

# On the distribution of 'Candidatus Phytoplasma pyri' in the European Union based on a systematic literature review approach

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## Abstract

The present study was conducted within the framework of a European Food Safety Authority (EFSA)-funded project (Prima phacie). The objective was to determine the current status of 'Ca. P. pyri' in the fruit growing areas of the European Union (EU) based on a systematic literature review approach (SLR). The results show that 'Ca. P. pyri' occurs in 15 out of the 27 EU countries, including the most important pear production areas in the EU. 'Ca. P. pyri' is not reported from ten pear producing countries, only two of which declared the absence on the basis of official surveys. In the eight others, official surveys for pest freedom are not available, thus contributing to the uncertain pest status in those countries. Within the Prima phacie project, the results of the SLR are used when analyzing the risk of entry, establishment, spread and impact of 'Ca. P. pyri' in regions where it is not present. Furthermore, the results are used to test the effectiveness of different options in reducing the risk of introduction and spread.

**Key words:** Pear decline, pest risk assessment, literature search.

## Introduction

Prima phacie is a European Food Safety Authority (EFSA)-funded project to improve methodology in pest risk assessment and in the evaluation of the effectiveness of risk reduction options (MacLeod *et al.*, 2010). Risk assessment methods being developed within the project are tested by using ten case study pests, among them 'Candidatus Phytoplasma pyri', which is associated with pear decline (PD) disease. This is a destructive disease of pear (Jarausch and Jarausch, 2010), which is currently regulated within the European Plant Health Directive 2000/29 EC. Obtaining up to date information on the present distribution of a pest, by countries and areas within countries, is essential in pest risk assessments. The objective of this study was to determine the current status (presence/absence) of 'Ca. P. pyri' in the fruit growing areas of the EU. The information obtained is based on a systematic literature review (SLR), including results of a questionnaire sent to the country representatives of EFSA's scientific network for risk assessment in plant health.

## Materials and methods

Following the principles of the EFSA Guidance on application of systematic review methodology (EFSA, 2010), the key steps to conduct a SLR were applied: a clearly formulated question was developed *a priori* ("What is the distribution of 'Ca. P. pyri' in the fruit growing areas of the EU?"), search terms were defined and combined (Pear decline OR Phytoplasma pyri OR Parry's disease OR *Cacopsylla pyri* OR *Psylla pyri* OR *Cacopsylla pyricola* OR *Psylla pyricola* OR *Cacopsylla*

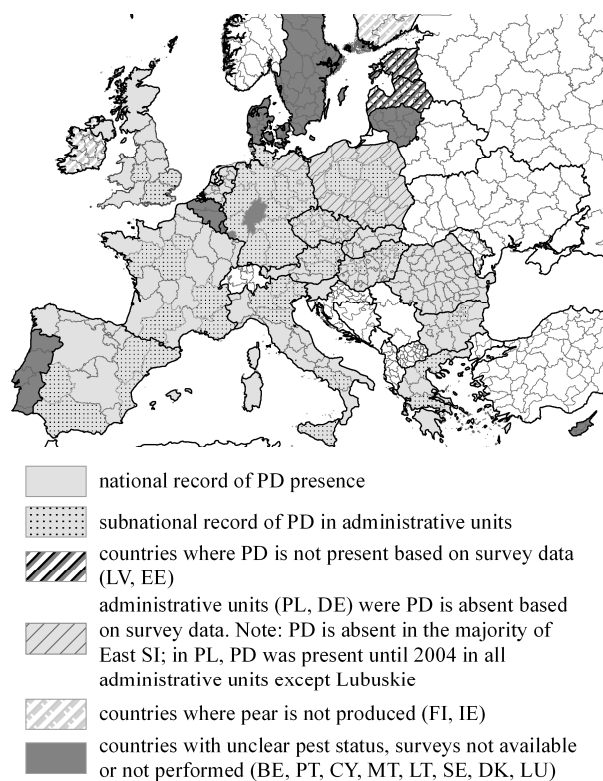
*pyrisuga* OR *Psylla pyrisuga* = Set 1; Set 1 AND occur\*, Set 1 AND distribute\*, Set 1 AND presen\*, Set 1 AND spread, Set 1 AND monitor\*, Set 1 AND survey) to search for articles in scientific abstracting databases (AGRICOLA, Agris and CAB Abstracts, searched on 08.04.2010; Web of Science, searched on 21.06.2010). The searches were not restricted concerning language and were traced back to the first findings of PD in the early 20th century.

In addition, a hand search was conducted, because not all relevant literature was expected to be included within electronic databases. For this purpose the following sources were used: EPPO Reporting Service (back to 1967, accessed 26.06.2010), EPPO-PQR (version 4.6; 07-2007), meeting reports (e.g. COST Action FA0807, Sitges, Spain, February 2010). Furthermore, in 2010 a questionnaire on the current status (the presence or confirmed absence) of 'Ca. P. pyri' in different fruit growing areas was sent to the delegates of EFSA's scientific network for risk assessment in plant health.

In a two step screening procedure all abstracts from databases and hand searches were checked for relevance to the question by two reviewers. In the first step, abstracts were filtered out which do not address the two predefined criteria. 1. Does the abstract describe the distribution of the phytoplasma diseases and/or the vector? 2. Does the abstract describe primary research (as opposed to a review?). For all abstracts, meeting these eligibility criteria, full text papers were obtained from library services and evaluated in a second stage by using the following question: Does the paper clearly specify the fruit growing region for which the results are applicable (e. g. region Emilia-Romagna, province of Parma, municipalities x and y; as opposed to "Northern Italy").

## Results

Searches with the key word combinations in the databases resulted in 477 abstracts (after removal of duplicates). 50 (10.5%) of them have been selected for the second stage screening. The main reason for papers not to be included was that the distribution of PD in fruit growing areas of the EU was not addressed, as the majority of these papers focused on diagnosis, biology or management of the phytoplasma and/or its vector. In the second stage, 24 full papers (out of 50) were selected to be included in the SLR. The main reason for discarding information was that more recent data for a specific fruit growing area was available. Furthermore, the results of 17 questionnaires (Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Italy, Latvia, Malta, Poland, Portugal, Slovenia, UK + questionnaires from pest experts in Greece and Cyprus), 9 citations in the EPPO Reporting Service and 5 papers through hand searching were included in the SLR.



**Figure 1.** Status of ‘*Ca. P. pyri*’ in the EU.

The results of the SLR are shown in figure 1. ‘*Ca. P. pyri*’ is a native European species, which is very widespread and has been reported in 15 out of the 27 EU countries, including the largest pear production areas in Italy and Spain. In Poland and Germany, PD is officially absent in few administrative units.

‘*Ca. P. pyri*’ is not reported from ten pear producing countries. Of these countries only Latvia and Estonia declared the absence based on official surveys. Portugal and Belgium, two major pear producing countries are cur-

rently surveying the pest status. In Denmark and Cyprus, the disease is assumed to be absent; however, surveys have not been undertaken so far. No data were available from Lithuania, Sweden, Malta and Luxembourg, but these countries have only limited area of pear production.

## Discussion

The study applies a SLR to assess the distribution of ‘*Ca. P. pyri*’ in the EU. The methodology of SLR was found particularly useful to answer a specific question in the pest risk assessments of ‘*Ca. P. pyri*’ as it presents an exhaustive, transparent and unbiased way of collecting, reporting and analyzing data. The results show that this pest is widespread in the EU; however, in a few countries/regions the disease appears to be absent. Within the Prima phacie project the results of the SLR are used when analyzing the risk of ‘*Ca. P. pyri*’ entering new areas. Entry comprises different elements, such as the association of the pest and the host plant at the place of origin, the volume of trade of the commodity, the survival of the pest along the pathway and the transfer to a suitable host. By testing different risk assessment methods, particular emphasis is given to the introduction and impact of ‘*Ca. P. pyri*’ in regions where PD has not been reported. Moreover, the effectiveness of risk reduction options on the introduction and spread is assessed.

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