

**Diagnóstico parasitológico de coentros (*Coriandrum sativum* L.) comercializados no
Município de Mossoró, Estado do Rio Grande do Norte, Brasil**

**Parasitological diagnosis of coriander (*Coriandrum sativum* L.) marketed in the
Municipality of Mossoró, Rio Grande do Norte State, Brazil**

**Diagnóstico parasitológico de cilantro (*Coriandrum sativum* L.) vendido en el Municipio
de Mossoró, Estado de Rio Grande do Norte, Brasil**

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Resumo

O objetivo da pesquisa foi diagnosticar a presença de parasitos em coentros (*Coriandrum sativum* L.) comercializados em supermercados e feira livre da cidade de Mossoró, Estado do Rio Grande do Norte. No total foram analisadas 40 amostras de coentros, sendo 20

comercializadas em feira livre e 20 provenientes de supermercados, em busca de estruturas parasitárias por meio da técnica de sedimentação espontânea, seguida por análise microscópica. Foram analisados, de forma aleatória, quatro supermercados e quatro bancas de uma feira livre. Dentre as 40 amostras analisadas, 27,5% (11/40) apresentaram-se positivas quanto à contaminação parasitológica, sendo das positivas 81,8% (9/11) provenientes de feiras livres e 18,2% (2/11) de supermercados. Entre as amostras positivas, foram diagnosticados estruturas parasitárias dos gêneros *Ancylostoma* sp., *Toxocara* sp., e *Strongyloides* sp. Dessa forma, conclui-se que os resultados demonstram que um índice considerável das amostras encontra-se impróprias para o consumo humano, podendo causar malefícios à saúde do consumidor.

Palavras-chave: Saúde pública; Hortaliça; Qualidade; Parasitos.

Abstract

The objective of the research was to diagnose the presence of parasites in coriander (*Coriandrum sativum* L.) sold in supermarkets and open markets in the city of Mossoró, State of Rio Grande do Norte. In total, 40 samples of coriander were analyzed, 20 of which were sold at open markets and 20 from supermarkets, in search of parasitic structures using the spontaneous sedimentation technique, followed by microscopic analysis. Four supermarkets and four stalls at an open market were randomly analyzed. Among the 40 samples analyzed, 27.5% (11/40) were positive for parasitological contamination, of which 81.8% (9/11) came from open markets and 18.2% (2/11) supermarkets. Among the positive samples, parasitic structures of the genera *Ancylostoma* sp., *Toxocara* sp., and *Strongyloides* sp. Thus, it is concluded that the results demonstrate that a considerable index of the samples is unsuitable for human consumption, and may cause harm to the health of the consumer.

Keywords: Public health; Vegetables; Quality; Parasites.

Resumen

El objetivo de la investigación fue diagnosticar la presencia de parásitos en el cilantro (*Coriandrum sativum* L.) vendidos en supermercados y mercados abiertos en la ciudad de Mossoró, estado de Rio Grande do Norte. En total, se analizaron 40 muestras de cilantro, 20 de las cuales se vendieron en mercados abiertos y 20 de supermercados, en busca de estructuras parasitarias utilizando la técnica de sedimentación espontánea, seguido de análisis microscópico. Se analizaron al azar cuatro supermercados y cuatro puestos en un mercado abierto. Entre las 40 muestras analizadas, el 27.5% (11/40) fueron positivas para

contaminación parasitológica, de las cuales el 81.8% (9/11) provino de mercados abiertos y el 18.2% (2/11) supermercados. Entre las muestras positivas, estructuras parasitarias de los géneros *Ancylostoma* sp., *Toxocara* sp. y *Strongyloides* sp. Por lo tanto, se concluye que los resultados demuestran que un índice considerable de las muestras no es adecuado para el consumo humano y puede causar daños a la salud del consumidor.

Palabras clave: Salud pública; Vegetales; Calidad; Parásitos.

1. Introduction

Currently, there is a great concern about food safety, since those can carry physical, chemical and biological hazards. Among those, parasites are important biological pathogens that can be transmitted to the consumer through the food contaminated by it, which may cause parasitic diseases that affect a large part of the population worldwide and because of this are considered an important indicator of public health (Esteves & Figueirôa, 2012; Neves et al., 2016).

As vegetables are usually consumed without cooking in preparations such as salads, it is important to evaluate its parasitological quality, since these foods can be contaminated with endoparasites in several stages that vary from the cultivation stage such as irrigation until commercialization (Esteves & Figueirôa, 2012; Nguyen et al., 2016). Fecal contamination is a key factor in the etiology of endoparasitoses, and the soil, when fertilized with animal excreta, is considered the main source of contamination for these plant products (Germano & Germano, 2011).

Vegetables must be free of parasites, which is recommended by the Brazilian National Agency for Sanitary Vigilance (ANVISA) through the Resolution CNNPA n° 12, from 1978 (Brasil, 1978). However, in most cases, those products undergo an inadequate sanitization, thus allowing the transmission of enteric parasites to the consumer, especially when inadequate hygienic-sanitary conditions are used since the obtaining until the handling (Nguyen et al., 2016; Batista et al., 2020). A common occurrence in free fairs where the foods are exposed for sale in temporary structures, with storage at improper temperature, associated with lack of hygienic-sanitary cares during handling by retailers and customers, which can intensify contamination risks, constituting a relevant fact to the public health (Gregório et al., 2012; Oliveira et al., 2016).

A prominent vegetable in Brazilian culinary is the coriander, being its cultivation traditionally practiced by small producers and its commercialization is common in both

supermarkets and free fairs (Oliveira et al., 2016). Therefore, the objective of the research was to diagnose the presence of parasites in coriander (*Coriandrum sativum* L.) marketed in supermarkets and open markets in the city of Mossoró, State of Rio Grande do Norte (RN).

2. Methodology

Sampling

The research was carried out at the Laboratório de Biotecnologia Aplicada a Doenças Infecto-parasitárias at the Universidade Federal Rural do Semi-árido, being a qualitative laboratory research. The experimental design is a randomized type. A total of 40 coriander samples were randomly collected in the city of Mossoró, state of Rio Grande do Norte, which was 20 from supermarkets and 20 from free fairs. Sampling was carried out weekly, from September to October 2017, at four random supermarkets in different parts of the city and at four stalls at an open market. Five samples were collected randomly from each supermarket and stall, packed in sterile plastic bags identified, placed in isothermal boxes and taken to a laboratory. Each sample of coriander was considered as a sample unit regardless of its weight or size. (Pereira et al, 2018).

Parasitological analysis

The collected samples were individually packed in plastic bags, placed in isothermal boxes and transported to the laboratory for processing and immediate parasitological analysis. Before processing, the roots were removed by manual cutting and discarded, where each sample unit was submitted to transversal cuts followed by the weighing of 100 g of the vegetable (leaves and stem), addition of 250 mL of distilled water, followed by homogenization with the resulting liquid sieved in gauze and submitted to spontaneous sedimentation technique (24h) (Takayanagui et al., 2007). After sedimentation, the supernatant liquid was carefully discarded, and the sediment analyzed in triplicate through a lugol stained slide, using an optical microscope (10 and 40 X).

Statistical analysis

After obtaining the data, these were recorded in Microsoft Excel version 6.2.9200 spreadsheets, being analyzed using descriptive statistics, establishing percentages and using the chi-square method at a 5% significance level, with the aid of PAST program.

3. Results and discussion

Parasites were diagnosed in coriander samples from free fairs and supermarkets. Among the found genus are: *Ancilostoma* sp. and *Toxocara* sp. eggs, besides *Strongyloides* sp. and *Ancilostoma* sp. larvae, associated with cross-contamination by insects (Table 1).

Table 1 - Diagnosis of parasites found in samples of coriander (*Coriandrum sativum* L.) randomly collected in open markets and supermarkets in the municipality of Mossoró, state of Rio Grande do Norte.

Parasites and contaminants	Number of positive samples	
	Supermarket (ns)	Open market (ns)
<i>Ancilostoma</i> sp. Eggs		1
<i>Toxocara</i> sp. Eggs		1
<i>Strongyloides</i> sp. Larvae		2
<i>Ancilostoma</i> sp. Larvae		4
Multiple contamination (<i>Ancilostoma</i> sp, <i>Toxocara</i> sp e <i>Strongyloides</i> sp)	1	1
Insects	1	
Total	2	9

χ^2 (p = 0,17), Source: Authors.

Among the 40 analyzed samples, 27.5% (11/40) were positive regarding parasitological contamination, being 81.8% (9/11) from free fairs and 18.2% (2/11) from supermarkets (Table 1).

Regarding diagnosed parasites, the hookworms (*Ancilostoma* sp.) can cause infections, especially in humans, causing serious public health problems, with contamination occurring through the ingestion of food contaminated with eggs and the contact of the larva present in the environment with the hosts. In the case of *Strongyloides* sp. larvae, the contamination occurs directly by the active penetration of the filarioid larvae in the human skin, causing direct risk to the producer of vegetables. As for *Toxocara* sp. eggs, those hatch in the gastrointestinal tract when ingested, promote the release of larvae that can migrate through the

circulation and reach different tissues of the body, causing Visceral Larva Migrans (Fortes, 2004; Neves et al., 2016).

A possible explanation for parasitic contamination detected in the present study is the probable irrigation with contaminated water or the lack of hygienic-sanitary cares during the handling, storage and distribution of this food (Nguyen et al., 2016; Tefera et al., 2018). Melo et al., (2011), showed the direct relation of higher contamination rates in lettuces submitted to different handling methods.

Moreover, the coriander has a structure that allows a good surface contact with the parasite when it is compared to other vegetables, which facilitates its contamination. The soil particles, which can carry parasites, or the contaminated irrigation water, end up lodging in the leafy vegetables, allowing the presence of gastrointestinal parasites such as helminths and protozoa (Nguyen et al., 2016; Oliveira et al., 2016).

When comparing the contamination between supermarkets and the free fair, it was observed a higher incidence in the studied fair, probably because the aseptic conditions during the food commercialization are considered inadequate, a fact that directly assists in the process of contamination and proliferation of enteroparasites (Almeida & Pena, 2011). In this context, the vegetables sold in these places may present a certain degree of contamination of their products, causing risks to the public health of those who consume it without proper sanitation (Coutinho et al., 2015).

Esteves & figueiroa (2012) investigated in their study parasites in vegetables from free fairs in the city of Caruaru, noting that 19% of the evaluated coriander samples were contaminated. Oliveira et al., (2020) found a contamination rate of 87.5% by parasitic structures in coriander in the city of Piripiri in the state of Piauí. Gregório et al., (2012) when evaluating the presence of parasites in vegetables from the eastern region of São Paulo, detected parasitic structures in 55% of the evaluated samples.

Concerning the cross-contamination by insects found in one sample in this study. It is a relevant result, since, when consuming without proper sanitization, it can be ingested and may cause a problem to the consumer (Silva et al., 2016). However, it is a common finding because of the large number of mites and insects which have thousands of representatives living in the same environment where the vegetables are sown, including a similar diagnosis in other studies about vegetables in Brazil (Santana et al., 2006).

In order to promote the Food and Nutrition Security for the consumer, long-term changes by the Epidemiological Surveillance are being implemented in order to reduce the incidence of infectious and parasitic diseases, which emphasize the basic sanitation actions,

changes in food production technology, besides promoting the population's health education (Silva et al., 2016). In this context, associated with the fact that the coriander is a vegetable widely consumed in food and in the herbal remedy form (Mandal & Mandal, 2015), it emphasizes the importance of parasitic researches concerning this species in Brazil, so that its nutritional potential is not compromised by the lack of safety.

However, the research pointed out that both coriander sold in open markets and in supermarkets had parasitic structures contaminating this food. This result implies that hygienic-sanitary conditions are being neglected, demonstrating that the population of the city of Mossoró-RN is supposedly exposed to several debilitating diseases, since food becomes vehicles for the transmission of the biological agents that cause them. For this reason, care with proper hygiene must be adopted.

4. Final Considerations

Parasitic eggs and larvae were found in coriander from free fairs and supermarkets, which characterized these contaminated samples as improper for consumption because it represents a risk to the consumer health.

This result demonstrates the need for continuous studies related to the quality of such foods, aiming to control the levels of contamination and consequently the transmission of diseases through food, providing the consumer with a safe product.

The survey data emphasize the lack of knowledge on the topic of parasites and Foodborne Diseases (DTAs) by small and large traders, as well as by the population. This turns out to be a side effect of socioeconomic factors in underdeveloped countries. With this in mind, it is necessary to conduct studies that address this issue in order to educate and inform them about correct ways of cleaning and distributing such foods.

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