

# HEALTH AND ECOLOGICAL NARCOTICS: AGROCHEMICALS AS A THREAT TO FOOD SAFETY AND THE ENVIRONMENT

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## ABSTRACT

This research deals with the topic of food safety and the use of agrochemicals in Brazil. The adoption of the expression Ecological Narcotics comes from a critical analysis made by the Indian author Vandana Shiva. The approach is justified because it is a theme that has brought about fervent discussions around the world, and also contributes to open the door to a sensitive and complex discussion in the scope of Law, specifically in Environmental Law and Right to Health. It also provides critical and reflexive contributions to the society in general. The goal is to clarify the fundamental issues that surround the subject, as well as to critically review the scientific statements

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supported by large corporations such as Monsanto. The methodology used in this article follows the hypothetical-deductive method, and consists mainly of bibliographic review on books, newspapers, articles, national and international laws, as well as the use of all types of materials and instruments available on the Internet. It was possible to demonstrate the growing concern about human and environmental health regarding the massive use of agrochemicals in Brazil, discussing the withdrawal of transgenic products labeling, the so-called “Projeto Lei do Veneno” (Poison Bill), and the lack of democratic dialogue regarding political decisions on agrochemicals. It was concluded that there are more efficient and sustainable methods, but their adoption depends on political will, something that is lacking in a democratic country such as Brazil.

**Keywords:** agrochemicals; democracy; labeling; human health.

### **RESUMO**

*A presente investigação trata do tema da segurança alimentar e da utilização de agrotóxicos no Brasil. O uso da expressão Narcóticos Ecológicos é proveniente de uma análise crítica da autora indiana Vandana Shiva. A abordagem justifica-se por ser um tema que tem provocado discussões fervorosas no mundo todo e, igualmente, contribui no sentido de abrir margem para uma discussão sensível e complexa no âmbito do Direito, especificamente no Direito Ambiental e Direito à Saúde, além de contribuir crítica e reflexivamente para a sociedade em geral. O objetivo é esclarecer as questões fundamentais que circundam a temática, assim como analisar criticamente as afirmações científicas sustentadas por grandes corporações, como a Monsanto. A metodologia utilizada neste artigo segue o método hipotético-dedutivo, e consiste, principalmente, na análise bibliográfica por meio de livros, jornais, artigos, leis nacionais e internacionais, bem como o uso de todos os tipos de materiais e instrumentos disponíveis na Internet. Foi possível demonstrar a crescente preocupação com relação à saúde humana e ambiental no que diz respeito ao uso massivo de agrotóxicos no Brasil, discutindo-se a retirada da rotulagem de produtos transgênicos, a PL do Veneno e a falta de diálogo democrático nas decisões políticas sobre agrotóxicos. Concluiu-se que*

*existem métodos mais eficientes e sustentáveis, porém sua adoção depende da vontade política, algo que está distante em um país democrático como o Brasil.*

**Palavras-chave:** *agrotóxicos; democracia; rotulagem; saúde humana.*

## INTRODUCTION

This research deals with the topic of food safety and the use of agrochemicals in Brazil. Considering that Brazil is the largest consumer of agrochemicals in the world. In Brazil, the use of chemicals with the greatest potential for harm and aggressiveness is carelessly allowed by legislation, thus compromising the health of thousands of people. The issue of this research is based on the following questions: Why is the use of agrochemicals in Brazil growing more and more? What are the challenges to be faced, and what measures and/or political-legal instruments should be proposed in an attempt to ensure effective food security?

The approach is justified because it is a topic that has brought about heated discussions around the world and, equally, it contributes to open a discussion on the link between Environmental Law and Right to Health.

The social contribution is justified by the urgency of studying the problem. It is worth noting that most of the food consumed basically has some kind of contact with agrochemicals, which may lead to serious risks to human health.

The objectives of this article are: clarify the core issues surrounding the theme; critically review the claims sustained by large corporations such as Monsanto, relating economic and political issues; make considerations about the Bill aimed to removing the transgenic products labeling; and investigate the arguments in favor of the so-called '*PL do Veneno*' (Poison Bill) as well as its respective critical review.

The methodology used in this research follows the hypothetical-deductive method, and mainly consists in the bibliographical review on books, newspapers, articles, national and international laws, as well as the use of all kinds of materials and instruments available on the Internet.

## 1 AGROCHEMICALS AND HUMAN HEALTH

The concept of agrochemicals should be established aiming at a better understanding by the reader. This concept can be found in the wording

given by Law No. 7.802, 1989, in its article 2, in which agrochemicals are considered

[...] the products and the agents of physical, chemical or biological processes, intended for use in the sectors of production, storage and processing of agricultural products, in pastures, in the protection of native or established forests and other ecosystems, and also in urban, water and industrial environments, whose purpose is to change the composition of flora or fauna in order to preserve them from the harmful action of living beings considered harmful (BRASIL, 1989, emphasis added, free translation).

Porto-Gonçalves (2012) disagrees, however, stating that agrochemicals are not only intended to fight and kill insects, pests and weeds, but also human beings, plants and animals. This happens essentially under a rationality or logic that goes against nature rather than for nature, as agroecology, permaculture, and ecological agriculture do. Ecological agriculture is, for example, an agriculture of care and respect for nature, while chemical agriculture is an agriculture of carelessness and destruction.

According to the World Health Organization (WHO, 2018), agrochemicals considered older and cheaper may cause serious impacts not only on human health, but also on the environment where they are used, for example, in the soil. Moreover, their permanence in the soil is considered quite long until it disappears completely. These chemicals, however, are no longer used in developed countries in face of the scientific and technological advances that have enabled the production and further marketing of other types of chemicals, theoretically less aggressive and less striking. It should be noted, however, that these chemicals are still used in developing countries.

In this context, according to Prauchner (2015, p. 31, free translation), “glyphosate is the active ingredient of many herbicides used to fight weeds present in many Brazilian crops, especially soybeans”. This is mainly due to the introduction of genetically modified plants, i.e., transgenic plants, which are resistant and tolerant to that chemical. Meanwhile, its massive and ordinary application may bring harmful consequences not only to human health, but also to the environment.

By way of illustration, a French beekeeping company filed a complaint against the German Bayer after traces of glyphosate were detected in honey batches. The fact is that hives were located relatively close to beet and sunflower fields. Glyphosate is extensively used in these crops and, thus, contaminate everything in the vicinities. Considering such a report,

the use and prestige of that chemical in food crop was expected to decrease. Even so, the French president at the time pledged to ban that agrochemical (SUSTAINABLE PULSE, 2018).

Moreover, the chemical may contaminate food produced by animals, as is the classic case of cow's milk, since dairy cattle is fed concentrated feed made from glyphosate-tolerant plants. These feeds are also used to feed poultry, pigs, and other bovines. Glyphosate produces a cyclical effect, contaminating the individual who sprays it, the plant (obviously), the animal that feeds on the plant and, finally, the population at large, which feeds on animals, animal products – such as milk and eggs – or vegetables (PRAUCHNER, 2015).

The endocrine system disturbance is like an instrument and/or toxic mechanism that negatively interferes with the ability of cells, organs and tissues to communicate. The consequences of this usually appear in the form of miscarriages, reduced fertility and fecundity, emergence of a myriad of cancers, hormonal changes that cause the process of puberty to start earlier or later, among other harms to human health (PRAUCHNER, 2015).

These changes also affect animals. For example, for experiments conducted on rabbits intoxicated by glyphosate, the reduction of libido and spermatozoa released by these mammals were clearly visible (YOUSEF *et al.*, 1995). In the same context, another research, now carried out in rats exposed to the chemical, observed a lower production of spermatozoa under a daily perspective. In addition, a large amount of the spermatozoa were abnormal, defective, and atypical (DALLEGRAVE *et al.*, 2003).

The existence of pests and weeds as a problem in agriculture is already a symptom that the current model of agriculture is proving to be wrong. It therefore needs correction rather than glyphosate spraying. Glyphosate spraying, however, has not solved the issue of pests and weeds, as these have become increasingly resistant to its application. As glyphosate no longer controls, chemicals even more toxic are used in an attempt to reduce unwanted weeds and pests. It is interesting to note that each spray causes more resistance, more damage, more environmental impact, and higher death rates from poisoning, inhalation, and exposure, among other harm.

Another aspect that deserves attention is directly related to the depressive states resulting from chemical intoxication caused by the indiscriminate use of agrochemicals. According to Bienkowski (2014, free translation), “Recent research has associated long-term agrochemical use with

high rates of depression and suicide. Evidence also suggests that agrochemical poisoning [...] doubles the risk of depression”. The author also mentions that there are about billions of chemical reactions that interfere with the dynamic order of chemicals in the human brain, which affects aspects related to mood, perceptions, and the desire to live, with depression and suicide being the apogee of the problem.

It is scientifically proven, therefore, that agrochemicals such as glyphosate are capable of causing serious damage to human health. Those who advocated that agriculture is not possible – or even feasible – without using agrochemicals are notably neglecting the history of agriculture. In other words, agrochemicals have been used in agriculture for less than a century, as they were introduced into agriculture only after the Second World War. It makes then clear that “[...] what kills people also kills insects” (LUTZENBERGER, 2001, p. 72). Following this reasoning, we have almost a century of agricultural destruction and chemical dependency/addiction. Vandana Shiva (2018) calls it ‘ecological narcotics’.

Art. 25 of the Universal Declaration of Human Rights states that food security is on the list of fundamental human rights. Thus, see:

1. Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including **food**, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control (UN, 1948).

In Brazil, Law # 11.346, also known as the Organic Law of Food and Nutritional Security (*Lei Orgânica de Segurança Alimentar e Nutricional*, Losan), establishes, in its article 3, the following:

Food and nutritional security consists in the realization of the **right of everyone** to regular and permanent access to quality food, in sufficient quantity, without compromising access to other essential needs, based on **health-promoting practices** that respect cultural diversity, and that is environmentally, culturally, economically and socially sustainable (BRASIL, 2006, emphasis added, free translation).

Considering the foregoing, food produced using chemicals with high potential for damage to human health and the environment and that, thus, compromises food security, directly violates human rights and some infra-constitutional provisions. Next we will explain the reason for this opposition, addressing the debates about economic interference in democracy.

## 2 PARADOXES BETWEEN DEMOCRACY AND AGRIBUSINESS

The argument of big corporations, such as Monsanto, is to *feed the world*. This, however, is a rather illogical – if not purposeful – way of feeding, because by common sense and throughout human history, no one survives on poisoned food; on the contrary, it accelerates the process of shortening existence.

In the same vein, the so-called Green Revolution, which mainly uses biotechnology developed by multinationals under the pretext of mitigating the problem of hunger and food security in the world, only ends up exacerbating the problem instead of mitigating it. This is because this type of technology and development logic requires large amounts of land to maintain monoculture and serve the world market, which consequently ends up compelling and/or driving away small farmers – who do not have the slightest government incentive – from the activity they exercise for their own subsistence. This way, small farmers are indirectly expelled from their properties, often being forced to sell these to landowners, all in the name of agribusiness, and for growing monoculture. This undoubtedly contributes to more people joining the statistics of the hungry and malnourished.

What would in fact be coherent and sensible to say is that increasing the productivity of certain crops, as well as increasing and raising certain animals for further consumption, would be only part of the solution to be sought to end and/or mitigate hunger in the world. Moreover, it is possible and also consistent to point out that the cause of world hunger is not a shortage of food, but to a shortage of democracy. Riechmann (2002, p. 105, free translation) emphasizes that “[...] severe hunger and malnutrition are not technical problems, but an issue of a political-social nature. [...] hunger is nothing more than a symptom of deeper social evils: poverty and inequality”.

In the same sense, Amartya Sen (1981) states that hunger in the world is not due to a shortage of food or lack of land for growing it. Rather, it is essentially caused by lack of access to food in quantities and quality minimally sufficient for the maintenance of human existence, as well as lack of purchasing power.

Antoniou *et al.* (2014, p. 284, free translation) state that “the cause of hunger is not a lack of food in the world. Hunger exists because there is a problem of distribution and poverty, problems that cannot be solved

by GMOs”. Furthermore, GM corn and soy have been produced for animal fodder, biofuels for cars, and processed foods for humans. It means they are products created for developed nations, and have no affinity whatsoever with the basic and minimal food needs of those people in extreme poverty and hunger. Transnational corporations are not at all interested in feeding these people, but only in generating profit. The cause of hunger in the world, therefore, is an economic, political, and social issue, and not one of production technology.

Furthermore, if one looks the complexity of current agriculture, it becomes quite clear that it is unfeasible. It requires agricultural machinery factories – such as tractors, sowing machines, harvesters, sprayers – agrochemical industries, factories for fertilizers, fungicides, agrochemicals, herbicides, among others; packaging industries, steel mills, refineries, transportation, burning of fossil fuels, etc. Thus, in modern agriculture farmers are nothing more than “[...] a small cog in a huge technical-bureaucratic infrastructure. [...] he is not much more than a tractor driver and a poison spreader” (LUTZENBERGER, 2001, p. 63, free translation).

According to Carneiro (2015), in the year 2008 Brazil became the world’s largest consumer of agrochemicals, surpassing even the United States of America. Moreover, about one-third of the food that is consumed daily in Brazil is contaminated by agrochemicals; rather, in colloquial language, one-third of the food in Brazil is poisoned, yet it is consumed seemingly without much concern. These figures were found after research conducted in Brazilian states by the *Programa de Análise de Resíduos de Agrotóxicos em Alimentos* (Program for Analysis of Agrochemical Residues in Food) (Para) (ANVISA, 2016).

It is also noteworthy that, according to a survey conducted by the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics) (IBGE), about 1,681,001 rural producers used agrochemicals in 2017, representing an increase of 20.4% when compared to the year 2006. In addition, the number of tractors also grew exponentially, reaching 49.7%, or 1.22 million units (CENSO AGRO 2017..., 2018).

About this, Carneiro (quoted in NASCIMENTO, 2018) stresses that “the 5% increase in cultivated area and in the use of agrochemicals in Brazil is due to the expansion of agribusiness and monoculture (such as soybeans), to the detriment of forests, health, communities and traditional peoples”. In other words, all this chemical dependency is also due to a legal-political framework derived from Eurocentric precepts. In other

words, a “[...] structure of power that kills, intoxicates, and contaminates” (MARTINS, 2018, p. 140, free translation).

Furthermore, more and more forests in Brazil are being devastated every day to make room for soybean crops. This is not done with the intention of reducing the hunger that afflicts a large number of Brazilians. The fact is that much of the soybean crop produced is exported to feed, for example, animals confined in other countries. All “[...] that because the legal-political frameworks of South America are ‘imbued’ in a universal system that privileges the economic to the detriment of any and all forms of life” (MARTINS, 2018, p. 139, free translation).

In the next topic, the issue of labeling transgenic foods will be approached.

### 3 WITHDRAWAL OF LABELING ON TRANSGENIC FOOD

Law # 11.105, of March 24, 2005, also known as the Biosafety Law, establishes in its art. 40 that “Food and food ingredients intended for human or animal consumption that contain or are produced from **GMOs or derivatives shall contain information to that effect on their labels**, according to the regulation” (BRASIL, 2005, emphasis added, free translation).

However, the passing of Bill – PL 4148/2008 –, an initiative of the then federal deputy Luis Carlos Heinze, which aimed to remove the labeling on transgenic food, releasing producers of this type of food from the obligation of stamping the label with the symbol of a yellow triangle with the letter “T” to inform concentration rates of genetically modified organisms below 1% (SENADO FEDERAL, 2015), has had repercussions in Brazil.

One of the arguments raised was that the labeling symbol resembles a negative perception about the product and, therefore, there would be no reason to differentiate them from others. Additionally, the Federal Deputy also argued that no country in the world uses the letter “T” on the labeling and, therefore, in his personal opinion, he sees no problems in consuming GMOs (HEINZE, 2015).

It is noticeable, however, a deep lack of scientific knowledge in these equivocal statements.

First, the statement that there is no country in the world with the letter “T” on the label is absolutely crude and unfounded, simply because the

world consists of a very wide variety of languages and alphabets. So, it is theoretically and practically impossible to find the letter “T” – which comes from some alphabets, such as Latin – on product labels in Oriental, Semitic, Slavic languages, etc. Moreover, in the Portuguese language the letter “T” represents the abbreviation of the word “transgênico”. In some countries, however, other expressions are used to inform the presence of genetically modified food, as is the case in the United States of America, where labels commonly use the expression genetically modified organisms (GMOs), or partially produced with genetic engineering (WODINSKY, 2018). Finally, according to Kingston (2013), about 64 countries in the world have laws for labeling GM products.

Secondly, with regard to the statement that there is no problem in consuming GMOs, it is noticeable that this is a personal statement, very close to a belief, since there is not even one scientific argument in defense of GMOs.

Claiming that GM food is healthy and safe, therefore, lacks scientific grounds since to date no in-depth epidemiological studies have been conducted. The only study considered of greater relevance was done by the Frenchman Seralini *et al.* (2012) on Roundup-tolerant GM corn, which demonstrated severe damage and hormonal changes in rats that were fed this product. This study was longer than Monsanto’s 90 days, up to 2 years of experimentation. It was a more detailed study, and calculated a greater number of bodily functions in animals. Results were alarming, as at the end of the research animals showed large tumors and hormonal changes. Sometime later, however, the study was withdrawn from the scientific journal in which it was published because of criticism received by scientists opposed to the research results, notably driven by commercial rather than scientific issues (ANTONIOU *et al.*, 2014).

Labeling is of utmost relevance, considering that consumers have the right to know what they are buying and consuming. Likewise, so states art. 6, III, of Law # 8.078 dated September 11, 1990, also known as the Consumer Defense Code (CDC):

**Art. 6. Following are the basic rights of the consumer:** [...] III – adequate and clear **information** about the different **products** and services, **with correct specification of quantity, characteristics, composition, quality, incident taxes and price, as well as about the risks they present** (BRASIL, 1990, emphasis added, free translation).

Every consumer, therefore, has the right to accurate and precise information about the products they are acquiring. The very constitutional text, art. 5, XXXII, combined with art. 220, states that the State shall promote consumer defense, and information shall not suffer any restriction, respectively (BRASIL, 1988).

It is clear the interest of a private nature in the proposal of the aforementioned Bill for the removal of labeling. An affront to democracy and disrespect for consumer rights.

#### 4 THE POISON BILL

Another fact that deserves to be highlighted is the Bill # 6.299/02, better known as '*PL do Veneno*' (Poison Bill), whose objective is to update the 1989 agrochemicals laws. Under this pretext of updating, the intention was to loosen the rigidity of the current norm, seeking to "[...] loosen the rules on the use, control, registration and inspection of agrochemicals, claiming that they do not meet the needs of the sector" (CUNHA, 2018).

The aforementioned Bill also discusses changing the nomenclature from *agrochemical* to *phytosanitary product*. The proposal to rename it with new terminology aims to soften the real danger of chemicals, as well as bring an understanding of false security about them (DANTAS, 2018).

Although the current proposal has been gaining support from entrepreneurs, there is discontent and criticism from environmentalists and related researchers, as well as institutions such as the *Agência Nacional de Vigilância Sanitária* (National Health Surveillance Agency) (Anvisa), the Oswaldo Cruz Foundation (Fiocruz), the *Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* (Brazilian Institute of Environment and Renewable Natural Resources) (Ibama), and the *Instituto Nacional de Câncer (National Cancer Institute)* (Inca), among others.

In a technical note, Ibama (2018) manifested its opinion against the Bill and, with regard to the proposed new nomenclature, pointed out that

Farmers, as the main users of the products approached by Law # 7.802/89 should recognize these products more as dangerous toxic products, as in reality they are, than as mere agricultural inputs, so that they have greater care when using them. Toxicity is a characteristic inherent to the great majority of products destined to the control of pests and diseases through biocide action. The term agrochemicals contributes to this characterization.

Moreover, the current laws provide that some agencies such as Anvisa, Ibama, the Ministry of Health, the Ministry of Agriculture, etc., shall authorize the approval of a new product. The new proposal waives these bodies from making decisions regarding the approval of a given product. One can notice, thus, a legislative loosening.

Politicians in favor of the approval of measures that facilitate and relax the release and marketing of agrochemicals are swayed by personal interests, such as the financing of their campaigns by agrochemical industries and corporations. There is not the slightest intention of defending democracy or the general health of the population they represent; they only move according to the potential benefits they can get to meet their private interests.

In its fact sheet, Abrasco states that Bill 6.299/2002 is devoid of scientific and technical grounds and rationale. All this discussion in favor of the ‘*PL do Veneno*’ is nothing but a commercial strategy of the agrochemical industries – producers of agrochemicals and transgenic seeds – which have seen in Brazil a unique opportunity to flourish economically, as the sale of these products in other countries is ruled due to the danger they pose to human health and the environment, thus making free trading and use impossible (FRIEDRICH *et al.*, 2018).

The Poison Bill also proposes amendments to art. 3, § 6, *a, b, c, d, e, f*, of Law # 7.802/1989 which establishes the prohibition to all agrochemicals associated with carcinogenic effects, mutation in genetic material, hormonal alterations, fetal malformations, that causes risks to public health, that there is no antidote or effective treatment in Brazil, and that causes damage to the environment. The amendment, however, aims to establish an *acceptable risk* in order to allow the registration of these agrochemicals. Such acceptable risk is based on the theory that these effects listed in the aforementioned legislation would not be manifested. However, it is scientifically proven that these effects cannot be accurately measured in a short period of time, because diseases such as cancer can take longer than the time period proposed by the Bill to be manifested (FRIEDRICH *et al.*, 2018).

Many initiatives have been engendered by the large agrochemical industries to, literally, “[...] weaken the actions of the State in the processes of inspection, control and registration of these products” (FRIEDRICH *et al.*, 2018, p. 4, free translation). In addition to the problem of neglecting information and violating the consumer’s right to choose, the removal of

transgenic labeling, the Poison Bill proposes restricting the results of agrochemicals evaluations, thus disregarding the universal human right to information.

On the other hand, with the entry of even more toxic products than those already registered in Brazil, industries will become less judicious regarding food safety, developing even more toxic and potent chemicals. In other words, the industry will have no interest in creating and marketing less-toxic products.

According to the Poison Bill, agrochemicals would not be assessed by health and environmental agencies, what may bring about commercial problems in the international scenario, since some products are linked to the emergence of lethal diseases, such as cancer. The Poison Bill also goes against the precautionary principle, and worse, this Bill aims at allowing the registration of chemicals even more toxic than those currently registered in Brazil, thus increasing the potential for diseases such as cancers and genetic mutations.

Likewise, the Bill would go against the provisions of Convention # 155 of the International Labour Organization (BRASIL, 1994) that refers to the health and safety of workers. That is so because the Bill requires a range of flexibilities that would contribute to further expose workers to poisoning, exposure and inhalation, i.e., making room for greater vulnerability and impact on their health.

It is envisaged that the Poison Bill will promote a sharp legislative setback, and an attempt to trivialize and/or naturalize contamination by agrochemicals, converting it into a form of legalized pollution. Still, “[...] even those that should already be subject to monitoring, according to the current laws, have been precariously monitored given the insufficiency of the public network of toxicological analysis labs to meet the massive and growing use of agrochemicals in Brazil [...]” (CARNEIRO *et al.*, 2015, p. 68, free translation).

The Poison Bill – currently called the Poison Package (*Pacote do Veneno*) – was passed in February 2022 by the House of Representatives with 301 votes in favor, 150 votes against and 2 abstentions. Due to the changes approved by the deputies, the project went on to be voted at the Federal Senate (BRASIL, 2022).

For the National Health Council, the harmfulness of agrochemicals is present in the production and use in agriculture by contaminating water sources and air, degrading soil quality, increasing the resistance of

insects and microorganisms, harming biodiversity, and leaving residues in the most diverse types of food consumed daily by the Brazilians. The Council also highlights that among the agrochemical-related problems that affect health are fetus malformations, reproductive disorders, infertility, neurotoxicity and hepatotoxicity, hormonal dysregulation, blindness, paralysis, depression, contribution to the formation of cancers, and even death (BRAZIL, 2022).

## FINAL REMARKS

Several countries have reduced the use and application of agrochemicals without compromising productivity, while in Brazil the massive and intensive use of agrochemicals keeps on increasing. Scientific knowledge as a tool to improve traditional farming methods is very significant and beneficial. Such technical and scientific improvement should not be applied exclusively to monoculture; rather, it may also be applied to polyculture.

Thus, monoculture cropped with genetically modified seeds and agrochemicals may cause damage to human and environmental health, disrupt ecosystems and decimate fauna and flora, leaving both indigenous and small farmers in misery. It also causes the emergence of lethal diseases, all in the name of insatiable greed of certain international groups and corporations. What comes out of all this is a “suicide in drops” of humanity. In face of this schizophrenic paradigm, based on monoculture and its respective agrochemicals as a means of salvation for humanity, thousands of small farmers were literally forced to abandon agriculture due to lack of incentives, and try their luck in urban centers. In these urban centers, many missed options, and ended up by migrating to the slums, while many others are condemned to marginalization and hunger.

In the same way, this paradigm of production, based on transgenic seeds, agrochemicals, and chemical fertilization, is responsible for the concentration of income in the hands of a select minority. In some cases, this model is also related to cases of overexploitation of workers, even going as far as slave-like conditions. The argument based on the pretext of feeding the world and eradicating hunger is a fallacy, since hunger is not due to lack of food, being more a problem related to distribution and poverty, since people do not have the minimum financial conditions to buy food, nor land to grow food.

The argument that the use of agrochemicals is a necessary evil, since

achieving any good demands a symbolic sacrifice, leads to accepting and/or considering normal certain actions that are harmful to society, because what minds more is to achieve a result that, in theory, will be beneficial to all.

Moreover, there are several alternative means to large-scale monoculture devised by respected researchers, such as Permaculture, created by Australian Bill Mollison (PERMACULTURE RESEARCH INSTITUTE, 2016), Synanthropic Agriculture devised by the Swedish Ernst Götsch (ANDRADE, 2019), Organic Agriculture and Family Farming, among others. Moreover, throughout history peasantry itself has proven to be sustainable and productive. The adoption of such alternatives, however, depends on political will, and effectively democratic decisions.

Agroecological and organic production models are, then, the key for food security, since the growing of transgenic crops widely varies, i.e., presents high yields in some places and low yields in others. In this sense, it would generate greater cooperation among farmers, and food production would be sustainable (ANTONIOU *et al.*, 2014, p. 295, free translation). Agroecological crops do not demand a large number of inputs – unlike genetically modified crops –, growing thousands of traditional food varieties that adapt to different soils and climates, selection-based phytomelioration methods, among others.

When it comes to food security, research shows that small farmers are the ones who contribute the most to the equation of food quality and quantity. Of course, cultivated seeds are traditional, gifts of nature, and therefore do not pose any problems to human health or risks associated with cancer and allergies, as is the case with genetically modified seeds. Likewise, there is no application of expensive, unsustainable agrochemicals that are harmful to human health, and environmental contaminants.

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Article received on: 07/25/2019.

Article accepted on: 08/07/2019.

**How to cite this article (ABNT):**

STURZA, J. M.; CENCI, D. R.; TONÉL, R. Health and ecological narcotics: agrochemicals as a threat to food safety and the environment. *Veredas do Direito*, Belo Horizonte, v. 19, n. 44, p. 311-330, may/aug. 2022. Available from: <http://www.domhelder.edu.br/revista/index.php/veredas/article/view/1600>. Accessed on: Month day, year.