SHADES OF GREEN VI

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Sustainable Agriculture in Brazil

CHAPTER 6 – TROPICAL INTENSIFICATION

PESTS, DESEASES AND INVASIVE SPECIES INTEGRATED CONTROL

[...]

Technologies today go far beyond the simple extermination of pests and invasive species because they are based on ecological control and natural mortality factors. Modern systems seek to streamline and reduce the use of industrial chemical pesticides, limiting their use and their risks to public health and the environment. Control tactics try to reduce the chances of insects or diseases adapting to some defensive practice (or acquiring resistance), and they also seek to expand the use of natural enemies[1].

The goal of this strategy is not to eliminate pathogens, but to reduce their population, and to promote the action of natural enemies, their presence on the plantation or in the vicinity. This requires a good understanding and monitoring of the planting system as a whole. It is essential, therefore, to be aware of the ecological interrelationships between aggressive insects and their natural enemies; to know how to use chemical pesticides; and to monitor the agrometeorological dynamics and understand the functioning of the environment where the plantation is located.

The management of pests, diseases and invasive plants still depends, initially, on the choice and judicious use of resistant or tolerant cultivars, among which are the genetically modified (GMOs) or biotechnological cultivars.

In recent years, new biotech cultivars have meant a major breakthrough in this direction, leading to a significant reduction in the use of chemical pesticides. In biotech crops, a significant reduction of 47.3 thousand tons of active chemical ingredients was observed between 1996/97 and 2013/14. By reducing the use of pesticides and, consequently, their production – at least at national level – it has also been possible to reduce energy use: the total electric energy consumed by the agricultural sector fell by 3.5% in 2013[2]. Of this savings, corn led the reduction, accounting for 53.2% of the realized benefit, followed by soybeans, with 34.7% and cotton, with 12.2%.

For the period 2014/15 to 2023/24, considering the premises of adoption of biotechnology in Brazil, it is estimated that the reduction in the use of active chemical ingredients will be 192.5 thousand tons. The crops with the largest share of this benefit in the future will continue to be corn, with 63%; soybeans, with 25% and cotton, with 12%.

It is also part of the integrated management, the control of pests and diseases by agricultural practices. The intention is to make planting less amenable to infestations by using crop rotation; implantation of refuge and multiplication areas for natural predators; crop-traps; use of ditches or other physical and mechanical barriers; traps using pheromones or adhesive tapes; sanitary voids; and adjustments to the planting calendar and management schedule according to meteorology.

As for the chemical control of pests, diseases and adventitious plants, Brazil is currently the world's largest market for agricultural pesticides, although it has the fourth largest cultivated area, after India, China and the United States. According to data from Sindiveg[3] (from Brazil) and international consultancy Phillips McDougall[4], sales of these products in Brazil in 2015 corresponded to 18.5% of the world total[5]. Latin America consumed 28% of the pesticides.

Nowadays, agricultural spraying includes various biological control agents, Patos de Minas, MG

It has been stated in a campaign that "... a Brazilian consumes 5.2 liters of pesticides per year." The 5.2-liter figure is the result of dividing the country's consumption of pesticides by the population. The calculation is misleading, however.

Export crops (soy, cotton and corn) use more than half of the agrochemicals in the country. Brazil is a major agricultural exporter, so most of these foods are not consumed in Brazil. By the reasoning of the misleading calculation cited in the preceding paragraph, the pesticides would be in the diet of the demanding consumers of Europe or Japan.

Another good part of the agrochemicals is used on fiber and energy crops, not food. Eucalyptus, pine, cotton (heavy use of pesticides) and sugarcane are raw materials in the production of pulp, firewood, coal, textiles and ethanol. None of these end up in the citizen's mouth – neither here, nor abroad. Even in the production of sugarcane, there is a post-harvest process that eliminates eventual residues, not mentioning the organic sugarcane cultivation specifically for sugar production.

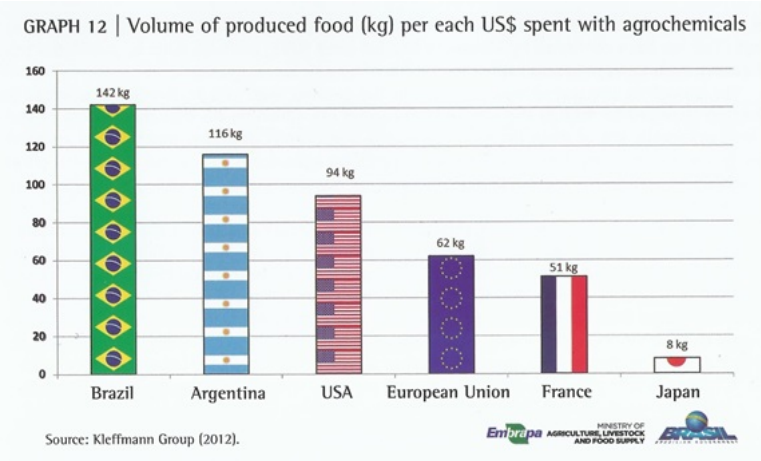
As for the actual food crops, it is erroneous to say that Brazilians ingest or drink these substances. Herbicides, for example, are applied when the crops are first planted, long before the plants produce the edible part (leaves, grains or fruits) and before they are finally harvested. And quite often the edible parts still have to be processed, as in the case of coffee beans and the above-mentioned sugar.

Lastly, the time between the final application of the agrochemicals and the date of harvest prevents them from ending up on the consumer's plate. These are active chemicals that degrade due to the action of temperature, light and moisture, or their quantity becomes so small and diluted that they no longer constitute a hazard[6].

Here is a weighting that is rarely done: Brazilian agriculture is practiced in tropical and subtropical environments, where the occurrence and severity of pests are a major problem. ln temperate regions, harsh winters naturally reduce the incidence of insects, worms and fungi, and the proliferation of bacteria and viruses.

ln addition, in Brazil, growing two or three annual crops increases the demand for chemicals, hence the

ongoing fight against pests. Consequently, the best unit for measuring the use of agrochemicals is kilos per hectare and not liters per inhabitant. Even with three annual production cycles, when one considers the consumption of pesticides per hectare, Brazil uses fewer chemicals than do many countries with only one anual crop, such as Japan, the Netherlands, England, Belgium and France, for instance. Grain, coffee, sugarcane, fruit and vegetable crops consume 96.8% of the agrochemicals, whose average use is 4.99 kg of active ingredients per hectare/year. In areas of planted forests and cultivated pastures, the average use of pesticides per hectare drops to 2.3 kg. The consumption data of plant protection products worldwide show highly variable values regarding kilograms of active ingredients per hectare: The Netherlands, 20.8; Japan, 17.5; Belgium, 12.0; france, 6.0; and England, 5.8[7] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftn1).



Another possible comparison is the consumption of chemicals by volume of production. According to a study by the German consultancy Kleffmann[8], Brazil reaps, on average, 142 kg of food for every dollar invested in agrochemicals. ln the United States, the average is 94 kg per dollar/agrochemicals, while in Europe the productivity is only 51 kg/dollar/agrochemicals. Japan has the worst performance: it reaps just 8 kg for every dollar invested!

In the production of grains in Brazil (for average productivity of 3,500 kg/ha), the consumption was 1.4 g of active ingredients/kg. Since agrochemicals degrade after application and must comply with the grace period (time between the last application and harvest), the amount left over in food is very low, on average. This has been confirmed by Maximum Residue Limit (MRL) analyzes done by public and private food quality monitoring programs carried out in Brazil[9].

The growth in the use of agrochemicals in the country was 14% in five years, whereas grain production increased by 40% in the same period (Graph 14), which means that the amount of chemicals used per metric ton of grain produced decreased significantly. Brazilian agriculturists are producing more and better crops. New technologies in precision agriculture ensure the adjusted application and variable flow of pesticides and herbicides based on geocoded, spatial and temporal records, plant growth, soil fertility, yield etc.

A recent example is the Weedit technology[10], whose adoption is booming in Brazil. Weed it is a high-performance, localized spray system consisting of weed chlorophyll and volume detecting sensors, which trigger extremely fast valves to ensure variable application of the herbicide only where it is needed[11]. This reduces herbicide use by up to 70%, resulting in environmental and financial gains.

In the United States and Europe, with only one crop each year and with the help of winter in pest and weed control, pesticides are widely used by local agriculturists in the summer. Their effectiveness is much less when compared to the average of Brazilian agriculturists (Graph 12) because Brazil's agriculture is increasingly combining the biological, physical and chemical controls of pests, diseases and weeds.

From the book: Shades of Green – Sustainable Agriculture in Brazil (2018)

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[1] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftnref1) WWF GLOBAL. Manejo integra do de pragas. Available at: <https://www.wwf.org.br/natureza_brasileira/reducao_dcimpactos2/agri-cultura/agr_acoes_resultados/controlando_pragas_dcmaneira_ambientalmentccorreta/>. Access in Jul. 2017.

[2] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftnref2) CÉLERES AMBIENTAL. Benefícios socioambientais da biotecnologia no Brasil: 1996/97 a 2013/14. 2015. Available at: <http://www. celeres.com.br/docs/biotecnologia/PressRelease2014_Ambiental.pdf>. Access in Jul. 2017.
[3] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftnref3) Formed by 37 companies in the pesticide sector, Sindiveg – National Union of the Plant Protection Products Industry – was founded in 1941.
[4] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftnref1) PHILLIPSMCDOUGALL. Agreaspire/Seed Service/ Agriservice/GM service Product Database/Agreworld. Available at: <https://www.phil-lipsmcdougall.com/home.asp?loginFailed=2>. Access in Ago. 2017.
[5] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftnref2) On average, 44.5% of the commercial agrochemical products are active ingredients. In 2015 Brazil used 887.6 thousand tons of pesticides and the amount of active ingredients was 395.6 thousand tons.
[6] (https://panamazonsynodwatch.info/?p=2517&elementor-preview=2517&ver=1568729013#_ftnref3) NARLOCH, Leandro. Mito: "o brasileiro ingere 5 litros de agrotóxicos por ano". *Veja*, 22/10/2015. Available at: <https://veja.abril. com.br/blog/cacador-de-mitos/mito-8220-o-brasileiro-ingere-5-litros-de-agrotoxicos-por-ano-8221/>. Access in Jul. 2017.
[7] MENTEN, José Otávio. Um contexto para o consumo de produtos fitossanitários no Brasil. Associação Nacional de Defesa Vegetal – Andef, 18/04/2016. Available at: http://www.andef.com.br/imprensa/artigos/1814-um-contexto-para-o-consumo-de-produtos- fitossanitarios no-brasil (http://www.andef.com.br/imprensa/artigos/1814-um-contexto-para-o-consumo-de-produtos-%20fitossanitarios%20no-brasil). Access in Jul. 2017.
[8] CRESCE mercado brasileiro de defensivos, indica pesquisa da Kleffmann. *Revista KLFF*, 22/02/2016. Available at: <http://www. portalklff.com.br/publicacao/cresce-mercado-brasileiro-de-defensivos-indica-pesquisa-da-kleffmann-1228>. Access in Jul. 2017.
[9] MENTEN, José Otávio. Consumo de produtos fitossanitários no Brasil. Sindicato Nacional da Indústria de Produtos para Defesa Vegetal – Sindiveg. Available at: <http://sindiveg.org.br/consumo-de-produtos-fitossanitarios-no-brasil/>. Access in Jul. 2017.
[10] WEEDit: Spot spraying and precision spraying. Available at: <http://www.weed-it.com/>. Access in Jul. 2017.
[11] SMARTSENSING. Available at: <http://smartsensingbrasil.com.br/weedit.html>. Access in Jul. 2017.

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