
FOOD SAFETY AND PESTICIDES: The situation of glyphosate before the Precautionary Principle

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ABSTRACT

This article uses the legal method and deductive reasoning, with application of the bibliographical and documentary research technique. It intends to verify if there's any omission from Public Power regarding the application of the Precautionary Principle, at the from the perspective of food security, in relation to the substance glyphosate, which is the most used pesticide in Brazil, especially at the genetically modified soya crops. Based on results of studies published by World Health Organization which was qualified as carcinogenic and causing damage to the DNA and chromosomes of human cells, together with the deficiency of information contained in the Program Analysis of Pesticides Residues in Foods, put out by ANVISA, it is inferred that reasonable scientific uncertainty would justifies the application of precautionary measures, including the prohibition of the use of glyphosate in food production in the country, enforcing the right of consumer safety.

Keywords: Pesticide; Glyphosate; Precautionary Principle; Risk Management; Food Security.

SEGURANÇA ALIMENTAR E AGROTÓXICOS: A situação do glifosato perante o princípio da precaução

RESUMO

O presente trabalho utiliza do método jurídico de raciocínio dedutivo, com aplicação da técnica de pesquisa bibliográfica e documental. Nele, pretende-se verificar se o Poder Público está sendo omissivo no que tange à aplicação do Princípio da Precaução, sob a perspectiva da segurança alimentar; em relação à substância glifosato, que é o agrotóxico mais utilizado no Brasil, em especial nas monoculturas com cultivo de soja geneticamente modificada. A partir de resultados de estudos publicados pela Organização Mundial de Saúde, no qual foi qualificado como cancerígeno e causador de danos ao DNA e a cromossomos de células humanas, em conjunto com a deficiência de informações constantes no Programa de Análise de Resíduo de Agrotóxicos em Alimentos, publicado pela ANVISA, infere-se que pela existência de dúvida científica razoável se justificaria a aplicação de medidas de precaução, inclusive a proibição da utilização do glifosato na produção de alimentos no país, efetivando o direito à segurança do consumidor.

Palavras-chaves: *Agrotóxico; Glifosato; Princípio da Precaução; Gestão*

de Riscos; Segurança Alimentar.

INTRODUCTION

The present article intends to verify, from the juridical method of deductive reasoning with qualitative, descriptive and explicative research, through a bibliographical and documentary analysis, if there is omission of the Brazilian Federal Public Power in matters regarding the application of the Precautionary Principle in relation to the use of the substance glyphosate, the most widely used pesticide in the country, in order to compromise consumer food safety.

The first topic has the objective of delimiting the contours of the Risk Society, inserting in such context the Green Revolution, evidencing the consequences that the Industrial Revolution brought to society as a whole, with special focus on the effects related to the use of pesticides in the Agricultural production.

In the next topic, the objective is to highlight the role of the Precautionary Principle in managing the uncertain risks arising from the modernization of production techniques. It will be verified the international forecast of this principle, besides its situation in the Brazilian constitutional and infra-constitutional plans, as well as the position of the Federal Supreme Court on its applicability and its consequences.

The third topic will analyze the legal recognition of the dangerousness of pesticides in the Brazilian legal system, specifying the types of intoxication that such substances can cause on the consumer. It will be discussed, in addition, a specification of the content of the fundamental right to adequate food, also checking if there is coherence in the conclusions obtained by ANVISA in the Program for the Analysis of Agrochemical Waste, published in 2016. Afterwards, there will be an exposition about the applicability of the Precautionary Principle in the management of pesticides.

Finally, scientific studies published by the World Health Organization (OMS) related to the use of glyphosate will be presented. It shall be ascertained whether there is reasonable scientific uncertainty with regard to the risks posed to human health by such a substance in order to justify the application of the Precautionary Principle, showing the possible

legal and social consequences if the answer is affirmative.

1 (INDUSTRIAL) RISK SOCIETY AND GREEN REVOLUTION

The Industrial Revolution - which began in the eighteenth century in England - prompted a break with the medieval stationary culture. It began a new era that was based on scientific rationality and on constant technological innovations, considered as the solution to the miseries of humanity and as the way to the fulfillment of their yearnings.

However, in London, in 1952, the need to consider the risks associated with technological innovations at the time of the “*Black Smoke*” disaster, in which thousands of people died and others became ill due to the excess of smoke generated by burning coal as an energy source. According to Ivan T. Berend “*in a week when people could not see their own feet in the thick black smog, as many as 12,000 Londoners died and 100.000 became ill. Air pollution reached in intolerable level in the advanced industrialized world!*” (BEREND, 2006, p. 312).

In the second half of the twentieth century, scientific-technological processes also reached the agricultural sector with the intention of increasing production, characterizing what was called the Green Revolution, which was based on large scale monoculture produced with the aid of machines and the application of agrochemicals. According to Douglas Gollin, Casper Worm Hansen and Asger Wingender “*The Green Revolution emerged from philanthropic efforts - arguably shaped by geopolitical interests - to address the challenges of rural poverty and agrarian unrest in the late 1950s and early 1960s*”² (GOLLIN; HANSEN; WINGENDER, 2016, p. 2).

From this perspective, there was a steady increase in the use of large-scale monoculture using machinery and chemical substances designed to assist in the fight against “pests”, in order to maximize production. Later on, as a result of the evolution of biotechnological techniques, the

1 In a week when people could not see their own feet under the dense black smoke, about 12.000 Londoners died and 100.000 became ill. Air pollution has reached an intolerable level in the modern industrialized world (author’s translation).

2 The Green Revolution was formed from philanthropic efforts - arguably shaped by geopolitical interests - to address the challenges of rural poverty and agrarian unrest in the late 1950s and early 1960s (author’s translation).

development of genetically modified seeds resistant to certain chemicals was also introduced, which were increasingly applied by the agricultural sector.

However, this modernization provided by the new technologies resulting from the industrialization process, which contributed greatly to social progress, was not accompanied by a scientific capacity capable of accurately predicting the extent of all its side effects. The industrialized society of the twentieth century and the beginning of the twenty-first century came to be inserted in a context of risks often invisible to the scientific community, but nevertheless they became less threatening.

It was therefore what Ulrich Beck called the (industrial) Risk Society, characterized by this symbiosis between the development of new technologies and the production of risks that, when they are manifested, cause serious damage to health and human life.

The *latency* phase of *risk threats* comes to an end. The invisible threats become visible [...] The balance of the presence of pollutants and toxic substances in food and consumer goods becomes more and more extensive. The dykes represented by the ceilings more closely resemble the requirements for Swiss cheese (the more holes, the better) than those for protecting the health of the population. The denial of retractions of those responsible always makes more noise and presents fewer arguments (BECK, 2011, p. 66).

In the context of food production, Rachel Carson highlighted in her work “Silent Spring” the dangerousness resulting from the use of pesticides, highlighting the warlike origin of these chemicals whose residues have permeated all over the globe:

In the period of less than two decades since they are in use, synthetic pesticides have been so widely distributed throughout the animate and inanimate world that they are found practically everywhere.

[...]

All this came about because of the sudden rise and the astonishing growth of an industry producing artificial or synthetic chemicals with insecticidal properties. This industry is one of the fruits of World War II. During the development of agents to be

used in chemical warfare, it was discovered that some laboratory-created chemicals were lethal to insects. The discovery did not happen by chance: insects were already being widely used to test chemicals as lethal agents for humans (CARSON, 2010, p. 30).

It is worth mentioning that in Brazil the National Plan for Sustainable Rural Development - implemented by Decree 8.735/16 - issued an alert highlighting the high costs that these new agricultural practices have brought to the environment and to society:

In the second half of the 20th century, with the so-called “Green Revolution”, considerable increases in production and productivity were achieved, based on mechanization, use of agrochemicals and monoculture. However, today there are high environmental and health costs, which represent high economic costs.

Soil degradation - a quarter of the world’s arable land is in the process of more or less advanced degradation - and the growth of desertified areas, as a result of deforestation and inadequate soil management practices, are processes that tend to worsen with the advances of global warming. In the case of fisheries, the excessive exploitation to which most of the fisheries resources are subject is highlighted, in addition to the degradation of aquatic environments, due to the rural and industrial development models prevailing in the last decades, which risk the fish stock and also pose a significant threat to global food security (BRAZIL, 2013, p. 15).

Faced with the need to deal with this scenario of generalized threats and uncertainties regarding the social and environmental risks posed by the Industrial Revolution - which includes the Green Revolution -, sovereign nations organized themselves internationally in order to create instruments capable of adequately managing without compromising technological development and economic growth.

2 THE MANAGEMENT OF UNFORESEEN RISKS BY WEIGHTED APPLICATION OF THE PRECAUTIONARY PRINCIPLE

Given the unpredictability of the risks inherent in the constant scientific and technological development, it was necessary to develop legal and political instruments capable of assisting in the management of such risks. With this bias, at the United Nations Conference on Environment and Development held in the city of Rio de Janeiro in 1992 (Rio-92), it was pointed out that the precautionary principle should be applied in cases where there is reasonable scientific doubt risks.

In order to protect the environment, the precautionary principle should be widely observed by States according to their capabilities. When there is a threat of serious or irreversible damage, the absence of absolute scientific certainty will not be used as a reason for postponing economically viable measures to prevent environmental degradation (UN, 1992).

However, this principle has come to be interpreted in many different ways, not always weighted, sometimes based on fear that justifies an excessive restriction on economic and technological progress, once based on reckless trust, prioritizing economic growth and treating such risks as a kind of necessary evil.

Undoubtedly, it is essential to avoid the risks of irreversible damage, but risk-taking is inherent in one's life - risk of death - and indispensable to human progress. According to Roger Scruton's assertion that humans "are willing to risk their own lives, defending a way of life that they refuse to abandon" (SCRUTON, 2016, p. 114).

It should be emphasized, moreover, that the inventive capacity that results in the constant creation of new technologies is a primal characteristic of humanity, as José Geraldo Freitas Drumond asserts: "Man is a technological being, since he has always used procedures and skills to better adapt to his habitat" (DRUMOND, 2007, p. 213).

In this way, the application - political and/or legal - of the precautionary principle should be guided by the identification of the interests involved, considering specific factual circumstances that arise. Only in this way will sustainable development be achieved, which, as pointed out by Denise Schimitt Siqueira Garcia, is composed of "three

important dimensions: environmental, social and economic” (GARCIA, 2016, p. 05).

In the Brazilian legal system, the precautionary principle is implicit in Article 196 and Article 225, §1 and II, III, IV, V and VI of the Constitution of the Federative Republic of Brazil of 1988 (CRFB/88), being applied not only for the preservation of the environment, but also to protect society against the harmful effects of environmental degradation - such as damage to health. This understanding was adopted by the Federal Supreme Court (STF) on the occasion of the judgment of the Direct Action of Unconstitutionality (ADI) 3.510/DF, on May 25, 2008, as can be seen in an excerpt from the vote of the rapporteur, then Minister Ayres de Britto:

When one considers the preservation of life on a wider scale, that is, at the collective level, not only national but also planetary, the so-called “precautionary principle” comes to light, which today guides the conduct of all those who work in the fields of protection of the environment and public health. Although not expressly formulated, it finds shelter in arts. 196 and 225 of our Constitution (BRASIL, 2008, p. 32).

However, there is express provision in infraconstitutional norms, such as article 54, § 3 of Law 9.605/98; article 2, item IV, of Federal Decree 5.098/04; article 1 of Law 11.105/ 05 (BRAZIL, 1998; 2004; 2005). Because of the Theory of the Dialogue of Sources, nothing prevents normative communication between Special Laws, as long as they are not incompatible and allow a greater realization of fundamental rights. In this sense, it is necessary to recognize the dialogue between the norms mentioned above with Law 7.802/89, which carries the precaution only implicitly when dealing with aspects related to pesticides.

On the Theory of the Dialogue of the Sources, it is useful to externalize its contours in the words of Cláudia Lima Marques:

In summary, there is also a dialogue between sources: systematic dialogue on coherence, systematic dialogue on complementarity or subsidiarity, and dialogue on adaptation or coordination. It should be noted that it is rarely the legislator who determines this simultaneous and coherent application of the special laws (an example of a dialogue of sources ordered by the legislator is to RT. 117 of CDC,

which determined the application of Title III of CDC to the cases of the previous Public Civil Action, Law 7.347/1985 [...] (MARQUES, 2016, p. 147)

More recently, on June 08, 2016, in recognizing the General Repercussion on the judgment of Extraordinary Appeal (RE) 627.189-SP, the Supreme Federal Court, under the report of Minister Dias Toffoli, recognized the relevance of applying the precautionary principle in situations of duly substantiated scientific uncertainty, affirming, even, that such doubt can even serve to the judicial questioning of public policies.

[...] The precautionary principle is a risk management criterion to be applied whenever there is scientific uncertainty about the possibility of a product, event or service unbalancing the environment or reaching the health of citizens, which requires the state to analyze the risks, assess the costs of preventive measures and, in the end, take the necessary actions, which will result from universal, non-discriminatory, motivated, consistent and proportionate decisions.

3. There is no restriction on the judicial control of public policies on the application of the precautionary principle, provided that the judicial decision does not depart from the formal analysis of the limits of these parameters and that privileges the democratic options of the discretionary choices made by the legislator and the Public Administration [...] (BRAZIL, 2016, s/p, author's highlight).

Therefore, the precautionary principle constitutes an indispensable tool for meeting the requirements set forth in article 170, III and VI and article 225, both of the CRFB/88. It is then concluded that its application must be guided by reasonable scientific uncertainty about risks, established within certain limits, in order to promote a balance between the economic, social and environmental dimensions of sustainable development.

It is also important to emphasize the obvious: the existence of reasonable scientific doubt depends on the study of a certain practice, applying the methodologies indispensable to obtain a result, which may or may not be conclusive. Scientific inertia in relation to the verification of the risks related to a substance or technology renders the application of the precautionary principle impossible and annihilates it in such a way as to

undermine the management of social and environmental risks.

The next topic will be a verification of the Brazilian legal treatment given to pesticides, relating it to the national objective of guaranteeing food security to society. Subsequently, the conclusions of the National Health Surveillance Agency (ANVISA) will be presented, regarding the risks inherent to the consumption of fruits and vegetables grown through the application of agrochemicals.

3 FOOD SAFETY IN BRAZIL FROM THE ANALYSIS OF FOOD AGROCHEMICAL RESIDUES

The realization of food security is a national objective that lends itself to guarantee the dignity of the human person. In order to achieve this, it is essential to ensure the enjoyment of the fundamental right to adequate food, which is provided for in article 6 of CRFB/88 and article 2 of Law 11.346/06. According to the National Food and Nutrition Policy (PNAN), the content of this right involves both quantitative and qualitative aspects:

Adequate and healthy food: food practice appropriate to the biological and sociocultural aspects of individuals, as well as the sustainable use of the environment. It must be in accordance with the needs of each stage of life and with special dietary needs; be referenced by food culture and the dimensions of gender, race and ethnicity; be physically and financially accessible; harmonic in quantity and quality; based on adequate and sustainable production practices; with minimal amounts of physical, chemical and biological contaminants. (BRASIL, 2013, p. 68)

These statements are fully in line with General Comment No. 12, which makes reference to art. 11 of the International Covenant on Economic, Social and Cultural Rights, organized under the United Nations (UN), which was incorporated into the Brazilian legal system by Decree 591/92. It emphasizes the need to interpret the right to food in an expansive way, and its content cannot be restricted to a specific package of specific nutrients, and must be carried out in a progressive way - prohibiting retreat and imposing an evolution in the respective public policy.

The right to adequate food takes place when every man, woman and child, alone or

in the company of others, has physical and economic access, without interruption, to adequate food or the means to obtain it. The right to adequate food should therefore not be interpreted in a strict or restrictive sense, which equates it in terms of a minimum package of calories, proteins and other specific nutrients. The right to adequate food will have to be resolved progressively. However, states have the primary obligation to implement the actions necessary to mitigate and alleviate hunger, as stipulated in paragraph 2 of Article 11, even in times of natural or unnatural disasters. (ONU, 1999, p. 2)

It can therefore be said that the right to adequate food is to guarantee access to food in quantity and quality that is in keeping with the biological and cultural characteristics of each individual, not only in terms of the provision of minimum nutritional values, but also the need to reduce the risks posed by physical, chemical and biological contaminants.

In this context, a relevant factor to be analyzed is the level of chemical residues present in foods eaten by consumers. According to a report on food safety published by the UN in 2017, pesticides pose a great risk to the health of consumers, who are exposed daily to multiple wastes:

Pesticide residues are commonly found in both plant and animal food sources, resulting in significant exposure risks for consumers. Studies indicate that foods often contain multiple residues, resulting in the consumption of a “cocktail” of pesticides. Although the harmful effects of pesticide mixtures are still not fully understood, it is known that in some cases, synergistic interactions can occur that lead to higher toxicity levels³ (ONU, 2017, p. 8).

It should be noted that according to information provided by the Brazilian Association of Collective Health (ABRASCO, 2015, p. 17), since 2008 Brazil is the country that consumes the most pesticides in the world. This excessive use of agrochemicals causes negative health impacts to different population groups, such as farm workers, residents of regions surrounding factories and farms as well as consumers.

According to the National System of Toxic Information - Pharmacological - SINITOX, created in 1980 and linked to the Oswaldo

³ Residues of pesticides are commonly found in food of plant and animal origin, exposing consumers to significant risks. Studies indicate that foods generally contain multiple residues, thus leading to consumption of a *cocktail* of pesticides. Although the harmful effects of the pesticide mixture are not yet fully understood, it is well known that in some cases synergistic interactions can occur which lead to higher levels of toxicity (author’s translation).

Cruz Foundation - FIOCRUZ - there are thousands of records of human intoxication and poisoning in the country (FIOCRUZ, 2016).

Neice Faria, Anaclaudia Fassa and Luiz Facchini analyzed the cases of pesticide intoxication in Brazil, and report that “agricultural work is one of the most dangerous occupations today, highlighting agrochemicals that are related to acute intoxication, chronic diseases, reproductive problems and environmental damage (FARIA et al., 2007, p. 26).

According to the Manual of Health Surveillance of Populations Exposed to Agrochemicals, prepared in 1996 by the Pan American Health Organization (OPAS) and World Health Organization (OMS), there are three possible types of intoxication that can be caused by agrochemicals:

Agrochemicals can determine three types of intoxication: acute, subacute and chronic. In acute intoxication the symptoms appear rapidly, some hours after the excessive exposure, for short period, to extreme or highly toxic products. It can occur mildly, moderately or severely, depending on the amount of venom absorbed. The signs and symptoms are clear and objective. Subacute intoxication occurs from moderate or small exposure to highly toxic or mildly toxic products and has a slower onset. The symptoms are subjective and vague, such as headache, weakness, malaise, stomach pain and drowsiness, among others. Chronic intoxication is characterized by late onset, after months or years, of small or moderate exposure to toxic products or multiple products, causing irreversible damage, such as paralysis and neoplasia (OPAS; OMS, 1996, p. 23).

It is clear, therefore, that the right to adequate food and the achievement of food security are factors closely related to the realization of the fundamental right to health, provided for in article 6 and 196 of CRFB/88. In addition, it is evident the relevance of the analysis and control of residues of pesticides present in the food ingested by consumers.

It should be emphasized, in addition, that the inherent danger of pesticides is constitutionally recognized by article 220, paragraph 3, section II and paragraph 4, which concerns the health of the population, imposes restrictions on advertisements involving such chemicals, just as it did in relation to tobacco and alcoholic beverages and medicines (BRASIL, 1988).

In the infraconstitutional sphere, it is worth highlighting

article 3, paragraph 6, letters C, D and F, and article 7, item I, letter H, both of Law 7.802/89; which require the provision of information about the toxicological classification of each substance on its label and also impose a ban on the registration of pesticides that have carcinogenic or mutagenic characteristics that cause hormonal disturbances or damage to the reproductive system (BRASIL, 1989).

It should be noted that this duty of care aims to protect not only the rural producers who manage the pesticides used in the crop but also the consumers of the foods that contain their residues, guaranteeing them the right to information and safety against harmful products to health, by determination of article 6, items I and III, of Law 8.078/90 - Consumer Protection Code (CDC); of article 2, paragraph 2 and paragraph 4, items III, IV, V and VI of Law 11.346/06; and of article 2, items I and II, of Decree 5.098/04 (BRAZIL, 1990; 2004; 2006).

It is important to note that the Manual of Health Surveillance of Populations Exposed to Agrochemicals makes a caveat regarding the safety analysis due to the ingestion of these chemical substances, emphasizing that several factors may contribute to eventual intoxication. The relevant scientific studies cannot be limited to verifying the toxicity of an isolated substance, but must also recognize the peculiarities of the organism of each individual and the fact that society is exposed to contact with multiple substances. In addition, there is a great methodological difficulty regarding the stipulation of a diagnosis about chronic intoxication.

These intoxications are not a reflection of a simple relationship between the product and the exposed person. Several factors are involved in its determination, including factors related to the chemical and toxicological characteristics of the product, factors related to the exposed individual, exposure conditions or general conditions of work. Characteristics of the product: toxicological characteristics, form of presentation, stability, solubility, presence of contaminants, presence of solvents, etc. Characteristics of the exposed individual: age, sex, weight, nutritional status, schooling, knowledge about the effects to safety measures, etc. Exposure conditions: general conditions of work, frequency, dose, forms of exposure, etc. The clinical characteristics of pesticide poisonings

depend, in addition to the aforementioned aspects, on the fact that there has been contact/exposure to a single type of product or several of them. In acute intoxication resulting from exposure to only one product, clinical and laboratory signs and symptoms are well known, the diagnosis is clear and the treatment is defined. With regard to chronic intoxication, the same cannot be said. The clinical picture is undefined and the diagnosis difficult to establish (OPAS, OMS, 1996, p. 23).

Considering that Brazil is the largest consumer of pesticides in the world and the serious health damage caused by poisoning due to the consumption of food with chemical residues, besides the difficulty in stipulating the possibility of its occurrence - especially chronic intoxication - a careful and continuous inspection of marketed foods is essential, applying the Precautionary Principle.

Regarding food safety, the competent authority to verify possible risks posed by toxic residues present in food is the National Agency of Sanitary Surveillance (ANVISA), since article 8, paragraph 1, item II, of the law 9.782/99 conferred on it an obligation to regulate, control and inspect products that pose a risk to health, while Article 6, item I of Decree 4.074/02 conferred competence to carry out the toxicological evaluation and classification of pesticides (BRASIL, 1999; 2002).

In the year 2016 ANVISA made available its last analysis of residues of pesticides in food, including samples collected between the years of 2013 and 2015. A total of 232 types of agrochemicals were investigated in the monitored samples, of which, according to the agency's findings, 80.3% presented satisfactory results, 42% of which did not present residues of the pesticides researched and 38.3% presented residues within the stipulated limits (ANVISA, 2016, p. 05).

It is important to note that the analysis in question did not consider all types of pesticides registered and used in the country, assuming as satisfactory the samples in which no residues of those specific substances were analyzed, which could contain other substances not analyzed (ANVISA, 2016, p. 05).

Of the total of the samples monitored, 9.680 samples (80,3%) were considered

satisfactory, and 5.062 of these samples (42,0%) did not present residues among the pesticides surveyed and 4.618 (38,3%) presented pesticide residues within the LMR. 2.371 samples (19,7%) were considered unsatisfactory, of which 362 of these samples (3,00%) presented residues above the LMR and 2.211 (18,3%) presented residues of pesticides not authorized for culture (ANVISA, 2016).

Regarding the methodology adopted to evaluate the risk of acute intoxication, the ANVISA analysis assumed that it is unlikely that an individual consumes a large quantity of two or more different types of food containing residues of pesticides in excessive concentrations, in a short period of time. From this perspective, he concluded that the level of food safety in Brazil is acceptable with regard to the potential risks of acute intoxication arising from dietary exposure to agrochemical residues. It was stated that only 1,11% of the foods surveyed showed a potential acute health risk (ANVISA, 2016, p. 06).

In relation to the risk of chronic intoxication, it was limited to mentioning the analysis carried out in 2013, in which it was stated that the health risk was considered acceptable, since, in the light of current knowledge, in most cases it would be necessary to daily consumption of various foods containing a certain amount of pesticide for years, always exceeding the maximum limits established. However, it was stressed that the possibility of chronic health risks due to diet cannot be ruled out (ANVISA, 2016, p. 105).

Faced with this acknowledged uncertainty regarding chronic intoxication, the effects of which are manifested months or years later, it is useful to bring to light the content of the fundamental right to health, elaborated by Paulo Affonso Leme Machado:

The health of human beings does not exist only in contraposition to not having diseases diagnosed in the present. The state of the elements of nature - waters, soil, air, flora, fauna and landscape - is taken into account in order to ascertain whether these elements are in a good state of health and if their use bring good health or diseases for humans (MACHADO, 2016, p. 70).

The constitutional provision of the fundamental right to health, therefore, obliges the Public Power to adopt precautionary measures aimed at avoiding gradual poisoning capable of causing diseases in the future

- chronic diseases. According to the National Cancer Institute (INCA), chronic intoxication resulting from the use of pesticides can lead to several problems for human health, such as: infertility, impotence, abortions, malformations, neurotoxicity, hormonal imbalance, effects on the immune system and cancer (INCA, 2015, p. 33).

In relation to subacute intoxication, ANVISA analysis does not make any manifestation, and it can be presumed that it considers only two types of poisoning by pesticides: acute intoxication - with effects in a short period of time - and chronic - with late effects.

The paper also reports that exposure to pesticide residues by diet was assessed considering exposure to a single active ingredient at a time, although it recognizes that some pesticides have the same mechanism of toxic action, which may lead to an additive effect on the body - bioaccumulation (ANVISA, 2016, p. 106).

No mention was made of the possibility of chemical interaction between distinct substances - due to the “*cocktail*” of multiple pesticides present in some foodstuffs - and there was no explicit allusion to the fact that, at the end of the day, any conclusion would be merely an estimate, since the organism of each individual reacts differently to contact with a certain chemical substance or with several of them associated.

Due to the parameters used by ANVISA, it can be said that the results presented are insufficient to guarantee safety in relation to acute intoxication, since there was no analysis of all authorized pesticides, effectively used in crops and present in foods eaten by consumers. On the other hand, in relation to chronic intoxication the conclusion was imprecise, and uncertainty regarding risks was later admitted.

Therefore, it can be considered that the level of food safety in Brazil - the world’s largest consumer of pesticides - is uncertain, given the insufficient risk assessment for acute intoxication. In addition, the gaps in the scientific community regarding chronic intoxication due to the cumulative effects of certain substances increase the uncertainties about the risks of synergistic effects by the chemical reaction of the residues of the different pesticides present in the food and by the diversity of reactions inherent in the organism of each individual.

Due to the continuous increase in the use of agrochemicals in the country, there is also a growing non-compliance with the obligation to

progressively guarantee the fundamental right to adequate food. It should also be pointed out that, according to ANVISA, the result obtained by the document does not serve as a useful tool for the provision of information to consumers regarding the imminent risks to food, since the analysis was performed after the consumption of food (ANVISA, 2016, p. 66).

It is observed that ANVISA concluded that the level of pesticides present in food consumed by Brazilians is satisfactory, despite an insufficient analysis of acute intoxication and that it has been admitted that in relation to chronic intoxication the degree of safety is merely speculative.

As pointed out earlier, due to the inseparable link between environmental preservation and human dignity, the application of the Precautionary Principle is not limited to the protection of the environment itself and should also be used to protect society from harmful effects that environmental damages pose to human health.

In this topic, therefore, the necessary considerations were made about the risks that pesticides generally pose to the environment and to human health, in addition to highlighting the need to apply the Precautionary Principle. A specific approach to the glyphosate substance will be given below.

4 THE SITUATION OF GLYPHOSATE IN THE INTERNATIONAL AND BRAZILIAN SCENARIO

In principle, it is pertinent to point out that according to ABRASCO, glyphosate alone accounts for 40% of the total pesticides used in Brazilian agricultural production, Brazil being the largest consumer of pesticides in the world (ABRASCO, 2015, p. 80). In the register of monographs authorized by ANVISA, it is reported that it is an herbicide class - combating invasive plants - and its toxicological classification is level IV (ANVISA, 2017, s/p).

It is a chemical that must be applied post-emergence in invasive plants of the following crops: cotton, plum, rice, banana, cocoa, coffee, sugar cane, citrus, coconut, beans, papaya, corn, nectarine, pasture, pear, peach, rubber, soy, wheat and grape. (ANVISA, 2017, s/p).

It is important to assert that previously, the application of “Glyphosate” occurred only before the birth of the plant (pre-emergent),

and in these days, as informed in the previous paragraph, ANVISA allows its post-emergence application, that is, after the birth of the plant: “Glyphosate (*Roundup Ready*) had its registration limited to pre-emergent use, ie, prior to the birth of the plant, and therefore could not be used in the post-emergent phase” (VAZ, 2006, p. 58).

According to ABRASCO, the constant increase in the use of agrochemicals in Brazil over the last decade is mainly due to the expansion of transgenic soybean cultivation and the resistance acquired by the weeds combated by glyphosate application (ABRASCO, 2015, p. 52).

Regarding the role of glyphosate in combating invasive plants that are harmful to agricultural production, it is worth mentioning an excerpt from the doctoral thesis produced by Maria Olandina Machado: “By explaining in a simplified way the process, we can say that glyphosate prevents the production of essential amino acids in the production of proteins, without which the plant dies” (MACHADO, 2016, p. 84).

Regarding the definition of the safety parameters related to the amount of glyphosate residues that can be found in food, the author highlights the situation of the cultivation of genetically modified soybeans, in which there was a large increase in relation to the established maximum limit as a condition for the preservation of the environment and human health.

It is important to note that common soy by 2002 had the limit set at 0.2 mg/kg. When GM soybeans were introduced, LMR of 2.0 mg/kg were established, unlike common soybeans. And since 2002 the LMRs have been set at 10 mg/kg. The opposing groups reported on the percentage increase of the limits, around 50 times (MACHADO, 2016, p. 154).

Intrigued by this dizzying increase in glyphosate residue limits, Larissa Mies Bombardi compared the safety parameters established in Brazil and in the European Union with regard to soybean, coffee and sugar cane plantations:

In the case of glyphosate, the permitted residue (LMR) in Brazil in coffee, for example, is ten times greater than that allowed in the European Union (respectively 1 mg/kg and 0.1 mg/kg).

In the case of sugarcane, the maximum permitted residue of glyphosate in Brazil is 20 times higher than in the European Union (0.05 mg/kg in the EU and 1 mg/kg in Brazil).

In the case of soybeans, this comparison quantifies the expression “asymmetry” of the differences between Brazil and the European Union regarding the “permissiveness of agrochemical residues. In Brazilian soybean, glyphosate residue 200 (two hundred) times greater than that permitted in the European Union (0.05 mg/kg in the EU and 10 mg/kg in Brazil) is allowed (BOMBARDI, 2017, p. 50).

The problem related to glyphosate is not limited to the fact that it is treated in the most widely used pesticide in Brazil, nor in the asymmetry related to safety parameters, when compared with those established by the European Union. It rests, in particular, on the findings of studies conducted by the International Agency for Research on Cancer (IARC), linked to the World Health Organization (WHO), published in 2015. It has been found that the substance has carcinogenic potential in humans, in addition to causing damage to the DNA and chromosomes of human cells.

The herbicide glyphosate and the insecticides malathion and diazinon were classified as probably carcinogenic to humans (Group 2A).

[...]

The IARC Working Group that conducted the evaluation considered the significant findings from the US EPA report and several more recent positive results in concluding that there is sufficient evidence of carcinogenicity in experimental animals. Glyphosate also caused DNA and chromosomal damage in human cells, although it gave negative results in tests using bacteria. One study in community residents reported increases in blood markers of chromosomal damage (micronuclei) after glyphosate formulations were sprayed nearby⁴ (IARC, 2015, p. 01).

In expressing the results of the analysis, ANVISA stated that it would continue with the toxicological re-evaluation of glyphosate, however, said that other substances would have priority, since according

4 The herbicide glyphosate and the insecticides malation and diazinon were classified as potentially carcinogenic to humans (Group 2A). [...] The IARC working group that conducted the evaluation considered the conclusions contained in the US EPA report and several recent positive results to be significant in the sense that there is sufficient evidence of carcinogenicity in animal experiments. Glyphosate also causes damage to the DNA and chromosomes of human cells, although the results have been negative in tests using bacteria. A study in residents of a community reported increases in blood markers of chromosomal damage (micronuclei) after the systematic spraying of glyphosate on its surroundings (author’s translation).

to the Oswaldo Cruz Foundation (FIOCRUZ) - with whom it signed an agreement - the evidence obtained by the IARC were insufficient, requiring further studies.

• **Glyphosate**

Glyphosate, which has also been classified as a probable carcinogen in humans by IARC, is a broad-spectrum herbicide, which currently has the highest production volumes among all herbicides. The pesticide is used in agriculture, forestry, urban and domestic areas. Its use has increased considerably with the development of varieties of genetically modified crops resistant to it. Anvisa signed a contract with Fiocruz to continue the re-evaluation of glyphosate and other agrochemicals that are scheduled to be reevaluated in the RDC. The institution was responsible for preparing the technical notes for each of the active ingredients, which must be reviewed by Anvisa's technical staff before being published. In the analysis of these technical notes by Anvisa, revision needs were observed and an order of analysis of these technical notes was established, according to the indications of toxicity pointed out by Fiocruz. The conclusion of the re-evaluation of glyphosate was not considered a priority by Anvisa, considering that, contrary to what happened with other active ingredients, Fiocruz did not indicate its banishment. The Foundation only concludes that evidence of mutagenicity, carcinogenicity and endocrine disruption of this active ingredient were insufficient and indicated the need for further studies (ANVISA, 2015, s/p).

Therefore, despite the warning made in 2015 by the cancer research institute linked to the world health organization, there was no change in the use of the substance in Brazil. This situation was highlighted in a document published by the Federal Public Ministry (MPF), in which the inertia towards the adoption of precautionary measures regarding the substance was emphasized.

Glyphosate was born along with transgenic soybeans, which was developed to be resistant to it. The animal tests for their release were carried out by the interested companies themselves and lasted only 3 months. Tests performed in the superior period caused tumors and intense metabolic changes. Glyphosate is linked to gastrointestinal disorders, obesity, diabetes, heart disease, depression, infertility, cancer, Alzheimer's disease, Parkinson's disease, and gluten intolerance.

In Brazil, water with less than 500 micrograms of Glyphosate per liter is considered to be safe. However, in the tests for its release the dosage used was 1 microgram. In March 2015 the IARC (International Agency for Research on Cancer) stated that Glyphosate is a probable carcinogen, which is why several authorities, mainly European, have begun to restrict its use. In Brazil, nothing changed (MPF, 2017, p. 02).

In 2016, the World Health Organization, based on studies carried out by the Food and Agriculture Organization of the United Nations (FAO), published a new communication contrary to that of the year 2015 issued by the International Agency for Research on Cancer. It said it was unlikely that eating food with glyphosate residues would cause cancer in humans.

The Meeting concluded that glyphosate is unlikely to be genotoxic at anticipated dietary exposures. Several carcinogenicity studies in mice and rats are available. The Meeting concluded that glyphosate is not carcinogenic in rats but could not exclude the possibility that it is carcinogenic in mice at very high doses. In view of the absence of carcinogenic potential in rodents at human-relevant doses and the absence of genotoxicity by the oral route in mammals, and considering the epidemiological evidence from occupational exposures, the Meeting concluded that glyphosate is unlikely to pose a carcinogenic risk to humans from exposure through the diet⁵. (WHO; FAO, 2016, p. 02)

It should be noted that the two statements made conclusions of probability - in 2015 the World Health Organization stated that glyphosate is potentially carcinogenic and capable of causing damage to the DNA and chromosomes of human cells, whereas in 2016 it was unlikely that substance would cause cancer - by not fully confirming or denying the harmful character of glyphosate.

The situation outlined in the previous paragraph is typical of the risk society and, since these are contradictory manifestations propagated by the main international human health care organization - World Health

⁵ The meeting concluded that glyphosate is unlikely to be genotoxic at food exposures. Several carcinogenicity studies in mice and rats are available. The meeting concluded that glyphosate is not carcinogenic in rats but did not rule out the possibility of carcinogenicity in mice at very high doses. Given the absence of carcinogenic potential in rodents at doses relevant to humans, the lack of oral genotoxicity in mammals, and considering the epidemiological evidence of occupational exposures, the meeting concluded that glyphosate does not present a risk of cancer for humans due to exposure through diet (author's translation).

Organization -, it can be said that there is reasonable scientific doubt that justifies the imposition of precautionary measures. This fits into the situation mentioned by Paulo de Bessa Antunes: “*the doubt about the harmful nature of a substance should not be interpreted as if there was no risk .However, risks have to be identified based on scientific information, with suitable protocols*” (ANTUNES, 2016, p. 73).

Such measures may vary, consisting of toxicity analysis studies, the provision of consumer warning information and even prohibition of the use of the chemical based on art. 3, paragraph 6, letters C and D, of Law 7.802/89 and art. 31, items III, IV, V and VI, of Decree 4.074/02 (BRASIL, 1989; 2002).

As if it wasn't enough, there is currently a movement of the Legislative Branch in the intention to omit the few information provided to the consumer, capable of enabling them to identify products that contain glyphosate residues, exercising their autonomy regarding the associated risks.

The statement made in the previous paragraph is based on the Bill of Law of the Chamber of Deputies (PLC) 34/2015, approved by the Committee on the Environment of the Federal Senate on 04/17/2018, which aims to remove the yellow triangle with the letter T of the packaging of products containing genetically modified foods, which are mostly grown with glyphosate application (SENADO FEDERAL, 2018).

It is worth noting that on September 25, 2013, on the occasion of the judgment of the Mandate of Security (MS) 20.457/DF under the report of the Minister Herman Benjamin, the Superior Court of Justice (STJ) stated that the rights to health and life are paramount in the Brazilian legal system, and the Public Power - in the three spheres of power - must adopt the *In Dubio Pro Salute* Principle in situations that represent a risk to human health - including the need to configure the scenario of reasonable scientific doubt:

CONSTITUTIONAL AND ADMINISTRATIVE. MANDATE OF SAFETY.
PROGRAM “MORE MEDICS FOR BRAZIL”. MP 621/2013. IMPETRATION
RETURNED AGAINST THE ACT OF THE MINISTER OF HEALTH THAT

6 doubt about the harmful nature of a substance should not be interpreted as if there was no risk; however, risk identification should be made on the basis of scientific information, with appropriate protocols (original translation).

DISTRIBUTED THE APPLICANT'S REGISTRATION. IN DUBIO PRO SALUTE PRINCIPLE

[...]

2. Two aspects of the same coin, life and health, embody in the Brazilian Constitution and infraconstitutional system the primordial and preeminent ethical, political, and juridical values of our Social State of Law, whose understanding and respect for all reflects the more complete image of what we call it civilization. For this reason, the activity of the legislator, administrator and judge must be guided by the in dubio pro salute principle [...] (BRASIL, 2013, s/p).

It would be opportune, in order to resolve the above-mentioned doubt, that ANVISA should carry out its own analysis, in accordance with its own commitment in 2015, after the disclosure of the results by the IARC. However, what is observed is a repeated omission of the agency, a fact that is conclusively verified at the publication of the last program on analysis of pesticide residues in food, on 2016.

As already mentioned in previous topic, the agency considered only 232 chemicals, considering the results of the samples that did not present residues of the substances analyzed (42%) as satisfactory. Among the substances that were not analyzed is glyphosate, although it is the most widely used pesticide in Brazil and despite the controversy about its harmful effects on human health. As justification, ANVISA reported that it did not perform the analysis of glyphosate because the methodology would be different from that used in other substances and that this would result in the overload of laboratory activities:

Glyphosate and 2,4-D pesticides also fit into this situation. Due to the need for specific methodology, the analysis of these substances overload the laboratory routine and therefore, it is necessary to evaluate in which cases the research is indeed essential. Anvisa intends to research these pesticides from the next monitoring, prioritizing the cultures in which these substances are most used (ANVISA, 2016, p. 21).

It should be noted, therefore, that once again ANVISA shrank from its obligation and, in the face of reasonable scientific uncertainty regarding the harmful effects of glyphosate on human health, decided to remain inert, not adopting the precautionary measure, leaving the consumer to his own fate. It did not required the minimum, which would be to warn

about possible risks to consumer health, allowing the exercise of conscious self-determination, in accordance with the requirements of CDC, Law 11.346/06 and Decree 5.098/04.

In summary, in 2015, IARC, an intergovernmental agency affiliated with the World Health Organization, indicated that glyphosate has a potential relation to disease in humans. Such positioning was not reviewed by IARC later, but in 2016, FAO, which is another agency linked to the World Health Organization, said that the substance is unlikely to cause cancer in humans due to diet.

These contradictory manifestations from the World Health Organization perfectly characterize a scenario of reasonable scientific doubt to justify the application of precautionary measures. However, despite the fact that it undertakes to conduct a detailed study on the harmful effects of the glyphosate substance after the release of the IARC studies, ANVISA remained silent, not verifying the presence of residues of the substance in food available to the consumer and not assessing the possibility of harmful effects on human health.

CONCLUSION

It is undeniable that the Industrial Revolution brought benefits to society, providing an increase in production capable of meeting ever-increasing demand. However, as a side effect of scientific and technological progress, there is the creation of risks not always perceived *a priori* by the scientific community, which threaten the environment, the healthy quality of life of the population and the very survival of future generations.

One of these serious risks is the consequence of the intense use of agrochemicals since the Green Revolution - which began in the second half of the 20th century - since such chemicals can cause acute or chronic intoxication and are now found anywhere in the world, be it biotic or abiotic medium. Its harmfulness is widely recognized, including by the Brazilian legal system.

There is an intimate relationship between agrochemicals control and food safety, since the latter is a national objective that will only be achieved through the individual guarantee of access to food necessary to quench hunger, with sufficient nutrients to promote healthy human

development and are also free of contaminants harmful to human health. In this sense, an efficient analysis of the amount of residues of pesticides present in food, as well as adequate risk management, is essential, and pertinent precautionary measures should be applied in the event of reasonable scientific uncertainty.

However, when verifying the results of the ANVISA analysis of residues, it is observed that the conclusion of the agency, in the sense that the level of food security in Brazil is satisfactory, does not correspond to the reality. This is because ANVISA itself reported the existence of risks of chronic intoxication and was found to be unable to measure them scientifically. Regarding acute intoxication, the studies were silent on chemical substances used in agricultural production, especially glyphosate, whose residues were not analyzed in the selected samples despite being the most commonly used pesticide in Brazil - 40% of the total.

In addition, glyphosate is the subject of major scientific controversy at the international level, since in 2015 the World Health Organization, via IARC, stated that the substance would be potentially carcinogenic in humans, with indications also that it would cause damage to DNA and chromosomes of human cells. However, in 2016 it changed its position, through FAO, to say that glyphosate is unlikely to cause cancer in humans through diet.

This situation characterizes what is understood by reason of reasonable scientific doubt, to justify the application of the precautionary principle in relation to the use of glyphosate in Brazilian agricultural production, and it is possible, even to the content of the rule contained in Law 7.802/89, to cancel the its registration and the prohibition of its use.

However, in addition to the fact that no precautionary measures were applied to glyphosate or products containing its residues, ANVISA relinquished its obligation, not carrying out studies on the level of glyphosate residues in foods marketed in Brazil and not even the risks associated with it.

As an aggravating factor, there is a growing tendency to omit information about food, as recently (04/17/2018) the Environment Committee of the Chamber of Deputies approved the PLC 34/2015 that determines the withdrawal of the yellow triangle with the letter T of the packaging of transgenic foods, potential disseminators of glyphosate

residues.

In view of the above scenario, it can be concluded that the Federal Public Authorities are ignoring the management of the risks associated with glyphosate, opting to remain inert regarding the application of the precautionary principle, inserting the consumer in a scenario of food insecurity.

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