pharmaceutical industry, the medical procedures (bioethics), nanotechnology, and all that relates to GMOs.

Due to all before stated, for Kottow & Carvajal, the precautionary principle is constituted as a legal, procedural and methodological tool that defends the right of protection against damages and risks, which can be applied as a reactive rule of abstinence that makes toxic products be taken out of the market and prohibits the entrance of those that are potentially harmful. (Kottow & Carvajal, 2011, p. 12).

In fact, in the field of policies about food security, the precautionary principle is the criteria used to elaborate policies and decisions to secure a high level of protection of public health and the interests of food consumers, at the same time as it guarantees the efficient performance of the domestic market (De Sadeleer, 2001).

Thus, the Regulation (CE) 178/2002 of the European Parliament and the European Council, of January 28, 2002, by which the principles and general requirements of food-related legislation were established, is where the first legal definition of the precautionary principle appears in the field of Community law.

On another note, as has been mentioned, the implementation of the precautionary principle implies that the consequences that can represent a threat to the environment have been identified, but whose scientific evaluation has not been able to determine with precision the magnitude of the risk. Hence, it should be

emphasized in this point that the task of deciding if, in the matter of food security, the risk is or is not tolerable for society, corresponds to the government institutions, that based on that will decide if the principle is to be applied when dealing with the source of the risk. (Vargas-Chaves et al, 2004).

The Scope of the Precautionary Principle

The Constitutional Court of Colombia, in a judicial sentence, stated its position by ratifying that it will propound for the protection of the environment, in the case where there may be doubt of the harmful effects that the environment may receive derived from the development of any activity. Therefore, the High Court related the precautionary principle with the maximum 'in dubio pro ambiente' (Corte Constitucional, Sentencia T-080 de 2017).

According to the World Health Organization (1986), it is possible to identify the precautionary principle with different postulates. For example, the postulate that expresses that it is essential to evaluate the impact that the changes to the environment produce in health, especially if they are related to food security, among other fields such as that of technology, work, energy, production, and urbanism.

The evaluation made about said impacts must be accompanied with measures and strategies of promotion of health that guarantee the positive changes in public health; strategies of which the planning of the protection not only of the natural ecosystems but also the artificial ecosystems must take part, as well as the conservation of natural resources. (World Health Organization, 1986).

In this sense, the disposition of preserving the environment through the conservation and protection of the ecosystems, not only is the fulfillment of the State but also, the people should be held responsible, whose activities must be limited by judicial ordainment, those who must be coerced by environmental authorities that, in virtue of the precautionary principle, are seen as the policing authority. (Corte Constitucional, Sentencia C-293 de 2002).

In another judicial sentence, the high court analyzed the constitutionality of the precautionary principle and pointed out certain requirements for its implementation: 1. That there is a threat of damage; 2. That the damage is serious or irreversible; 3. That there exists a principle of scientific certainty, even if it is not absolute; 4. That the decision that the authority adopts be directed to prevent the degradation of the environment, and 5. That the act in which the decision is adopted be motivated. (Corte Constitucional, Sentencia T-080 DE 2017).

All stated before was ratified in judicial Sentence C-595 de 2010, by which two relevant premises are pointed out in respect to the precautionary principle. The first is that the precautionary principle is a constitutionally established tool and in the international order, dominant when it comes to the determination of whether, or not, an intervention of the environmental and public health authorities is needed. The second, that the precautionary principle not only deals with the effects of the activities, processes, or products through its implementation but that it demands anticipation or prevision of the future environmental panorama, seeking to ensure a bigger emphasis on the protection of the surrounding natural life.

The Application of Precautionary Measures to Guarantee Food Security in the Case of FIPRONIL

Through the document with filing number 2018038207-1-000 of the 3rd of April of 2018, the Ministry of the Environment and Sustainable Development gave the authority to the National Environmental License Authority, a petition made by the Ministry of Agriculture and Rural Development, and the General Director of the Colombian Institute of Agriculture in the sense of giving implementation of the precautionary principle, specifically for the use of an active ingredient, FIPRONIL, in open environments of citric crops, passionflowers



crops, avocado crops, and coffee fields, taking into account the scientific signs that relate the use of the active ingredient mentioned with the death of bees of the *Apis mellifera* species.

The entities that signed the document mentioned before also included technical documents in which the results of laboratory testing show that the active ingredient FIPRONIL is found in most of the specimens of those species.

In this sense, and the framework of the functions and competency of the National Environmental License Authority, the following complementary measures were taken apart from the technical environmental evaluations that contain the active ingredient FIPRONIL, to guarantee food security and to give the implementation of the precautionary principle.

Measures to Guarantee Food Security

In the first place, it required a petitioner to formulate, present and implement a specific program for the protection of the bees because of the use of the product stated, in which the following measures were included even in the least way possible: (i.) Ensure that all the phrases and pictograms of warning related to the protection of bees were included in the product label of the product used; (ii.) Conduct course activities specifically directed to actors involved in the phase of application and actors in the surrounding areas (beekeepers), through workshops, conferences, and seminars, among others.

It was asked to fulfill the restrictions on the product label through its adequate reading, pointing out the importance of following the indications of the pictograms, warning phrases and recommendations of use and environmental care for the protection of bees; and clarifying to the object public the implications of the product being categorized as "Highly toxic for bees" and that in consequence, it could kill insect pollinators.

Additionally, the technical conditions needed to be given to minimize the derision of aspersion during the application of the product, to reduce the coverage of the areas that do not object to treatment. Speaking of the protection of the bees in pollination of the crops to guarantee food security, through the process of pollination and fertilization, controlling the factors that can diminish the population of pollinators, they were urged to adopt good agricultural and beekeeping practices.

Precautionary Measures

For the National Environmental License Authority, it was clear that the precautionary principle implied the adoption of actions to guarantee the fulfillment of the restriction of not applying the product in presence of or during the activity of pollinating insects or in time of flowers blooming. These actions should contemplate aspects to consider applying the product with the dose recommended and with better precision to the organ of the plant or the biological target to be controlled.

Additionally, it was demanded to develop activities of following up the application of the formulated product through periodic visits of the fields, where the form of application of the product was reviewed, evaluating the criteria associated with the protection of the bees under the approved uses and verifying that the beekeepers nearby were previously informed about the application of the pesticide product. From the results of the visits, the corresponding actions should be taken for improvement.

Other Measures

The National Environmental License Authority sent letters to the societies that are in charge of the environmental control and management tools given for the importation of Chemical Products for agricultural use and that are used as insecticides, to remind them of the importance of the fulfillment of all the programs



that are part of the Environmental Management Plan for the **prevention** of environmental impacts that could affect the bees and pollinators because of the use of chemical pesticides and thus, preventing their affectation.

To date, the National Environmental License Authority, with the Ministry of Environment and Sustainable Development, the Ministry of Agriculture and Rural Development and the Colombian Institute of Agriculture, all form a part of a worktable on the diminishing population and death of bees in Colombia, that seeks to increase the knowledge of the matter and propounds for actions oriented to mitigate this problem.

In that sense, the NAEL is taking measures to restrict the use of products with the active ingredient of FIPRONIL in open fields, in coffee fields, in passionflower crops, citric crops, and avocado crops, to materialize its application, for the Technical Environmental Evaluation that currently is being done by the NAEL and the Technical Environmental Evaluation and Licenses are given before.

Discussion

A first approximation of "food security is given when all the people have physical and economic access to enough food, being this a constant, secure, and nutritious diet that satisfies their dietary needs and food preferences to living an active and healthy life." (World Food Summit, 1996)

The FAO now uses four measurable and interrelated components to estimate the number of people with food insecurity. It takes into consideration the availability, access, and stability. Barrett & Christopher (2010) describe these components of food security in a hierarchical fashion. In this measure, the first component, the availability of food, means that there must be enough physical quantity or available food supply to give all an adequate quantity of calories.

Therefore, for people to have food security, there must be enough food supply available, and they must have access to said supply. When speaking of the use, it deals with the problems of food security-related to the quality of the diet, food security, and the adequate intake of macronutrients, vitamins, and essential minerals. Dealing with the fourth component, stability, introduces a temporal dimension that takes into consideration the risks of availability, access, and use of economic shocks, natural disasters, or political instability. (Barrett & Christopher, 2010)

When analyzing the situation and the conditions of food security in the context of countries under development, it is key to highlight those rural areas suffer important levels of poverty and food security crises. These problems show an increase as the projection of the world population shows an increase to 9 thousand million for 2050 (United Nations 2015). Given the correlation between the demographic growth and nutrition, plus the emerging social turmoil, such scenery, and conditions, urge to produce more food and to guarantee food security at a regional level to alleviate poverty and undernutrition and at the same time, to improve human health and well-being.

To satisfy the demand for food and face such challenges, the technological bet has surfaced as a solution to "increase the area of agricultural land, improve the yield of crops through the use of agricultural chemicals, organic fertilizers, biological controls, and a better soil and water management. Also, the use of more productive plants and varieties of plants resistant to pests and the promotion of the use of Genetically Modified Organisms (GMOs) resistant to pests and illnesses could help" (Carvalho, 2006: 687). Thus, new practices Surface in agriculture to help strengthen the agricultural industry.

Carvalho (2006) emphasizes the impacts of this new agricultural development for decades. The introduction of agricultural chemicals to improve the yield of crops and protect crops of pests has generated the use of higher quantities of chemical components for a better adaptation and developed resistance of pests towards the chemicals, provoking secondary unwanted effects and elevating the costs of food production.



On the other hand, he adds that the use of pesticides including insecticides, fungicides, herbicides, and rodenticides, etc., to protect crops of pests has permitted the significant reduction of losses and improvement in crop yields of crops such as corn, vegetables, potatoes, cotton, as well as the protection of livestock from illnesses, and mites, and the protection of humans of malaria carriers (Carvalho, 2006).

The debate about the diminishing population of bees on a worldwide level gain more strength due to its impacts on food production and about the ecosystem, since pollination is the major contributor of crop yields, and it contributes much more than any other practice of agricultural management. Thus, the bees and other pollinators make important contributions to agriculture (Drivdal & van der Sluijs, (2021).

Pollinators affect at least 35% of agricultural lands around the world, supporting the production of 87 leading food crops worldwide. Also, the crops dependent on pollination are five times more valuable than those that do not need pollination (Burkle et al., 2017).

Likewise, the wild pollinators provide essential ecosystem services to the fields (Klein et al., 2007) and agricultural landscapes. Recent studies claim that the bees and other pollinators are being threatened using pesticides and the changes in the environmental conditions. Meaning that the consequences not anticipated of the efforts to control the population of mosquitos and pests can cause serious and harmful damages to the population of pollinators, wreaking havoc in crop production which depends on these pollinators (Bonner, 2017).

Additionally, the residues of pesticides, especially the organochlorine and organophosphorized compounds found in soil in high latitudes, the atmosphere, and the aquatic environments in high concentrations, especially in countries of the tropics (Carvalho et al., 1997). Direct exposure of many workers to chemical products and acute intoxication with effects in reproduction and the central nervous system, as well as degradation of the quality of food and water is seen (Carvalho, 2006).

In the study of Kimaro (2013) certain practices of management of local farms are presented, such as organic agriculture, the heterogeneity of the habitat in the farm, as well as the quality and structure of the surrounding landscape, as important for the abundance and richness of the wild pollinators in the field, which is a fundamental element for the betterment of the agricultural ecosystems to maintain and guarantee food security.

Apiculture is one of the best practices in small and medium-sized parcels, such as family gardens, since it improves the productivity through better pollination and reduces the competition in land resources (Baptist & PUNCHIHEWA, 1983; Kimaro, 2013).

On the other hand, an implementation of the concepts is propounded in vegetal ecology, which can aid food security:

First, the assembly and dismantling of the community describe the processes of addition or loss of species, respectively, operating at different scales in time and space to educate local and interacting communities (for example, Ostfeld & Logiudice 2003; Hillerislambers Et Al. 2012). We can apply these concepts to the ecosystems in agriculture to better comprehend the existing communities of pollinating plants, as well as to manage the conservation of biodiversity and the services of sustained pollination.

Secondly, the functional diversity, many times, predict the processes of the ecosystems with better precision than the richness of the species (Reiss Et Al. 2009; Gagic Et Al. 2015). Of importance to the conservation of biodiversity and the performance of the ecosystem is an approach with a functional aspect, for it allows the capacity to quantify the level in which interactions or services of the ecosystem can be maintained even if the composition of the species changes. (Díaz y Cabido 2001; Elmqvist Et Al. 2003; Laliberte Et Al, 2010).



About the specific proposal of this chapter, the objective that the CAN propounds in Article 1, stipulates that "the requirements and proceedings harmonized for the registry and control of chemical pesticides for agricultural use, to secure its correct use and management to prevent or minimize the hazards to health and the environment in the authorized conditions, and to facilitate its commercialization in the member countries."

Article 3 continues establishing the inclusion of "all the chemical pesticides for agricultural use, whose origin is or isn't of the Subregion, including the active ingredients at a technical level and its formulations. Except the biological agents used for the control of pests."

In the interest of harmonizing the laws of registry and control of chemical pesticides for agricultural use in the Andean group, using as a foundation the framework established by the International Code of Conduct for the Distribution and Use of Pesticides of the FAO of 2002, the bloc of integration of the Andean Community seeks to obtain a higher level of food security in the subregion, through the augmentation of production of the basic food elements, and the levels of productivity, the sub-regional substitution of importations and the diversification and increase of exportations, also takes into consideration other factors such as the efficient application of agricultural inputs such as pesticides, minimizing the hazards to health and the environment.

Conclusion

The use of chemical pesticides has recently sparked a debate regarding the impacts and risks posing to health, food safety, and the environment. Many countries are starting to regulate the use of pesticides to address this issue, and from a legal perspective, the precautionary principle is put forward when there is either sufficient evidence of risk or a lack of certainty about those risks to take appropriate precautions.

The development in the production of food products has revolved around a new model that begins to form in the 70s, and that today has as central axes the genetic engineering of organisms or Genetically Modified Organism, the use of agrochemicals, and pesticides, and the agro-industrialization food system. These developments have raised a series of issues and challenges to food security, product availability, and the stability of production.

An initial source that raises challenges is the concentration of agricultural production in big agro-industrial conglomerates since it does not use agrochemicals and pesticides, but that its big-scale production reduces the production of farmers in farms and parcels with an agro-ecological type of production, which requires a greater study in the case of developing countries.

Furthermore, the expansion of agroindustrial conglomerates can lead to land grabbing and the displacement of rural communities. As these conglomerates acquire large tracts of land for their agricultural operations, they may displace small-scale farmers who have been living and working on the land for generations. This can have devastating consequences for rural communities, as it can lead to loss of livelihoods, food insecurity, and social instability.

On the other hand, the use of pesticides not only raises the effects to human health and the biodiversity of ecosystems for the sake of food production but also extends to the degradation of soil, which can be seen as a threat to human security, not only in the approach of food security but also in its connection with environmental security and social security of the people and territories.

The use of pesticides in agriculture raises some questions especially for the purposes for its use, which is to control, destroy and prevent pests that impact agricultural activity. While they offer effective solutions for controlling pests that threaten crop yields, their widespread application has raised significant concerns about their environmental implications.

The agro-industrial model is a priority in food production; the use of pesticides and agrochemicals begins to have control over its use, and the precautionary principle arises as an important and effective tool in the legal framework to face its effects, nonetheless, according to the government and its policies, they are still weak.

Despite the international legal framework against these practices, it is necessary to strengthen the approach of food security and to raise the conceptual aspects of food security once again, especially instability, use, and availability of food that should be included in national and international law.

As the elements of the agro-industrial paradigm are deepened to improve production using agrochemicals, intensive irrigation farming, and a variety of plants with better yield, as argued, the effects to the environment and humans increases for the sake of food production in the territories, and consequently, it will drive the movements that promote agriculture free of chemicals, GMOs, and pesticides, not only in the farming community but also in consumers.

References

- Bonner M, Alavanja M 2017. Pesticides, human health, and food security. *Food and Energy Security* 6(3):89-93. <https://doi.org/10.1002/fes3.112>
- Botos Á, Graham J, Illés Z 2019. Industrial chemical regulation in the European Union and the United States: a comparison of REACH and the amended TSCA. *Journal of Risk Research* 22(10):1187-1204. <https://doi.org/10.1080/13669877.2018.1454495>
- Burkle L, Delphia C, O'neill K 2017. A dual role for farmlands: food security and pollinator conservation. *Journal of Ecology* 105:890–899 <https://doi.org/10.1111/1365-2745.12784>
- Carvalho F 2006. Agriculture, pesticides, food security and food safety. *Environmental Science & Policy* 9(7):685-692. <https://doi.org/10.1016/j.envsci.2006.08.002>
- Colombia, Autoridad Nacional De Licencias Ambientales 2018. Oficio 2018038207-1-000 del 03 de abril de 2018.
- Colombia, Corte Constitucional 2002. Sentencia C-293 de 2002
- Colombia, Corte Constitucional 2010. Sentencia C-595 de 2010
- Colombia, Corte Constitucional 2017. Sentencia T-080 de 2017
- Colombia, Instituto Colombiano Agropecuario 2008. Resolución 1442 del 14 de agosto de 2008.
- Colombia, Ministerio De Ambiente y Desarrollo Sostenible 2008. Resolución 1442 del 28 de abril de 2008.
- Colombia, Ministerio De Ambiente y Desarrollo Sostenible 2019. Guía para la Gestión Ambiental Responsable de los Plaguicidas Químicos de uso Agrícola en Colombia.
- Comunidad Andina 1998. Decisión 436 de 1998



Comunidad Andina 2002. Resolución 630 de 2002

Comunidad Andina 2011. Decisión 767 de 2011

Comunidad Andina 2015. Decisión 804 de 2015

De Cózar J 2005. Principio de precaución y medio ambiente. *Revista Española de Salud Pública* 79:133-144. <https://www.scielo.org/article/resp/2005.v79n2/133-144/>

De Sadeleer N 2001. Les avatars du principe de précaution en droit public. Effet de mode ourévolution silencieuse? *Revue Française de Droit Administratif* 17:547-562. <http://hdl.handle.net/2078.3/144775>

Drivdal L, Van Der Sluijs J 2021. Pollinator conservation requires a stronger and broader application of the precautionary principle. *Current Opinion in Insect Science* 46:95-105. <https://doi.org/10.1016/j.cois.2021.04.005>

El Hassani K, Dacher M, Gauthier M, Armengaud C 2005. Effects of sublethal doses of FIPRONIL on the behavior of the honeybee (*Apis mellifera*). *Pharmacology Biochemistry and Behavior*, 82:30-39. <https://doi.org/10.1016/j.pbb.2005.07.008>

European Union, European Parliament 2002. Regulation EC/178/2002 of 28 January 2002.

FAO 2018. The importance of bees and other pollinators for food and agriculture. Retrieved from: www.fao.org/pollination/en

Gómez-Rey A, Vargas-Chaves I, Rodríguez G 2020. El desarrollo sostenible como política en Colombia: un análisis desde la protección de los páramos. *Civilizar Ciencias Sociales y Humanas* 20(38):41-52. <https://doi.org/10.22518/jour.ccs/2020.1a02>

Gunasekara A, Truong G, Kean S, Spurlock F, Tjeerdema R 2007. Environmental fate and toxicology of Fipronil. *Journal of Pesticide Science* 32(3):189-199. <https://doi.org/10.1584/jpestics.R07-02>

Holder P, Jones A, Tyler C, Cresswell J 2018. Fipronil pesticide as a suspect in historical mass mortalities of honeybees. *Proceedings of the National Academy of Sciences* 115(51):13033-13038. <https://doi.org/10.1073/pnas.1804934115>

Jalil N, Norman A, Hamid S 2017. Studies on Technology and Halal Food Security: A Review. *Pertanika Journal of Social Sciences & Humanities* 25:225-239. <http://www.myjurnal.my/public/article-view.php?id=114073>

Kottow M, Carvajal Y 2011. Bioética y precaución. *Nuevos folios de bioética*, 5:7-32. <https://revistas.uchile.cl/index.php/NFB/article/download/32902/34639>

Kravets I 2019. Teleological Constitutionalism, Constitutional Identity and Public Order. *Вестник Томского Государственного Университета* 439:202-215. <https://doi.org/10.17223/15617793/439/28>



- Mayer D, Lunden J 1999. Field and laboratory tests of the effects of FIPRONIL on adult female bees of *Apis mellifera*, *Megachile rotundata* and *Nomia melanderi*. *Journal of Apicultural Research* 38(3):191-197. <https://doi.org/10.1080/00218839.1999.11101009>
- Mechlem K 2004. Food Security and the Right to Food in the Discourse of the United Nations. *European Law Journal* 10(5):631-648. <https://doi.org/10.1111/j.1468-0386.2004.00235.x>
- Mustapha M, Halimoon N, Johar W, Abd Shukor M. 2019. An overview on biodegradation of carbamate pesticides by soil bacteria. *Pertanika Journal of Science & Technology*, 27(2):543-568. <http://psasir.upm.edu.my/id/eprint/68692/>
- Ñaupari R 2017. Comparación del proceso de registro de plaguicidas de uso agrícola en la zona andina. Universidad Nacional Agraria La Molina, Lima.
- Pickett J 2013. Food security: intensification of agriculture is essential, for which current tools must be defended and new sustainable technologies invented. *Food and Energy Security* 2(3):167-173. <https://doi.org/10.1002/fes3.32>
- Sage C 2014. Food security, food sovereignty and the special rapporteur: Shaping food policy discourse through realizing the right to food. *Dialogues in Human Geography* 4(2):195-199. <https://doi.org/10.1177%2F2043820614537156>
- Siems M, Síthigh D 2012. Mapping legal research. *The Cambridge Law Journal* 71(3):651-676. <https://doi.org/10.1017/S0008197312000852>
- Tosun J 2013. How the EU handles uncertain risks: Understanding the role of the precautionary principle. *Journal of European Public Policy* 20(10):1517-1528. <https://doi.org/10.1080/13501763.2013.834549>
- Troncoso M 2010. Principio de Precaución y la Responsabilidad Civil. *Revista de Derecho Privado* 18:205-225. <https://ssrn.com/abstract=1623294>
- Vargas-Chaves I, Ibáñez-Elam A, Gómez-Rey A 2020. El principio de precaución: de norma crepuscular a criterio jurídico vinculante. *Revista Guillermo de Ockham* 18(1):53-65. <https://doi.org/10.21500/22563202.4377>
- Vargas-Chaves I, Luna-Galván M, Torres Y 2020. Del biocentrismo a la seguridad humana: un enfoque en el marco del reconocimiento del páramo de Pisba como sujeto de derechos. *Prolegómenos. Derechos y Valores* 23(45):85-101. <https://doi.org/10.18359/prole.4264>
- Vargas-Chaves I, Rodríguez G, Cumbe-Figueroa A, Mora-Garzón S 2020. Recognizing the rights of nature in Colombia: the Atrato River case. *Jurídicas* 17(1):13-41. <https://doi.org/10.17151/jurid.2020.17.1.2>
- Vidau C, Diogon M, Aufavre J, Fontbonne R, Viguès B, Brunet J, Delbac F 2011. Exposure to sublethal doses of FIPRONIL and thiacloprid highly increases mortality of honeybees previously infected by *Nosema ceranae*. *PLoS one* 6(6):e21550. <https://doi.org/10.1371/journal.pone.0021550>



Walker V 2001. Some dangers of taking precautions without adopting the precautionary principle: a critique of food safety regulation in the United States. *Envtl. L. Rep. News & Analysis* 31:10040. https://scholarlycommons.law.hofstra.edu/faculty_scholarship/757

World Health Organization 2009. The WHO Recommended Classification of Pesticides by Hazard. http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf