

## 1. Introduction

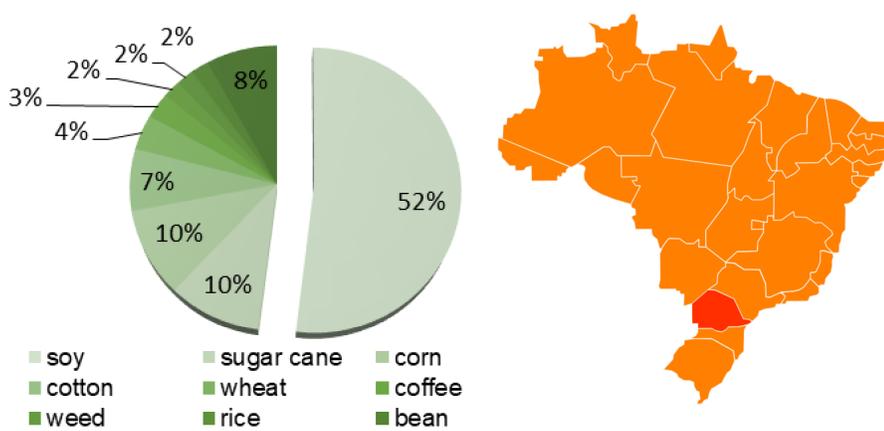
Soybean has contributed not only to the economic growth of several regions of Brazil, mainly in the agricultural frontier areas, but also to the national surplus of balance of payment. In spite of the large volume of agricultural production promoted by the modern inputs model, in Brazil it was accompanied by intensive use of fertilizers and pesticides. Consequently, this production system generates negative externalities in terms of environments', consumers' and agricultural workers' contamination.

This article presents a great contribution to the study of contamination by agrochemical, since it analyzed aspects related to the self-report symptom of organic and convention soybean producers in the Western of Paraná – South of Brazil.

## 2. Brazil Pesticides Overview

Brazil leads the world ranking of pesticides' use, consuming approximately 20% of the total amount of pesticides sold in the world. In Brazil 504 active ingredients are allowed, 30% of them are banned in the European Union. Exactly some of these pesticides are more sold in the Brazilian territory.

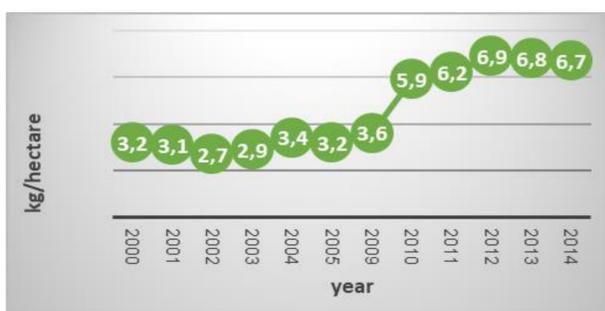
Graph 1: Consume of pesticides per crop, Brazil, 2015



Source: Bombardi (2017)

Besides that, Brazilian legislation allows levels of pesticides significantly higher than those allowed in EU countries. The glyphosate, for example, can reach up to 5,000 times the maximum residue limit in drinking water. Graphs 1 and 2 show the worrying scenario of pesticides' consumption in Brazil.

Graph 2: Consume of Pesticides in Brazil



Source: IBGE (2018)

## References

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- PETERSON, H.H.; BARLEY, A.; CHACÓN-CASCANTE, A.; KASTENS, T.L. (2012). The motivation for organic grain farming in the United States: Profits, lifestyle, or the environment?. *Journal of Agricultural and Applied Economics*, 44(2), pp. 137-155.

## 3. Methods

It was applied a structured questionnaire with small and medium soybean producers: 139 conventional and 62 organic. They answered about self-reported symptoms associated with agrochemical exposure, based on the World Health Organization: headache, dizziness, stomach ache, rash, sneezing, blurred vision, eye irritation and/or diarrhea. All of them the owners were responsible of applying agrochemical, except three organic producers. They also declared how often they had/felt the symptoms: frequently, infrequently or rarely. It was applied a logit model.

$$y = F(x_p, x_d, x_h, x_e)$$

Where:

$y = 1$  declared at least one disease symptom;  $y = 0$  declared no symptoms;

$x_p = 1$  organic soybean farmer;  $x_p = 0$  conventional soybean farmer;

$x_d \rightarrow$  vector of demographic;

$x_h \rightarrow$  vector of health;

$x_e \rightarrow$  vector of exposure.



## 4. Results and Conclusion

The organic and convention soybean producers at Western of Paraná are majority men and have similar education level.

Table 1 shows the number of agrochemical operations in crop during the harvest 2014-2015. Although the conventional producers use stronger products against weeds, the number of operations are higher than those of organic producers. How strong is the agrochemical it is presented at Table 2, which considers only products with toxicological class II and III. Therefore, the conventional way to produce soybean in Western Paraná is a technological standard that involves much more exposure and risk to the applicators and to the environment as well as the consumer.

Table 1: Number of agrochemical operations, soybean, Western Paraná, 2014-2015

Number of agrochemical operations	Organic		Conventional		Total Frequency
	Frequency	%	Frequency	%	
1 to 5	16	25,4	5	3,6	21
6 to 10	29	46,0	46	33,1	75
11 to 15	16	25,4	60	43,2	76
16 to 20	2	3,2	28	20,1	30
<b>Total</b>	<b>63</b>	<b>100</b>	<b>139</b>	<b>100</b>	<b>202</b>

Source: Field research

Table 2: Number of agrochemical class II and III operations, soybean, Western Paraná, 2014-2015

Number of agrochemical operations	Organic		Conventional		Total Frequency
	Frequency	%	Frequency	%	
0	40	63,5	11	7,91	51
1 to 10	20	31,8	93	66,9	113
11 to 30	1	1,6	30	21,6	31
31 to 50	2	3,1	2	1,44	4
51 to 90	0	0	3	2,16	3
<b>Total</b>	<b>63</b>	<b>100</b>	<b>139</b>	<b>100</b>	<b>202</b>

Source: Field research

Besides that, this perception was also present in the statement of absence of symptoms – 48% of organic producers declared to have “no” health symptom. Among the conventional, the result was only 38%.

Last but not least, logit model shows that if one is organic producer, it reduces 22% his chance to report symptoms related to exposure of agrochemical. This reinforces the importance of organic production not only for the health of the consumer, but also for the producer.

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