



RESEARCH ARTICLE

OPEN ACCESS

PARASITOLOGICAL ANALYSIS IN VEGETABLE HORTALITIES IN LICÍNIO DE ALMEIDA - BA

¹Elizia Maria Alves Souza, ⁵Anny Carolinny Tiger Almeida Keys, ¹Julliendy Paiva de Almeida, ⁴Adriana Vanderlei do Amorim, ⁸Rafael Cerqueira Campos Luna, ²Michelle Miranda Militation, ⁷Beatriz Rocha Sousa, ⁷Iaggo Raphael David, ^{*3,4,6,7}Stenio Fernando Pimentel Duarte and Léia Alexandre Alves

¹Student Independent Faculty of the Northeast – FAINOR; ²Student Faculty of Technologies and Science – UniFTC; ³Teacher Student Independent Faculty of the Northeast – FAINOR; Teacher University Center Faculty of Technology and Sciences – UniFTC; ⁴Master Teacher and Dentist by ABEPO; ⁵Teacher University Salvador – UniFACS; ⁶Teacher Faculty Saint Augustine – FASA; ⁷NEPEdc Specialist Professor and Researcher; ⁸Doctor and Professor of Medicine at the Santo Agostinho School of Health - FASA

ARTICLE INFO

Article History:

Received 28th August, 2019
Received in revised form
17th September, 2019
Accepted 09th October, 2019
Published online 30th November, 2019

Key Words:

Contamination, Enteroparasites; Lettuces.

*Corresponding author:

Stenio Fernando Pimentel Duarte

ABSTRACT

The consumption of vegetables in Brazil Occurs largely due to Several factors such as low cost, ease of cultivation and acquisition of These products. Another relevant factor is the recommendation by doctors and nutritionists because of their great nutritional value, adding various vitamins, minerals and dietary fiber to their consumers' menu. However, the consumption of *Lactuca Sativa L.* occurs mainly in fresh form, which may be a vehicle for parasite contamination. The objective of this study was to evaluate the presence of parasite contamination in lettuce commercialized in Licínio de Almeida - BA. The analysis was performed with samples obtained from free markets, supermarkets and places of cultivation, through the spontaneous sedimentation method of Hoffman, Pons and Janer. The results demonstrated the occurrence of contamination with all samples studied. It was concluded that the need for improvement in the planting, cultivation, transportation and storage processes of these vegetables, since contamination by its consumption can cause serious health problems.

Copyright © 2019, Elizia Maria Alves Souza et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Elizia Maria Alves Souza, Anny Carolinny Tiger Almeida Keys, Julliendy Paiva de Almeida et al. 2019. "Parasitological analysis in vegetable hortalties in licinio de almeida - ba", *International Journal of Development Research*, 09, (11), 32039-32043.

INTRODUCTION

Brazil is considered one of the countries with the highest index of vegetable consumption in the world. The ease of cultivation and acquisition of these products, besides the low cost, are factors that contribute to the high consumption of the leafy, especially *Lactuca Sativa L.*, popularly known as lettuce, which is present in the eating habits of Brazilians (Perondi et al., 2013). In addition to its freshness and pleasant taste, lettuce also offers highly nutritious sources, which is why it is always recommended by doctors and nutritionists, adding to the diet nutrients such as vitamins A, K, C, E, tiamina pantatênico acid and riboflavin, and minerals and dietary fiber (Maldonado et al. 2019). However, studies show that lettuce is the vegetable with the highest prevalence of enteroparasite contamination (Mendonça. 2014). In recent years, the frequency of outbreaks of transmitted diseases resulting from

the consumption of products fresh has been increasing, which may be associated with a change in the diet of the population, which is increasingly seeking to improve diet and maintain a healthier lifestyle (Costa et al., 2018; Santos et al., 2014). Data show that about 2 billion people worldwide have already been affected in some way by intestinal infections caused by helminths and protozoa (Mohamed et al., 2018). These parasites can trigger different clinical manifestations in people who become infected, from the most common to the most severe symptoms (Costa et al., 2018; Santos et al., 2014). Parasitic diseases often present asymptotically, at least at the onset of infection. However, the patient may present with symptoms such as diarrhea, anemia, malnutrition, cognitive retardation and irritability, as well as opportunistic infections, since they take advantage of the individual's physiological state (Santos et al., 2019; Akoachere et al., 2018). Foodborne diseases are still considered a major public health problem, and

the pursuit of securing the supply of foodstuffs with a safety seal has become a constant concern of government health agencies, epidemiological surveillance agencies, and the food industry (Souza *et al.*, 2018). Thus, the present study aimed to evaluate the presence of parasite contamination in lettuces marketed in open market, supermarkets and cultivation sites in the municipality of Licínio de Almeida - BA.

MATERIALS AND METHODS

The samples were obtained at free-market points, supermarkets and places of cultivation in the municipality of Licínio de Almeida - BA. The lettuces were collected and packed in sterile plastic bags identified, which stored the samples until the Parasitology laboratory of the Independent Faculty of the Northeast - FAINOR, where the analysis was performed. The Hoffman, Pons and Janer spontaneous sedimentation method was used, which is based on the microscopic analysis of fecal samples, in order to verify the presence of evolutionary forms, and finally, the obtained data should be observed and tabulated (Ribeiro and Furst, 2012). To perform the spontaneous sedimentation method, the lettuce leaf was smashed into the bag in which it was collected (without contact with the hand of the handler), then added 200 ml of distilled water, following which the bag was shaken vigorously for a few minutes until water came into contact with the entire sample in an attempt to remove possible parasitic agents present (Santos *et al.* 2018). Then the volume was strained into the four-part gauze-covered gauze under a chalice and allowed to stand for 24 hours until complete sedimentation (Santos *et al.* 2018). At the end of the resting process, one drop of sediment it was transferred to a slide and a drop of lugol added over a cover slip. The prepared slides were observed in triplicate under the optical microscope for 10x and 40x magnification objectives to evaluate the presence or absence of parasites. The results obtained were tabulated in an Excel spreadsheet for better interpretation and analysis.

RESULTS AND DISCUSSION

We analyzed 23 samples of vegetables (*Lactuca Sativa*), in which 39.1% (n = 9) came from supermarkets; 30.4% (n = 7) of free markets and 30.4% (n = 7) of cultivation sites. The analysis showed that the samples from the three collection sites presented positivity for the presence of parasitological contamination. Sample sadvi Of the cult ndassitesive showedamior prevalence of infection of 71,4% contaminated samples, followed by supermarkets to 66.7% and the lowest percentage feilrasivres 57 1%. It is noted that the proportion of contamination of cultivation sites was shown to be much higher than in samples purchased in supermarkets, followed by fair market. A study conducted in the city of Bebedouro in São Paulo also showed that vegetables from cultivation sites present a higher amount of contamination when compared to other analyzed sites (Oliveira *et al.*, 2013). According to Gregório (2012), the possible forms of contamination of vegetables in the cultivation site may be associated with improper water intended for irrigation, which may have fecal waste contaminating it, soil polluted by organic fertilizer containing fecal material, and poor condition. hygiene of vegetable handlers; Another form of contamination is the contact of vegetables with vector animals and transmitters of diseases such as rat and cockroach flies.

Table 1. Relationship between parasitological analysis of lettuce collected in open market, supermarkets and places of cultivation

Shapes Presented	Cultivation Sites	Free fairs	Supermarkets
<i>AscariLumbricoids</i>	-	2	1
<i>Entamoeba Coli</i>	2	4	2
<i>Entamoeba histolytica</i>	1	-	-
<i>Hepatic fasciola</i>	-	-	1
<i>Giardia Lambia</i>	-	2	2
<i>Hymenolepis nana</i>	-	-	2
<i>Strongyloides</i>	2	-	-
Tapeworm	1	2	2
Total A. analyzed	7	7	9
Total A. parasitized	5	4	6
% of parasitized A.	71.4%	57.1%	66.7%

Source: Research Data.

This result can be explained by the possible failure or lack of hygiene of the vegetables after the harvesting process. Because they are grown directly in the soil, the harvest of vegetables should be preceded by a cleaning process. What has been observed, however, is that producers usually only immerse the vegetables in a container of water. According to RDC No. 216, the correct thing is that they go through a process of selecting the vegetables, washing them in running water and removing the parts and leaves unfit for consumption, and then with the disinfection process. It is also important to note that the handlers should make proper hand hygiene before starting the process, as well as the monitoring of the transport and storage process. It should be noted here that the samples obtained at the cultivation and marketing sites were acquired on different days, ie, they were not part of the same production lot, since it was not possible to trace vegetables directly from the cultivation site until the environment where they are traded, due to the routine process that involves shipping and delivery. Thus, it is not possible to affirm that the positivity of the presence of parasites in lettuces obtained in open markets and supermarkets was acquired in the cultivation or commercialization places, although these places are considered conducive to contamination (Moreira *et al.*, 2017). However, this fact does not minimize the result that showed that the vegetables obtained in the three sites presented contamination in more than half of the analyzed samples. A study in the city of Muriaé - MG, showed a high incidence of vegetable contamination in supermarkets (Ribeiro *et al.*, 2015). The most relevant causes that can cause changes in the quality of offoodsfreshin supermarkets are: inadequate structure and space, lack of conservation equipment, lack of running water, inadequate food and utensils conservation and hygiene, poor hygiene of handlers and even presence of animals (Ribeiro; Rodrigues, 2017; Alhabbal. 2015). The great demand for these vegetables is due to the fact that they are widely used in the daily diet due to their nutritional value of vitamins, minerals and dietary fibers, besides being part of the Brazilian culture being present at the families table (Moreira *et al.*, 2017). Lettuce is the eating vegetable fresh- with the highest prevalence of enteroparasite contamination (Mendonça, 2014). Helminth and enteroprotzoan infections are among the most frequent diseases in the world, and can not only affect the nutritional balance of humans, but also cause significant complications, such as intestinal obstruction, rectal prolapse, abscess formation, among others (Schemes *et al.*, 2015; Balarak *et al.*, 2016). With the analysis several parasites were identified in the samples and it is noticed that all of them have relevance to public health, however, we highlight *Entamoeba Coli*, *Taenia*, *Strongyloides* and *Giardia Lambia* with a higher level of concern when it comes to the health of the population

(Esboei *et al.*, 2017). Anvisa / Ministry of Health (MS) RDC 14/2014 provides for macroscopic and microscopic foreign matter in food and beverages, their tolerance limits and other measures. According to article 16, item III of this CPR, food containing parasites (defined in article IV, item X, item X as foreign material indicating risks to human health) will be considered in violation of the legislation (Silva *et al.*, 2016). The severity of parasitic infections depends on the type of parasite that will affect the individual, besides the intensity and evolution of the parasitosis, other aspects may influence how the immune and nutritional status of the human host. These parasitic diseases can cause several clinical manifestations ranging from less severe symptoms such as abdominal pain and diarrhea, and may progress to malabsorption, malnutrition and anemia (Hooshyar *et al.*, 2015; Carrero. 2013). In recent years the concern with parasitological control has increased, due to the fact that the inclusion of vegetables in the population's diet gradually. And this concern stems from the risk of contamination that these vegetables present may cause infections caused by helminths and protozoa especially when consumed in natura (Oliveira *et al.*, 2013; Jung *et al.*, 2014). Based on the results found, it is noted that *Entamoeba Coli* and *Taenia* were prevalent in the samples of the 3 collection points, corroborating the results of a study conducted in the city of Parnaíba, Piauí, showed a higher prevalence of *Entamoeba Coli* among the analyzed samples indicating a strong potential for fecal-oral contamination (Trindade *et al.*, 15). Another analysis performed in the city of Anápolis in Goiás, found the same result (Neres *et al.*, 2011). The results obtained from *Taenia* also corroborate those of an analysis performed in supermarkets and fairs of Umuarama - PR where showed a frequency of contamination by *Taenia*, it is noteworthy that *Taenia solium* can develop human cysticercosis, a disease that can generate severe neurological sequelae (Fernandes *et al.*, 2014).

Importantly, the transmission of enteroparasites involves vegetables not only from public markets, but also from private markets, as indicated by a study conducted in Latin America (Traviezo-Valles *et al.*, 2013). Proper hygiene of vegetables is of paramount importance to ensure the quality of these foods, as reports of infectious diseases associated with them have aroused interest from public health agencies and consumers concerned about food safety. However, the diagnosis of these parasites is essential, thus providing data for both sanitary surveillance and the population that consumes them, preventing them and enabling them to better control hygiene regarding the food consumed (Pinheiro *et al.*, 2015). Educational measures are also required to inform farmers of the relevance of the process to be followed, adopting good practices at all stages of production in accordance with the Good Hygiene Practices Manual which includes Good Agricultural Practices (BPA) and Good Manufacturing Practices (GMP) (Maldonado *et al.*, 2019). In Brazil there are resolutions and ordinances that provide for these good practices such as ordinance no. 368, of September 4, 1997, approves the Technical Regulation on hygienic-sanitary conditions and Good Manufacturing Practices for food laboratory / manufacturers, in companies that are under the supervision of the Ministry of Agriculture, Livestock and Supply. And the Ordinance of the National Health Surveillance Secretariat nº 1.428 / 93, addresses Good Manufacturing Practices as norms and procedures that aim to meet a certain standard of identity and quality of a product or service (Machado *et al.*, 2015). However, the need for sanitary

control of vegetables at all stages of production, from planting and harvesting, to the moment when the consumer purchases the product at the point of sale, is essential, since they are fresh products and in most cases. They are often consumed *in natura* becoming vectors of pathogenic microorganisms such as protozoa and helminths (Filho *et al.*, 2017).

Final Considerations

With its nutritional richness, low cost, ease of planting, cultivation and acquisition, in addition to the many possibilities of consumption highlighted *in natura*, the *Lactuca sativa L.* is consumed in large scale in Brazil. However, despite the high consumption, the contamination control of these vegetables is ineffective in view of the results obtained in this study and in many others that corroborate the same result. This contamination may be due to several factors, such as the use of contaminated soil for planting, irrigation with water contaminated with fecal material, or even failure during the cultivation process until the moment when the consumer makes the purchase of food in outlets. Thus, the need for improvement in the planting, cultivation, transportation and storage of these vegetables is clear, since contamination by its consumption can cause serious health problems.

REFERENCES

- Akoachere, J. F. T. K *et al.* Bacterial and parasitic contaminants of salad vegetables sold in markets in Fako Division, Cameroon and evaluation of hygiene and handling practices of vendors. *BMC Research Notes*, v.11, n.100, 2018.
- Alba, E. L. G *et al.* Prevalencia de parasitosis intestinal en mujeres embarazadas del Centro de Salud Jaihuayco Julio-Septiembre 2012. *Rev. Cient. Cienc. Méd., Cochabamba*, 2013 v.16, n.1, 2013.
- Albuquerque, I. V. S *et al.* Lifestyle after seven years of post ischemic coronary event: cross-sectional study. *J. Physiother. Res.*, Salvador, v. 9, n. 1, p. 67-73, February, 2019.
- Alhabbal A. T. The Prevalence of Parasitic Contamination on Common Sold Vegetables in Alqalamoun Region. *Int. J. Pharm. Sci. Rev. Res.*, v.30, n.1, Article No.18, P.94-97, January – February, 2015.
- Anvisa. Resolução-RDC no 216/2014. Disponível em http://portal.anvisa.gov.br/documents/33916/388704/RES_OLU%25C3%2587%25C3%2583ORDC%2BN%2B216%2BDE%2B15%2BDE%2BSETEMBRO%2BDE%2B2004.pdf/23701496-925d-4d4d-99aa-9d479b316c4b. Acessado em 22/10/2019.
- Astudillo, O. G.; Bava, A. J. Prevalencia de las parasitosis intestinales en el Hospital de Enfermedades Infecciosas "Dr. Francisco Javier Muñoz". *Acta bioquím. clín. Latinoam, La Plata dic*, v.51, n.4, 2017.
- Augusto, C. A *et al.* Pesquisa Qualitativa: rigor metodológico no tratamento da teoria dos custos de transação em artigos apresentados nos congressos da Sober (2007-2011). *Rev. Econ. Sociol. Rural, Brasília*, v.51, n.4, Oct./Dec. 2013.
- Balarak, B. D *et al.* Prevalence of parasitic contamination of raw vegetables in ahar, Iran. *International Journal of Analytical, Pharmaceutical and Biomedical Sciences*, v.5, n.1, p.28-31, 2016.

- Barreto, A. Análise das condições higiênicas-sanitárias em folhosos vendidos na Central de Abastecimento S.A. (CEASA) em Brasília/DF. Trabalho de conclusão de curso - Departamento de Nutrição. Faculdade de Ciências da Saúde da Universidade de Brasília, Brasília, 2012.
- Carrero, S. H. S. Prevalencia de parásitos intestinales y factores de riesgo escolares del colegio Chicamocha Kennedy I del municipio de Tuta, Boyacá – Colombia. *Revista Universidad Y Salud*, v.15, n.2, p. 218-224, 2013.
- Costa, E. A et al. Avaliação microbiológica de alfaces (lactuca sativa L.) Convencionais e orgânicas e eficiência de dois processos de higienização. v. 23, n. 3, p. 387-392, jul./set. 2012.
- Costa, J. O et al. Prevalence of Entamoeba histolytica and other enteral parasitic diseases in the metropolitan region of Belo Horizonte, Brazil. A cross-sectional study. *Sao Paulo Med. J. São Paulo*, July/Aug 2018, v.136, n.4, 2018.
- Costa, M. A et al. Intestinal parasites in paper money circulating in the city of Diamantina (Minas Gerais, Brazil). *Research and Reports in Tropical Medicine*, p.77–80, 2018.
- Díaz, H. S et al. Enteropatógenos predominantes en reas agudas y variables asociadas en niños atendidos en el Hospital Regional Lambayeque, Perú. *Revista Horizonte Médico, Perú*, fev-mar., v.17, n.1, 2017.
- Esboei, B. R et al. Parasitic Contamination in Commonly-Consumed Vegetables in Mazandaran Province, Northern Iran. *Journal of Human, Environment and Health Promotion*, v.2, n.2, p.89- 95, 2017.
- Fernandes, K. C et al. Contaminação por enteroparasito sem verduras de supermercados e feiras de Umuarama-PR. *Arq. Ciênc. Vet. Zool. UNIPAR, Umuarama*, v. 17, n. 2, p. 115-119, abr/jun. 2014.
- Ferro, J. J. B et al. Avaliação parasitológica de alfaces (Lactuca sativa) comercializadas no município de Tangará da Serra, Mato Grosso, Brasil. *Revista de Patologia Tropical, Goiânia*, 2012 jan.-mar., v.41, n.1, 2012.
- Filho, A. F. M et al. Microbiological and parasitological contamination of hydroponic grown curly lettuce under different optimized nutrient solutions. *Australian Journal Of Crop Science*, v.12, n.3, 2017.
- Gregório, D. S et al. Estudo da contaminação por parasitas em hortaliças da Região leste de São Paulo. *Science in Health* v.3, n.2, p.96-103, maio-ago, 2012.
- Hellmann, M. A.; Velasquez, L. G. Contaminação micro biológica em plantas medicinais e hortaliças e sua implicação no estado de saúde do consumidor: revisão. *Arq. Ciênc. Saúde UNIPAR, Umuarama*, v. 21, n. 2, p. 123-130, maio/ago. 2017.
- Hooshyar, H et al. An Annotated Checklist of the Human and Animal Entamoeba (Amoebida: Endamoebidae) Species- A Review Article. *Iran J Parasitol.*, v.10, n.2, f.146-156, Apr-Jun, 2015.
- IBGE - Instituto Brasileiro de Geografia e Estatística | v.4.3.18.1, 2010. <https://cidades.ibge.gov.br/brasil/ba/licinio-de-almeida/panorama>. Acessado em 02/04/2019.
- Jaramillo, L. M. G et al. Identificación de parasite sintestinales en agua de pozos profundos de cuatro municipios. Estado Aragua, Venezuela. 2011-2012. *Rev Cubana Med Trop, Ciudad de la Habana*, Mayo.-ago 2014, v.66, n.2, 2014.
- Juárez, M. M; Rajal, V. B. Parasitosis intestinales en Argentina: principales agentes causales en el hombre y en el ambiente. *Rev Argent Microbiol.* v.45, n.3, f.191-204, 2013.
- Jung, G. J et al. Parasitose em alface lactuca sativa (asterales: asteraceae) cultivada em pequenas propriedades rurais dos municípios de Capinzal, Vargem Bonita e Lacerdópolis, Santa Catarina, Brasil. *Unoesc&Ciência - ACBS, Joaçaba*, v. 5, n. 1, p. 103-108, jan/jun. 2014.
- Kheirandish, F et al. Prevalence of intestinal parasites among food handlers in western Iran. *Rev. Inst. Med. trop. S. Paulo* v.56, n.2, Mar/Apr. 2014.
- Lima, D. V. M. Research design: a contribution to the author. *Online braz j nurs [Internet]*. 2011 Oct [Cited 2019 Abr 19]; 10(2): Available from: <http://www.objnursing.uff.br/index.php/nursing/article/view/3648>. doi: <http://dx.doi.org/10.5935/1676-4285.20113648>.
- Luz, J. G. G et al. Contamination by intestinal parasites in vegetables marketed in an area of Jequitinhonha Valley, Minas Gerais, Brazil. *Revista de Nutrição.*, Campinas, 2017 jan-fev., v.30, n.1, p.127-136, 2017.
- Machado, R L P et al. Boas Práticas de Fabricação (BPF). Embrapa Agroindústria de Alimentos, 1º edição, Rio de Janeiro, 2015.
- Maldonado, I. R et al. Good manufacturing practices of minimally processed vegetables reduce contamination with pathogenic microorganisms. *Rev. Inst. Med. trop. S. Paulo*, v.61, Feb, 2019.
- Marchi, D et al. Ocorrência de surtos de doença transmitidas por alimentos no Município de Chapecó, Estado de Santa Catarina, Brasil, no período de 1995 a 2007. *Epidemiol. Serv. Saúde, Brasília*, 2011 jul-set v.20, n.3, p.401-407, 2011.
- Mendonça, L. S. Qualidade e segurança alimentar: risco de contaminação por coliformes em alfaces produzidas e comercializadas em feira livre, de Uberlândia – MG. Dissertação, Universidade Federal de Uberlândia, Instituto de Geografia (IGUFU), Ago-2014.
- Mesquita, D.R et al. Ocorrência de parasitose em alface-crespa (Lactuca sativa L.) em hortas comunitárias de Teresina, Piauí, Brasil. *Rev Patol Trop*, 2015 jan.-mar., v.44 n.1 p.67-76, 2015.
- Mohamed, M. A et al. Parasitic contamination of fresh vegetables sold at central markets in Khartoum state, Sudan. *Annals of Clinical Microbiology and Antimicrobials*, v.15, n.17, 2016.
- Moreira, C. C et al. Avaliação microbiológica e parasitológica de hortaliças comercializadas na baixa da luminense, Rio de Janeiro. *Revista UNIABEU*, v.10, n.26, set-dez, 2017.
- Moura, L. R et al. Pesquisa de parasitose em alface e couve provenientes de feiras da região central e suas implicações na cidade de Anápolis-Go. *RESU – Revista Educação em Saúde*. v. 3, n. 2, 2015.
- Nascimento, E. D.; Alencar, F. L.S. Eficiência antimicrobiana e antiparasitária de desinfetante na higienização de hortaliças na cidade de Natal – RN. *Revista do Centro de Ciências Naturais e Exatas – UFESM Santa Maria*, v. 36, n. 2, p. 92–106, mai-ago, 2014.
- Neres, A. C et al. Intestinal parasites in samples of lettuce (Lactuca sativa var. crispata) from the municipality of Anápolis, state of Goiás, Brazil. *Biosci. J., Uberlândia*, v. 27, n. 2, p. 336-341, Mar/Apr. 2011.
- Oliveira, A et al. Doença transmitidas por alimentos, principais agentes etiológicos e aspectos gerais: uma revisão. *Rev HCPA*. 2010 Ago-set; v.30, n.3, p.279-285, 2010.
- Oliveira, R. S. P et al. Prevalência de parasitose em alface em estabelecimentos comerciais na cidade de Bebedouro, São Paulo. *Revista Saúde – UNG – SER*. v.7, n.1-2, 2013.

- Perondi, P. C *et al.* Evaluation of total and thermotolerant coliforms on lettuce self servicerestaurants in Sinop-MT. Scientific Electronic Archives, v.4, p.48-52, 2013.
- Pinheiro, F. C *et al.* Parasitological evaluation of lettuces (*Lactuca sativa*) marketed in a municipality of the western frontier, RS, Brazil. *Journal of Tropical Pathology*, v.44, n.5, 2015.
- Queiroz, A *et al.* Produção de alface americana em função da fertilização com organomineral. ENCICLOPÉDIA BIOSFERA, Centro Científico Conhecer - Goiânia, v.14, n.25, p.1056, Jun., 2017.
- Ramos, A.L.C.S *et al.* Perfil epidemiológico e formas mais eficazes do diagnóstico das enteroparasitoses de importância médica. *Revista Interdisciplinar de Ciências Médicas - Anais - Teresina-PI*.
- Ribeiro, D. F.; Rodrigues, R. S. Evaluation of the hygienic-sanitary conditions in the commercialization of fruits and vegetables in the city of Manhuaçu, Minas Gerais. *Revista Verde de Agroecologia e Desenvolvimento Sustentável*, V.12, Nº 1, p. 85-89, 2017.
- Ribeiro, G. M. R *et al.* Avaliação parasitológica de alfaces (*Lactuca sativa*) comercializadas em feira livre e supermercados na cidade de Muriaé (MG). *Revista científica da família maio-ago 2015*, v.11, n.2, 2015.
- Ribeiro, S.; Furst, C. Parasitological stool sample exam by spontaneous sedimentation method using conical tubes: effectiveness, practice, and biosafety. *Revista da Sociedade Brasileira de Medicina Tropical* may-jun, 2012.
- Santos, A. A *et al.* Factors associated with the occurrence of intestinal parasites in children living in the federal district of Brazil. *Rev Patol Trop*, v.43, n.1, p.89-97, jan.-mar, 2014.
- Santos, A. B *et al.* Avaliação Parasitológica de Couve Minimamente Processada: Riscos Associados ao seu Consumo in Natura. *Rev. Mult. Psic.* v.12, n. 42, p. 933-942, 2018.
- Santos, O. Y *et al.* Hygienic-sanitary quality of vegetables and evaluation of treatments for the elimination of indigenous *E. coli* and *E. coli* O157:H7 from the surface of leaves of lettuce (*Lactuca sativa* L.). *Ciênc. Tecnol. Aliment.*, Campinas, v.30, n.4, Oct./Dec, 2010.
- Santos, P. H. S *et al.* Prevalence of intestinal parasitosis and associated factors among the elderly. *Rev. Bras. Geriatr. Gerontol.*, Rio de Janeiro, 2017, v.20, n.2, p. 244-254, 2017.
- Santos, T. V *et al.* Prevalence and epidemiological aspects of enteroparasitoses in children in Brazil. *Research, Society and Development*, v.8, n.6, 2019.
- Schemes, C. M *et al.* Prevalência de parasitose em alfaces (*Lactuca sativa*) de supermercados de umacidade no sul do Brasil. *Revista Saúde*, v. 9, n.3-4, 2015.
- Silva S. R. M *et al.* Detection of intestinal parasites on field-grown strawberries in the Federal District of Brazil. *Rev. Soc. Bras. Med. Trop.* Uberaba, Nov./Dec 2014, v.47, n.6, 2014.
- Silva, A. S *et al.* Análise parasitológica e microbiológica de hortaliças comercializadas no município de Santo Antônio de Jesus, Bahia (Brasil). *Vigil. sanit. Debate*, 2016, v.4, n3, f.77-85, 2016.
- Sitta, ÉI *et al.* A contribuição de estudos transversais na área da linguagem com enfoque em afasia. *Rev. CEFAC*. 2010 Nov-Dez; v.12, n.6, p.1059-1066, 2010.
- Soto, F. R. M *et al.* Risk factors with the occurrence of parasites and coliform in vegetables from an agroindustry. *Rev. Ceres*, Viçosa, v.65, n.1, Jan/Feb. 2018.
- Souza, A. C *et al.* Perfil epidemiológico das parasitoses intestinais e avaliação dos fatores de risco em indivíduos residentes em um assentamento rural do nordeste brasileiro. *Revista Conexão UEPG*, Ponta Grossa, 2016 jan./abr., v.12, n.1, 2016.
- Souza, G C *et al.* Sanitizing action of triple-strength vinegar against *Escherichia coli* on lettuce. *Hortic. Bras.*, Vitória da Conquista, v.36, n.3, July/Sept, 2018.
- Travieso-Valles, L. E *et al.* Detección de enteroparasitos senlechugas que se comercializan en el estado Lara, Venezuela. *Rev Méd-Cient "Luz Vida"*, v.4, n.1, p.7-11, 2013.
- Trindade, R. A *et al.* Avaliação parasitológica de hortaliças: da horta ao consumidor final. *Revista Saúde e Pesquisa*, v. 8, n. 2, p. 255-265, maio/ago. 2015.
- Uzunlu, S. Effect of active antimicrobial films on the growth of pathogenic bacteria in Mantı. *Food Sci. Technol*, Campinas, Jan./Mar. v.39, n.1, 2019.
