

PERCEPTION OF RURAL WORKERS ON THE HAZARDS ARISING FROM THE PESTICIDE USE IN ALTO PARAÓPEBA REGION, MINAS GERAIS STATE, BRAZIL

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Introduction

In 2009, the cover of an important magazine in the economy field (The Economist) showed an image of the most famous monument of Brazil, the statue of “Christ, the Redeemer”, transformed into a rocket. The image was used for illustrating the economic growth that was expected to come, as it was accompanied by the sentence “Brazil takes off”. The performance of the Brazilian economy was not as good as foreseen; however, the image gives an idea about the economic turbulence experienced by the country in recent years. In addition to the industrial development, a big expansion of the agro-business has been witnessed in Brazil. This economic activity has brought with it a heavy use of pesticides. Brazil constitutes one of the largest world markets for these toxic products. The purchasing of pesticides by the country represented 20% of the total amount of money spent with agrotoxicants in the entire world¹. In 2011, 71 million hectares were used for temporary (soybeans, corn, sugar cane, cotton) and permanent (coffee, fruit, eucalyptus) crops. Around 853 million litres of pesticide were sprayed on these harvests in 2011².

Contradictory information is found when data on the use of pesticides and genetically modified organisms (GMO) are considered. Besides being an important market for pesticides, Brazil is among the largest world producers of GMO. This contradiction is demonstrated by some studies³, as they have shown that the utilization of GMO is not reducing the pesticide use in the country.

In addition, many chemicals that have been banned from developing countries are still legally used in Brazil. Among the 50 most used pesticides in the country, 22 have been prohibited by the European Union².

Although there has been an increase in the research efforts on the human health impacts of pesticide use⁴, quantifying data on such use are still scarce in Brazil. An investigation performed through interviews with 60 agriculture workers from Parana state (Brazil) has shown that 30% of the pesticide applicators did not wear personal protective equipment (PPE)⁵. Furthermore, the same study has found that 47% of the interviewed employees felt some kind of dizziness, nausea, vomiting, changes in salivation, drowsiness in the body and headache after application of pesticide products.

In addition to the lack of PPE usage, a study performed with agriculture workers from Rio de Janeiro state has shown that many of them do not understand correctly the information on labels of pesticide products⁶. Waichman et al⁷, interviewing agriculture employees from Amazonas state (Brazil), verified that illiteracy and poor schooling predominated among those workers. This aspect turns informing through labels into a difficult task. Hence, the different degrees of toxicity of distinct pesticide products are not always known by those users. The present study aimed to evaluate, interviewing agriculture employees from Alto Paraopeba region (Minas Gerais state, Brazil), the perception of these workers about the hazards arising from pesticide use.

Materials and methods

Agriculture workers ($n=105$) were interviewed between October 2013 and March 2014 about their perception on the hazards arising from the pesticide use. The researcher had a framework of themes to be explored during the interview, but the questionnaire could be amplified depending on the answers, in a semi structured way. The semi structured interviews allow researchers: (1) to access information beyond the planned questions; (2) to clarify aspects of the interview, obtaining point of views, guidance and new hypothesis; (3) to define new strategies and instruments⁸.

Results and discussion

The agriculture work at Alto Paraopeba region is performed mainly by male individuals (69%), with predominance of teenagers (41%). The education level as a whole, *i.e.*, including the adults, is low, where only

10% of these workers completed the high school (Table 1). In addition, education in Brazil is considered unsatisfactory, reaching the 38th position among 39 countries analysed by the Economist Intelligence Unit in 2012. For this report, they considered cognitive skills and scholarship levels to rank countries.

Table 1: Social features and pesticides use perception among interviewed agriculture workers ($n=105$) from Alto Paraopeba region, Minas Gerais state (MG), Brazil.

Characteristics	Percentage (%)
Sex	69 (men) 31 (women)
Age (years)	
10 - 19	41
20 - 29	15
30 - 39	09
40 - 49	10
50 - 59	13
60 - 69	07
70 - 79	03
80 - 89	02
Educational stages	
incomplete middle school	30
complete middle school	8
incomplete high school	50
complete high school	10
College degree	2
The direction for pesticide use (for the 1st time) was given by...	
Relatives and friends	73
Technicians from the government	6
Sellers of agricultural product stores	21
Pesticide use	96 (yes) 4 (no)
Opinions about pesticide use	
Good	51
Bad	3
Harmful to health	15
Harmful to the environment	4
Improve the crop conditions	22
The worker does not have opinion about it	5
Number of applications per week	
1 to 5 applications	78
5 to 10 applications	13
Over 10 applications	5
Zero applications	4
Crop area	
1 to 10 ha	56
11 to 50 ha	29
51 to 100 ha	12
Over 100 ha	3
Does the worker perform mixture of pesticides?	90 (yes) 10 (no)
Has the worker already felt sick during applications?	50 (yes) 50 (no)
Does the worker realize toxicity by the label of the product?	90 (yes) 10 (no)
Does the worker use PPE during application?	85 (yes) 15 (no)
Main used PPE	
Gloves and boots	33
boots	42
Gloves, boots, masks and overalls	20
only gloves	3
only masks	2

The vast majority (96%) of the interviewed workers use pesticides and the main (73%) stimulus for such use has come from friends and relatives. More than 70% had a positive view about pesticide use and less than 20% associated the utilization of agrotocicants to deleterious health and environmental effects. Most of the people interviewed (78%) stated applying pesticides five times a week. Mixing pesticides with sodium hydroxide, manure, burnt oil or acetic acid is a common procedure. This mixture is produced with the alleged purpose of improving pesticide efficiency, as previously reported by Alves et al⁹ for other areas in Brazil.

The organophosphate Roundup was the main used pesticide by the workers (33%). Organohalogen compounds (with their commercial names in Brazil), such as Clortal (Dacthal®), Ciproconazol (Priori XTRA®), Tiametoxam (Cruiser 350®), Endosulfam (Endosulfan Nortox®), Dicofol (Dicofol Milenia®), Atrazina (Gesaprim®, Atrazina Nortox®), Piraclostrobina + Epoxiconazol (Comet®), Tetraconazol (Domarck 100 EC®), Tebuconazole (Systemic®), Cloropirifos (Colosso®), Dodecacloro (Mirex®), Flumetralina (Flupro®), Fipronil (Topline®, Klap®), Lufenuron + Profenofós (Curyom 550®), Tembotriona (Soberan®), Atrazina + S-Metolacloro (Primestra Gold®), Picloram (Tordon®), Atrazina + Simazina (Extrazin SC®) and Diflubenzuron (Difly S3®) were also commonly used (Figure 1). The “other” pesticides showed in Figure 1, comprising 23% of the pesticides used, were: Ridomil, Tamaron, Ortene, Abamectina, Ivermectina, Afalon, Manzate, Soberan, Extrazin, Atrazina, Triatox, Topline, Primestra Gold, Difly S3, Dectomax, Butox, Curyom 550, Lancer 750 SP, Ripercol, Ramicina, Cruiser 350FS, Gesaprim GRDA, Priori XTRA, Zapp QI 620, Accent, Callisto, Carbendazim, Dithane NT, Gastoxin, Systemic, Flupro, Domark 100 EC, Dicofol Milenia, Endosulfan Nortox, Dacthal, Nicosulfan, Supera, Klap, Gramoxone 200. It is important to highlight the presence of Mirex and Endosulfan among the pesticides listed above, as both of them had their uses prohibited by the Stockholm Convention (in 2001), by the Environmental Protection Agency of the United States (in 2010), as well as by the Ministry of Environment from Brazil (in 2011)^{10, 11, 12}.

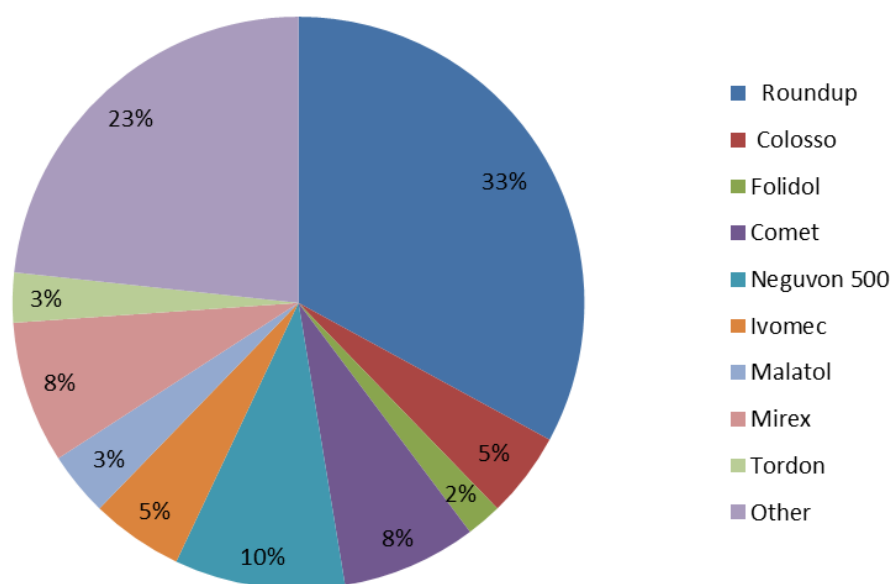


Figure 1: Percentage of the main pesticides used by agriculture workers from Alto Paraopeba region, Minas Gerais state (MG), Brazil.

Although the labels of the pesticide products present information on the necessity of PPE use, as well as on the time interval required between applications of the agrototoxicants, these instructions are not followed by the agriculture workers from Alto Paraopeba region (Table 1). Probably as a consequence of this reckless behaviour, half of the interviewed workers reported having felt unwell while dealing with pesticide products. Despite the fact that 85% of the people interviewed alleged using PPE, only 20% of them use the equipment properly. With this dangerous way of dealing with toxic products in mind, special attention should be given to a group in particular. This risk group is composed by women of childbearing age, who represent 31% of the interviewed workers. The low education level, associated with the behaviour of not following the safety instructions provided by the pesticide manufacturers, raises concern on the potential exposure of foetuses and neonates. Concluding, it is important to highlight that the pesticide use seems to be a cultural one in the studied region. This use is performed by agriculture workers with low education level, who, as a consequence, present a careless conduct while dealing with agrototoxicants. Therefore, there is an urgent need for (1) educational campaigns, as well as for (2) supervision by government agents on use and sale of pesticides. In these instructive campaigns, special attention should be given to women of childbearing age. The latter statement is based on the documented association between exposure to pesticides and adverse events in pregnancy¹³.

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