

# Reverse Logistics Applied to Agrochemical Packaging

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**Abstract:** This paper aims to report on the activities developed during training of rural workers regarding the use of Personal Protective Equipment (PPE) and the correct devolution of empty agrochemical containers in the city of Petrolina (PE). During the training, the risks and possible consequences of not using these equipment during the application of the products were discussed, as well as the environmental impacts generated by the incorrect destination of these packages, emphasizing the importance of the application of reverse logistics in the region. Approximately 30 residents and workers from the rural area of Petrolina-PE were directly reached by the training, and the listeners evaluated the methodology adopted (language and visual aids), comprehension and importance of the contents, through a brief questionnaire answered. According to the results obtained, it was possible to observe the great importance of educational work aimed at educating rural workers on the subject, especially in regions that stand out for the agricultural sector in the national scenario, such as the São Francisco Valley.

**Key words:** San Francisco Valley, rural area, EPI, chemicals

## 1. Introduction

Modern agriculture was formed during the eighteenth and nineteenth centuries in several areas of Europe. In a period of intense technological, social and economic changes, now called the Agricultural Revolution, which played an important role in the decoupling of feudalism and the implantation of capitalism [1].

In Brazil, in the 1930s, agricultural production expanded with the transfer of accumulation from the exporting agricultural sector to the industrial sector. At the same time that agricultural production for the domestic market grew due to the increase in the surplus marketed by small subsistence producers and the so-called reorganization of productive space, with regional specializations in determined types of products, and the social division of labor at national agriculture [1]. The current farmer scenario is

characterized by the use of new techniques and equipment, increasing the number of agronomic researches and the use of various inputs, such as pesticides and fertilizers [2].

The production of pesticides arose during the Second World War, with the synthesis of several chemical compounds of antibiotic activity or insecticide. Initial discoveries of these compounds promoted an uncontrolled dispersion in many parts of the world. However, from the observation at the long-term effects in insects which became increasingly resistant on the environment, due accumulation generated by the slow biodegradation of these substances, and the increasing wave of studies that showed carcinogenic effects in animals, governments of several countries noticed felt the need to promote actions capable of restricting and controlling the use of these compounds [2].

Brazil is the largest consumer of agrochemicals in the world [3]. Occupational exposure to these substances has a strong impact on public health, since rural workers are susceptible to acute exposure, with

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symptoms of headache, dizziness, nausea and vomiting, and chronic exposure involving neurological, immune, behavior disorders and others. Among the causes of these intoxications and even deaths caused by pesticides is the inadequate handling of waste and packaging, including the inadequate or non-existent these packaging washing and the use to store food and water, as well as failure to comply with established safety standards, such as not use of EPIs [3]

The country ranks third in the world ranking of fruit production, second only to China and India [4]. Being the northeast region, the main region producing and exporting fruit, through the participation of its irrigated poles. The São Francisco River Valley, which encompasses the city of Petrolina-PE, is currently one of the most dynamic agricultural regions in the Brazilian Northeast, playing a strong role in the region's and country's economies. Presenting natural advantages for the production of fruits of international standard the whole year, from the irrigation [5]. According to CODEVASF (São Francisco and Parnaíba Valley Development Company), the rural area of the city occupies approximately 20,361 hectares, of which the largest part is occupied by family farmers, the settlers, and the smallest by small, medium and large companies [6].

It is believed that socioeconomic factors of rural workers, coupled with poor instruction provided by vendors at the time of purchase, contribute to the inappropriate use and disposal of empty products and packaging. Therefore, the objective of this study was to train rural workers in the use of Personal Protective Equipment (PPE) and the correct disposal of empty agrochemical containers in the city of Petrolina-PE. Aiming to inform and raise awareness among rural workers about the proposed themes and thus contribute not only socially to employees, but also environmentally to the region.

## 2. Material and Methods

The work was carried out in the city of Petrolina-PE,

located in the sub-area of the San Francisco Valley (Fig. 1), rural area, in Project Senador Nilo Coelho, n-3.

For the preparation of informative material, it was sought to elaborate the content in a dynamic and easy-to-understand way, using mainly illustrative images, demonstrating the process of triple washing and of returning empty containers was described.

In order to obtain feedback on the method, a quick questionnaire of 3 questions was elaborated, containing a poor to optimal evaluation scale, regarding the methodology adopted (language and visual resources) in: understood totally up until poorly understood in terms of content, and I consider very important and I little consider important in relation to the importance of the information.

The Contact with producers and rural workers was done via telephone and e-mail. The search was carried out initially by the internet, prioritizing the establishments and properties located in the rural area of the city.

## 3. Results and Discussion

About 30 (thirty) workers and residents of the rural area participated in the training. By means of the questionnaire, all evaluated the informations as very important and understood, and considered the dynamics of the lectures as optimal.

Most confessed that even aware of the need to use PPE, they had already handled agrochemicals without using them fully, and all reported knowing workers who were have been intoxicated due to the absence of safety equipment (Verbal Information). Data that



Fig. 1 Map of Pernambuco, Brazil, with highlighted city area<sup>1</sup>.

<sup>1</sup> [https://biblioteca.ibge.gov.br/visualizacao/periodicos/2980/momun\\_ne\\_pe\\_petrolina.pdf](https://biblioteca.ibge.gov.br/visualizacao/periodicos/2980/momun_ne_pe_petrolina.pdf).

corroborate those found other researchers, what when researching the socio-demographic characteristics of the farmers in São Francisco Valley, they found that workers who claimed not to use PPE were among workers and producers of small and medium-sized farms [1]. This suggests the need for works educational to raise awareness about the importance and necessity of the use of PPE for the health of the worker.

Regarding the fate of empty agrochemical containers, most of the listeners stated that they had returned more than once to the Agricultural Commerce Association of the São Francisco Valley (ACAVASF). However, some of them reported that they kept the empty packagings in the lot itself (Verbal Information).

According to latest study, 78% of the empty agrochemical containers are delivered to ACAVASF, 2% are returned to the store where they were purchased, 7% are burned and 13% are retained on the properties [1]. This fact demonstrates the need for effective supervision, public policies to encourage return, and the importance of educational work aimed at guiding and raising awareness of the correct destination of empty chemical packaging.

#### 4. Conclusion

The practice of work in the field of action research is of great importance, since it makes possible the change

and improvement of society from the research. Such research does not have a conclusive character, taking into account that the subject under debate is of great relevance and it is necessary that the educational institutions have concern with the development of projects that favor the production of systematized knowledge.

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