



## **Food practices and climate change: the potential of pedagogical vegetable gardens**

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#### ABSTRACT

This study aimed to investigate the potentialities of implementing pedagogical vegetable gardens for the development of Food Projects and actions to reduce the greenhouse gas emissions. The research was developed through a qualitative approach, with documentary analysis and the review of scientific papers. The implementation of the pedagogical vegetable garden, in formal and non-formal scopes, can be a way for socio-environmental changes and for the construction of more conscious knowledge and attitudes of the population towards the preservation of the environment. It was concluded that pedagogical vegetable garden projects are powerful in food education and in mitigating the disposal of solid waste to the environment and, consequently, in reducing the emission of greenhouse gases.

**KEYWORDS:** Social and Environmental Rights. School Feeding. Critical Environmental Education.

## 1 INTRODUCTION

The 1988 Federal Constitution established, in its art. 6, fundamental social rights for the Brazilian population, such as the right to education and health (BRASIL, 1988), and Constitutional Amendment no. 64, of February 4, 2010, included the right to food (BRASIL, 2010). Art. 225 of the 1988 Federal Constitution, in turn, introduces the right to an ecologically balanced environment and a healthy quality of life, in addition to imposing on the government the responsibility of defining public policies to guarantee social and environmental rights (BRASIL, 1988).

In 1999, the National Policy for Environmental Education was instituted – Law no. 9.795, of April 27, 1999 – with the objective of guaranteeing Environmental Education, permanently and articulated with the National Education, at all levels and modalities of the educational process, formally and non-formally (BRASIL, 1999a). This Law defined Environmental Education as a process through which the individual and the community build values, knowledge, skills and attitudes for the preservation of the environment, a common good of all, essential to the quality of life and its sustainability (BRASIL, 1999a).

Environmental Education has many potentialities and the key role of proposing actions to raise awareness about the necessary integration of human beings with the environment in order to preserve it and encourage new social practices, sustainable production and reduced consumption. Therefore, Environmental Education cuts across several implemented national policies, among which stand out, for this study, the National Food and Nutrition Policy (in Portuguese *Política Nacional de Alimentação e Nutrição* – PNAN) and the National Policy on Climate Change (in Portuguese *Política Nacional sobre Mudança do Clima* – PNMC).

In 1999, the PNAN was instituted, with the purpose of improving food conditions, food security, nutrition and health for the entire Brazilian population, guided by the Unified Health System (in Portuguese *Sistema Único de Saúde* – SUS) (BRASIL, 1999b). The PNAN was updated in 2011, through Ordinance no. 2.715, of November 17, 2011 (BRASIL, 2011).

In 2006, the first edition of the Food Guide for the Brazilian Population was published by the Ministry of Health, with the aim of presenting official guidelines, principles and recommendations for an adequate and healthy alimentation for all (BRASIL, 2014). In 2014, the second edition of this Guide was published, with the aim of facilitating the population's access

to knowledge about adequate and healthy food, to expand choices and autonomy, with changes and actions that contribute to improving the quality of life and the guarantee of food and nutritional security for all (BRASIL, 2014).

In 2009, through Law no. 11.947, of June 16, the School Feeding Program (in Portuguese *Programa de Alimentação Escolar* – PNAE) was instituted, with the aim of offering school meals and food and nutrition education actions for basic education students (BRASIL, 2009a). The Federal Government then transfers to municipalities and states financial amounts for coverage, during the 200 school days, according to the number of students enrolled in each education network (BRASIL, 2009a). One of the actions encouraged by the PNAE is Environmental Education through pedagogical vegetable gardens, as fundamental strategies to promote health and a meaningful learning about the environment, education, food and nutrition. It can be highlighted that the implementation of the National Policy, the Food Guide and the School Feeding Program present the challenge of the historical fulfillment of guaranteeing the human right to adequate and healthy food, health and quality of life.

In 2009, Law no. 12.187, of December 29, instituted the PNMC, aimed at reducing anthropogenic emissions of greenhouse gases in relation to their different sources, preservation, conservation, recovery, of natural resources to make economic and social development compatible with the protection of the climate system and the reduction of poverty and social inequalities (BRASIL, 2009b).

In 2019, Bill no. 6.539 was presented, which is still pending, amending Law no. 12.187/2009, with the aim of including in the PNMC guidelines the commitments assumed by Brazil in the Paris Agreement (BRASIL, 2019). This Bill “[...] provides for action plans for the prevention and control of deforestation and for mitigation and adaptation to climate change, on the governance of the PNMC, on the obligations of the public power in the implementation of the Policy and on the commitments of the Country” (BRASIL, 2019, n.p.).

Therefore, taking into account these legal provisions, the implementation of pedagogical vegetable gardens in schools can contribute to raising the population’s awareness for the reduction of waste and greenhouse gas emissions through actions of separation, reuse and recycling of solid waste.

## **2 OBJECTIVE**

The objective of the research was to investigate the potential of implementing pedagogical vegetable gardens for the development of Food Projects and actions to reduce the emission of greenhouse gases.

## **3 METHODOLOGY**

The research was developed through a qualitative approach and with bibliographical research. According to Chizzotti (2006, p. 26), investigations with a qualitative perspective will have different standards, since they “[...] admit that reality is fluent and contradictory, and the investigation processes also depend on the researcher – his conception, his values, his objectives”, which requires the researcher to delineate strategies that will be used during the

process of construction, investigation and analysis of its content. To the author, “[...] research recognizes the knowledge accumulated in human history and is invested with an interest in deepening analyzes and making new discoveries in favor of human life” (CHIZZOTTI, 2006, p. 19).

Bibliographical research, in turn, according to Lakatos and Marconi (2003, p. 26), “[...] consists of examining human productions developed throughout the evolution of humanity, to survey and analyze what has already been produced on certain subject, which are assumed as a subject of scientific research”. To analyze the collected data, content analysis was used, which, according to Bardin (2011, p. 15), “[...] is a set of increasingly subtle methodological instruments in constant improvement, which are applied to ‘discourses’ (contents and continents) extremely diversified”.

For this, a survey was carried out in scientific papers, electronically, in the databases of Scientific Electronic Library Online (SciELO), Google Scholar and SciVerse Scopus, in papers published during the period from 2016 to 2022. The following keywords were used for the research: pedagogical vegetable garden, school feeding, food safety, solid waste, climate change, which resulted in a total of 178 scientific papers. After initial analysis, 11 studies were selected and the criterion was the possibility, from reading and analyzing the contents of these works, of collecting necessary information for the elaboration of the theoretical *corpus* proposed for this research.

#### 4 RESULTS

Eno, Luna and Lima (2015) investigated the garden, of medicinal plants and vegetables, as a means of encouraging the school community to learn about herbal medicines and have a healthy diet, as well as to implement Environmental Education practices at school. The main objective of the study was a living vegetable garden, with pedagogical practices at the *Padre Mário Castagna* State Elementary School, using the creation, development and cultivation of the vegetable garden as a strategy to provide learning about the importance of healthy eating and preservation of the environment. In view of this, according to the authors, the project provided greater quality in botany knowledge, relating medicinal herbs to everyday life based on popular knowledge and the use of healthier foods for school meals.

Eno, Luna and Lima (2015) concluded that the interaction of the entire school community was of great importance, with everyone’s responsibility to maintain and preserve this pedagogical action as well as the cultivation of the vegetable garden, including habits and knowledge about herbal medicines, mainly healthy eating habits with vegetables grown at the school, as well as raising awareness about the importance of preserving the environment. The authors point out as a suggestion the development of projects that aim to cover the cultivation of fruit tree/plants to enrich school meals with natural juices and fresh fruits (ENO; LUNA; LIMA, 2015).

Stora *et al.* (2022) aimed to identify sustainability practices in the management of State Schools in the city of Guarapuava, state of Paraná, Brazil. The authors investigated 17 state public schools located in the municipality, based on the parameters of the Socio-environmental Sustainability Model Spreadsheet of the Environmental Agenda in Public Administration (known

as A3P). In addition, they intended, based on the reports, to highlight the challenges and particularities of each institution.

The authors observed that the schools have good sustainability practices aligned with the A3P, carried out monthly monitoring of the use of natural resources, mainly in relation to the reuse of water, search for the use of taps and automatic mechanisms to reduce consumption, capture of rainwater, use of presence sensors and energy-saving light bulbs, consumption and reuse of paper and waste separation, practices that bring positive environmental, social and economic impacts. There was also concern about the environment, with preservation of equipment, promotion of accessibility, classrooms with good structure, ventilation and adequate external spaces (STORA *et al.*, 2022).

The study concluded, with regard to public procurement, construction and sustainable renovations, that guidelines for local purchases, prioritization of quality, community consultation and adoption of sustainability criteria are still observed, although little understood. Regarding this sustainability factor, projects that meet the environmental and social pillars were identified, even occasionally. The economic pillar is also highlighted, but less frequently and more oriented to the notions of waste. However, despite existing, these practices were characterized by institution managers as occasional and not continuous, given that a deficit of continuous training was observed for directors to act in a more incisive and oriented way in sustainability actions (STORA *et al.*, 2022).

The study suggested more public interventions on the part of the maintainer and State incentives to redirect constructions towards more sustainable principles; reduction of bureaucracy for contracting renovations, constructions and expansions, since, in certain cases, bureaucratization prevents the execution of contracts with the local community; and more government incentives to replace light bulbs and implement mechanisms and more sustainable energy sources. Furthermore, Stora *et al.* (2022) highlighted the realization of sustainable actions carried out informally and with artisanal methods; lack of manpower to carry out practices related, for example, to waste management; absence of more guidelines and partnerships for the disposal of hazardous waste; and lack of government subsidies for the establishment of school vegetable gardens.

Pastorio (2020), in his study on the School Vegetable Garden project in the Schools of Campo de São Gabriel, in the state of Rio Grande do Sul, aimed to reactivate and transform the School Vegetable Garden into a formal and non-formal educational space in rural schools and in the development of a teaching method of Environmental Education. The research was aimed at raising awareness that the adoption of healthy habits and care for the earth can improve the quality of life, enable children and young people to make correct choices about behaviors that promote the health of the individual, family and community, as well as encourage agricultural production in a sustainable way. The author observed that school occupies practically a third of the student's life; therefore, it is necessary to seek a more humane education that promotes development in the physical, emotional, intellectual and ethical aspects of the students, offers the opportunity for concrete learning, uses different school environments and guides the students for the practice of good sustainable life habits/actions.

The author pointed out the importance of the school vegetable garden in rural schools as an educational space for the production of knowledge and the development of learning. The

school vegetable garden advanced not only as a project by the maintainer, but as an educational space, which the community envisioned as a place of concrete pedagogical practices, approximation of local knowledge and dealing with the land materialized in the students, with concepts and contents of school subjects (PASTORIO, 2020).

Pastorio (2020) concluded that the school vegetable garden was one of the local actions that managed to unite the school community, transforming the institutional territorial area into an interdisciplinary, multidisciplinary and transdisciplinary laboratory, which integrated the contents of the disciplines into applications, in practice, making the vegetable garden an educational space. As these relationships were established, at the confluence of local and scientific knowledge, the school vegetable garden has become one of the symbols of the rural school.

Zambelli (2020), in the study entitled *Programa Horta Educativa: análise da política pública no município de Limeira – SP* [Educational Vegetable Garden Program: analysis of public policy in the municipality of Limeira – São Paulo] aimed to understand the educational actions proposed by the Educational Vegetable Garden Program in the scope of Environmental Education and Food and Nutrition Education, which were advocated by public policies as important instruments for facing contemporary socio-environmental, food and nutritional problems. The author showed that the current systems, despite generating sufficient food production for the world’s population, do not guarantee adequate and accessible nutrition for all, in addition to compromising current and future productivity. According to Zambelli (2020), the document *The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report*, published in 2019,<sup>1</sup> points out that obesity, malnutrition and climate change are considered pandemics, constituents of a Global Syndemic, that represents a serious threat to humans, the environment and the planet, and has food systems as one of the main drivers.

Zambelli (2020) also revealed that there is consonance between public policies, the Educational Vegetable Garden Program, the National Policy of Environmental Education and the Food and Nutrition Education Reference Framework for Public Policies, in relation to the objectives, but the educational and evaluation actions proposed by the program in dissonance with the principles for Environmental Education and Food and Nutrition Education may disfavor the achievement of the objectives of the Educational Vegetable Garden Program. In the categories of analysis, the author did not verify the compliance of the content of the pedagogical material with the principles for actions of Environmental Education and Food and Nutrition Education, since it does not contemplate the multidimensional perspective that addresses the complexity necessary to understand the contemporary environmental, food and nutrition issues (ZAMBELLI, 2020).

Oliveira *et al.* (2018) considered that pedagogical school vegetable gardens have been recognized as a strategy for promoting health as well as effective education, enabling meaningful learning on topics such as food systems, healthy eating, ecology and regional culture. In this sense, the authors developed a survey in the city of São Paulo with the aim of monitoring and describing the process of implementing pedagogical vegetable gardens in public schools in

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<sup>1</sup> Available at: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32822-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32822-8/fulltext). Accessed on: Aug. 16, 2023.

the city of São Paulo which received the course “Pedagogical Vegetable Gardens – More Organic Schools” in 2016. The study took into account the “Plan for the Progressive Introduction of Organic or Agroecological Food in the School Feeding Program (in Portuguese *Programa de Alimentação Escolar – PAE*) of the Municipality of São Paulo”, an instrument that provides for training on the subject for public schools. According to the authors, the municipality of São Paulo has 13 Regional Boards of Education with about 970,000 students enrolled in 3,205 schools under municipal management, however the work was realized with 55 schools that carried out the “Pedagogical Vegetable Gardens” course. To carry out the research, data were collected through two electronic questionnaires sent to the schools, as well as to the course participants (OLIVEIRA *et al.*, 2018).

After analyzing the data, the authors point out that, in the school units that participated in the “Pedagogical Vegetable Gardens” course, there is a higher prevalence of active vegetable gardens, including the involvement not only of the school community, but also of the students’ parents. However, some challenges are mentioned by the research participants in the process of implantation and maintenance of the vegetable gardens, which is the lack of inputs, adequate space and involvement of the school team. According to Oliveira *et al.* (2018), for the success of the project, the significant importance of the involvement of the entire school community, the presence of the theme of vegetable gardens in curricular discussions and the realization of training in schools were observed.

Between August 31<sup>st</sup> and September 2<sup>nd</sup>, 2022, Cunha *et al.* (2022) carried out a survey in the school vegetable garden of the Federal Institute of Rio Grande do Norte (IFRN), Macau campus, Brazil, built and maintained according to agroecological concepts. The research aimed to verify whether the treatment of the IFRN school vegetable garden favored microclimatic changes in the soil and a greater diversity of arthropods in the vegetable beds and the feasibility of using this experimental design in didactic activities. For this, three vegetable beds were built with different management conditions, being the Vegetable bed A with little soil management and with little vegetation cover; Vegetable bed B with soil management and little vegetation cover, leaving part of the soil exposed to direct soil action; and Vegetable bed C with soil management and good vegetation cover and no direct sunlight on the soil. Temperature data were obtained with a common mercury thermometer installed ten centimeters deep in the soil. Arthropod diversity data were obtained with the pitfall installed on August 31<sup>st</sup> and collected on September 1<sup>st</sup>, 2022 (CUNHA *et al.*, 2022).

According to the authors, the results showed microclimatic and arthropod diversity differences, indicating that the chosen parameters and methods can be replicated. The next step was to adapt and apply it to the didactic activity format that could be carried out in schools around the IFRN, Macau campus.

Kopeginski and Lindino (2023), in their study on climate change, announce the potentiation of natural events due to anthropic actions. As a result, the negative effects are perceptible and place populations in a situation of socioeconomic vulnerability, as agriculture has been losing productivity and, as a consequence, presenting potential risks to the food and nutritional security of populations.

Taking into account the context presented, the authors carried out a bibliographical research defending that it is possible to mitigate the effects of the climate emergency by working

on the theme through the school vegetable garden, since, by elaborating it, it is possible to collectively discuss actions to minimize the effects of climate change, reinforcing the idea that Environmental Education has been fulfilling the role of working on the causes and consequences of these changes with different ages and teaching modalities (KOPEGINSKI; LINDINO, 2023).

The study developed by Cartaxo *et al.* (2020) presented the biodigester as a way to insert the discussion of Environmental Education in schools. The research consisted of producing an anaerobic biodigester with 2<sup>nd</sup> grade High School students, with the aim of using it as a methodology for teaching Environmental Education at school. The results suggest that the experience with the homemade biodigester showed significant results in raising awareness of environmental issues. Cartaxo *et al.* (2020) report that reflection on the generation of solid organic waste and its correct destination reduces the environmental impacts in the production of greenhouse gases. According to the authors, “[...] the students identified physical, chemical and biological phenomena that occur in the anaerobic biodigestion process, evidencing the multidisciplinary role played by the biodigester [...]” (CARTAXO *et al.*, 2020, p. 214).

Among other aspects, the study discusses organic solid waste, pointing out that less than 1% of the total organic solid waste in the urban environment is recycled. This fact is “[...] considered worrying, since the decomposition of organic matter present in solid waste results in the formation of leachate that can contaminate the soil and surface or groundwater [...]” (CARTAXO *et al.*, 2020, p. 217).

The study presents the relevance in the discussion of the chemical constitution of biogas (70% methane gas) and its conversion into electricity and cooking gas. According to Cartaxo *et al.* (2020, p. 217), “[...] methane gas is cheaper, renewable and reduces the emission of gases that intensify global warming [...]”. The researchers complement by stating that, from the biodigester, in addition to biogas, biofertilizer is also produced, “[...] a product very rich in nutrients and considered a natural fertilizer, without chemical products. Thus, it can be used in gardens and vegetable gardens as a fertilizer and bioinsecticide” (CARTAXO *et al.*, 2020, p. 217).

The research developed by Cruz *et al.* (2021) consisted of a survey of scientific productions on the development of school vegetable gardens and their pedagogical contributions in journals indexed in scientific databases from 2013 to 2018, analyzing 17 papers. The analyzes of the papers contained in the study by Cruz *et al.* (2021) mostly deal with eating and consumption habits, problematized and emphasized for the importance of health and sustainability. In this sense, the researchers point out that “[...] the school vegetable garden is a space for socializing formal learning combined with non-formal environmental education, through discussions that seek to re-signify the knowledge inherent in each community [...]” (CRUZ *et al.*, 2021, p. 3).

The researchers also addressed studies of school vegetable gardens, focusing on “[...] waste treatment, composting, worm farm, use of alternative forms of insect control [...]” (CRUZ *et al.*, 2021, p. 3). Although the studies approach, in a very simple way, the idea of composting, advances are inferred for the reflection of the school community regarding the idea of disposal of solid organic waste. The researchers point out, in the analysis, that the “[...] use of organic fertilizer, black soil and the planting of vegetables in trays, enabled the students involved to get closer to nature and to comprehend how to produce in a sustainable way” (CRUZ *et al.*, 2021, p. 6).



On the pedagogical aspects, Cruz *et al.* (2021, p. 5) highlight studies in which the school vegetable garden plays a role in learning “[...] in various areas of knowledge, providing opportunities for contextualized learning and the formation of citizens who are aware and critical of environmental issues”. They also emphasize that, with the school vegetable garden, one can “[...] ‘work with a dialogic and emancipatory perspective of education’; and contact with food production provides knowledge and ‘contributes to the formation of a bond with this food produced [...]’” (CRUZ *et al.*, 2021, p. 5), favoring reflection on *in natura* foods and processed foods, their consumption and their health benefits.

It appears that the researchers selected studies that dialogue with the environmental principles that require changes in attitudes towards the conservation of the environment to “[...] promote the development of values in individuals, making them committed to ecological and social sustainability” (CRUZ *et al.*, 2021, p. 6).

The study conducted by Resende (2022, p. 101) points out that “[...] the vegetable garden can be a methodological instrument in the development of environmental learning, being the role of the school management to implement the project”. The research analyzed scientific papers published in the Brazilian Journal of Environmental Education (*Revista Brasileira de Educação Ambiental – RevBEA*), indexed in the SciELO database. Focusing on technical training for the implementation of school vegetable garden projects, the research sought findings that would contribute to the expansion of school management actions in the implementation of the vegetable garden for the construction of environmental knowledge.

Resende (2022, p. 103) emphasized that environmental issues are part of the curriculum and schools have “[...] the task of providing, in their planning, activities that address the theme”. According to the author, the publications give special attention to the reflection of school administrators on initiatives aimed at implementing projects in Environmental Education. “Such educational practices have the potential to mitigate the anthropic damage caused to the environment with regard to pollution, in all its aspects” (RESENDE, 2022, p. 103).

From the analysis of Resende’s (2022) paper, it can be inferred that the school vegetable garden projects corroborate the learning of the most varied curricular components, because “[...] their insertion in the school mobilizes diverse multidisciplinary knowledge enabling environmental awareness and sustainability [...]” (RESENDE, 2022, p. 106). The author states, in her research, that managers “[...] are responsible for all stages of implementation of the vegetable garden project, since its planning, installation and evaluation of the entire process” (RESENDE, 2022, p. 106).

The study carried out by Rosa, Costa and Lara (2022) presents the production of organic fertilizer from waste discarded at a school as a focus. According to the researchers, the fertilizer produced in the laboratory can “[...] act as a [source] of nutrients for the treatment of infertile soils” (ROSA; COSTA; LARA, 2022, p. 13). The authors state that the fact of understanding the chemical phenomena and their transformations is potent knowledge in the intervention and improvement of the environment.

The research was carried out with students from a public school in the state of Rio Grande do Sul, with the objective of “[...] developing in the student pro-activity, competences and abilities for research aligned with the school practice, as well as the understanding of how certain chemical processes occur in nature” (ROSA; COSTA; LARA, 2022, p. 13). The research was

developed in three stages: 1) approach to theoretical aspects and planning of actions; 2) construction of a vegetable garden, collection of waste and production of organic fertilizer; 3) validation of the obtained results.

Rosa, Costa and Lara (2022) considered that, in the effective fulfillment of all stages of the process, significant changes were noted in the disposal of organic solid waste. The case report on the use of composting in the production of vegetables resulted in a nourished soil. This result was due to the construction of composters and implementation of the school vegetable garden, as the soil for growing seedlings was treated with organic fertilizer from a composter that used organic material from the school.

## 5 CONCLUSION

The correlated studies researched contributed to the understanding of Environmental Education that must be implemented in schools and in all segments of formal and non-formal education with actions to develop educational practices for the construction of a more reflective, critical and emancipatory education for student and teacher in relation to the environment. Such studies brought to the debate topics such as the implementation of pedagogical vegetable gardens, food education, composting, reduction and destinations of organic waste that, if mitigated, generate less greenhouse gases and contribute to the reduction of global warming as foreseen in the action plan defined in the last Conference of the Parties (COP).

In this sense, teachers, students and society in general can intervene and build a collective planning in the school routine and other spaces of coexistence, such as squares, gardens, zoos, parks, community vegetable gardens, as something intrinsic and of socio-environmental changes, in order to build knowledge and more conscious attitudes towards the preservation of the environment.

## REFERENCES

BARDIN, Laurence. **Análise de Conteúdo**. São Paulo: Edições 70, 2011.

BRASIL. [Constituição (1988)]. **Constituição da República Federativa do Brasil**. Brasília, DF: Senado, 1988.

BRASIL. **Lei nº 9.795, de 27 de abril de 1999**. Dispõe sobre a educação ambiental, institui a Política Nacional de Educação Ambiental e dá outras providências. Brasília: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos, [1999a]. Available at: [http://www.planalto.gov.br/ccivil\\_03/leis/l9795.htm](http://www.planalto.gov.br/ccivil_03/leis/l9795.htm). Accessed on: May 1, 2023.

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. **Política Nacional de Alimentação e Nutrição**. Brasília: Ministério da Saúde, 1999b.

BRASIL. **Lei nº 11.947, de 16 de junho de 2009**. Dispõe sobre o atendimento da alimentação escolar e do Programa Dinheiro Direto na Escola aos alunos da educação básica; altera as Leis nºs 10.880, de 9 de junho de 2004, 11.273, de 6 de fevereiro de 2006, 11.507, de 20 de julho de 2007; revoga dispositivos da Medida Provisória nº 2.178-36, de 24 de agosto de 2001, e a Lei nº 8.913, de 12 de julho de 1994; e dá outras providências. Brasília: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos, [2009a]. Available at: [http://www.planalto.gov.br/ccivil\\_03/\\_ato2007-2010/2009/lei/l11947.htm](http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/l11947.htm). Accessed on: May 2, 2023.

BRASIL. **Lei nº 12.187, de 29 de dezembro de 2009**. Institui a Política Nacional sobre Mudança do Clima. Brasília: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos, [2009b]. Available at:

<https://legislacao.presidencia.gov.br/atos/?tipo=LEI&numero=12187&ano=2009&ato=d5aQWU1EeVpWT227>.

Accessed on: May 2, 2023.

BRASIL. **Emenda Constitucional nº 64, de 4 de fevereiro de 2010**. Altera o art. 6º da Constituição Federal, para introduzir a alimentação como direito social. Brasília: Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos, [2010]. Available at: [http://www.planalto.gov.br/ccivil\\_03/constituicao/emendas/emc/emc64.htm](http://www.planalto.gov.br/ccivil_03/constituicao/emendas/emc/emc64.htm).

Accessed on: May 2, 2023.

BRASIL. **Portaria nº 2.715, de 17 de novembro de 2011**. Atualiza a Política Nacional de Alimentação e Nutrição.

Brasília: Ministério da Saúde, Gabimete do Ministro, [2011]. Available at:

[https://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt2715\\_17\\_11\\_2011.html](https://bvsms.saude.gov.br/bvs/saudelegis/gm/2011/prt2715_17_11_2011.html). Accessed on: May 3, 2023.

BRASIL. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. **Guia alimentar para a população brasileira**. 2. ed. 1. reimp. Brasília: Ministério da Saúde, 2014.

BRASIL. **Projeto de Lei nº 6.539, de 2019**. Altera a Lei nº 12.187, de 29 de dezembro de 2009, que institui a Política Nacional sobre Mudança do Clima – PNMC, para atualizá-la ao contexto do Acordo de Paris e aos novos desafios relativos à mudança do clima. Brasília: Senado Federal, [2019]. Available at:

<https://www25.senado.leg.br/web/atividade/materias/-/materia/140343>. Accessed on: May 18, 2023.

CARTAXO, Amanda da Silva Barbosa; LEITE, Valderi Duarte; ALBUQUERQUE, Maria Virginia Conceição; LOPES, Wilton Silva; CARTAXO, Mailson Augusto Almeida. Biodigestor caseiro como ferramenta metodológica para o ensino de educação ambiental nas escolas. **Revista Gestão & Sustentabilidade Ambiental**, Florianópolis, v. 9, n. 2, p. 214-230, abr./jun. 2020. DOI: <https://doi.org/10.19177/rgsa.v9e22020214-230>. Available at:

[https://portaldeperiodicos.animaeducacao.com.br/index.php/gestao\\_ambiental/article/view/7928](https://portaldeperiodicos.animaeducacao.com.br/index.php/gestao_ambiental/article/view/7928). Accessed on: May 18, 2023.

CHIZZOTTI, Antonio. **Pesquisa qualitativa em Ciências Humanas e Sociais**. Petrópolis: Vozes, 2006.

CRUZ, Lilian Pereira; BELIZÁRIO, Aline Franco Brandão; SILVA, Virginia Vieira Santos; LINS, Giovana; FURLAN, Marcos Roberto. Hortas Pedagógicas: análise de artigos publicados em periódicos e Congressos. **Revista Ciências Humanas**, Taubaté, v. 14, n. 1, p. 1-9, 2021. DOI: <https://doi.org/10.32813/2179-1120.2021.v14.n1.a613>. Available at:

<https://www.rchunitau.com.br/index.php/rch/article/view/613>. Accessed on: May 19, 2023.

CUNHA, Carla Virgínia Silva da; SILVA, Moabe Pina da; MENDONÇA, Monike Paulino da Silva; KAWAMOTO, Tatiana Hideko. Temperatura, perda de água e diversidade de artrópodes terrestres em três condições de solo em uma horta escolar. In: CONGRESSO NACIONAL DE EDUCAÇÃO – CONEDU, 8., 2022, Maceió. **Anais eletrônicos** [...].

Maceió: Conedu, 2022. Available at:

[https://editorarealize.com.br/editora/anais/conedu/2022/TRABALHO\\_COMPLETO\\_EV174\\_MD4\\_ID17130\\_TB4331\\_03122022172528.pdf](https://editorarealize.com.br/editora/anais/conedu/2022/TRABALHO_COMPLETO_EV174_MD4_ID17130_TB4331_03122022172528.pdf). Accessed on: May 19, 2023.

ENO, Élen Gomes de Jesus; LUNA, Renata Raimundo; LIMA, Renato Abreu. Horta na escola: incentivo ao cultivo e a interação com o meio ambiente. **Revista Eletrônica em Gestão, Educação e Tecnologia Ambiental**, Santa Maria, v. 20, n. 1, p. 248-253, jan./abr. 2015. DOI: <https://doi.org/10.5902/2236117019538>. Available at:

<https://periodicos.ufsm.br/reget/article/view/19538>. Accessed on: May 5, 2023.

KOPEGINSKI, Sandra Inês Reisdorfer; LINDINO, Terezinha. Educação Ambiental para segurança alimentar na emergência climática. **Revista Pleiade** v. 17, n. 38, p. 34-40, jan./mar. 2023. DOI:

<https://doi.org/10.32915/pleiade.v17i38>. Available at:

<https://pleiade.uniamerica.br/index.php/pleiade/article/view/904>. Accessed on: May 19, 2023.

LAKATOS, Eva Maria; MARCONI, Marina de Andrade. **Fundamentos de metodologia científica**. 5. ed. São Paulo: Atlas, 2003.

OLIVEIRA, Sofia dos Reis Miranda Laurenço; VILLAR, Betzabeth Slate; FLORIDO, Julia Mercedes Perez; SCHWARTZMAN, Flávia; BICALHO, Daniela. Implantação de hortas pedagógicas em escolas municipais de São Paulo. **Revista Demetra**, Rio de Janeiro, v. 13, n. 3, p. 583-603, 2018. DOI: <https://doi.org/10.12957/demetra.2018.34062>.

Available at: <https://www.e-publicacoes.uerj.br/index.php/demetra/article/view/34062>. Accessed on: May 19, 2023.

PASTORIO, Eduardo. Horta escolar nas escolas do campo de São Gabriel/RS. **RELACult** - Revista Latino-Americana de Estudos em Cultura e Sociedade, [s. l.], v. 6, p. 1-14, maio 2020. DOI: <https://doi.org/10.23899/relacult.v6i0.1675>. Available at: <https://periodicos.claec.org/index.php/relacult/article/view/1675>. Accessed on: May 5, 2023.

RESENDE, Flávia Grecco. O papel da gestão escolar na implementação de projetos de educação ambiental. **Revista Estudos e Negócios Academics**, Santo André, v. 2 n. 4, p. 101- 106, 2022. DOI: <https://doi.org/10.58941/26760460/v2.n4.102>. Available at: <https://portaldervistas.esags.edu.br/index.php/revista/article/view/102>. Accessed on: May 20, 2023.

ROSA, Carine Borchert; COSTA, Erli Schneider; LARA, Daniela Mueller de. Horta na escola: o ensino de química a partir da produção de adubo orgânico. **Revista Eletrônica Científica da UERGS**, Porto Alegre, v. 8, n. 1, p. 13-21, abr. 2022. DOI: <https://doi.org/10.21674/2448-0479.81.13-21>. Available at: <http://revista.uergs.edu.br/index.php/revuergs/article/view/3011>. Accessed on: May 19, 2023.

STORA, Fernando; DOLIVEIRA, Sérgio Luis Dias; GONZAGA, Carlos Alberto Marçal; MASSUGA Flavia. Práticas de sustentabilidade em escolas estaduais de Guarapuava (PR). **Revista Brasileira de Estudos Pedagógicos - RBEP**, Brasília, v. 103, n. 264, p. 378-403, maio/ago. 2022. DOI: <https://doi.org/10.24109/2176-6681.rbep.103i264.5021>. Available at: <https://www.scielo.br/ij/rbeped/a/srbz5J6pbGqftnZSRXBWD3m/?format=pdf&lang=pt>. Accessed on: May 15, 2023.

ZAMBELLI, Luana Cristina. **Programa horta educativa**: análise da política pública no município de Limeira-SP. 2020. 150 f. Thesis (Master's in Applied Human and Social Sciences) – Universidade Estadual de Campinas, Limeira, 2020. Available at: <https://hdl.handle.net/20.500.12733/1639175>. Accessed on: May 5, 2023.