

# The intellectual scales of environment: Agricultural pests and public sphere in 19<sup>th</sup> century Portugal

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**KEYWORDS:** biological invasions, agriculture, newspapers, Portugal.

**JEL CODES:** N53, N90, Q15, Q50.

*Studies and research on biological invasions have acquired increasing attention in environmental history. However, the acknowledgement of certain specific cultural markers –such as the press– has been hitherto limited in such works. In light of this, this paper seeks to evaluate the importance of regional Portuguese newspapers in studying plant pests and agricultural diseases through a substantial corpus of publications produced between the 1850s and 1910s. This article looks at three newspapers Jornal de Penafiel (1890-1914), the Damião de Goes (1886-1914) and the O Elvense (1880-1904) in order to establish the informative potential gleaned from these types of sources in different regions in the north, centre and south Portugal respectively.*

*The results highlight the importance of vine diseases (phylloxera, mildium, oidium) in the examined journalistic narratives. Nevertheless, other pests (potato blight, chestnut blight, brown rot) or bioinvaders (locust) were also important parts of these discourses. The results of this research reveals just how closely directed periodical press and diffusion of technical knowledge were in the strategies and attitudes against agricultural pests, showing that science was incorporated into the relationship between State and the rural communities.*

## Las escalas intelectuales del medio ambiente: plagas agrícolas y esfera pública en el Portugal del siglo XIX

**PALABRAS CLAVE:** invasiones biológicas, agricultura, periódicos, Portugal.

**CÓDIGOS JEL:** N53, N90, Q15, Q50.

*Los estudios e investigaciones sobre las invasiones biológicas han ido adquiriendo importancia en la historia ambiental con ejemplos recientes, pero no han tenido en cuenta algunas referencias culturales como la prensa. El objetivo principal del artículo es analizar la importancia de los periódicos regionales portugueses para estudiar enfermedades agrícolas, basándose en un corpus documental publicado entre las décadas de 1850 y de 1910. A partir del estudio de tres periódicos (Jornal de Penafiel, entre 1890 y 1914; Damião de Goes, entre 1886 y 1914, y O Elvense, entre 1890 y 1904), se ha revisado el contenido de la información disponible en este tipo de fuentes para diferentes regiones del norte, centro y sur, respectivamente.*

*Los resultados muestran la importancia que la narrativa periodística dio a las enfermedades fúngicas en los viñedos (filoxera, mildiu, oidio). No obstante, otras enfermedades (de las patatas, de las castañas o el brown rot) y otras especies invasoras (langostas) ocuparon también una parte importante de esos discursos. El texto demuestra las estrechas relaciones existentes entre la prensa periódica y la difusión de conocimientos técnicos como estrategia de lucha contra las plagas agrícolas, y muestra también que la ciencia se incorporó en ese periodo a las relaciones entre el Estado y las comunidades rurales.*

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## 1. INTRODUCTION

In recent decades historians have become progressively aware of the importance of environmental history. In this respect, various studies have shown how *the living and non-living systems of the Earth have influenced the course of human affairs* (Hughes, 2003: 24). New themes and forms of analysis have emerged from this approach to the past, with attention being turned to threats to vulnerable ecosystems and resilience, resulting in bioinvasions (Johnson, 2010; Queiroz & Pooley, 2018; Rotherham & Lambert, 2013), natural hazards or ecological losses becoming matters of study. Questions have appeared regarding major threats to the preservation of biodiversity and to human activities, addressing matters that need to *be integrated into historical narratives as well* (Lübken & Mauch, 2011: 4). The categories of *exotic*, *invasive* or *alien* –as expressions of the same phenomenon– can no longer be employed only in biological studies and it is important to understand them from a historical perspective. In light of this consideration and, more specifically, enhanced analysis, the causes of changes to ecosystems can be obtained through addressing the following question that is common to environmental historians: namely [...] *how do movements of organisms from one place to another change those places?* (Stewart, 2016: 209).

As such, when seeking to comprehend the historical actions in and of these ecosystems, it is important that cultural variables are taken into account with a view to producing an understating of social perspectives (Rotherham & Lambert, 2013). The study of so-called *bioinvaders* is a field where a number of scientific areas could usefully contribute to a more holistic understanding of the phenomena, *analysing the interaction between humans and their environment in a reciprocal way* (Coclanis, 2019: 197). For those who explore agricultural dynamics by way of a diachronic approach, interdisciplinary investigations into the circulation of concepts is fundamental.

The research presented here draws on and contributes to the history of agriculture and environmental history, making use and exploring one of the most representative characteristics of modern societies: newspapers and their role *on the genesis of the bourgeois public sphere* (Habermas, 1991: 14-26). Following theoretical reflection, through focussing on three specific examples, this article discusses how these local sources described agricultural pests in order to consider two key aspects: firstly, the social perceptions and responses to plant pests and, secondly, the uses of scientific discourse in the State-building process and the associated relationships between the *centre* and *periphery*.

This article consists of four parts. The first section explores the social, political and economic contextualization of Portugal under the liberal regime, including the importance

of pests in these dimensions. The second part investigates the sources consulted during the research and the methodology adopting during their scrutiny. The third section presents the analysis of the case studies; the final part discussing the results, within their broader context.

## 2. AGRICULTURAL PLANT PESTS IN THE PORTUGUESE SOCIO-ECONOMIC AND INSTITUTIONAL CONTEXT

Throughout the so-called *long 19<sup>th</sup> century*, the Portuguese economy was based on the primary sector in terms of employment and production. As Pedro Lains demonstrates, during this chronological period, the early decades of the 19<sup>th</sup> century saw, *a slight decline in output followed by a period of relative stagnation [...] After 1880, agricultural output entered a phase of sustained growth that lasted until the beginning of the twentieth century* (Lains, 2003: 47). The weakness of this economic sector was readily apparent, namely the absence of mechanization and technical innovation. However, certain external factors could also jeopardize their performance, such as biological invaders<sup>1</sup>.

In this way, based on the exploration of natural resources Portugal encountered several agricultural pests which had a significant impact on rural economies that raised concerns, nurtured political and scientific discussions, and fed into different responses amongst the population, local powers and the authorities. In the case of Europe, the impact of pests is of importance owing to the economic implications for agriculture, and of which Portugal is a particularly good example. Although some countries in the north of Europe already had considerable levels of industrialization (*e.g.* Great Britain or Germany), most of the population in southern Europe (*e.g.* Spain, France, Italy, Greece) worked in the primary sector and lived in rural areas, with low levels of urbanization in these countries. Any environmental disruption could endanger harvests therefore resulting in a series of harmful consequences, such as the fall in production, rising prices and considerable economic losses to landowners and producers. In this way, the occurrence of pests is an important element to study, not only in terms of agriculture, but also of the socioeconomic structures themselves and the institutions that dealt with environmental issues<sup>2</sup>.

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1. According VALÉRY *et al.*, *A biological invasion consists of a species' acquiring a competitive advantage following the disappearance of natural obstacles to its proliferation, which allows it to spread rapidly and to conquer novel areas within recipient ecosystems in which it becomes a dominant population* (2008: 1349).

2. For an analysis about the environmental management in Portugal in the 19<sup>th</sup> century, see MELO (2007).

These invasive species and plant pests were not an exclusively Portuguese phenomena and had truly continental dimensions. To give just one example, phylloxera (*Daktulosphaira vitifoliae*) had its origins in America but spread into Europe and the first signs of its presence detected in France between 1863 and 1864, in the city of Orange and in the region of Bordeaux. Indeed, in the 1870s, the disease affected the most European countries, particularly Spain, Austria, Switzerland, Germany, Hungary and Italy. This situation had a profound effect on wine production, thereby contributing to the creation of some solutions. One of the resolutions to end this agricultural crisis was the Congress of Lausanne in 1877, in which the aforementioned countries were represented and the intention was to discuss ways to control and minimize the harmful effects of this problematic pest. Another example was the Moroccan locust (*Dociostaurus maroccanus*) that, through their migratory currents, attacked north African territories, Portugal, Spain and France, in the late 19<sup>th</sup> century, resulting in the promotion of control practices to tackle recurrent insect outbreaks (Gomes, Queiroz & Alves, 2019).

The repercussions of biological invasions or alien species was also felt in other geographic areas outside of Europe in many periods. Here are some examples, according to some recent bibliography. In the first years after the independence, the Hessian fly invasion was *the first new environmental problem confronted by citizens of an independent United States, the insect shaped American naturalists' terminology, imagery, and expectations* (Pauly, 2002: 486). In Asia, in early years of the 20<sup>th</sup> century, the British colonial administration fought the spread of the water hyacinth in Bengal, showing *a wealth of competing players are at work, contradicting one another, struggling over bureaucratic power and funding, and attempting to further and extend their administrative reach* (Iqbal, 2009: 36). And even in South Africa, during this same period, *vigorous campaigns [were made] to preserve "virgin" indigenous vegetation against invasion by "alien" interlopers and damaging practices* (Pooley, 2010: 605).

Considering this aspect and to ensure that rural communities and their populations benefit fully from State protection during the outbreaks, a combination of measures was considered by governments. In the Portuguese case, during the 19<sup>th</sup> century, this objective was also achieved through private initiatives pursued by some individuals (farmers, agricultural owners, producers) and some structures, such as associations, *adegas regionais* (regional wineries) or *sindicatos agrícolas* (agricultural unions). From a sociological point of view, if we look at the economic elites' involvement, the *gentlemen farmers* were the best example in that aspect. The Visconde de Chanceliros, in his farm in the Douro region, carried out several scientific experiments intended to regenerate wine production, despite being ultimately unsuccessful. Also, in the Douro, Joaquim Pinheiro de Azevedo tried some processes with the same objective. From the scientific perspective, through the publica-

tion of articles and dissemination brochures, several agronomists sought to demonstrate the best processes to combat diseases and agricultural pests. However, *it is difficult in any case to sustain a high level of activism, especially when the state offers an institutionalized alternative* (Flader, 1998: 15).

The State intervention in these agricultural pest issues reveals some weaknesses, not regarding the importance given to this type of environmental and climatic events and in the notion of risk, but in terms coordination and control processes. As Ulrich Beck wrote: *risk consciousness and activism are more likely to occur where are a direct pressure to make a living has been relaxed or broken* (Beck, 1992: 53). The agricultural pests studied directly affected very important sectors of the economy of the time, mainly wine and cereals, but also those with lesser economic significance, but very relevant for exports, such as fruits and vegetables. This had clear consequences for the economic stability and even created demographic changes, such as the increase of emigration in the Douro area after the phylloxera period. A newspaper from Évora describes that situation in the following terms:

*The inhabitants of the villages destroyed by the phylloxera continue to abandon their homes, emigrating, mainly to Brazil, and families who, having once lived in abundance, extend their hand to public charity today.<sup>3</sup>*

According to this scenario, although an internment form, the State took measures, with some signs in the modernization of the means of action but *the affirmation of the state as pater territorium would result from a long process of changing mentalities* (Melo, 2007: 178). Territory policies as systems of centralizing power have encountered some obstacles in everyday practice. Regulation of property rights in land was, in different historical situations, consistently an issue for negotiation and conflict, a fact that was reinforced in the context of an agricultural crises, the State attempting to enforce regulations that would create a circumscribed system that followed specific procedures. Underlying all this were the ideals of persevering private property, *the most solid foundation of political rights* (Hespanha, 2004: 466), meaning that the Portuguese liberal State could not impose unilateral measures to prevent further damage caused by agricultural diseases and pests. The management of the problem had to find ways to circumvent the obstacles posed by the people's common experience and the prevailing political mind-set.

One of the key issues for all these questions concerns the belief in the benefits of progress. As David Justino wrote: *recognizing that living in an age of uncertainty, the only*

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3. *O Manuelinho de Évora*, 4 (156), 15/01/1884, p. 2.

*references of the future were science, as a guide for the way forward, work and technology, as driving forces of this march of humanity in search of civilization* (Justino, 2016: 57). Throughout the period analysed in this article, the associated political factors are not difficult to identify. The State was trying to correct a weak social and economic situation and did so by generating a structure that required different behaviours from citizens that were more participative and cooperative. There was an investment in agricultural extension to raise producers' awareness of the importance of fighting the diseases through scientific expertise, which means, in many cases, adjusting and promoting the reliable information published in the newspapers. This led to an attempt to reduce the asymmetry between farmers and agronomists. In addition, government leaders and local officials embraced a vision of "social modernism" with a bottom up approach to public policy, creating variations from region to region. As a result of these two combined factors, it is possible to determine that agricultural change did not occur uniformly across time and space. In the case of the elites, the use of pesticides, plant breeding and other treatments reached a consensus in the regional social scene through the adoption of an explicitly modernizing position. By contrast, in many other places, some specific economic and social conditions led farmers to accept, reject, or respond to the new treatments. Its effectiveness in the short term demonstrated the problems with the objective of "modernizing" agricultural management.

Once again, taking the fight against phylloxera as an example, with the emergence and recognition of this pest in several parts of the country, a number of structures were created such as *comissões concelhias de vigilância* (surveillance committees), *viveiros* (vine-nursery), *postos antifiloxéricos* (antiphylloxera stations) and *postos experimentais de ampelografia* (experimental ampelography stations). Some legal measures were also taken such as, for example, the treatment of vines against phylloxera becoming mandatory, with the decree of June 22, 1880. The importance of agricultural pests and diseases has been recognized in other respects. It should be noted that the measures taken for the grapevine diseases have had some negative consequences for the wine trade, the replanting of the vineyards eventually creating an overproduction that could not find a consumer market, leading to a fall in prices, clear signs of crisis in the sector emerging in the early 20<sup>th</sup> century.

Events of this type have experienced several repercussions, namely, the presence of news in the printed press. The spreading of the periodical press is directly link to the affirmation of the Portuguese liberal State and the construction of public opinion was conducted through newspapers and magazines. The bourgeoisie, the social basis of liberalism, found mechanisms to enforce their ideas and visions about the economic-political reality, using their own information channels, with newspapers were the cornerstone for

the accomplishment of this objective. Metamorphoses in the dissemination of reading and the press it is a movement in which *law, economics, literature, science and technique and politics, leave the sphere of knowledge and conversation of literate individuals, to be known and debated by the general public* (Espada, 2004: 8).

In this context, the use of the concept *useful knowledge* becomes associated with the movement of scientific diffusion, and journalistic work is one of the best means to fulfil this purpose. Erudition becomes more associated with popular culture through a *widening of the public and the reproducibility of cultural goods, which progressively would be witness by the advance of industrialization and capitalism* (Santos, 1988: 700). This awareness of culture and science as a beneficial factor in the development of nations is a common characteristic of liberal regimes, the origins of which go back to the Enlightenment. Portugal was part of this movement, with special relevance in the second half of the 19<sup>th</sup> century, as a country not completely estranged to from the technological fervour whose direct objective was the change of economic activities, and where agriculture was also present.

Besides being the main economic activity, from the scientific point of view, the agricultural sector *is in the centre, in close relation with several disciplines [...] promotes, and disseminates science in various fields* (Lisboa, 1991: 101-02). The study of agriculture, namely of agronomy, is closely related to physics, botany, chemistry and veterinary sciences. These are some of the areas that newspaper articles alludes to, since mentioning pests and their fighting becoming important aspects for the study of agricultural pests in various regions (Marques, 1998). Also, during the 19<sup>th</sup> century, the struggles for environmental justice were sought from the *mobilisation of public opinion through the local or regional press* (Guimarães, 2020: 7). In this sense, before the Ecological Era, environmental awareness was a reality, and newspapers played a substantial part in this movement.

Regional newspapers published in district capitals or in other medium-sized cities and towns (such as Elvas and *O Elvense*, Cantanhede and *Jornal de Cantanhede*, or Alenquer and *Damião de Goes*) were read, as a matter of priority, by the local public. The main core of these publications responded to the interests of the population to whom they address. Some have regular columns with agricultural news, such as the *Jornal de Penafiel* and its “Secção Agrícola” (1889-1907), or *Damião de Goes* and its sections “Pela agricultura” (1886-94) and “Secção Vinícola” (1886).

Having established this framework for discussion and the objectives of this article, it is necessary to comprehend the importance of newspapers from two perspectives. Firstly, understanding the relevance of newspapers as a vehicle for disseminating information on



events and new knowledge and, secondly, as a basis for historiographical investigations. The use of periodic press as a historical source has gradually become increasingly usual, particularly in studies of the contemporary period and there are several cases confirm this situation. In the scientific and academic production around these problems, some works stand out (Alves, 1992, 2000; Lousada, 1989; Tengarrinha, 1965, 1993). On the local and regional press, the following examples are also highlighted (Baía, 2002; Nobre, 1992; Nunes, 2001; Reis, 2000; Santos, 1988; Serrano, 2005; Tengarrinha, 1999). In order to analyse agricultural changes and environmental dynamics that happened in regional contexts, it is important to understand the full implications of plant diseases, even in their cultural sense. However, collecting data from local newspapers has not been properly explored, although some recent works have sought to address this situation. For example, newspapers of Madeira archipelago were used to gain a better generic understanding of the Argentine ant invasion's effects, the feedback of populations and of the authorities in this regard (Queiroz & Alves, 2016). The same conceptual and documental framework was applied to the case “orange tree devourer” (*Coccus hesperidum*) in Azores (Queiroz & Alves, 2019).

It is possible to say that *modernizing agriculture and civilizing the rural population were two sides of a same policy* (Vivier & Petmezas, 2008: 15) and the press has an enormous impact in terms of accomplishing these objectives. Several newspapers specialized in the area of agriculture appeared to indicate *the evils of which it suffered and proposing measures for its development* (Tengarrinha, 2013: 787). Therefore, in addition to pamphlets and periodicals dealing specifically with agricultural issues<sup>4</sup>, columns and articles of agronomists, farmers and journalists appeared in several generalist newspapers. During this period, besides the informal mechanisms, such as the relations between farmers and scientists, *there was a fundamental concern to the research of lessons of agriculture, of knowledge with scientific support that were presented to readers with a high degree of systematization* (Nunes, 2001: 217).

### 3. SOURCES, MATERIALS AND METHODS

The research presented in this article emerges from investigations of the project “PPESTS- Introductions, invasions and control measures of plant pests in Southern Europe: An interdisciplinary comparative approach from the 19<sup>th</sup> century onwards” (<http://ihc.fcsh.>

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4. There are many examples of that kind of publications during the 19<sup>th</sup> century: *Agricultura Portuguesa*; *Boletim da Real Associação Central da Agricultura Portuguesa*; *Gazeta das Aldeias*; *Jornal de Horticultura Prática*; *Jornal Hortícola-Agrícola*; *Portugal Agrícola*; *Revista Agronómica*, etc.

unl.pt/project/ppests-projecto/) and the direct reading of the newspapers, a corpus of articles and reports published in the regional press about the pests and plants diseases. These were compiled and classified in a database that was made available in open access (<http://www.fcsh.unl.pt/pragasnosperiodicos/>). This article concerns the analysis of recorded data centred on the territory of mainland Portugal. Starting from this territorial set, the process of construction of the used sources was realized through close reading of all copies filed in the General Fund of newspapers at the Biblioteca Nacional de Portugal (National Library of Portugal). News about pests and plants diseases, transcription and classification were identified with “labels”: descriptors that allowed searching by date, pest or disease, and associated topics.

The analysis proceeds in around three main objectives. First, to evaluate the representation of news about plant pests and diseases in the 19<sup>th</sup> century regional weeklies. As a way for thinking about social and economic issues, newspapers establish a certain type of looking at agriculture that it is important to recognize. More specifically, we are interested in the differentiation of mental constructions and cultural concepts behind the discourse about pests. Second, this article seeks to address the implications of biological invasions on local communities, from political claims, the circulation of ideas and scientific treatments, as well as phenomena based on superstitions and religious behaviours. Finally, this paper interprets articulations between the local and international dimensions owing to the spread of these agricultural pests beyond national borders.

In order to achieve these objectives, our work was based on certain issues such as the journalistic discourse about the geographies of invasions, the understanding and reaction of the populations to the outbreaks of plant pests, the relationships established between occurrences and meteorological conditions, and perceptions of the magnitude of crop losses.

This set of research intentions aims to extrapolate the nature of highly restricted historical subjects. With this purpose, the perception of political dynamics as the reaction of the central state and analysis of its actions towards the pests and diseases become more intelligible and demonstrates the multiple faces that governmental institutions had during the period in which the liberal State and all its bureaucratic-administrative apparatus were being constructed.

The main methodological mechanisms used in this paper were weekly or biweekly newspapers. With the application of this condition, we certified the perception of the durability of the issues analysed. The example of phylloxera that took place in our period of analysis is expressive. Region by region, as the disease has advanced from the north to the

south, is possible to make a contextualization to chronologically frame the theme (*i.e.* its spread in rural areas).

**TABLE 1**  
**Regional newspapers in Mainland Portugal**

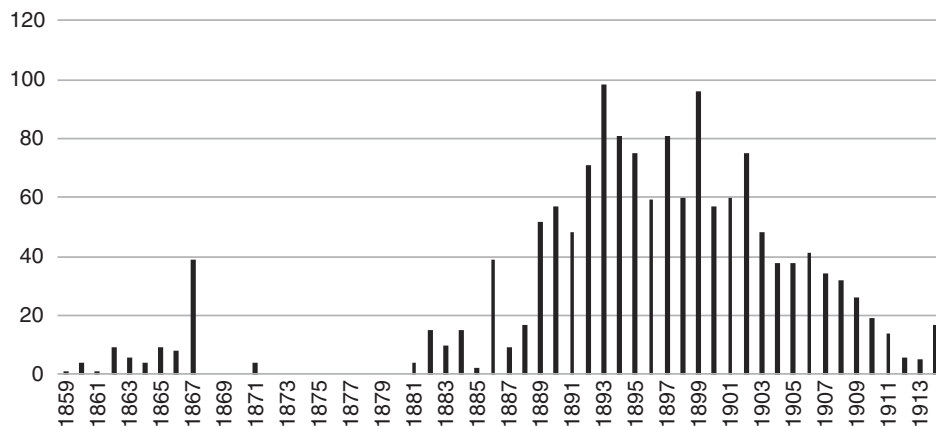
<b>Title</b>	<b>Period consulted</b>	<b>Number of records</b>
<i>A Defesa da Beira</i>	1893-1903	28
<i>A Plebe</i>	1902-1909	35
<i>Jornal da Louzan</i>	1885-1898	76
<i>Jornal de Cantanhede</i>	1889-1914	292
<i>Jornal de Penafiel</i>	1890-1914	238
<i>Nove de Julho</i>	1894-1908	97
<i>O Apóstolo da Verdade</i>	1870-1871	4
<i>O Bracarense</i>	1904-1913	8
<i>O Distrito de Faro</i>	1902-1906	26
<i>O Elvense</i>	1881-1896	101
<i>O Jornal do Norte</i>	1864-1867	22
<i>O Bejense</i>	1867-1897	45
<i>O Manuelinho de Évora</i>	1882-1902	121
<i>Algarve e Alentejo</i>	1902-1904	11
<i>A Folha de Beja</i>	1900-1907	11
<i>O Vimeirense</i>	1858-1868	22
<i>O Povo d'Ovar</i>	1886-1893	11
<i>O Commercio da Guarda</i>	1898-1904	12
<i>O Mirandez</i>	1894-1897	6
<i>Damião de Goes</i>	1886-1914	301
<i>O Nordeste</i>	1890-1906	19
<b>TOTAL</b>		<b>1.486</b>

Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

Figure 1 shows the period studied and there is a very clear preponderance on the 1890's and 1900's, decades in which the pests had already spread throughout a large part of the country, a situation that was deeply noticed by the population and, consequently, by the press.

Of all the newspapers consulted during the research, this article draws on three in particular: the *Jornal de Penafiel*, *Damião de Goes*, and *O Elvense*. The selection of these case studies was motivated by the intention to construct two criteria: the length of the period of publication and the territorial coverage of the country (*i.e.* including the main areas of the north, center and south) respectively.

**FIGURE 1**  
**Records' chronological distribution in all the newspapers**



Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

The dissemination of news concerning agricultural pests, practices and treatments to mitigate or fighting them was varied and crossed several regions. Table 2 shows the five most frequent pests or diseases identified in our corpus. From this set of pests, those that stand out the most are those that mostly affected the wine culture in 19<sup>th</sup> century Portugal: mildew (n=402), phylloxera (n=391) and oidium (n=205). There is also the generic name *vine pests* which appears in the news where the affected crop is identified but not the agent that causes it.

**TABLE 2**  
**Most often mentioned pests in the corpus (n= 1486)**

Plague	Scientific name	Number of records	% of the total
Mildew	<i>Plasmopara viticola</i>	402	27
Phylloxera	<i>Daktulosphaira vitifoliae</i>	391	26
Oidium	<i>Oidium anacardii</i>	205	13
Locusts	<i>Locusta migratoria</i>	182	12
Vine disease	(agents not identified)	79	5

Note: 17% corresponds to Other pests.

Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

Table 3 shows the five thematic “labels” of pests and diseases most frequent in the corpus. Looking at the main pests mentioned in the consulted newspapers, it was possible to reconstruct an image of the realities of Portuguese agriculture in the 19<sup>th</sup> century, indicated a country that excels in wine culture but also in cereals, although other sectors were also marked as fruit (chestnuts) and vegetables (potatoes).

Through the number of registrations, it is possible to understand perceptions of the importance and divulgation on methods capable of combatting agricultural pests (42% of the total records). In addition, the regional progression of the same pests occupies a large part of the journalistic records that were analysed. The concern with the treatments triggered the collection of information that was not limited to the local view.

Normally, several bibliographical references were used to record the news, with different origins, whether they were national newspapers or foreign scientific publications. A particular use of French magazines was noticed. The circulation of knowledge was a characteristic of this period, establishing scientific channels and institutional mechanisms in order to fulfil that objective. A feasible conclusion is that *during the 19<sup>th</sup> century technology itself became a fundamental element for the invention of a new shared culture* (Saraiva, 2007: 264) and newspapers had an important role in this area, which can go a long way in explaining why the use of French publications was a common reference to the Portuguese newspapers, alongside British and German publications.

Through the *geography of invasion*, a territorial approach emerges by locating the outbreaks of the various pests. Through the number of references, it is concluded that, at the time, the progression of pests was of key concern for those who wrote the articles. The places where the information had its origins was diverse: farms, villages, peri-urban areas, and even foreign countries, either from the European continent or from other points such as Asia or Africa.

Crop losses (17%) were also an important subject showing how the local press perceived the environmental and economic impacts. This type of consequences could be indicated by the numerical data or only through the perception of the authors' view. When the data were present, losses were calculate based on production from previous years.

Forms of disease control (12%) also occupied an important part of the news texts. Through this type of reference, methods for the treatment of diseases were often taught, even with pictures. Above all, the measures taken to control the consequences of pests were the central topic. There was also mentions to the creation of special legislation for the problem, like local taxes and various fees<sup>5</sup>. From the State point of view, agents' control strategy in the rural territories was sending missions to the affected areas, composed of agronomists or a specially empowered inspector for a better understanding of the diseases.

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5. A law of May 29, 1884 created subsidies to compensate priests in the parishes of the Douro wine region invaded by phylloxera. Another law, dated August 13, 1889, provided for the annulment of the property tax, due to the losses caused by the plant disease.

These situations also appeared in our research and were included in the aforementioned label.

**TABLE 3**  
**Thematic labels more often mentioned in the corpus (n = 1495)**

Theme	Number of records
Treatments	634
Geography of invasion	450
Bibliographic references	341
Losses	258
Control	182

Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

#### 4. CASE STUDIES

In order to illustrate more clearly the previous considerations, three case studies from different regions of Portugal were selected: namely *Jornal de Penafiel* from the north, *Damião de Goes* from the center, and *O Elvense* from the south.

##### 4.1. *Jornal de Penafiel* (1890-1914)

The *Jornal de Penafiel* was a twice-weekly periodical published in Penafiel, between October 29, 1886 and June 25, 1964. For reasons relating to the availability of the source, the search was not possible for the years 1902, 1903 and 1912. The 237 reports mentioning identified plant pests and diseases were distributed very irregularly throughout the period investigated. They were found in all 21 years that could be consulted, with a minimum in 1910 (n = 2) and a maximum in 1893 (n = 29). The annual average was 11 news items.

Figure 2 maps the three most frequently mentioned pests: mildew, phylloxera and locusts. Starting with the vine diseases, mildew –classified as *an enemy that must be fought before it gives a sign of existence*<sup>6</sup>– is found in 34% of the total and has records in 18 years (21 years), appearing early in the 1890s (1891-96) and continuing thereafter with a new peak in 1904-07. Phylloxera is found in 15% of the total and has records in 11 of 21 years. There is a prevalence in the 1890s, especially in the early years. These two diseases seem

6. *Jornal de Penafiel*, 8 (50), 20/04/1894, p. 1.

to have been those that most affected this region of the country, although situations in other areas were also reported. It is important to realize that this impact was so intense that the press dedicated significant attention.

Locusts are found in 10% of the total and have registrations in nine of 21 years. As the available data suggest, the distribution of news diverges over time depending on the outbreaks. Much of the news refers to other areas of the country, where cereals crops had some economic importance, especially in the south of Portugal (Alentejo). Sometimes, measures focused on actions to promote the fight against these biotic agents were mentioned:

*They left for the Algarve, by determination of the Minister of Public Works, Mr. Anastácio Monteiro, the head of the agronomic services division, and the veterinarian Mr. Mendonça Brandeiro, who will try to put into practice the measures considered necessary in order to combat the next invasion of locusts<sup>7</sup>.*

It is important to remember that we should not disregard the role played by other regions across the globe in the press perceptions of the problem. Other news focused on specific areas in which locust caused problems. A good example of this is the African continent, specifically Mozambique, where *the terrible plague of locusts destroyed everywhere palm plantations<sup>8</sup>*, or even Morocco where, in 1891, *the emperor determined that the people of the interior work for the extinction of this cursed plague<sup>9</sup>*.

News of other pests and plant diseases account for 41%, including potato disease, aphid, cork disease and chestnut disease, amongst others.

Looking for the major pests described in the newspaper, we can observe the predominance of vine diseases. This is not surprising because Penafiel is situated in a wine-growing area (the Douro region). According to the reports of the time, this area was, after France, one of the first regions of Europe affected by phylloxera (Oliveira, 1880: 23), a problem that began in 1863 and continued until 1885, with most of the countries of the Mediterranean area attacked (Freitas, Dias & Pereira, 2002: 20). Conceição Andrade Martins refers that *it turns out that the phylloxera didn't had, in the trade, the influence that had in the production* (Martins, 1990: 111). The economic consequences of these diseases were mainly local, affecting a large number of producers and *the social costs were enor-*

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7. *Jornal de Penafiel*, 13 (44), 31/03/1899, p. 2.

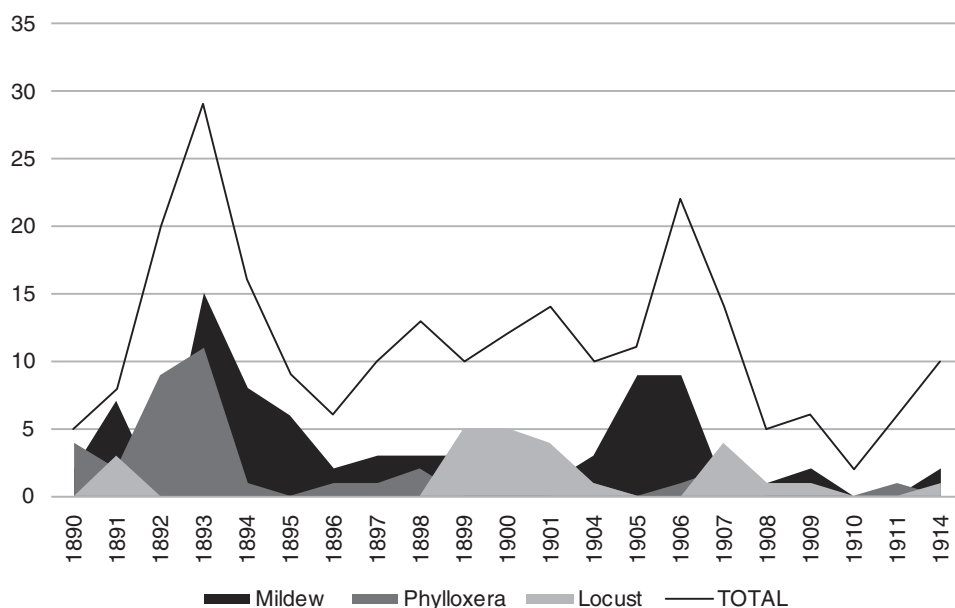
8. *Jornal de Penafiel*, 21 (42), 22/03/1907, p. 3.

9. *Jornal de Penafiel*, 5 (63), 09/06/1891, p. 1.

*mous* [causing] *sensible changes in the structure of the property of Douro* (Pereira, 2010: 168). Evaluating the full repercussions of changes for smallholder agriculture requires an analysis of how agricultural practices were affected by the phylloxera. This disease, in the Douro landscape, created new developments in vine plantations, bringing major global shifts in land use, in direct relation with the treatments used at the time.

**FIGURE 2**

**Number of records on mildew, phylloxera and locusts (and total pests and diseases) identified in the *Jornal de Penafiel* over the analysed period**



Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

In the *Jornal de Penafiel*, the thematic label *treatments* correspond to 47% of the records ( $n = 111$ ) (Figure 3). They are more frequent in the 1890s and, once again, with a higher frequency of vine diseases, where for phylloxera the news refers to the application of chemicals, syrups, and grafts, similar to what happened with mildew. The war against the pests and the treatments associated with them led to *agronomists recreated Douro vineyards as a laboratory space* [and] *the results of such experiments fundamentally reconceptualised perceptions of landscape* (Macedo, 2011: 166-67).

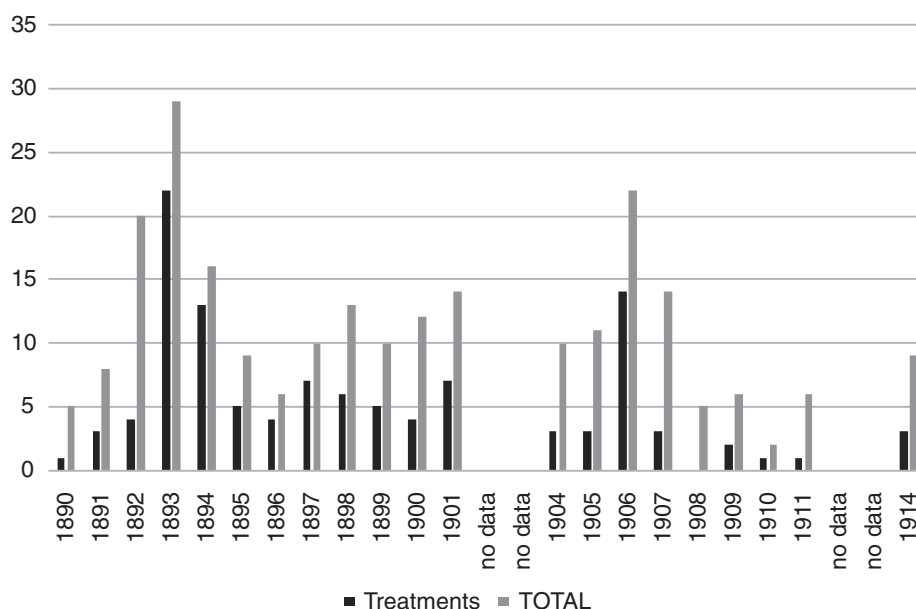
The treatments that were used consisted of chemical process and the soil readapting to new types of vines. The high mortality caused by phylloxera resulted in the introduction of one of the biggest changes in viticulture (grafting) with national (European) grape



varieties were grafted onto American grape varieties (phylloxera resistant). At the time, *we have the three main methods of vineyard conservation: insecticides, submersion or planting in sands and planting American vineyards*<sup>10</sup>. It is important to underline the role of the elite actors who appearing in this context in the success achieved by some experiences, such as grafting. They were, in effect, the experimental framework by which the scientific solutions to the diseases were consolidated, overcoming, and supplanting more rudimentary methods and techniques.

FIGURE 3

Number of records classified with label theme *treatments* (and the total of pests and diseases) identified in *Jornal de Penafiel* over the analysed period



Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

The picture that emerges from scouring the reports is common to other regional newspapers: many items are republications from *A Actualidade*, *Jornal de Horticultura Prática*, *Gazeta das Aldeias*, etc. In the particular case of *Jornal de Penafiel*, this occurred in 65 of the 237 reports (27.4%). The international cooperation and intellectual influences are also seen in this newspaper owing to foreign publications occupying prominence in the numbers of the *Jornal de Penafiel*, namely the *Bulletin du Ministère de l'Agriculture de France*. Having said this, France was considered the perfect model of agricultural innovation in

10. *Jornal de Penafiel*, 6 (11), 04/12/1891, p. 1.

the 19<sup>th</sup> century and its influence can be observed in many respects such as this. In short, and in the opinion of J. Montalvão Machado, *it was the French who taught us everything about this epiphyte: causes, effects, symptoms and treatments* (Machado, 1983: 10).

#### 4.2. *Damião de Goes* (1886-1914)

Making use in the name of an important figure in 16<sup>th</sup>-century Portuguese culture, *Damião de Goes* was published in Alenquer between January 3, 1886 and November 20, 1925, those consulted published between 1886 and 1914. Unlike the *Jornal de Penafiel*, this journal had no subtitle, which may be indicative of an intention to cover as many subjects as possible about the geographical area that it dealt with.

The total number of records obtained is 301, which corresponds to an average of ten news items per year. Its distribution (Figure 5) has a clear importance in the later years of the 19<sup>th</sup> century and progressive decline from 1902 onwards. Except for 1887, 1888, 1907 and 1913, all the years that have been surveyed had reports on pests and diseases. The proximity that Alenquer had with the main city of the country (Lisbon) could explain this extensive series of reports. The contact with a nearby urban reality may have conferred more information and better knowledge about what happened in different points of the national territory and abroad.

Concerning pests and diseases, those related to vineyards are the most mentioned (mildew, phylloxera and oidium) (Figure 4).

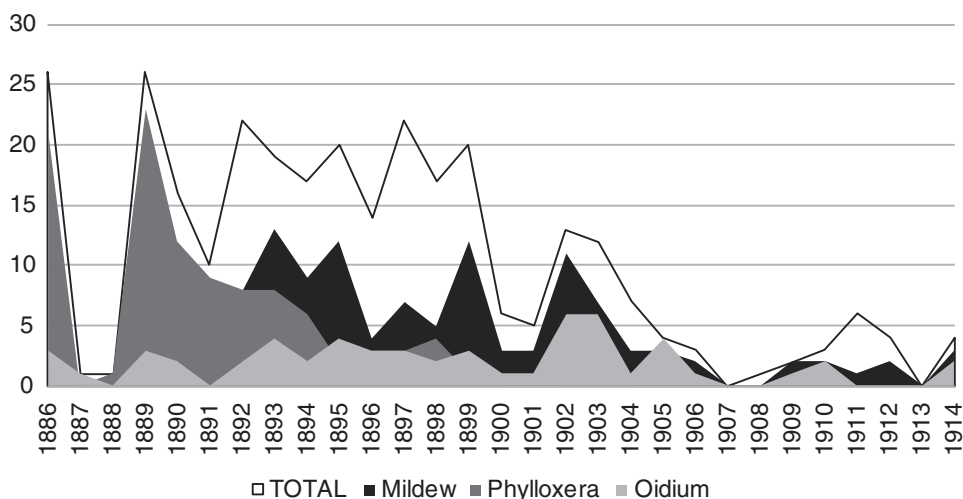
Like Penafiel, Alenquer was in a wine producing area on Lisbon district (Ribatejo). Thus, the effects of the diseases mentioned previously had an important impact on the local agricultural economy (Matias, 2002). For instance, phylloxera had a significant peak in 1880s and in the beginning of 1890s corresponding to the fact that *during the 1880s, phylloxera practically only progressed in the Centre, Estremadura and Ribatejo* (Freire, 2010: 46). In fact, pests of the vine were a constant in the analysed period.

Although our analysis focuses on the period in which the journal was in print, following the published reports, some signs of phylloxera were recognized before 1886. As this excerpt shows, *the extent of the vineyard in great early destruction is great, and is estimated to date as early as two years*<sup>11</sup>. In addition, the crop losses were noticed very quickly: [...]

11. *Damião de Goes*, 1 (30), 25/07/1886, p. 2.

*In Merceana, Olhalvo, Aldeia Galega and Aldeagavinha it is already quite sensible to decrease the harvest, compared to the previous years, in view of the damage produced by phylloxera [...] <sup>12</sup>.*

**FIGURE 4**  
**Number of records on mildew, phylloxera and oidium (and total pests and diseases) identified in the *Damião de Goes* (1886-1914)**

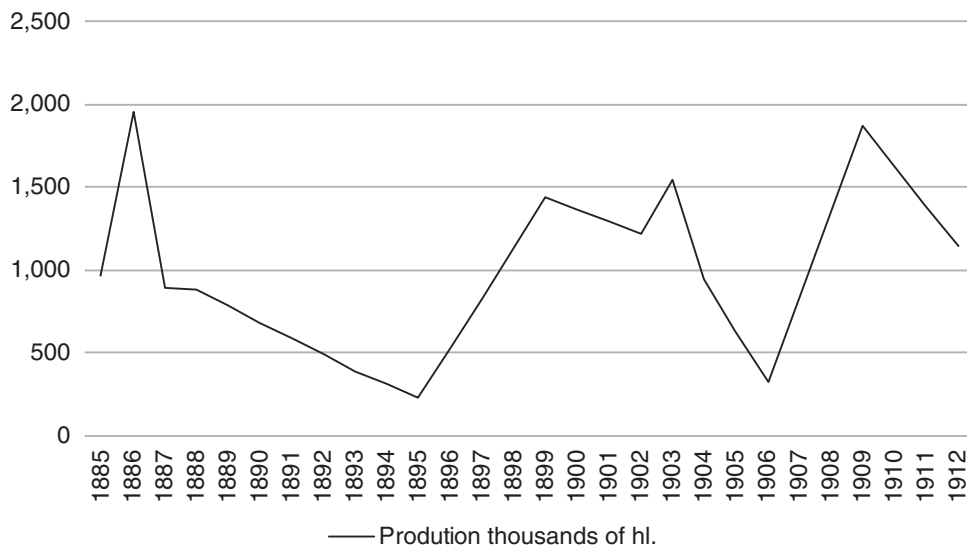


Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

After the second half of the 1870s, there was a *time of great commercial expansion* (Pereira, 1991: 152). The wine crisis in the south of France and the enlargement of the internal market contributed significantly to the flow of production. It is important to observe that in the regions of Ribatejo and Estremadura there is an increase in viticulture. However, a great expansion occurs until the 1880s, years when the pests mentioned were detected, resulting in a great decrease in production. This is paralleled by declining imports from Brazil, Germany and England and the recovery of French vineyards. The combination of the occurrence of pests and mercantile factors created a crisis scenario that, moreover, extended to the remaining wine production, except for Port wine. In this way, it is important to realize the issues of farm ownership and acreage. Changes in ownership even led to an increased cultivated of land: if in 1870, the vineyard area in Portugal was 200,000 hectares, by in 1902, it was already 313,000 hectares (Freire, 2010: 41).

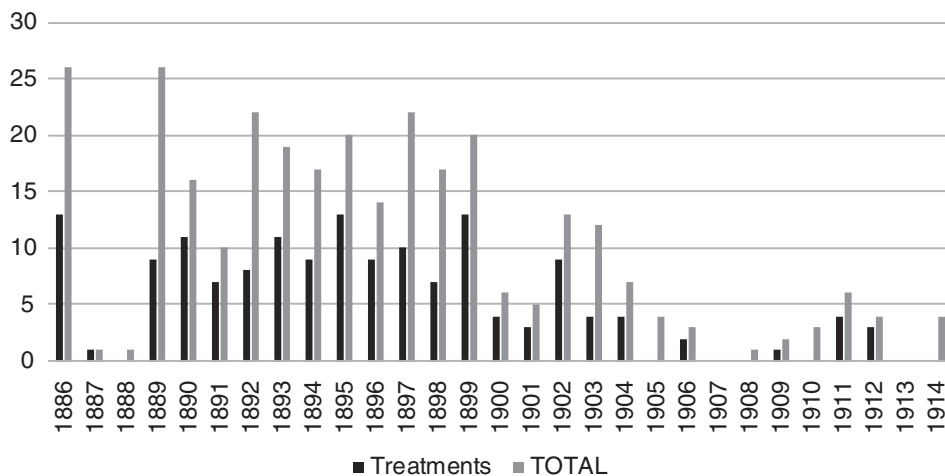
12. *Damião de Goes*, 3 (146), 14/10/1888, p. 2.

**FIGURE 5**  
**Wine production in Lisbon district (1885-1914)**



Source: <http://www.ruralportugal.ics.ul.pt/data-files/>

**FIGURE 6**  
**Number of records classified with label theme *treatments* (and the total of pests and diseases) identified in *Damião de Goes* (1886-1914)**



Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

Observing the production of wine in the district of Lisbon between 1885 and 1914 (Figure 5), there is an obvious correlation between the fall in production and the increase

in phylloxera, mildew or oidium news reports, with an emphasis on the first half of the 1890s.

The question of treatments was also important in this newspaper. As described at the time, it was necessary to resort to *the improvement of cultivation methods and to treatments for destroying the parasites* (Allen, 1879: 10). Meeting this goal, this newspaper mentioned, several times, a set of treatments formulated to combat the various pests that attacked agricultural crops. Like the *Jornal de Penafiel*, the highest number of references to treatments coincides, once again, with peaks of disease attacks.

### 4. 3. *O Elvense*

*O Elvense*, which in its title outlines its geographical origin, was published in Elvas between 10 June, 1880 and 5 March, 1997, the copies consulted dating between 1880 and 1904. For reasons relating to the availability of the source, the search was not possible for the years 1887 and 1888 with no newspapers held in the National Library for these years. The total number of records obtained by the research was 101, which corresponds to an average of four reports for each full year surveyed.

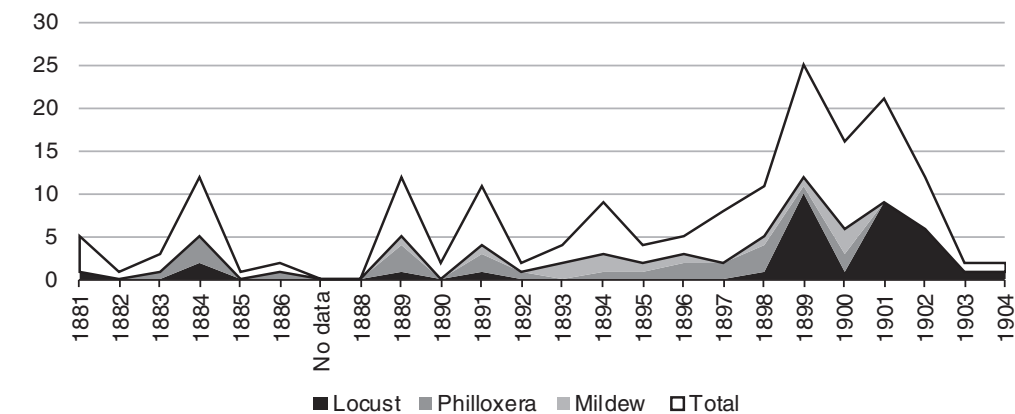
All the 23 years surveyed had reports on pests and diseases, the least for the years 1882, 1885, 1886, 1892, 1903 and 1904 (only one record per year), while the most detected for the 1899 (13 records). In seeking to explain this, for so many years the geographical distance between Elvas and the main cities of the country at the time (Lisbon and Porto) the contact with a nearer urban reality could be a symptom knowledge of what was happening at different points in the territory, contrary to what happened in Penafiel or Alenquer,

As outlined in Figure 7, there are three pests which are mentioned more often in the *O Elvense*. Locusts are found in 34 of the 101 records (33.6%), distributed in 11 of 23 years, especially those at the turn of the 19<sup>th</sup> century to the 20<sup>th</sup> century. Like *Jornal de Penafiel*, this suggests that its importance varies over time and varies depending on the outbreaks. Where phylloxera appeared, in 22.7% of the total (23 in 101), records can be found in 12 of 23 years, which demonstrates a significant temporal continuity. Finally, there is another disease of the vineyard, the mildew, corresponding to 12.8% of the total, with records in nine of the 23 years.

The remaining 69% of the reports concern other plant pests and diseases, such as: anthracnose (five records), pests in the olive trees (four records), caterpillars and aphids (both with three records). The region's main agricultural crops were wine and olive groves.

FIGURE 7

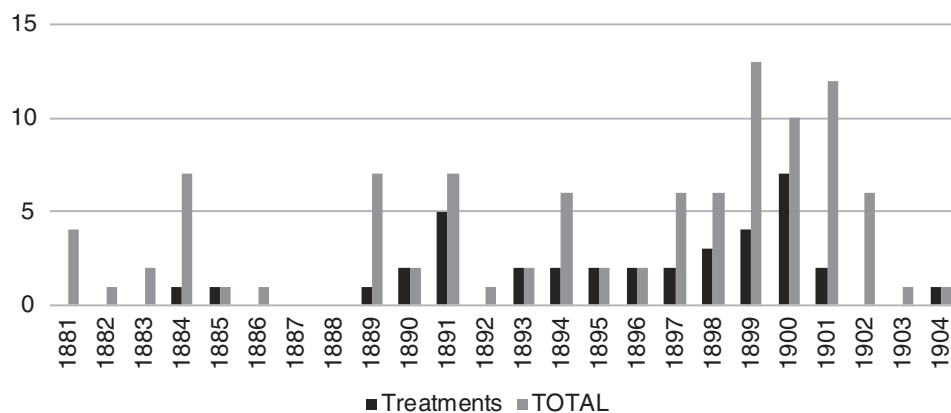
Number of records on mildew, phylloxera and locust (and total pests and diseases) identified in the *O Elvense* (1881-1904)



Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

FIGURE 8

Number of records classified with label theme *treatments* (and the total of pests and diseases) identified in *O Elvense* (1881-1904)



Source: <http://www.fcsh.unl.pt/pragasnosperiodicos/>

The *treatments* can be found in 36% of the reports in the corpus, equivalent to 37 reports in which they refer to solutions for the end of the agricultural pests, being more frequent in 1890s. In order to fight against phylloxera (11 records, 29.7%) and mildew (9 records, 24.3%), various instructions and treatments were prescribed, some of which were made in foreign countries and carried into national territory. In addition, treatments against the invasions of grasshoppers take place in this newspaper (5 registries, 13.5%).

Given that Elvas is in the Alentejo, cereals were important in the region, a culture that is particularly vulnerable to attacks by insects. The fear that this plague caused amongst the inhabitants of the region is visible in this excerpt: *the damage they cause is large and the municipality's agriculture can be considered seriously threatened if the pest threatens to develop*<sup>13</sup>.

Regardless of the series of years in which only a record appears and beyond the explanations already mentioned, once again (like the *Jornal de Penafiel*) some of the reports are republications from other newspapers; in this case 16 of the 101. These are references to the *O Imparcial* (Coimbra) or *O Panorama* (Lisbon), the magazine *Vinha Portuguesa*. Outside of Portugal we can identify references to the *Seculo* from Milan (Italy) and to the French magazine *L'Agriculture Moderne*.

## 5. DISCUSSION

The relationship between humans and nature finds in the study of bioinvasions a research topic that crosses many subjects and that can contribute to a better understanding of human perception of a natural environment and, specifically, about invasive species, plant pests and agricultural diseases. The 19<sup>th</sup> century proved to be particularly rich in biological invasions, creating a context for debate about the public management of natural resources, landscapes and environmental systems. This same context led to the emergence of a group of individuals, such as property owners, farmers and politicians that promoted governmental and circumstantial policies to combat bioinvaders. Scientists and agronomists also informed the contemporaries' discernment and understanding of pests with technical solutions adopted locally and adapted to the circumstances of the affected agricultural crops. The scales of the decisions taken by these experts reshaped the relationship between nature and population.

As has been noted during our research, newspapers were privileged vehicles to communicate and inform these matters. Given the large sample size and through the examples used in this article, it is possible to confirm the role that the regional newspapers played in the diffusion of ideological and political positions, linked to certain economic interest groups, but also as disseminators of the most advanced scientific and technological knowledge at that time, also in agronomic matters. In this context, plant pests and diseases are a theme present in all the newspapers that was possible to study.

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13. *O Elvense*, 19 (1905), 14/05/1899, p. 1.

Another important aspect to emphasize is related to the occurrence and durability of diseases outbreaks. The regions were differently affected by the importance of prevalent cultures and other biophysical conditions. The relative frequencies of each plant pest were directly related to outbreaks occurring locally, nationally, and internationally. This means the longer the spread across regions, the longer the presence in the news and therefore the different regularity over time. The case studies referred to in this article show some irregularity over the years. This also could be connected to the importance of the pest to the agricultural activity of each area and also other factors, for example, the relative importance of other subjects, changes in the orientation of the newspaper or of one of the collaborators linked to the agricultural theme. Nevertheless, these factors do not affect the type and relative frequency of each of the pests or diseases.

Agricultural journals were also widely disseminated amongst 19<sup>th</sup> century farmers engaged in new practices that could increase production or facilitate agricultural work; the so-called *gentlemen farmers* (Nunes, 2001; Radich, 1996). Among this type of publications are: *Arquivo Rural*, *Gazeta das Aldeias*, *Jornal de Agricultura e Horticultura Prática*, *Jornal Hortícola-Agrícola*, *O Lavrador*, *O Zoophilo*, *Revista Agrícola*, *Revista Agronômica*, *Vinha Portuguesa*, etc. The infestations were explained to the readers, either through pieces written by the editorial staff or through the reference or republishing of journalistic pieces or scientific dissemination. The circulation of regional newspapers was common amongst newsrooms.

In this context, it is not surprising that linking some news to the latest technical knowledge seems to ensure the quality of published information on plant pests. The value of local data, in terms of the territorial incidence (label *Geography of the invasion*), the impact caused (label *Damages*) or the responses given (label *Treatments*) amongst others, are valuable sources for understanding the dynamics which, in official archival resources, are forgotten or ignored.

However, the collected corpus cannot pass without a critical analysis. As at present, some rhetoric of exaggeration over losses may have served to attract readers, to create pressure on farmers, and to initiate measures of prevention or control. It would also serve to draw the attention of national and regional authorities to issues of local interest. Through this dramatization, the reports would also contribute to substantiate claims to the political powers, associated with the development of infrastructure or the relief of land taxes. One characteristic that stands out from the analysis is the scarce presence of the national authorities (the Government through the ministries that supervise agriculture and its decentralized services, in this case, *Ministério das Obras Públicas, Comércio e Indústria*), regional (*governos civis*) and local (*câmaras municipais*). It is consequently thought that the



regional newspapers compensated, in a certain way, and at least in the matter of diffusion of agronomic culture and science, for the absence of the power in the field.

One last remark concerns the population's agency and the cultural mobilization of the peasantry. Closer to the realm of action, new techniques were also disseminated on the pages of the newspapers. This shows how *certain invasive species contribute to our "sense of place"* (Reichard *et al.*, 2005: 112) by forcing new criteria for the agricultural practices that is reflected in some areas. However, it should also be notice that the Portuguese population was characterized by low levels of literacy and culture; in 1910, the illiteracy rate was around 75%. Also, according to some newspapers, another determinant factor for this situation was a deep sense of mistrust and suspicion toward the new agronomical techniques amongst the population, particularly in the prevention and control of plant diseases. Despite intensification in the use of chemical fertilizers and pesticides, many preferred to keep the traditional treatments applied in each case. This situation reconfigured the end of these environmental phenomena considering that the beliefs can remain remarkably strong in certain ways, preferring traditional strategies to deal with bioinvaders. There is no doubt that the intention of the newspapers was not only the construction of a journalistic and communication intention, but also an educational and instructive one, being the vehicle for the dissemination of treatments, notwithstanding the suspicions pointed out, often rooted in years of traditions and practices, often difficult to suddenly abandon. As Ana Cardoso de Matos stated, imparting knowledge amongst the rural population was *extremely difficult due to the reluctance of these populations to follow new practices* (Matos, 1998: 245).

## 6. CONCLUSIONS

Regional newspapers published in Portugal in the contemporary period reflect a mass culture and a mirror of diverse natural and cultural realities. They are also a privileged source for a spatiotemporal approach at the local level, without neglecting the information at the national and at the international level. Their use in this study of plant pests and diseases is very important because it was often in these publications that the first echoes of invasions were felt, being the first way of informing the local population.

Not being something exclusive in the Portuguese cultural universe, it is understood that references to other countries were constant. Can we talk about transnationality in the idea of agricultural development? From our case study, the answer is yes, following some conclusions made by other historians. There were channels of dissemination of technical knowledge that crossed the physical borders of the territory. It is important to remem-

ber that, due to the fact that some countries with which Portugal had intense contact share the same problems, it led the Portuguese press to take these examples to demonstrate the conduct to be followed in the treatment of pests. The inclusion of extracts from France, Spain and Italy in regional newspapers demonstrates not only the attention paid abroad, but also the understanding of what is the appropriate technical and scientific paradigm to follow. In Portuguese society in the second half of the 19<sup>th</sup> century *it is from France that the fundamental ideas come* (Justino, 2016: 83). Given that France was also affected by some diseases, especially those of the vineyard, helped to create this sense of parallelism amongst the Portuguese intellectual elites.

## ACKNOWLEDGES

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