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ENVIRONMENTAL DIAGNOSIS OF SOLID WASTE IN RURAL PROPERTIES IN A MUNICIPALITY IN WESTERN AMAZONIA

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ABSTRACT

With the advance of family farming, the amount of waste in rural areas grows and, in this sense, carrying out environmental diagnoses in these places is of vital importance to know how the environmental health of these properties is. Thus, the present work aimed to make an environmental diagnosis in relation to the collection and disposal of rural solid waste from domestic and agricultural activities in family farming properties in the municipality of Colorado do Oeste - Rondônia. For this, the application of a questionnaire was used as a methodology, which, according to Amaro, Póvoa and Macedo (2005), is an excellent instrument for data collection to diagnose situations. Thus, the instrument was applied to twenty family farming properties in 2019, on line 02 of the municipality of Colorado do Oeste – Rondônia. Based on the data, it was observed that the situation of solid waste management on properties is worrying. Regarding crop protection waste, there is no collection on the properties, and it is the responsibility of the farmer to dispose of it at the appropriate collection points. In relation to the other waste produced on the properties, it was found that there is no public collection, so the destination is done inadequately, most of the time being burned or thrown on the ground. In addition, the survey also evaluated the importance of waste collection by the perception of the owners of the investigated areas, and in this regard all emphasized the importance of having regular waste collection.

Keywords: Solid Waste. Rural environment. Environmental Diagnosis.Basic Sanitation.

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INTRODUCTION

The collection of solid waste in rural areas is essential to preserve the environment and ensure the quality of life of local populations. Improper waste disposal can lead to soil, water, and air contamination, in addition to contributing to the disease vector methodology and impacting local biodiversity levels (Barros; Oliveira, 2019). Solid waste management in rural areas faces specific challenges, such as geographic dispersion and the lack of adequate infrastructure for collection and final disposal.

According to Almeida and Silva (2021), the implementation of collection and recycling practices in these places helps to reduce environmental impact and promotes the sustainable development of the region, in addition to stimulating environmental awareness among residents.

In times of concern with environmental education, environmental perception and society's awareness of issues of great socio-environmental relevance, environmental research is important instruments for dialogue, discussion and study in the search for sustainability. In addition, in view of the reality experienced, it is increasingly necessary to adopt measures that anchor environmental sustainability in the context of public policies, being of vital importance for management, through less equidistant measures, which provide the right to health and collective well-being.

In this context, the management of rural solid waste becomes increasingly worrying in the face of the precarious reality in which the collection and disposal of waste from agricultural and domestic activities in family farming properties is found.

According to the Brazilian Institute of Geography and Statistics (IBGE) (2010), the collection of urban solid waste covers 97.8% while in rural areas it is only 28.8%. Without alternatives, inadequately, 59.6% burn or bury the waste produced. Thus, the difficulties in the face of the inefficiency of the current rural waste collection systems in Brazil are perceived.

The environmental changes generated by the inadequate disposal of domestic waste in small communities or in rural areas, despite being of a smaller magnitude than those produced in the "dumps" of large cities, can also constitute negative environmental impacts, mainly because they often come to occupy a physical space not yet occupied by man, contrary to what occurs in cities (Collares *et al.*, 2007).

> Everyone has the right to an ecologically balanced environment, a good for the common use of the people and essential to a healthy quality of life, imposing on the

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> Government and the community the duty to defend and preserve it for present and future generations (Brasil, 1988).

With the diagnosis on the collection and disposal of rural waste, it is intended through this work, to present the results of the survey in the properties studied, in order to try to fill the gap in which the state of Rondônia finds itself when it comes to initiatives on the part of works, projects, scientific studies and public policies so that it serves as an initiative for more research directed to this and other places, Mainly with the same theme, which, due to the scarcity of scientific studies focused on the specific issue of rural solid waste in the state, is considered very relevant.

Thus, the objective of this study was to make a diagnosis to obtain information on the collection and disposal of rural solid waste from domestic and agricultural activities in family farming properties.

THEORETICAL FRAMEWORK

REVERSE LOGISTICS

Reverse logistics is essential to promote the reuse of materials and reduce the environmental impact resulting from improper waste disposal. This process, which involves the return of products and materials to the production cycle, contributes to the circular economy and the preservation of natural resources, in addition to minimizing the amount of waste sent to landfills. According to Silva and Gomes (2020), reverse logistics plays an essential role in reducing resource depletion and reducing greenhouse gas emissions.

According to Lacerda (2002), reverse logistics can be understood as a cycle that must be complemented by bringing back the products already used from the different points of consumption to their origin, going through a recycling stage and returning again to the chain until it is finally discarded, going through the "product life cycle".

According to item XII of article 3 of the PNRS, reverse logistics is:

> An instrument of economic and social development characterized by a set of actions, procedures and means aimed at enabling the collection and return of solid waste to the business sector, for reuse, in its cycle or in other production cycles, or other environmentally appropriate final destination; (Brazil, 2010).

Reverse logistics aims to reduce pollution, waste of inputs and promote the reuse and recycling of products. Thus, its adoption in rural areas makes it an important tool for

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reducing waste with the return of packaging and inputs for reuse in activities makes it possible to add value to waste.

This model has proven to be a promising alternative, because for Lacerda (2004), the reuse of materials and the economy with returnable packaging have brought gains that increasingly stimulate new initiatives and efforts in development and improvement in Reverse Logistics processes.

ENVIRONMENTAL DIAGNOSTICS

Generally speaking, according to the International Labor Organization (ILO), diagnosis is:

> The entire process of collecting, analyzing, and interpreting data, within the scope of a strategic plan, in order to identify the strategic topics that should serve as a reference framework for determining the objectives to be achieved. The objective of the diagnosis is to establish a correct identification of the weaknesses, threats, strengths and opportunities in the past, present and future at the external and internal levels, of the territory and its resources in relation to future development. (ILO, 2004, p.87).

To carry out an environmental diagnosis of solid waste, it is essential to identify and evaluate the quantity and quality of the waste generated, in addition to verifying the practices of collection, storage, transportation and final disposal. This process helps to identify the main environmental problems related to solid waste and allows for the proposal of defined solutions to mitigate the impacts caused by them. Barros and Oliveira (2019) highlight that efficient solid waste collection in rural areas is crucial for environmental sustainability, as it reduces the negative impact on soil, water, and air.

According to the State Secretariat for Sustainable Economic Development (2006), an environmental diagnosis describes the environmental conditions existing in a given area at the present time, so it analyzes the current situation of a study area through surveys of components and processes of the physical, biotic and anthropic environment and their interactions.

Thus, with the diagnosis, it is intended through the report of family farmers to collect information on the conditions of final disposal of the waste produced in this environment for analysis of the current situation.

It is important to mention that reverse logistics is a tool of great importance, but in most cases, it is applied in companies whose focus is on the correct disposal of the waste

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produced in their activities. The diagnosis is used in the environmental survey, its function is to present the main elements of the physical, biotic and socioeconomic environment.

In this context, in view of the gap that this research intends to fill by proposing the two management tools, it is faced with the distance in which the rural reality is, when observing that reverse logistics and diagnosis, even though they are management tools that demonstrate efficiency, are used in environments that are still very distant from them.

It is worth remembering that for the region it is not impossible to be adopted, when observing that in Rondônia there are already social projects by private initiative that encourage the creativity of families in rural settlements for the production of handicrafts with disposable objects, bringing the return of waste to the economic cycle and enabling income for the settlers (biojewelry, toys, among others).

The legislation states that the responsibility for collecting household solid waste lies with the municipalities. Erroneously, it is very common to think that the responsibility for solid waste management is outsourced only to the government. It is important to note that the responsibility is everyone's and no one will save us from problems related to waste, in whatever the environment (rural and urban).

Therefore, it is necessary that civil society, responsible agencies, public authorities and waste generators act in the participation, duties and obligations in the management of solid waste.

METHODOLOGY

The direct application of a questionnaire was chosen, because in the conception of Amaro, Póvoa and Macedo (2005), the application of questionnaires is extremely useful when a researcher intends to collect information on a certain topic. Thus, the instrument was composed of questions randomly applied, voluntarily, to 20 rural producers in 20 different properties in order to carry out a diagnosis on the collection and disposal of domestic and agricultural waste produced in the places. With this, it sought to investigate and gather information for discussions that will be addressed later.

The application of the questionnaires took place in 2019, in the rural area called line 02 located in the municipality of Colorado do Oeste, Rondônia. It is considered a descriptive research because it intends to describe the characteristics of the studied environment, but the data were approached qualitatively, as they are based on an exploratory character, presenting the specific reality of the place.

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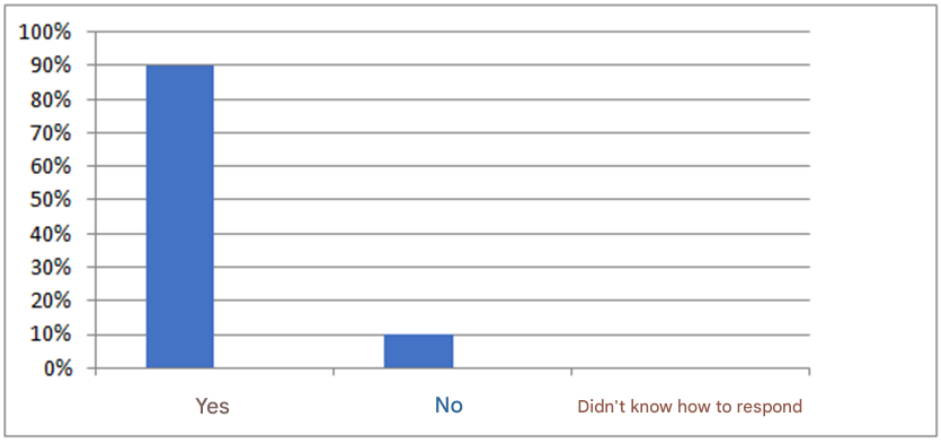
RESULTS AND DISCUSSION

The first point presented (Graph 1) is in relation to family farmers who use some type of pesticide in the activities developed on the property.

Graph 1. Percentage of farmers who claim to use pesticides on their property.



Source: Prepared by the authors.

As can be seen, most of the interviewees use pesticides on their property, in this case 90% of the family farmers in this place use some type of herbicide or insecticide.

Despite the effort to raise awareness about not depending on the use of pesticides in rural environments, it is still difficult to reverse the current situation, as the country is one of the largest consumer markets for pesticides in the world. However, the family farmer is left with no way out in terms of crop control, in addition to the transnational companies that are responsible for idealizing and financing its use, inhibiting and overlapping family farming, hindering the transition process to agroecology, because the family farmer is scarce in techniques for pest control, so he starts to depend on chemical products.

Therefore, the need for public policies such as technical assistance, subsidies for food production, farmers' rights, peasant education, and agroecological transition programs is vitally important to reverse the current situation.

The second point researched (Graph 2) sought to know the destination of pesticide packaging resulting from activities on the properties.

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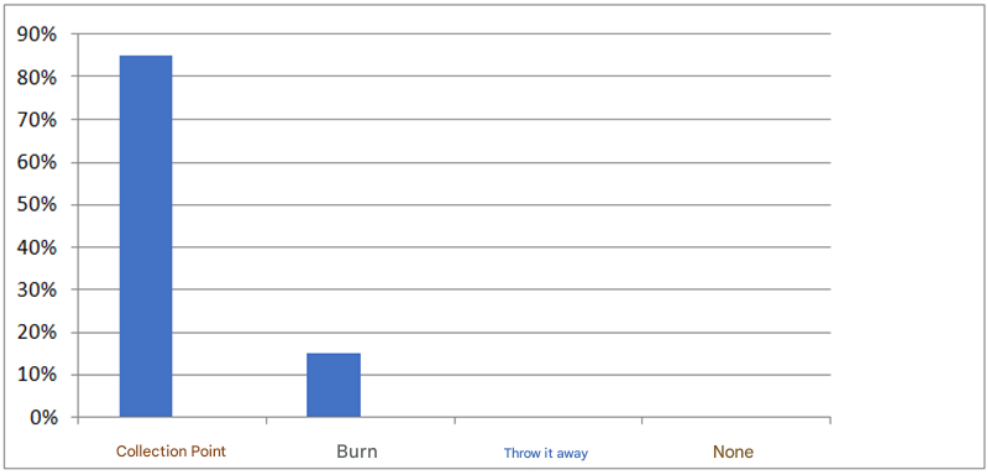
Graph 2: Percentage of farmers who claim to use pesticides on their property.

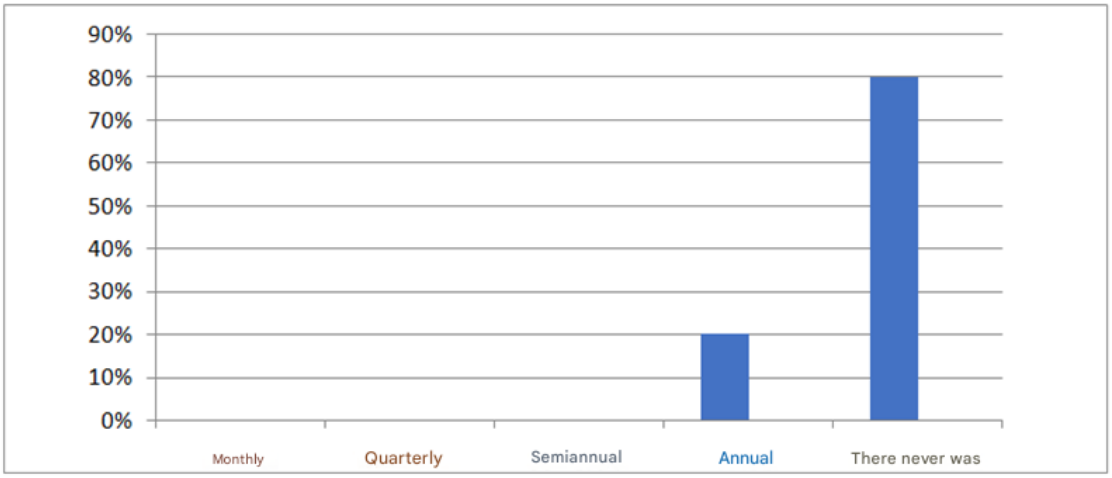


Source: Prepared by the authors

The collection of packaging in rural areas is of vital importance, as it allows the removal of contaminating waste, avoiding its contact with soil, water, man, among others. Therefore, as can be observed, 85% of those studied stated that they dispose of the packaging at a collection point. With this, the performance of the agency responsible for the service is noted. According to the report of some farmers, the packages are collected once a month in most cases.

Graph 3 shows the frequency of solid waste collection in family farming properties in the municipality of Colorado do Oeste, RO.

Graph 3: Frequency of rural solid waste collection in the municipality of Colorado do Oeste, RO.



Source: Prepared by the authors

As mentioned earlier, the city hall is responsible for collecting household waste, but after analyzing graph 3 it was observed that there has never been collection in most

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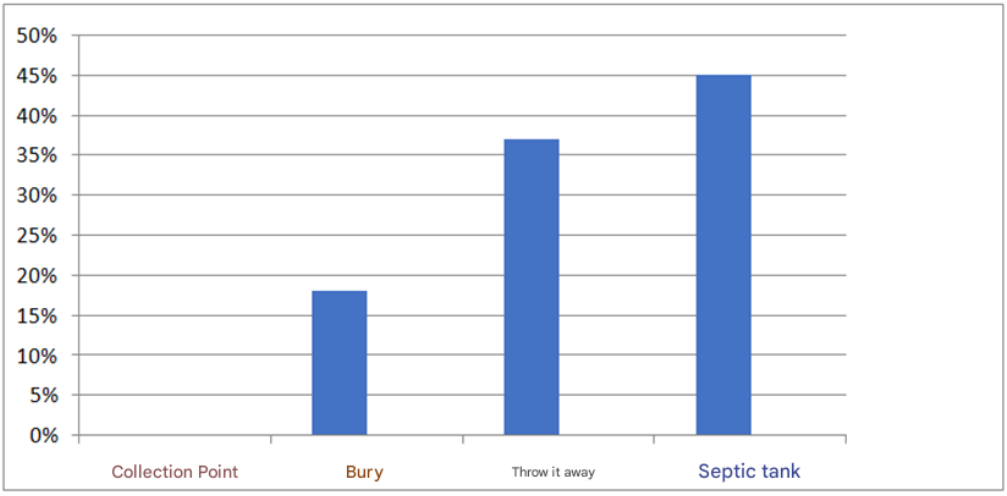
properties, others claim that the collection has already happened, but at a frequency of approximately once a year. In this case, 80% of the farmers said they never had access to the waste collection service and 20% said that they had already collected it once a year at their residence. Selective collection in rural areas is not yet implemented, so a radical change in the management of rural solid waste is necessary, as little is done to reverse this situation.

Thus, the issue of rural waste should be something to be observed more closely. For Darolt (2008), this social lack of concern with rural garbage comes from a mistaken idea of the urban population about the rural population, in which the former considers that due to the small number of people living in the countryside, the problem of garbage is insignificant.

Graph 4 shows the places of disposal where family farmers give up the waste from residential activities.

Graph 4: Disposal of rural residential solid waste in the municipality of Colorado do Oeste, RO.



Source: Prepared by the authors

Proper disposal is a challenging issue for the management of rural solid waste. In this sense, it was observed that most farmers dispose of these residues inadequately, either in septic tanks, throwing in the open or burying.

However, the lack of information is an unfavorable factor in this case, as it prevents the farmer from having access to solid waste management measures on his property. As an example, reverse logistics is an important tool to reverse the problem, being adopted in cooperatives and in environmental education projects with the farmer allows the exchange of information, the possibility of having access to knowledge that can mitigate this problem.

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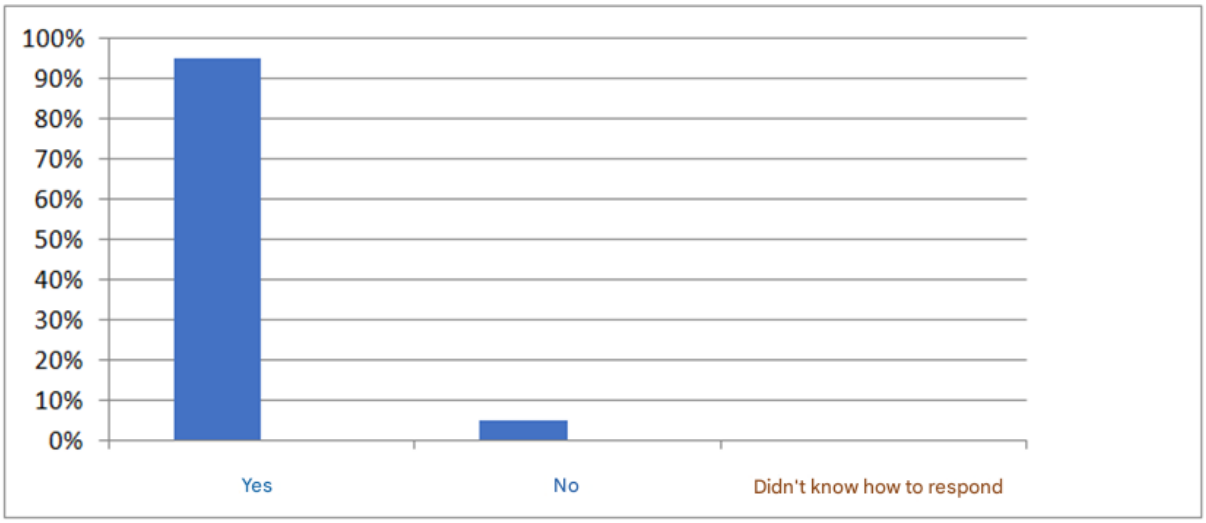
Another alternative is the use of organic waste in the making of composts for later use in agricultural crops.

For recyclable inorganic waste, the PNRS in its Article 33. It provides for manufacturers the obligation to structure and implement reverse logistics systems, upon return of products after use by the consumer, independently of the public service of urban cleaning and solid waste management. Being the manufacturers, importers, distributors and traders of:

> I pesticides, their residues and packaging, as well as other products whose packaging. After use, it constitutes hazardous waste, observing the rules of hazardous waste management provided for by law or regulation, in standards established by the bodies of SISNAMA, SNVS and Suasa, or in technical standards; II batteries; III tires; IV lubricating oils, their residues and packaging; V fluorescent, sodium and mercury vapor and mixed light lamps; VI electrical and electronic products and their components. (Brazil, 2010).

Graph 5 presents the opinion of family farmers regarding the importance of the possible existence of the collection service in rural areas.

Graph 5: Opinion of family farmers in Colorado do Oeste. RO on the importance of having a solid waste collection service in the rural environment.



Source: Prepared by the authors

Solid waste collection in rural areas plays a crucial role in environmental preservation and the quality of life of communities. Improper waste management in these areas can result in soil and water pollution, in addition to favoring the guidance of preventive practices and diseases. As highlighted by Barros and Oliveira (2019), the collection of solid waste in rural regions is an essential component to promote

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environmental sustainability, since it allows the correct disposal and treatment of waste, thus reducing environmental impacts.

In any approach that involves the adoption of policies of civil interest, it is vitally important to know the opinion of those engaged in the issue. In this context, the objective was to ascertain the perception of family farmers through the opinion they have about the importance of having the selective collection service in rural areas. In this case, 95% of farmers think it is important to collect waste on their properties.

CONCLUSION

Based on the current conditions in which the management of rural solid waste in the municipality of Colorado do Oeste - Rondônia is found, it is considered that this research has achieved its objective, but investigations on the subject have not been exhausted.

In view of the environmental problem that the family farmer submits to by dealing with these issues being excluded from public policies, many still without access to information, and developing an empirical management of waste from domestic and agricultural activities, this work pointed to the need to include the residents of rural properties in public policies, addressing environmental education issues and being contemplated with waste collections.

With the advancement of family farming, the amount of waste in these environments grows, therefore, the adoption of measures that solve environmental problems, which despite the false impression that is given to the rural environment, inadequate management is responsible for a diversity of aspects that generate various socio-environmental impacts in these environments. Therefore, initiatives are needed to reverse the situation.

It is vitally important that environmental sustainability anchored in management measures is one of the main management tools that provide family farmers with the opportunity to have access to public policies, environmental education projects, state aid, rural extension, among others, and not to be marginalized to these policies.

Therefore, the research pointed out that, the way the residents of the researched properties are acting in relation to solid waste, it has caused problems in the environment, because selective collections are not done properly and neither has the disposal of waste occurred correctly, as it is disposed of in inappropriate places, causing pollution in the environment.

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