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Communication on plant health risks: Social science research, audience segmentation, and communication strategy for an EU awareness- raising campaign

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Abstract

The European Food Safety Authority (EFSA) carried out preparatory work to inform an EU awareness-raising communication campaign on plant health risks. In a first phase, this included social science research and audience segmentation to inform appropriate choices regarding targeting and topics to be covered. Mixed methods research was carried out – including analysis of survey data, literature review and in-depth interviews –, to identify plant health awareness, knowledge, risk perception, preferred information sources and trust in different actors. Four “personas” were developed based on the results, representing four potential audience segments: “curious traveller” (P1), “home gardener and hobby farmer” (P2), “conscious young parent” (P3), and “adventurous and green foodie” (P4). The research also included an additional focus on stakeholders involved in plant health, agriculture, and related sectors since they can support the objectives and reach of a campaign. Then, in a second phase, the communication strategy for the 3-year campaign was designed, building on the social research as well as on situational analysis and a stakeholder mapping. The proposed strategy for the campaign foresees targeting of P1, P2 and P3, and entails using a progressive model aimed at raising target audiences’ awareness (Year 1), triggering critical thinking (Y2), and activating and creating advocacy (Y3). A crucial role will also be played by plant sector operators, who will be involved in dedicated activities and act as touchpoints and amplifiers for the campaign. The strategy provides a common framework allowing Member States (MSs) to fully localise the national implementation and to join the campaign throughout its 3-year course. The report outlines the objectives and topics defined for the different years of the campaign per target audience, as well as the tactics and the evaluation methodology. EFSA plans to launch the campaign in summer 2023 in collaboration with participating MSs.

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Key words: plant health, risk perception, audience segmentation, risk communication, awareness-raising, EU campaign

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Summary

The European Food Safety Authority (EFSA) carried out preparatory work to inform an EU awareness-raising communication campaign on plant health risks. In a first phase, this included social science research and audience segmentation to inform appropriate choices regarding targeting and topics to be covered. Mixed methods research was carried out to identify plant health awareness, knowledge, risk perception, preferred information sources and trust in different actors. This included: i) analysis of data from EFSA's 2022 Food Safety Eurobarometer (26,509 respondents across the EU27; EFSA, 2022a) and Plant Health Flash Poll (8,600 respondents across the 24 Member States; EFSA, 2022b), ii) a literature review comprising 31 studies (identified based on the application inclusion and exclusion criteria defined in the associated methodology), as well as additional sources identified through complementary desk research, and iii) in-depth interviews with five citizens and seven plant health stakeholders.

Four audience segments were identified through the research and translated into "personas" to facilitate an "audience-first approach": i) "curious traveller" (P1): Interested in bringing plants home from their trips abroad and environmentally conscious; positive attitude towards plant health, although they do not feel well informed (e.g. phytosanitary certificate); ii) "home gardener and hobby farmer" (P2): Interested in growing healthy and sustainable plants in their own gardens; positive attitude towards plant health, and moderately informed; the motives underlying their interest are diverse (beauty, sustainability, biodiversity, human health); iii) "conscious young parent" (P3): Interested in plant health, sustainable lifestyle and in local food supply, as well as in passing their values to their children; positive attitude towards plant health, and moderately informed; food safety is top of mind; and the iv) the "adventurous and green foodie" (P4): Passionate about sustainable and local food supply, and likely to be aware about their health, and the quality of food they eat; positive attitude towards plant health, and sustainability and organically produced food are important to them; taste prevails over safety when buying foods. These four segments can be seen as 'higher risk' and/or 'more willing', and thus present the type of target groups that are particularly relevant according to the literature. The research also identified specific themes relevant for the design of communication content for each of the personas. It also included an additional focus on stakeholder involved in plant health, agriculture, and related sectors since they can support the objectives and reach of a campaign.

Then, in a second phase, the communication strategy for an upcoming 3-year campaign was designed, building on the social research as well as a situational analysis and a stakeholder mapping. The proposed strategy for the campaign entails using a progressive model aimed at raising target audiences' awareness (Year 1), triggering critical thinking (Y2), and activating and creating advocacy (Y3). It foresees targeting of P1, P2 and P3, which represent a broad yet manageable portion of the target audience. For P1 and P2, a higher intensity will be applied as these are the audiences with potentially riskier behaviour, but also more likely to be mobilised and to act as advocates for plant health within their communities. A crucial role will also be played by plant sector operators, who will be involved in Y2-3 in activities mainly linked to the phytosanitary certificate and plant passport, as well as pest recognition, and act as touchpoints and amplifiers for the campaign. In terms of topics and thematic areas, the campaign will start by raising awareness of the link of plant health with citizens everyday life, including its link with food security, food safety, heritage, and the economy. Activities to raise target audiences' awareness of the phytosanitary certificate and its implication on travelling and purchasing plants will also start in Y1. During Y2, the campaign will focus on specific topics to trigger target audiences' critical thinking by providing them more specific and engaging activities. Topics will include the phytosanitary certificate, pest recognition and reporting, the plant passport, and the knowledge transmission on the importance of plant health and the related good practices. During Y3, the campaign will focus on the phytosanitary certificate and plant passport, pest recognition and reporting, plant purchase best practices, knowledge transmission on the importance of plant health and the related good practices. The communication strategy was designed to provide Member States with a common framework allowing them to fully localise the national



implementation based on their specific context and needs, as well as to join the campaign throughout its 3-year course.

Campaign objectives for the different years of the campaign per target audience, the tactics and the evaluation methodology have also been developed. Tactics for the campaign include the creation of a dedicated website, social media organic and paid activities, media partnership and relations, collaboration with influencers, search engine marketing, cooperation with private entities, training activities, participation in fairs, billboards, activities with schools, cooperation with museums, and live events. The evaluation methodology comprises specific KPIs identified to measure three domains: process evaluation, outcome evaluation, and impact evaluation. EFSA plans to launch the campaign in 2023 in collaboration with an external company. The campaign tactics and evaluation methodology that are outlined in this report, will be refined with the objective of maximising outreach, impact, and resource-effectiveness.



Table of contents

Abstract	1
Summary	4
1 Introduction	7
1.1 Background and terms of reference as provided by the requestor	7
2 Data and Methodologies.....	8
2.1 Data	8
2.1.1 Social science research and audience segmentation	8
2.1.2 Multi-year communication strategy.....	8
2.2 Methodology	9
2.2.1 Social science research and audience segmentation	9
2.2.2 Multi-year communication strategy.....	12
3 Assessment	15
3.1 Social science research and audience segmentation	15
3.1.1 Overview in relation to segmentation parameters	15
3.1.2 Four target audience segments: personas	18
3.1.3 Plant sector stakeholders	25
3.1.4 Additional aspects of plant health to be explored within the communication campaign	27
3.2 Multi-year communication strategy	28
3.2.1 Situational analysis	28
3.2.2 Stakeholder mapping	31
3.2.3 Campaign: from awareness to activation.....	33
4 Conclusion	38
5 Recommendations	40
References	41
Abbreviations.....	48
Appendix A – Infographics of the four personas	49
Appendix B – Population size estimates for the target audience segments	51
Appendix C – Supplementary findings from the research.....	51
Appendix D – Overview of the surveys samples	54



1 Introduction

1.1 Background and terms of reference as provided by the requestor

The Plant health Regulation plays an important role in delivering the objectives of the EU's Farm to Fork Strategy. With its focus on surveillance and early detection of plant pests, the Regulation supports efforts to promote the reduction on the use of pesticides. By extension, it also contributes to the climate and biodiversity goals contained with the European Green Deal.

The environmental and economic effects of some pests to cultivated and wild plants may be devastating. For example, impact simulations indicate that the plant bacterium *Xylella fastidiosa* has the potential to cause annual production losses of 5.5 billion euros in a scenario where it spreads fully across the entire EU (European Commission, nd). Data from recent social research shows that awareness about plant health risks among EU citizens is low when compared with other food-related topics (45%) and concern among citizens about plant health risks is even lower (10%) (EFSA, 2019).

The lack of a common understanding of plant health among stakeholders and the public in general has been recognised during previous plant health outbreaks, leading to difficulties in the enforcement of phytosanitary measures.

Under the initiative of the Maltese Presidency in 2017, the Chief Plant Health Officers (COPHS) agreed to launch a new and a comprehensive awareness-raising strategy for plant health in the EU. Discussions were taken forward by the Commission's Expert Group on awareness and activities in the EU intensified in 2020 during the International Year of Plant Health (IYPH). Many successful initiatives and activities in Member States and at the EU level took place.

Under the Portuguese Presidency in March 2021, Agriculture Ministers underlined the importance of raising awareness on plant health and the need to be able to identify dangerous pests early and eradicate them as effectively as possible.

The Commission has already worked on digital and other platforms to demonstrate the importance of plant health to citizens (poster and videos for travellers). The European and Mediterranean Plant Protection Organization (EPPO) has also published a communication kit to raise public awareness about the risks of moving plants and their associated pests when travelling internationally.

In the context of the Farm to Fork Strategy, there is a need to continue awareness-raising efforts about plant health risks amongst the general public and stakeholders. Through its expert Working Group on Social Research Methods and Advice, the European Food Safety Authority (EFSA) is able to provide technical input on this issue based on social science evidence and approaches on the principles and implementation of risk communication.

In the context of Article 31 of the General Food Law Regulation, EFSA is requested to provide technical assistance to the Commission with regards to an awareness-raising communication campaign in the European Union on plant health risks. This assistance should take the form of Technical Report and is based on the following Terms of Reference: The Technical Report should contain the following:

- A detailed analysis of the audience segment(s) to be targeted by the awareness-raising campaign. This segmentation should be carried out by EFSA's Working Group on Social Research Methods and Advice and undertaken in line with the principles defined in EFSA's report on Technical assistance in the field of Risk Communication. It should cover audience understanding and perceptions in relation to different aspects of plant health, preferred information sources and messages, and trust in actors involved in plant health activities in the EU. The analysis should result in recommendations to inform appropriate



choices and topics for awareness-raising initiatives and risk communications on plant health in the EU.

- A multi-year communication strategy for an awareness-raising campaign on plant health that builds on the recommendations gathered in the analysis described above. The communications strategy should include:
 - A situational analysis describing the scientific, stakeholder, and political environment in which the awareness-raising campaign will be delivered.
 - An outline of campaign objectives, describing what the campaign expects to achieve in its different phases.
 - A detailed timeline, explaining the different phases of the campaign with regards to the selection of topics for awareness-raising.
 - A description of the communication tactics (tools and channels) that would be used to achieve the campaign objectives.
 - A description of how the campaign would be monitored and evaluated against the campaign objectives.

2 Data and Methodologies

2.1 Data

2.1.1 Social science research and audience segmentation

The social science research and resulting target audience segmentation presented in this Technical Report builds on results from a background study that EFSA commissioned to ICF. This study on “Preparatory work in support of risk communication on plant health” has been published as a separate External Scientific Report and can be referred to for further information (Porta et al., 2023). In short, the present study relies on the following sources:

- Citizen survey: EFSA’s 2022 Special Eurobarometer Survey on Food Safety (EFSA, 2022a), which was carried out in the 27 EU Member States between 21 March and 20 April 2022 using face-to-face and computer-assisted web interviewing in respondents’ mother tongue. It comprised a sample of 26,509 respondents (see Appendix D for additional information) from different social and demographic groups, and a total of 13 questions (excluding socio-demographics).
- Citizen survey: EFSA’s Plant Health Flash Poll (EFSA, 2022b), which was carried out in 24 European countries (i.e. EU-27 minus Cyprus, Luxembourg) between 20 and 24 June 2022 using computer-assisted web interviewing in respondents’ mother tongue. It comprised a sample of 8,600 respondents (see Appendix D for additional information) from different social and demographic groups, and a total of seven questions (excluding socio-demographics).
- Literature review: Comprised 31 studies, which were identified for inclusion based on the application of criteria for inclusion and exclusion, and screening (see Methodology section below). Additional desk research was carried out to complement insights for the audience segmentation.
- In-depth interviews: Five in-depth interviews with citizens (IE, FR, and ES) and seven with plant health stakeholders (2 public sector representatives; 2 EU business association representatives; 3 custom officers). Interviews were carried out by ICF in the mother tongue (citizens) or English (stakeholders).

2.1.2 Multi-year communication strategy

The multi-year communication strategy described in this report is informed by a background study that EFSA commissioned to ICONS. This study titled “Plant health campaign strategy” is published as a separate External Scientific Report and can be referred to for further information (Michi et al., 2023). In short, the present study relies on the following data:



- Social research (see 2.1.1): the strategy builds on the data used during this phase of pre-campaign work, and on the related findings.
- Over 90 studies, papers, reports and articles used to carry out the PEST analysis, the stakeholder mapping, and the design of the communication strategy (see references of Michi et al., 2023).

2.2 Methodology

2.2.1 Social science research and audience segmentation

To generate insights for a targeted awareness-raising campaign on plant health, the analytical approach outlined in EFSA's scientific report on "Technical assistance in the field of risk communication" (EFSA, 2021) was applied to carry out the audience segmentation analysis. Accordingly, the following factors were considered: i) food safety knowledge; ii) personal risk perception; iii) information sources; and iv) trust in information coming from different actors. Socio-demographic factors were also considered to provide insights into identified segments, but not used as a segmentation criterion per se.

In short, the social science research and resulting target audience segmentation relied on a mixed methods approach. This comprised analysis of data from two previous EFSA surveys (EFSA, 2022a; 2022b), a literature review, and in-depth interviews. Personas were then created building on the data and evidence from this research. Five main areas of interest were identified: i) level of awareness and understanding regarding plant health risk and benefits; ii) preferred sources of information about plant health associated risks and benefits; iii) level of awareness, knowledge, and risk perception about the phytosanitary certificate (needed for transporting certain plants and plant products into the EU); iv) responses to risk and benefit communications regarding plant health; and v) willingness to adopt biosecurity behaviour. In all cases coverage was not limited to European citizens, but included also European plant sector operators, as well as international travellers entering the EU. This was done to carry out the target audience segmentation analysis, while additionally gathering insights to support the design and strategy for the awareness-raising campaign.

As previously mentioned, this Technical Report builds on results from a background study that EFSA commissioned to ICF. This study on "Preparatory work in support of risk communication on plant health" has been published as a separate External Scientific Report. The methodology is summarised below, but this report can be referred to for further information (Porta et al., 2023).

2.2.1.1 ANALYSIS OF DATA FROM CITIZEN SURVEYS

Data from two recent EFSA surveys was analysed, namely the i) 2022 Food Safety Eurobarometer (EFSA, 2022a), which focused on food safety and thus also encompassed questions on topics not related to plant health; and the b) Plant Health Flash Poll (EFSA, 2022b), which was a thematic survey as the name indicates. Questions from each survey were assessed for their relevance regarding the five main areas of interest summarised earlier. For additional details please see Porta et al. (2023).

2.2.1.2 LITERATURE REVIEW

A literature review was carried out to identify and assess relevant studies addressing the five main areas of interest summarised earlier. The literature review followed a rigorous methodology based on the following steps: i) scoping phase to define the search protocol, including a series of search queries; ii) location and selection of relevant studies in EBSCO using the search strings; iii) critical appraising of the selected studies; iv) extraction of relevant data; v) analysis and synthesis of results; and vi) reporting the review findings. This resulted in 17 studies identified for inclusion. Subsequently, the following complementary approach was followed to overcome the limited number of studies that had been identified to address some of the identified areas of interest, as well as ensure extensive coverage: Adding studies suggested by EFSA and carrying

out snowballing, whereby studies previously synthesised were used to identify additional relevant sources (additional 14 studies identified). Figure 1 provides a summary of the process and outcomes of the literature review. Finally, additional desk research was carried out to provide complementary psychographic insights (e.g. target audiences' values and motivations) and thus refine the definition and understanding of each target audience segment/persona. For additional details on the literature review methodology, including search strings, inclusion and exclusion criteria, or screening criteria please see Porta et al. (2023).

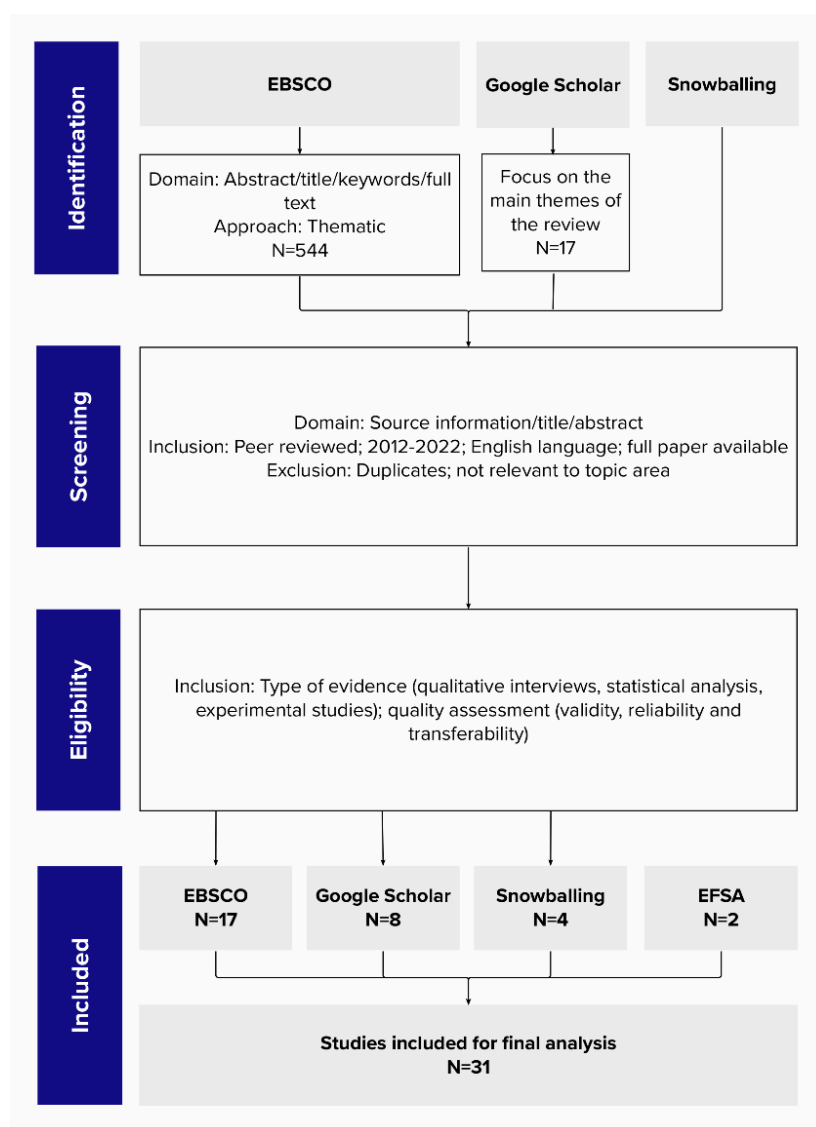


Figure 1: Literature review process and outcomes (Porta et al., 2023)

2.2.1.3 INTERVIEWS

The qualitative research consisted of a series of in-depth interviews and covered the five main research questions summarised earlier. It comprised interviews with five citizens and seven plant health stakeholders. The interview guide and sampling were developed by ICF, together with EFSA and its Working Group on Social Research Methods and Advice. EU citizens were recruited from online market research panels, with the sampling strategy based on the following demographic and geographical criteria: Age diversity considering preliminary findings from the survey analysis (3 citizens between 15 to 35 years old, and 2 over 54 years old), gender balance (2 male, 3 female), and coverage of countries from different EU regions (IE, FR, and ES). The sampling strategy for the stakeholders focused on ensuring coverage of diverse sectors, such that the sample included two public sector representatives (1 EU institution, 1 Member State/SI),



two business association representatives at EU level (1 food producers, 1 nursery stock), and three custom officers (1 HU, 1 IT, 1 NL). For additional details please see Porta et al. (2023).

2.2.1.4 PERSONAS

To facilitate an “audience-first approach” when designing the communication strategy and content, four personas were created building on the data and evidence from the mixed methods research (i.e. analysis of existing survey data, literature review and in-depth interviews). A persona is a fictional, but realistic description of an audience segment as it is built on research insights and data from real citizens (Harley, 2015; Porta et al., 2023). As pointed by Massey et al. (2021), persona development is data-driven and “personas are based on real-life typologies of people that can be used to create characters and messages to communicate important (...) information through relatable narrative storylines”. Personas are a valuable tool for communication as they help make details and key characteristics of target audience segments more salient and memorable. To help make the information more digestible and memorable and thus facilitate communication design, personas typically include fictional elements, such as a name, a photo, or a quote to sum up the persona’s attitude building on the available evidence (Harley, 2015; Porta et al., 2023).

As mentioned earlier, the present study entailed a detailed analysis of the audience segments to be targeted by the awareness-raising campaign building on the principles defined in EFSA's scientific report on Technical assistance in the field of risk communication (EFSA, 2019). Accordingly, and to the extent possible with the available evidence, each of the four personas illustrates the audience segment’s awareness, understanding and perceptions in relation to different aspects of plant health, preferred information sources and messages, and trust in actors involved in plant health activities in the EU. In describing each persona, the focus is on its key characteristics that can impact the choices and design of risk communication for each segment.

In short, each persona portrays a fictional individual but encompasses a summary of the corresponding audience segment’s characteristics building on the insights from the literature review and analysis of the citizens’ surveys and interviews data. Further, once the four personas were identified and some of their key characteristics outlined, additional desk research was carried out. This was done to gather additional psychographics of the target audiences, such as their values and motivations, as well as additional insights for the creation of relevant and actionable messages that effectively reach and resonate with the target audience. The resulting narrative developed for each of the four personas brings the additional insights together into a practical and operational description to facilitate an “audience-first approach” (Porta et al., 2023).

2.2.1.5 LIMITATIONS

The limitations of the present study included the small sample size of the qualitative research carried out, which may have been insufficient to reach the saturation criteria (i.e. point when gathering additional data would no longer generate new insights). Notwithstanding the small number of in-depth interviews carried out, for some of the research topics a few recurrent themes emerged from the analysis, and the interviews provided rich information to complement the findings from the literature review and analysis of existing survey data. In addition, the literature review revealed that only a limited number of studies focused on some of the topics of interest for the present research – e.g. phytosanitary certificate – and the available studies often covered a single or a small subset of countries, thus evidence available for the segmentation was limited at times. Accordingly, gaps in the literature are mentioned in the results section, so that they can be considered when interpreting the findings. Further, complementary desk research was carried out, particularly to refine the identified segments and corresponding personas definition. Finally, the present study relied on analysis of two existing survey datasets (EFSA 2022a; 2022b). Though they provided a wealth of data from large European samples, this analysis was by design limited to the set of available set of questions. An assessment of the questionnaire was thus carried out in each case to identify questions that were relevant to the present study and centre the analysis accordingly.



2.2.2 Multi-year communication strategy

2.2.2.1 METHODOLOGY

To generate insights for the development of EFSA's awareness-raising campaign on plant health, EFSA tasked an external contractor, ICONS, to conduct a situational analysis and a stakeholder mapping. Based on these findings and on those of the social research, ICONS was tasked to design a communication and engagement strategy for the campaign.

This section of the report builds on the finding of ICONS' external scientific report "Plant health campaign strategy" (Michi et al., 2023).

2.2.2.2 SITUATIONAL ANALYSIS

The PEST methodology was used to conduct the situational analysis. A PEST analysis is a tool used to understand the external macro environments such as the political, economic, social, and technological factors surrounding a specific matter. The PEST analysis forms part of the "evaluation stage" in the strategic design process (Sigcha et al. 2020) of the campaign on plant health.

The identification of data to be included in the analysis followed a pragmatic approach. Research questions for each of the four PEST factors were proposed and discussed with EFSA. Desk research was then conducted on the topics identified. To collect the relevant studies, papers, reports and articles, Google and Google Scholar search engines were used. Additionally, EFSA Journal and EPPO Bulletin were also used as scientific libraries. Only the studies relevant for answering research questions were further analysed. Specific keywords were used in connection with the specific topic of the search, but recurring keywords used were "plant health", "plant pests and diseases", "phytosanitary certificate" and "plant health in Europe" (Michi et al., 2023).

2.2.2.3 STAKEHOLDER MAPPING

The stakeholder mapping was based on the findings of the social research and of the PEST analysis. Desk research of available information was activated to support the process – all sources listed in the References section of "Plant health campaign strategy" (Michi et al., 2023).

The stakeholders mapping categorises stakeholder groups and ranks them according to their level of interest, and their ability to activate the campaign target audiences (TAs). The methodology implies:

- Identifying and profiling the different stakeholder groups and types of stakeholders in each group according to their "stake" in the campaign;
- Ranking them along a scale of relevance based on two variables, their impact on TA and the potential interest of the stakeholder in the campaign.

The following information was mapped for the stakeholders identified: stakeholder group, organisation name, organisation type, organisation description, key TA (P1, P2, P3, and plant sector operators), how they could contribute to the campaign, and their geographic coverage.

"Plant sector operators have been considered both as TA and as multiplier for European citizens, especially plant sector operators' associations.

Different categories of private companies could potentially be key stakeholders in the campaign. For example, P1 might come in contact with several private stakeholders linked to potential risks associated with the international import of plants (e.g. transport industry, travel companies, outdoor equipment companies, etc). It was thus decided to map a selection of private companies. The identification of the private companies to engage was based on the following criteria (one or more):

- The company mentions plant health-related initiatives in its current sustainable report and CSR activities;



- The company has already cooperated on EU projects related to environment;
- The company is listed in official rankings of environmentally “virtuous” companies, like the “Climate leaders in Europe list 2021” compiled by Financial Times with the help of the research company Statista. The listed companies are those that cut their greenhouse gas emissions the most between 2014 and 2019 (Hawcock, 2021);
- The company has environmental certifications like, for example, ‘is certified B Corp’’, (Michi et al., 2023).

Stakeholders were then ranked according to a matrix that leverages TA impact (defined as the level of trust expressed by the TA towards the stakeholder and the level of affinity between the TA and the stakeholder) and the stakeholder interest in the campaign (based on their affinity to plant health-related topics). ICONS and EFSA qualitatively scored these two variables for each of the TAs considered using the findings of the social research and the PEST analysis using the following scale: 1=low, 2=low to medium, 3=medium, 4=medium to high, 5=high.

Based on this evaluation, a prioritisation map for each stakeholder was derived. The four quadrants of the map are as follows:

- High impact, High interest: Stakeholders to involve first
- High impact, Low interest: Stakeholders to involve, but require some effort
- Low impact, High interest: Stakeholders to keep informed
- Low impact, Low interest: Stakeholders to involve, with minimum effort (at least in the short term).

2.2.2.4 COMMUNICATION STRATEGY

The communication strategy of the campaign was designed based on the findings on the previous work carried out, i.e. social research, PEST analysis, and stakeholder mapping.

The communication strategy of the campaign defines its macro-objective and themes, the specific objectives, topics, key messages, tactics per persona for the three years of campaign implementation, and an evaluation methodology.

The campaign is developed through a funnel approach guiding the TAs through an engagement journey. The journey consists of three steps:

1. Raising awareness: providing audience with knowledge and guidance on the topics identified;
2. Triggering critical thinking: consolidating the knowledge that the audience acquired in the previous actions and provide them with resources and tools to be involved into more active and engaging activities;
3. Activating and creating advocacy: enrolling the audience in plant-health protection and engaging them in sharing messages on plant health to raise awareness and mobilise their peers, leveraging their informal community. Using opportunities, contexts and tools to encourage the audience to act in favour of plant health in their everyday life.

The report (Michi et al., 2023) suggests different levels of intensity to communicate different topics to different audiences, depending on how relevant messages are for the audiences. Intensity is defined as a combination of frequency of the message per channel used and investment. The scale of intensity uses the following levels: high, medium or low.

The report also prioritises actions to facilitate a modular, flexible and localised approach for MSs. Actions are classified as:

- Highly recommended: crucial to the campaign success
- Recommended: useful to boost the campaign success, but additional layer of complexity present



- Suggested: activities that might benefit the campaign but require a high investment at national level, as well as active involvement of the audience.

Activities are also labelled in terms of resources expenses. The scale used has five levels (€-€€€€€). For some activities, a range is provided as the cost would vary according to choices [made](#) during [their](#) implementation.

The PESO communication model is used to categorise activities in four areas:

- Paid media: including sponsored media and social media content
- Earned media: free published content resulting from PR activities
- Shared media: organic social media build on curated content
- Own media: wholly owned content.

On 22 March, EFSA presented the proposed communication approach for the campaign to the Commission's Expert Group on Plant Health Awareness Raising during a virtual meeting. The Group endorsed the approach suggested which is described in the section "Multi-year communication strategy".



3 Assessment

3.1 Social science research and audience segmentation

3.1.1 Overview in relation to segmentation parameters

3.1.1.1 AWARENESS, KNOWLEDGE, AND RISK PERCEPTION

The literature review revealed that there is scarce evidence regarding citizens' level of awareness (or extent to which they heard about) on plant health. The limited evidence available suggests that citizens' awareness and knowledge of plant health and associated risks is low, and that plant buyers tend to be slightly more aware (albeit their awareness is still low) (Dunn et al., 2020; EFSA, 2022a, 2022b; Fuller et al., 2016; Marzano et al., 2015; Urquhart et al., 2017). A study including citizens from seven EU countries revealed variability in level of awareness for different invasive forest pathogens,¹ with differences also visible across countries (Eriksson et al., 2018). Additionally, some studies suggest higher awareness among older people (Marzano et al., 2016; Urquhart et al., 2017) and those who visit forests with higher frequency (Marzano et al., 2016). According to the 2022 Eurobarometer on Food Safety, around half of respondents across the EU-27 heard about plant diseases, e.g. affecting crops (48% vs 70% heard about additives, the top topic in terms of awareness) (EFSA, 2022a).²

In terms of risk perception, the 2022 Eurobarometer showed that plant diseases, e.g. affecting crops, is one of the food safety topics that Europeans are the least concerned about (11%, corresponding to the bottom three out of 15 possible topics) (EFSA, 2022a).³ Results from the literature review suggest that some socio-demographic characteristics and psychological factors influence the level of concern. Namely, higher concern among older than younger individuals, members of environmental or countryside-related organisations, those who frequently go in the forest, buy and exchange plants, or collect firewood, and those who shared high "place identity"⁴ (Urquhart et al., 2017). Additionally, qualitative research by Hilaire et al. (2022) in three EU countries and the UK showed low familiarity about plant viruses in agriculture and their potential impacts. Perceived risks were not specific and focused on risk to environmental and human health, as well as economic problems and losses linked to diseased plants (Hilaire et al., 2022).

Finally, some studies have examined the relationship between awareness and concern about plant health. According to Porta et al (2023) "Marzano et al. (2017) found a high level of concern among stakeholders and citizens about the negative impacts of pests and pathogens on trees and forests, despite them reporting low awareness of specific tree pests and related management options. These findings are supported by Urquhart et al. (2017), who reported that "this may reflect a tendency for people to be more concerned about unfamiliar risks"."

3.1.1.1.1 PHYTOSANITARY CERTIFICATE

¹ Dutch elm disease, ash dieback, phytophthora decline on oak, beech or chestnut, alder phytophthora, oak powdery mildew, chestnut blight, pine wood nematode, and pine pitch canker.

² At national level, "at least two-thirds say they have heard of plant diseases as a food safety topic in Greece (72%), Sweden (69%) and Slovenia (66%), while four in ten or less answer this way in Romania (36%), Lithuania (37%) and Belgium (40%). In 14 countries, the share of respondents who have heard of plant diseases as a food safety topic has increased since 2019. Increases by more than ten percentage points in this proportion can be found in Italy (+29 pp), Slovakia (+15 pp), Malta (+12 pp) and Hungary (+11 pp). At the other end of the scale, large decreases are observed in Cyprus (-16 pp), Lithuania (-12 pp) and Portugal (-10 pp)" (EFSA, 2022a).

³ "The highest proportions expressing concern about plant diseases are observed in Greece (24%), Slovakia (21%) and Cyprus (20%). Concern about this topic is the lowest in Germany (4%) and France, Lithuania and Luxembourg (all 6%)... [Since 2019] Concern about plant diseases has risen the most in Italy (+10 percentage points), Finland (+8 pp) and Latvia (+6 pp)" (EFSA, 2022a).

⁴ Urquhart et al., 2017: p. 2568. [Ibidem: "Place identity is associated with experiences, memories and beliefs attributed to a place (Relph 1976)"].



The literature review did not identify any study focusing specifically on awareness about the phytosanitary certificate (hereafter certificate)⁵, or risk perceptions associated with transporting plants into the EU without this certificate (Porta et al., 2023). Data from EFSA's 2022 Plant Health Flash Poll (EFSA, 2022b) and the in-depth interviews carried out allowed to partly fill this evidence gap. Analysis of the data from the flash poll showed low awareness about the requirement for passengers to have an official certificate from the plant health authority if they are travelling into the EU and bringing with them plants. Specifically, around four in ten respondents (39%) had never heard of the certificate, and an extra four in ten (43%) indicated that they heard of it, but did not know much about it. Notwithstanding, data suggests a positive attitude towards the need for a phytosanitary certificate (to guarantee that products have been inspected and are free of pests and diseases), with around seven in ten respondents (72%) agreeing that requiring passengers to have a certificate for entering the EU is a needed measure (vs. 22% who neither agree nor disagree, and 6% who disagree). Similarly, around seven in ten respondents (71%) agree that plants brought by passengers into the EU without a certificate could have negative consequences to agriculture and the environment (vs. 23% who neither agree nor disagree, and 6% who disagree) (EFSA, 2022b).

Further, the Flash Poll showed that Europeans mostly lack or have incorrect knowledge about the requirements linked with the certificate. About one third (33.4%) does not know that a certificate is needed even if there are no signs of diseases (vs. 57.3% and 9.3% who answer correctly and incorrectly, respectively); close to four in ten (37.2%) does not know that bringing potted plants or fruits into the EU is not allowed even if these are for personal consumption (vs. 39.5% and 23.3% who answer correctly and incorrectly respectively); and close to half (47.6%) does not know that certain fruits do not require a certificate (vs. 21.6% and 30.8% who answer correctly and incorrectly respectively). Data also reveals higher levels of knowledge for the first two items among those who are aware of the certificate (i.e. increase in correct and reduction of don't know answers) (EFSA, 2022b).

Evidence from the interviews with citizens is in line with these results: When asked about the requirements for the transport of plant and plants products, none spontaneously mentioned phytosanitary certificates, and two out of five citizens indicated they had heard about the certificate when explicitly asked about it. One "said that these certificates rule the introduction of a product and the conditions of its utilisation; and [the other] believed that these certificates ensure that plants are grown in line with relevant regulations" (Porta et al., 2023). Interviews with two public sector officials and three customs officers revealed that they shared the perception that citizens are not aware about trade rules, which is consistent with the evidence reported above. Further, one custom officer indicated that "passengers do not even wonder about the legitimacy of bringing plants and plant products into the EU without certificates" and another indicated that "in 2021 out of 6 thousand hits, only one passenger was found with the phytosanitary certificate". Both mentioned also that passengers tend to have an "emotional link" with the good imported, with one of the officers noting however that most opt for voluntary renunciation (immediately or after receiving information about the fines) when non-compliances are detected (Porta et al., 2023).

3.1.1.1.2 AGE DISTINCTIONS

The analysis of data from EFSA's 2022 Food Safety Eurobarometer (EFSA, 2022a) and Plant Health Flash Poll (EFSA, 2022b) showed differences between age groups. The young generation (15-35 years-old) was the least aware that plant pests and diseases introduced by non-native species can lead to harm to agriculture and environment, as well as about the existence of a phytosanitary certificate. By contrast, the old generation (55+ years-old) presented the highest levels of awareness, and transitional generations (i.e., 36-45 and 46-55 years-old) were in-

⁵ The phytosanitary certificate is a mandatory requirement for most plants and plant products entering the EU. It guarantees that they have been properly inspected, are free from quarantine pests, and are in line with the plant health requirements of the EU. The certificate is issued by the exporting country's national plant protection authorities. Once in the EU, a plant passport may replace the phytosanitary certificate (European Commission, n.d.).



between. All age groups showed, however, similar patterns in that awareness was lower for the certificate than harm to agriculture and environment, and in that those aware expressed low levels of knowledge for both topics (i.e. indicate not knowing much about it rather than being reasonably or very well informed) (EFSA, 2022b; Porta et al., 2023). Likewise, data from the Eurobarometer showed that the share of respondents who had heard about plant diseases, e.g. affecting crops was higher among the older than the younger generation, and the same was true in terms of the share of respondents concerned about the topic (EFSA, 2022a; Porta et al., 2023). These findings are consistent with previous studies (Fuller et al., 2016; Marzano et al., 2016; Urquhart et al., 2017).

Additionally, the data showed that the share agreeing that requiring a phytosanitary certificate was a needed measure or that plants brought by passengers into the EU without a certificate could have negative consequences to agriculture and the environment, was higher among the older generation, but high across all groups (around two-thirds of respondents or more). A high share across all age groups (around eight in every ten respondents) report being concerned about the environment. Further, around four in ten respondents report that them or someone they know have witnessed first-hand the loss of food crops/trees due to plant pests or diseases, but the share was higher among younger rather than older generations (47% vs. 40% respectively) (EFSA, 2022b; Porta et al., 2023). This indicates a particular need among the younger generation regarding awareness raising in the field of plant health risks, which was taken into consideration when defining the audience segments (Porta et al., 2023).

3.1.1.2 PREFERRED INFORMATION SOURCES

Data from the 2022 Eurobarometer (EFSA, 2022a) showed that television, a TV set and the internet were the main sources of information about food risks (61%). This was followed by exchanges with family, friends, neighbours, or colleagues (44%), internet search engines (37%) and online social networks and blogs (e.g., video hosting websites) (22%). Analysis showed that across age groups and gender, TV was consistently the main information source, except for the youngest age group (15-24 years-old) for whom 'internet search engines' was the main information source. Additionally, data on general media consumption showed that watching TV (online + offline) was the most popular channel consumed (almost) everyday, followed by online social networks. However, online social networks were the least trusted source of information with only two in ten (20%) respondents indicating they tend to trust them (vs. 68% tend not to trust; 12% don't know). This contrasts with around half of respondents tending to trust television or written press (vs. 49%) and just over a third the internet (35%). In line with this, in the interviews "all the citizens reported that the news shared on social media needs to be double-checked as they question their reliability, [...] which might indicate that citizens' preferred source of information might be different from the one most used." (Porta et al., 2023).

Additionally, evidence from the literature review suggests that preferred sources of information vary according to the type of recipient, including their age, location, proximity to plant health issues, and level of interest in its risks and benefits. According to Porta et al. (2023), a review by Marzano et al. (2015) indicated that "citizens preferred traditional media and informal interactions (e.g., with friends, family, retailers, or local extension services) as sources of plant health information. On the other hand, producers of plant products often consulted specialists in the industry, including local extension services, consultants, professional organisations, and trade journals for information on managing pests".

3.1.1.3 TRUST IN DIFFERENT ACTORS

Data from the 2022 Eurobarometer showed that more than eight in ten respondents trust doctors (89%), scientists working at public institutions (82%) and consumer organisations (82%) as sources of information on food risks. Analysis further showed that high trust in these actors was consistent across age groups and gender. Notably, at the other end with the lowest levels of trust were 'celebrities, bloggers and influencers', with only two in ten (20%) tending to trust them (EFSA, 2022a). However, as mentioned by Porta et al. (2023), it is worth noting that "this is a category with a broad description (e.g., people might trust in influencers, but not in

celebrities), this result risks to flatten more specific insights. Based on Nielsen (2022), 'influencers' are trusted by 71% of the interviewees (N=2,000)."

Additionally, results from the interviews with citizens indicated that they tend to trust and consult governmental or official websites when it comes to information about plant health, but that they do not monitor and/or regularly check information on the topic (Porta et al., 2023). Furthermore, some authors have suggested that involving citizens and/or stakeholders in decision-making processes (e.g. consultation or discussion plant health problems and solutions) can increase trust (Oude Lansink et al., 2018; Reed et al., 2015).

3.1.2 Four target audience segments: personas

Based on the research above, four personas were developed in the present study: "the curious traveller", "the home gardener and hobby farmer"; "the conscious young parent"; and "the adventurous and green foodie" (see Figure 2 and Table 1). A persona is a fictional, but realistic description of an audience segment as it is built on research insights and actual data from real citizens. Personas are a valuable tool for communications as they help make details and key characteristics of the target audience segments more salient and memorable, and thus facilitate an "audience-first approach" when designing the communication strategy and content (Harley, 2015; Porta et al., 2023).



Figure 2: Four personas

Their selection aligns well insights from the literature suggesting the relevance of "targeting 'higher risk' and 'more willing' groups, such as those engaged in environmental activities, members of environmental groups or gardeners" (Urquhart et al., 2017). As pointed by Marzano et al. (2017), "it will always be difficult to build high levels of awareness among the general public so it is perhaps more useful to identify and target intermediaries who can make a difference through their behavioural actions and networking abilities."



Table 1: The four personas in brief (adapted from Porta et al., 2023)

Persona	Persona snapshot
The curious traveller	Interested in plants they discover during their walks and trips abroad, and in bringing plants home from as a souvenir for the garden or yard, or to give away as an original gift from their travels. Positive attitude towards plant health, although they do not feel well informed (phytosanitary certificate). Environmentally conscious, and commonly function as ambassadors for sustainability.
Home gardener and hobby farmer	Interested in growing healthy and sustainable plants in their own gardens, they may be concerned also about the health and quality of the plants they purchase. Positive attitude towards plant health, and moderately informed. The motives underlying their interest in plant health are diverse (beauty, sustainability, biodiversity, human health). Likely to share and even sell at a small scale the plants they grow in yards and gardens to local people or online.
The conscious young parent	Interested in plant health, sustainable lifestyle and in local food supply, as well as in passing their values to their children. They have a sense of ‘urgency’ and higher likelihood of engaging in activities to reduce their own environmental impact. Positive attitude towards plant health, and moderately informed. They may be concerned about the health and safety of the plants they have in their homes and yards. Food safety is top of mind, and they are concerned about the diet of their children.
The adventurous and green foodie	Passionate about sustainable and local food supply, and likely to be aware about their health, and the quality of food they eat. Positive attitude towards plant health, and sustainability and organically produced food are important to them. They value ways to protect the environment through their eating habits and are often very vocal in promoting and advocating for a shift in dietary choices. Taste prevails over safety when buying foods.

These four personas can form the basis for the development of the communication strategy. They support the definition on more specific goals and content, as well as a “focus on personalising user experience across communication tools, based on social insights, personal needs, and motivators” (Porta et al., 2023). Each persona is presented next, together with profile-specific communication approaches. Additionally, an infographic for each of them can be found Appendix A and estimates of the target audience population size for each of the four personas are provided in Appendix B (Porta et al., 2023).

3.1.2.1 THE CURIOUS TRAVELLER

International travellers are a key target audience for plant health activities in the EU. “40% of Europeans travel to other countries, both within and outside the EU. According to Eurostat data, 92% of the personal trips take place via land. These movements provide for the opportunity to move plants and plant products with less checks and without certificates.” (Porta et al., 2023). In a study focusing on invasive species intercepted at three Border Control Points (BCPs; two ports and one airport) in Italy (Campania region) from 2016 to 2021, Pace et al. (2022) found that during this period “large quantities of plant products were found in the luggage of passengers travelling from outside the EU and seized at the BCPs”. Results suggested very high risk for possible introduction of threatening pests through luggage from air passengers, and the authors noted that there is lack of sufficient data on the risk and that its frequency is underestimated.

Based on the insights from the social science research, the curious traveller is within the age group of 18 to 30 years old and is someone who tends to be more environmentally conscious than other travellers. The curious traveller often chooses trips or activities that are nature related, is more knowledgeable about and open towards sustainable tourism practices, and often uses locally sourced products and services to reduce their environmental impact. They are “more open to learn about plant health and can become of influence in disseminating information about protecting native vegetation, organic fertilizers, pesticides, and invasive species.” Curious



travellers commonly function as ambassadors for sustainability, and many are likely to spread knowledge about plant health issues with their family, friends, and social media's followers through the sharing of their adventures, knowledge, and experiences (Porta et al., 2023).⁶

Insights from the research on this audience segment additionally revealed that the curious traveller has a positive attitude towards plant health, although they do not feel well informed and have low awareness of the risk that imported plants can pose to other plants and the environment (EFSA, 2022b; Porta et al., 2023). They are mostly unaware or do not know much about the phytosanitary certificate, and their knowledge of specific requirements of this certificate is low (Figure 3).⁷

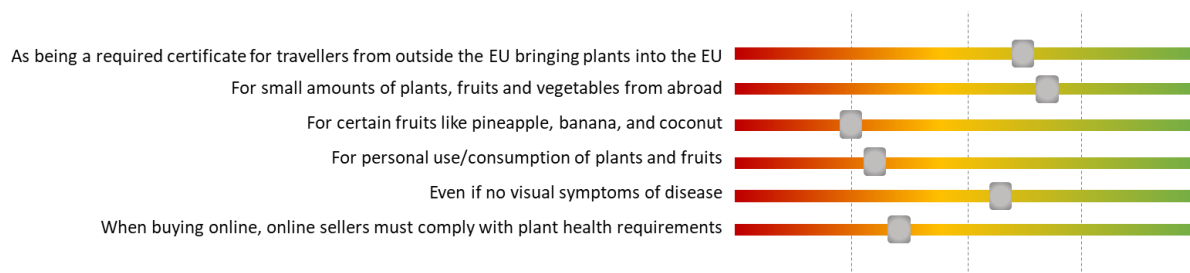


Figure 3: Curious traveller's level of awareness of the different aspects of phytosanitary certificate (Porta et al., 2023).

Turning next to sources of information, Figure 4 Figure 4: Relevance of different sources of information for the curious traveller (Porta et al., 2023).

presents an overview of the relevance of different sources for the curious traveller persona. This is based on analysis and interpretation of data from several recent citizens surveys and available information (EFSA, 2022a; EFSA, 2022b; European Parliament, 2022; European Commission, 2022; Haugen, 2017). As can be seen, search engines, thematic websites, and influencers have the highest relevance. To a less extent, but still relevant for this segment, are thematic tv channels, social media, and airports or other international travel hubs. It is worth highlighting that to the extent possible the analysis considered both use of and trust in information sources. To illustrate, social media scored high in consumption according to the available data, but its relevance was adjusted down as the level of trust in this media is low.⁸

⁶ See Appendix C.1 for additional highlights from the research relating to this persona.

⁷ Figure is based on results from EFSA's Flash Poll on Plant Health (EFSA, 2022b). Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).

⁸ Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).

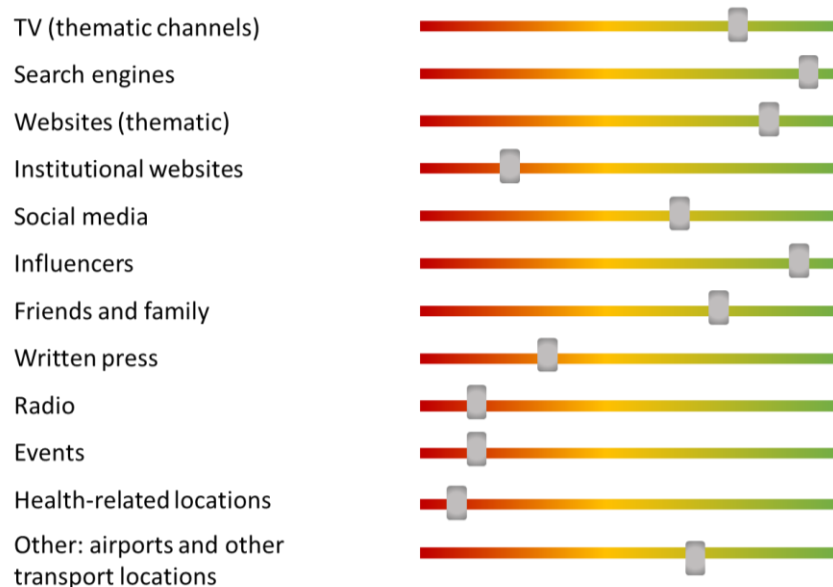


Figure 4: Relevance of different sources of information for the curious traveller (Porta et al., 2023).

3.1.2.2 THE HOME GARDENER AND HOBBY FARMER

Home gardeners and hobby farmers are a key target audience for plant health activities in the EU given their level of interest and engagement when it comes to plants and horticulture. Further, they can be seen as opinion leaders in the green space and have access to vast information networks (Porta et al., 2023). Recent data indicates that the share of Europeans with a garden was 58% in 2020, ranging from 75% in Belgium and the Netherlands to 30% in Spain (USP, 2020). Further, interest in gardening and growing fruits and vegetables at home saw a steady increase in the EU during the Covid-19 pandemic (Montanari et al., 2021; Porta et al., 2023; Marsh, 2021; Turnsek et al., 2022). This “might have also increased the number of home gardeners selling seeds online in Europe via platforms [...] but with no indication of the risks, dangers, or any certification” (Porta et al., 2023).

Based on the insights from the research, the “home gardener and hobby farmer” is within the age group of 25-55 years old. The motives underlying their interest in plant health are diverse and include pleasure of gardening and beauty that healthy plants bring to their homes; interest to tackle climate change and foster sustainability within the local environment; interest to promote biodiversity and protect wildlife; and/or recognition that a healthy environment is important for human health. Additionally, they have a variety of backgrounds, especially considering the changes to interest and take up in gardening following Covid-19. In general, the focus is on food provision among home gardeners/hobby farmers in rural areas vs. green aspects in urban areas. Namely, “the urban areas have seen an increase in the shared urban gardens (initially for recreation and food quality reasons, recently also as part of sustainability efforts and climate change mitigation) and ‘guerrilla gardening’ and ‘street gardening’⁹ (Keshavarz, et al. 2016); they increase biodiversity and counteract the heating of cities (McEldowney, J. 2017; Noonan and Barreau, 2021)” (Porta et al., 2023).¹⁰

Insights from research on this audience segment additionally reveal that the “home gardener and hobby farmer” segment has a positive attitude towards plant health, and they feel moderately informed. When buying online, cost is more important than the country of origin, and they also value reviews and ratings of other buyers over proximity of the seller (EFSA,

⁹ It consists of planting flowers along streets, on traffic islands or around street trees.

¹⁰ See Appendix C.1 for additional highlights from the research relating to this persona.



2022b; Porta et al., 2023). In addition, their awareness about the phytosanitary certificate, and their knowledge of its requirements is low (Figure 5)¹¹.

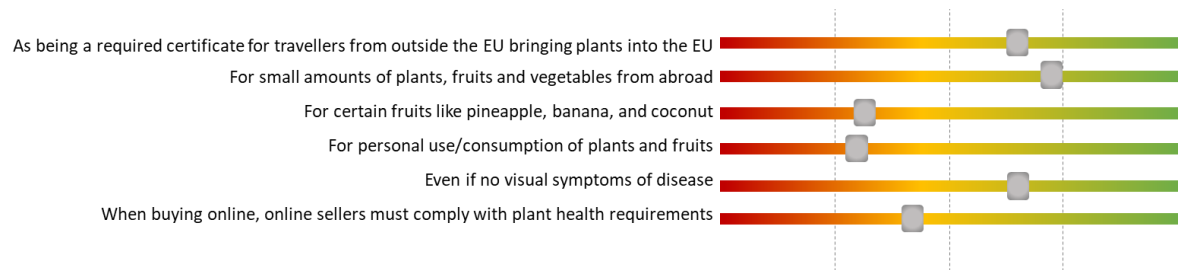


Figure 5: Home gardener and hobby farmer's level of awareness of the different aspects of phytosanitary certificate (Porta et al., 2023).

Turning next to sources of information, Figure 6 presents an overview of the relevance of different sources for the home gardener and hobby farmer persona. This is based on analysis and interpretation of data from several recent citizens surveys and considering both use and trust in information sources to the extent possible (EFSA, 2022a; EFSA, 2022b; European Parliament, 2022; European Commission, 2022).¹² As can be seen, thematic tv channels, search engines, friends and family, radio, and gardening and farming e-commerce/retail or flower festivals have the highest relevance. To a less extent, but still relevant for this segment, are thematic websites, social media, and influencers.

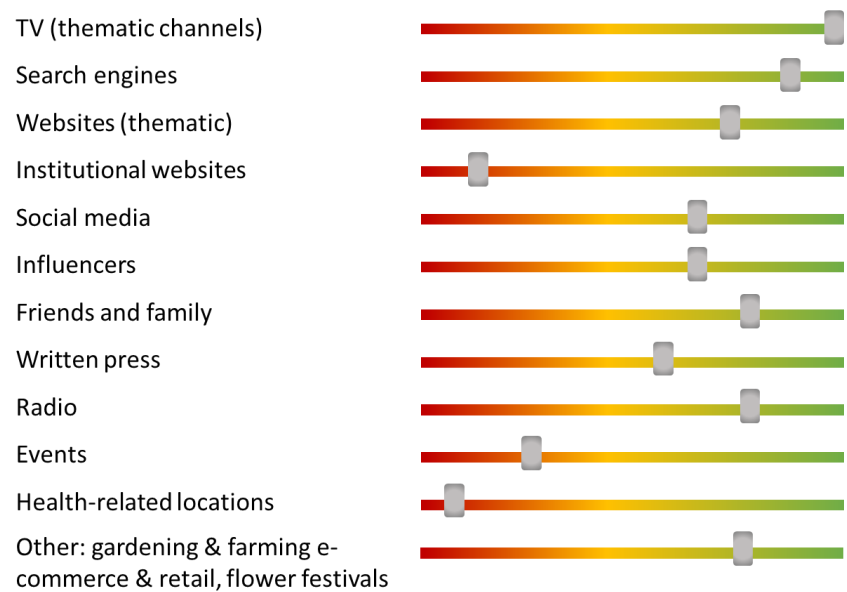


Figure 6: Relevance of different sources of information for the home gardener and hobby farmer (Porta et al., 2023).

3.1.2.3 THE CONSCIOUS YOUNG PARENT

Conscious young parents are a relevant target audience for plant health activities in the EU since they display high care for the environment, are likely to prioritize sustainability, and can influence their children to also do so. They see their children are the influencers of tomorrow's

¹¹ Figure is based on results from EFSA's Flash Poll on Plant Health (EFSA, 2022b). Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).
¹² Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).



society, and believe they have a role to play in helping them become responsible citizens (Porta et al., 2023).

Based on the insights from the research, the conscious young parent is within the age group of 25 to 45 years old and comprises parents with children under 12 (age of the youngest child). They are motivated by a desire to promote their children's (physical and psychological) wellbeing, as well as the state of the world around them. In particular, "they are highly concerned with the potential impacts of irresponsible farming and agricultural practices on their children's health and the environment." The sense of 'urgency' of conscious young parents is significant, and relative to the general public they have higher likelihood of engaging in activities to reduce their own environmental impact. For instance, "reducing their consumption of animal products, wasting less food and water, and reducing their energy use." Moreover, "they have become increasingly enthusiastic and vocal about plant health, particularly in relation to sustainable farming, organic, genetically modified organisms (GMOs) and chemical-free products." When it comes to food purchases, they prioritize buying from eco-friendly farms/shops and are willing to pay a premium for produce that are locally sourced, in-season. They are furthermore attentive to food labels and knowledgeable about plant-based diets (Porta et al., 2023).

Targeting the conscious young parent segment is relevant also given the potential to capitalize on "reversed influence" (Porta et al., 2023). Namely, on the one hand, "parents play a crucial role in educating the future generation on the importance of plant health and its impact on the food system worldwide". On the other hand – and specially as recent data suggests widespread worry and distress about climate change (climate anxiety) in children and young people (Hickman et al., 2021) – children can contribute to increasing awareness and concern among parents about the risks of transporting with plants and plant products with certification.

Insights from research on this audience segment additionally reveal that the conscious young parent has a positive attitude towards plant health, and that they feel moderately informed. Their personal interest in and awareness about food safety is very high (EFSA, 2022b; Porta et al., 2023). In addition, their awareness about the phytosanitary certificate, and their knowledge of its requirements is low (Figure 7).

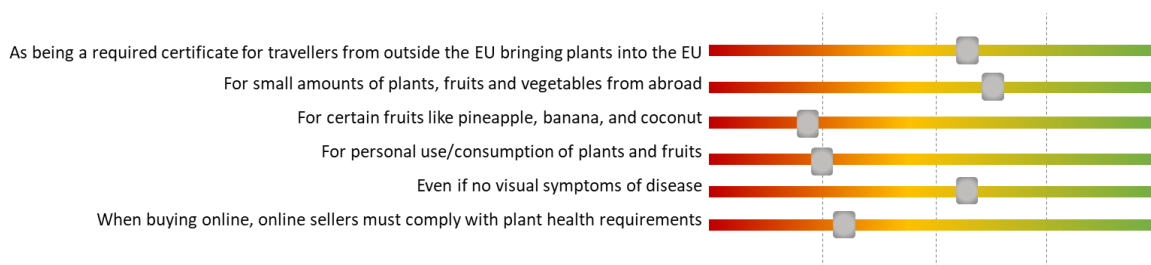


Figure 7: Conscious young parent's level of awareness of the different aspects of phytosanitary certificate (Porta et al., 2023).

Turning next to sources of information, Figure 8 presents an overview of the relevance of different sources for the conscious young parent persona. This is based on analysis and interpretation of data from several recent citizens surveys and considering both use and trust in information sources to the extent possible (EFSA, 2022a; EFSA, 2022b; European Parliament, 2022; European Commission, 2022).¹³ As can be seen, thematic tv channels, search engines, thematic websites, influencers, and online communities of young parents have the highest relevance. To a less extent, but still relevant for this segment, are friends and family and health-related locations.

¹³ Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).

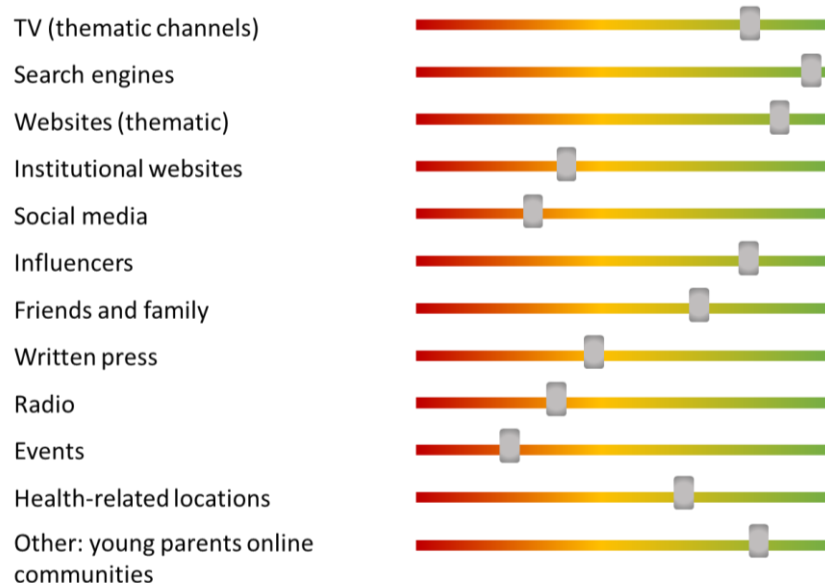


Figure 8: Relevance of different sources of information for the conscious young parent (Porta et al., 2023).

3.1.2.4 THE ADVENTUROUS AND GREEN FOODIE

Adventurous and green foodies are a relevant target audience for plant health activities in the EU since they have a medium to high involvement in food, and when it comes to food-related lifestyle dimensions they place high value in food innovativeness but also food responsibility. They are also open to new ways to make their plant-based eating healthier and more efficient (Porta et al., 2023; Stancu, et al., 2022). According to a survey by the EU-funded Smart Protein project encompassing nine EU-countries and the UK (N=7,590), there is a growing interest in plant-based eating in Europe. Data showed that fewer than one in ten were plant-based eaters (7%), but that an additional three in ten followed a flexitarian diet (sometimes eat meat, but trying to reduce its consumption and often choosing plant-based products instead). Further, among the nine in ten respondents who indicated they ate meat, 46% indicated that they were eating less meat than a year ago, suggesting openness to change (vs. 48% no change; 6% more) (Smart Protein, 2021).

Based on the insights from the research, the adventurous and green foodie is within the age group of 18 to 35 years old, and tendentially female and middle class. They are likely to be aware about their health, and the quality of food they eat, but also “to have a greater understanding of the environmental and health impacts of its diet”. Sustainability and organically produced food are important for adventurous and green foodies, and they are “eager to find out new ways to protect the environment through its eating habits [...] and “motivated to make food choices that considers to be healthier (e.g., by reducing animal-based products consumption).” Further, this audience segment is motivated to learn more about the impacts of their diet on the environment, the planet and animal welfare, and to share it with others. “They are often very vocal in promoting and advocating for a shift in dietary choices and they are using social media platforms to share their experiences and recipes. Through their online presence, they can reach larger audiences and help to spread their message of sustainability and to encourage people to make more conscious and healthy choices in their eating habits [...] (they are) actively involved in campaigns to promote plant-based food and provide resources to help people make the switch.” (Porta et al., 2023).

Insights from research on this audience segment additionally reveal that the adventurous and green foodie has a positive attitude towards plant health. Their awareness about food safety and plant health is high, but taste prevails over safety when buying foods (EFSA, 2022a; 2022b;

Porta et al., 2023). In addition, their awareness about the phytosanitary certificate, and their knowledge of its requirements is low (Figure 9).¹⁴

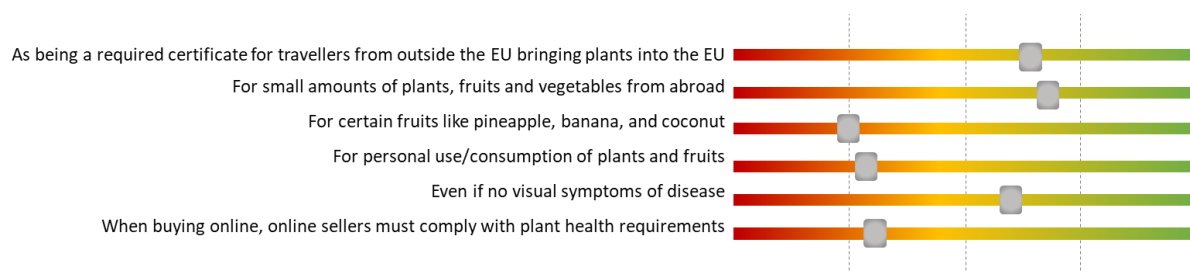


Figure 9: Adventurous and green foodie's level of awareness of the different aspects of phytosanitary certificate (Porta et al., 2023).

Turning next to sources of information, Figure 10 presents an overview of the relevance of different sources for the adventurous and green foodie persona. This is based on analysis and interpretation of data from several recent citizens surveys and considering both use and trust in information sources to the extent possible (EFSA, 2022a; EFSA, 2022b; European Parliament, 2022; European Commission, 2022).¹⁵ As can be seen, search engines, thematic websites (e.g. health and nutrition-society websites), and influencers have the highest relevance. To a less extent, but still relevant for this segment, are thematic tv channels, social media, and friends and family.

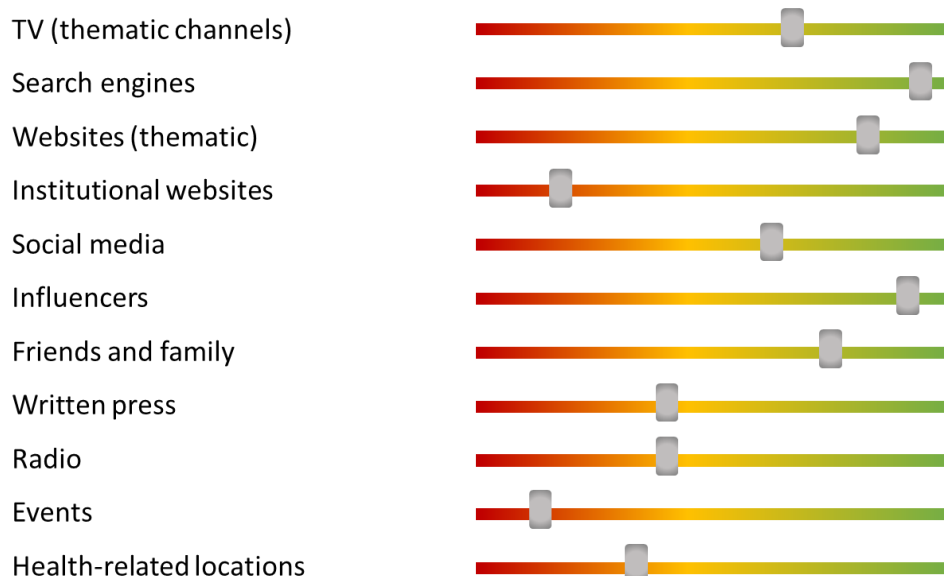


Figure 10: Relevance of different sources of information for the adventurous and green foodie (Porta et al., 2023).

3.1.3 Plant sector stakeholders

Stakeholders involved in plant health, agriculture, and related sectors (i.e., plant health researchers, crop scientists, agronomists, farmers, policymakers, transportation and trade sector, NGOs, etc.) can play a role in supporting the objectives and reach of an awareness-raising campaign on plant health. As mentioned by Porta et al. (2023), "they have the necessary expertise to understand the threat posed by plant health risks and develop strategies to prevent, mitigate and control them. Also, they can provide advice on best management practices and

¹⁴ Figure is based on results from EFSA's Flash Poll on Plant Health (EFSA, 2022b). Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).

¹⁵ Details on the analysis and interpretation of the data used to produce the slider can be found in Porta et al. (2023; see Appendix E).



valuable input on effective communication methods and language". Accordingly, plant sector stakeholders were covered by the research carried out and findings are summarised next.

Studies suggest that involvement of stakeholders can contribute to increasing the effectiveness of plant health risk communication (Oude Lansink et al., 2018; Porta et al., 2023; Reed et al., 2015).¹⁶ They can, for example, help tailor communication to their peers/contexts, as well as play a central role in communicating plant health risks particularly among target groups who perceived them as trusted sources of information (Maye et al. (2012; Porta et al., 2023; Reed et al., 2015).

A review paper by Marzano et al. (2015) found that limited evidence was available regarding awareness levels of plant health stakeholders. Gaps, in terms of the limited number of available studies, were more pronounced for nurseries and horticultural professionals despite the role they can play in the spread of pests. The limited available research suggested low levels of awareness in general, with slightly higher levels in some cases. In particular, it indicated that there are "high levels of relatively superficial knowledge" among gardeners, and good general awareness of the tree pest issue, but a lower level of knowledge among professionals that work in forestry and arboriculture. This finding is supported by Marzano et al. (2016), who found relatively modest levels of awareness of pests in a survey of tree professionals working in forestry, agronomy, landscape architecture, horticulture, conservation from nine European countries (five EU).^{17,18}

In terms of preferred sources of information, the literature review revealed that plant sector operators tend to use experts in the field as sources of information. Marzano et al. (2015) found that "producers of plant products often consulted specialists in the industry, including local extension services, consultants, professional organisations, and trade journals for information on managing pests." Additionally, results from a survey with tree professionals from nine European countries (N=392) showed that they rely on multiple sources of information, with internet being the most frequently used source (71%), followed by education and training resources (56.1%), government organisations (46%), trade journals (44%) and professional organisations (33.2%) (Marzano et al., 2016). In line with this, the two business operators interviewed in the context of the present study both indicated EFSA and EPPO, as well as the European Commission's website as their preferred and more trusted sources of information. Other trusted sources mentioned by one of the two included agri-food debrief of EuroActive, and EIP technical newsletter, the newsletter Medisys, and research institutes' websites¹⁹ (Porta et al., 2023). Finally, when it comes to custom officers, results from interviews from the present study indicated that official actors were the preferred and trusted source of information. These included National Plant Protection Organisation (NPPO), Eurolex, EPPO, the European Commission's website and TRACES (where interceptions are reported, i.e. which bacteria, on which products it was found, and where they were coming from) (Porta et al., 2023).

¹⁶ For instance, Oude Lansink et al. (2018) found that "found that ambrosia management had been effective as it included supranational bodies (such as the EU and environmental NGOs), national bodies (including ministries, farmer unions, researchers, and health providers), and regional bodies (including regional and local government and private sector retailers and contractors working together to raise awareness and provide education and training)" (Porta et al., 2023).

¹⁷ "Marzano et al. (2016) found that participants had "modest levels of knowledge and awareness". They found that 20.4% had never heard about selected pests and diseases, 31% had heard about them but knew very little, 26.5% had some knowledge of those pest or disease, and only 22% had a lot of knowledge. Overall, they noted that higher awareness and knowledge was reported in countries where a pest was present: this was the case for Bulgaria, Sweden, Macedonia, and Italy, but not the UK where participants reported low level of awareness and knowledge about pests present in their territories. The authors concluded that there was not enough data to thoroughly examine these differences." (Porta et al., 2023)

¹⁸ See Appendix C.2 for research findings on stakeholders in what regards the plant passport. Plant passports are "issued to accompany the plants, products and other objects once they have passed all the EU checks." (European Commission, n.d.)

¹⁹ Both business operators noted that they tend not to pay much attention to information from other sources (i.e., street information points; online social networks/blogs; information retrieved in health-related location; newspapers, magazine; workshop and event; TV; professional journal; radio/podcast).



3.1.4 Additional aspects of plant health to be explored within the communication campaign

EFSA's Plant Health Flash Poll (EFSA, 2022b) showed that, for citizens, important beliefs related to plant health are that plant health is key to quality and availability of food, and that the state of plants and crops has an impact on human health.²⁰ Results also showed high levels of concern about potential consequences of plant pests and diseases. This is in line with previous research which has generally found low awareness and knowledge of plant pests and diseases, but higher levels of concern (e.g. Fuller et al. 2016; Marzano et al. 2016; McFarlane et al. 2006; cited in Urquhart et al., 2019). As pointed out by Urquhart et al. (2019) "This may reflect a tendency for people to be more concerned about unfamiliar risks or those they know little about, risks that may have effects that are delayed in time and where there is scientific uncertainty". Additionally, in a study in the UK in the context of an outbreak, "Porth et al. (2015) showed that residents felt communication was needed on what the pest looked like and the impact it can have but also whether the measures" (Porta et al, 2023).

In terms of the nature of concerns, EFSA's Flash Poll showed that around three-third of respondents were concerned about effects to human or animal health, price increases due to impacts on food security; potential harm to biodiversity, the environment; or need to apply more pesticides (EFSA, 2022b).²¹ Consistent with this, other research suggests that citizens' risk perception in relation to plant diseases tends to focus on environmental, human health, and economic aspects (Hilaire et al., 2022), or fall under two main areas, i.e. "concern about the broad threats to public goods and ecosystem services (e.g., loss of a tree species, biodiversity, landscape, and the forest as an economic resource); and concern about personal impacts such as the cost of removing or treating an infected tree on their land or the health impacts to themselves or their family" (Urquhart et al., 2017). Likewise, the interviews with citizens carried in present study showed that they tended to associate plant health with environmental aspects (e.g. link between plant health and air quality and pleasantness of the environment; use of pesticides as a risk associated with plant health), public health (e.g. plants in good health can bring nutrients to human bodies) and diet (i.e. good variety of plants is needed for plant-based food) (Porta et al, 2023).²²

Additionally, the research carried out provided insights regarding specific themes relevant for each of the identified personas. As mentioned by Porta et al. (2023), some include i) "the need to be careful when bringing plants and plant products across borders", and "plants provide essential resources for all the organisms on Earth" for the curious traveller; ii) "keep plants healthy while protecting the environment by choosing safe plants and plant products. Be extra careful when selling or buying online" for the gardener and hobby farmer; iii) "Protect your family's health and the planet's health by taking proactive steps to protect the health of plants. This contributes to a more sustainable and equitable future for [...] and enhance health and well-being for current and future generations" for the conscious young parent; and iv) "Discover and enjoy foods while protecting your health. [...] Plants provide essential resources for all the organisms on Earth and protecting their health is important to improve nutrition and enhance health and well-being for current and future generations" for the adventurous and green foodie. In line with an "audience first" approach, it will be essential that the awareness-raising campaign also comprises risk communication messages specific for each target audience, with their design

²⁰ In line with this, EFSA's 2022 Eurobarometer showed that a large share of Europeans across the EU-27 agreed that state of plants and crops have a moderate or strong impact (34% and 55% of respondents, respectively) on human health (2022a).

²¹ Data from the survey (N=8,600) revealed 78% were concerned about potential need to apply more pesticides to treat infected crops; 77% about effect on human and animal health due to the threat they can pose to food safety; 76% about price increases of food due to less food being available; 74% about harm to biodiversity, and the environment; 73% about financial hardship of farmers due to need to treat or destroy infected crops/trees; and 70% about trade losses in agricultural products due to lost food production.

²² By contrast, when asked about plant health the stakeholders interviewed "did not mention public health, but reported specific pests (i.e., pests affecting potato and citrus, *Xylella fastidiosa*, and the 'quarantine pests') and pests' economic implications." Food security was also mentioned by one of the public sector and one of the business association representatives, observing that pests can cause a reduction in the production (Porta et al., 2023).



based on the audience's needs and motivations to make the communication more salient in each case. Finally, the themes outlined above require further development and refinement during the campaign strategy and production stages.

Furthermore, the literature review provided some evidence on citizens' willingness to adopt biosecurity behaviour, which is worth considering when designing the campaign. As indicated by Porta et al. (2023), Urquhart et al. (2017) found that respondents with affective attachment to a place or "with high positive attitudes towards trees and woodlands, those who buy plants, regular woodland visitors and members of environmental organisations were most likely to be willing to adopt biosecurity behaviours". Additionally, "Eriksson et al. (2018) [...] found that while the public accepted strict measures on plant production, it was less positive towards policies restricting their personal freedom (e.g., policy restricting public access to protected areas)." and indicated that "personal experience, if not severe, may reduce the 'willingness to act'" (Porta et al., 2023). Finally, Marzano et al. (2017) highlighted the important role of risk communication in helping to build trust among the public. For instance, if there is a perception that public agencies fail to consider concerns of affected communities during an outbreak this can affect the reactions to communication and acceptability of biosecurity measures.

Finally, the limited evidence available suggested low awareness among citizens about the process of reporting plant health issues and the authorities to be contacted (Porta et al., 2023). Findings from Urquhart et al. (2017) indicate that the likelihood of reporting an issue varies, either due to lack awareness about the reporting mechanisms or to low willingness to report and adopt the required biosecurity behaviours. In line with this, the interviews carried out in the present study indicated that while "business associations were aware about the process to follow, citizens interviewed were not aware about plant pests and disease, and they were confused about the process to follow to report plant health problems. Only one of the five citizens reported to have detected a "sick plant" and as a follow up action to have informed the mother. Other citizens reported that, if in that situation, they would have checked on internet." Further, one of the custom's officers indicated that "is very likely linked to the strong network of people among specific communities that exchanged information about the possibility of importing plants via certain airports.

3.2 Multi-year communication strategy

3.2.1 Situational analysis

The purpose of the situational analysis carried out was to integrate the findings of the social research to develop the basis of understanding of the environment in which the campaign will be delivered.

ICONS notes the challenge related to navigating and retrieving information about the political environment of PH in Europe: "While the European Commission's website offers useful and easily accessible information, it lacks an organisational chart of the players and their positions within Europe's PH political ecosystem. In the Member States, the challenge is even greater as it is extremely difficult to find details about how they implement EU regulations on PH. Therefore, it has not been possible to provide a detailed discussion about national differences on the implementation of PH regulations in Europe" (Michi et al., 2023).

A similar challenge was encountered when investigating the latest scientific and technological advances in the PH field. In particular, it is not easy to find online the tools and channels that citizens can use to report pests to their national authorities, nor to find information on citizens' science projects aimed at facilitating reporting by citizens.

Key insights of the situational analysis are reported below.

3.2.1.1 POLITICAL ENVIRONMENT

The political and regulatory environment of PH in Europe is complex and articulated, and involves a number of stakeholders:



- The Directorate General for Health and Food Safety (DG SANTE) is in charge of PH at EU level;
- EFSA provides advice and risk assessment to the EC on PH;
- The Euro-Mediterranean Plant Protection Organization (EPPO) is an intergovernmental organisation responsible for cooperation against the introduction and spread of pests (EPPO, online a);
- The Chief Officers of Plant Health (COPHS) are a Working Party of the Council of the EU dealing with PH topics;
- The Standing Committee on Plants, Animals, Food and Feed (PAFF Committee), composed by representatives of all EU countries and presided by a European Commission representative, delivers opinions on draft measures that the Commission intends to adopt;
- The Commission's Expert Group on Plant Health Awareness Raising, composed of representatives of all EU countries and presided by DG SANTE, discusses the awareness raising campaign on plant health.

At the national level, Member States' PH authorities and National Plant Protection Organisations (NPPOs) deal with plant health. The structure and function of Member states' PH authorities and NPPOs vary. In some EU countries, the NPPO is also the national PH authority, while in other countries the two organisations share PH responsibilities.

At the global level, the International Plant Protection Convention (IPPC) coordinated by the United Nations Food and Agriculture Organization (IPPC, 2023a) is an international treaty signed by over 180 countries, including EU NPPOs.

These actors work together to ensure the protection of PH in Europe, preventing the introduction and spread of plant pests and diseases from outside the EU, as well as to ensure the safe trade of plant and plant products between EU Member States and non-EU countries. Key EU Regulation define the EU quarantine pests, establish the plant passport and the phytosanitary certificate, set out requirements for control on plants, and regulate specific pests, such as *Xylella fastidiosa*.

Member States are responsible for implementing and enforcing EU legislation at national level to protect their territory and the EU from plant pests and diseases. "Additionally, EU Member States also have their own national laws and regulations in place which complement the EU legislation. These laws provide additional protection or specify how the EU rules will be applied in practice in a particular country. (European Commission, 2019; Baldissera et al., 2020; Handford et al., 2015)" (Michi et al., 2023). National regulation is linked to the specific risks faced by the country (e.g. spread of specific pests, high trade volumes of plant products, prevalence of greenhouse horticulture versus conventional horticulture) and pest zoning strategies adopted.

This research suggests that for citizens it can be complicated to identify the roles of the different actors working on PH at EU level and in their country. Citizens' awareness should be raised with regard to the pests most relevant in their country and to their role in preventing their spread. In particular, the link between the legislation on PH and the daily life of European citizens needs to be highlighted. The phytosanitary certificate and the plant passport are thus two topics to include in the campaign, also in light of the low level of awareness on the phytosanitary certificate showed by the social research.

3.2.1.2 ECONOMIC FACTORS

Plant virus infections account for global economic losses estimated at around €28 billion annually and are responsible for nearly 50% of plant diseases worldwide, threatening global food security (Hilaire et al., 2022). The European Union developed various programmes and initiatives aimed at protecting PH. National authorities also invest to protect PH in Europe. In addition, plant health private operators and farmers bear some of the costs linked to PH, for example related to monitoring and control of pests, compliance with regulation, and research and development.



Several global issues might negatively impact PH in Europe, namely the war in Ukraine and the consequent economic crisis, the COVID-19 pandemic, and the trends of trade and import/export linked with globalisation. In particular, the displacement of people due to the war and the reduced border control and quarantine measure increases the risk of spreading plant pests and diseases (OECD, 2022a; FAO, 2022). Additionally, the crisis increases the risk of reduced monitoring and control of pests due to fewer resources available and a raising pressure to produce more at a lower cost.

The EU is a large market importing and exporting plants and plant products, with the export trade of agricultural goods higher than the import one (Michi et al., 2023). Non-EU imports come mainly from Brazil, the United Kingdom, the United States, Norway, China and Ukraine (Eurostat, 2022).

The findings suggest the need to raise awareness among European citizens and stakeholders about the correlation between plant health and food security, food safety, and the economy. They also support efforts in raising awareness and activating European citizens in pest recognition and reporting to their national authority, to complement efforts put in place by national authority in a context of limited resources available.

3.2.1.3 SCIENTIFIC AND TECHNOLOGICAL ADVANCES

In Europe, plant health constitutes one of the most pressing challenges. There is a need to further increase production of safe food, while preserving healthy and functional ecosystems, and restoring those that have been disrupted (Michi et al., 2023). In this context, it is paramount to continue to protect plants from known pests, while addressing emerging plant pests and diseases. These often result from changes in agricultural practices, globalization and climate change (Paul et al., 2019; Valent 2021). Tackling pesticide resistance is another major challenge (Fisher et al., 2018), and among the recent scientific developments used in the fight it is worth mentioning Integrated Pest Management and the development of biopesticides.

In relation to the campaign, technological advances in the field of artificial intelligence linked to plant health are of interest. Several PH mobile apps have been created by private entities for plant enthusiasts, farmers and gardeners (they are relevant for P2 and plant sector operators) and can help them to identify and treat plant pests and diseases. A number of those apps have been analysed and listed in the report (Michi et al., 2023), and although now they cannot be used to report pests to national authorities, synergies in terms of communication or enhancement of those apps to allow reporting could be explored.

The role of citizens in pests reporting is increasingly gaining importance, alongside activities carried out by national authorities. Citizens can report the presence of pests to their national competent authority, although the analysis shows that finding information on whom to contact and how to submit the report is not easy.

A number of citizen science projects focusing on pests reporting have arisen in the last years. Some of these projects developed apps which enable citizens to easily report pests and invasive insects to their national authorities. Also in this case, it is not easy to find information on apps and systems citizens might use to report pests.

The main findings of the analysis suggest that citizens should have easy access to clear information on how to report pests to their national authority (it should be clear what is the competent authority in the country or region, what are the possible routes and tools to submit a report, and how they report will be dealt with).

Synergies with existing apps and systems developed by private entities and targeting plant amateurs, as well as with pest reporting apps and tools developed in the framework of citizen science projects can be analysed and leveraged during the campaign in connection with pest recognition and pest reporting.



3.2.1.4 COMMUNICATION AROUND PLANT HEALTH

Several organisations promote information on plant health in the EU. The main actors are the EC, EFSA, EPPO and NPPOs (Michi et al, 2023). EPPO maintains also a Global Database to provide pest-specific information that has been produced or collected by them (EPPO, 2023). There are also several non-governmental organizations that work to promote PH and biodiversity conservation in Europe, including the Nature & Biodiversity Conservation Union, the European Environmental Bureau, Euphresco, EPSO, Euroseeds (for more detailed information, see Michi et al, 2023).

Below are listed some of the global and European awareness-raising campaigns and activities launched in the past years²³:

- International Year of Plant Health (IPYH) 2020: The Food and Agricultural Organization (FAO) designated 2020 as the International Year of Plant Health to celebrate the benefits of healthy plants.
- International Day of Plant Health – 12 May: The Food and Agricultural Organization (FAO) established 12 May as the day of Plant Health and offers all interested stakeholders a way and materials to get involved.
- Beastie the Bug: Beastie the Bug was created as a communication campaign launched by EPPO for the IPYH 2020 based on a mascot symbolising an invasive pest.
- “Don’t Risk it” campaign: An initiative led by EPPO to raise awareness about the risks associated with bringing plant material into the EU from outside the EU.
- Plant Health – rules for passengers: video, poster and social media materials on the do’s and don’t of travelling into the EU with plants developed by DG SANTE.
- Tree Health – Keep it clean campaign: Plant health campaign led by the United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) that promoted good hygiene practices to prevent the spread of tree pests and diseases.
- Global Trees Campaign: The GTC campaign was a joint initiative between Botanic Gardens Conservation International (BGCI) and Fauna & Flora International (FFI). It was launched in 1999 and assessed over 7,000 threatened tree species at global level.
- EU Choose Safe Food: EFSA’s campaign on the science behind safe food includes Plant Health among the topics for 2023, and interested MSs will be able to tap into the content developed within EFSA’s PH campaign.
- World Food Safety Day: International Day established by the World Health Organisation on 7 June. The campaign is relevant in light of the correlation between PH and food safety.

Also in the domain of plant health, misinformation can have a deep, negative impact. “For example, false information about the efficacy of pesticides or other chemical treatments can lead to overuse or misuse of these products, which can in turn harm beneficial insects, soil microorganisms, and other organisms that are essential for maintaining healthy plant populations. Misinformation about plant health can also lead to decreased biodiversity and reduced crop yields, which can have significant economic and ecological impacts (Wang et al., 2019). This is especially the case for the issue of false information given on Genetic Modified Organism (GMOs), which may harm the livelihood of smallholder farmers by preventing them from accessing new crop varieties that are resistant to pests (Evanega et al., 2021)” (Michi et al., 2023).

The analysis suggests exploring synergies with ongoing campaigns and initiatives to leverage the interest of relevant stakeholders and maximise the impact of such activities with a limited effort.

3.2.2 Stakeholder mapping

²³ Please note the list is not comprehensive.



Stakeholders and partners were mapped to define an effective and efficient strategy to involve the relevant ones in the campaign, thus maximizing its potential outreach and impact. The mapping covers the four personas informed by the social research as well as plant sectors operators, however in light of the campaign approach selected (see section below), P4 is not addressed in this section. The stakeholder mapping includes the following stakeholder groups, relevant for one or more target audiences:

- National and European public experts – P1, P2, P3, plant sector operators
- EU and non-EU NGOs dealing with environment protection – P1, P2, P3
- NGOs and organisations specifically related to TAs and focusing on
 - Urban gardening and farming, urban beekeeping associations, plant swap, etc. – P2, P3
 - Local and sustainable food – P3
 - Hiking and rambling – P1
 - National parks – P1
- Plant sector operator associations – P2, P3, plant sector operators (mainly farmers and traders)
- Private companies
 - Travel companies, airports – P1
 - Travel agencies – P1
 - Luggage companies – P1
 - Outdoor and sport equipment – P1
 - Plant traders, retailers, postal service – P2
 - Large food retailer companies – P3
 - Companies and SMEs for plant sector operators - plant sector operators (mainly farmers and traders)
- Social media influencers, experts and science communicators related to the TAs
 - Horticulturalist experts, urban farmers, etc. – P2
 - Young parent bloggers, food mentors – P3
 - Travel communities and bloggers – P1
- Influential personalities within the non-native European communities living in the EU – P1, P2, P3
- Institutional stakeholders and advocates – P1, P2, P3, plant sector operators.

The complete list of stakeholders is provided in Annex N of Michi et. Al, 2023.

The qualitative evaluation of the impact and interest of each stakeholder group led to the creation of a priority map of stakeholders to be engaged for each TA. Below are listed the stakeholders that the report suggests involving immediately (as they are in the map quadrant with “High impact, High interest”) and those to involve because they can have a strong impact on the TA, but require additional efforts to be engaged in the campaign (“High impact, Low interest”):

- P1:
 - High impact, High interest: national and European plant health public experts, EU and non-EU NGOs related to environment protection, hiking and rambling associations, EU travellers communities and bloggers;
 - High impact, Low interest: private stakeholders related to travel such as transportation companies, main airports, travel agencies, global travellers communities and bloggers (including from the non-EU community living in EU), outdoor and sports equipment companies.
- P2:
 - High impact, High interest: organisations related to gardening and farming and in plant exchange, horticulturalist, gardening and farming influencers (including from the non-EU community living in EU), public plant health experts, NGOs related to environment protection and plant traders (especially online sellers);
 - High impact, Low interest: plant sector operator associations.
- P3:



- High impact, High interest: public experts, NGOs, organisations and influencers promoting plant health protection with an eye to food health and nutritional aspects (including from the non-EU community living in EU), e.g. the local and sustainable food associations – but even some large food retailers already implementing environment-related activities;
- High impact, Low interest: organisations related to gardening and farming, botanical gardens.
- Plant sector operators:
 - High impact, High interest: plant sector associations and unions, including plant transportation sector;
 - High impact, Low interest: private companies and SMEs offering services for plant sector operators.

These findings are integrated in the campaign approach described below. The full stakeholder mapping including stakeholders with “Low impact, High interest” and “Low impact, Low interest” for P1, P2, P3, and plant sectors operators, as well as the four stakeholder maps are available in the “Stakeholder and partner mapping” section of Michi et al., 2023.

3.2.3 Campaign: from awareness to activation

The social research showed that raising awareness on plant health risks is not sufficient to promote safer risk perceptions and behaviour linked to plant health. Over its 3-year implementation, the campaign will thus create a full communication journey for target audiences based on a 3-steps funnel approach, of which the first step is raising awareness, the second triggering critical thinking, and the third activating and creating advocacy (see methodology section for additional information on these).

The campaign will target P1, P2 and P3. P1 and P2 will be lead through the full funnel described above because they represent the personas with potentially riskier behaviour linked to plant health, but also the audience which is more likely to be mobilised and to act as advocates for PH topics within their communities. P3 is also targeted in view of their role in children education and of the reverse influence children can have on parents. This TA is involved in a shorter communication funnel, leading to critical thinking.

In light of the wide part of population reached by targeting P1, P2 and P3 (Porta et al., 2023) and with a view to ensure a manageable campaign set-up and implementation, the campaign will not target P4.

A crucial role in the campaign will be played by plant sector operators, who will be involved in dedicated activities and act as touchpoints and amplifiers for P1 and P2. The campaign aims at enrolling them as advocates at the forefront of plant health protection and pest prevention (Michi et al., 2023).

The campaign will start by raising awareness of the link of plant health with citizens everyday life, including its correlation with food security, food safety, heritage, and the economy. Activities to raise TAs awareness of the phytosanitary certificate will also start in Y1.

During Y2, the campaign will focus on specific topics to trigger TAs critical thinking by providing them more specific and engaging activities. Topics will include the phytosanitary certificate and its implication on travelling and purchasing plants²⁴ (especially P1), pest recognition and reporting (especially for P2), the plant passport (especially P2), and the knowledge transmission on the importance of plant health and the related good practices for P3. Plant sector operators will be involved in activities focused on all the topics described.

²⁴ Please note: when referring to the phytosanitary certificate in connection with the campaign strategy, the implications of the certificate in relation with travel and purchase of plants and plants products are considered.



During Y3, P1 and P2 will be guided through the last step of the communication funnel to promote their activation and their role as advocates among their peers. Activities promoting the critical thinking of P3, considering children’s reverse influence, will continue. The campaign will focus on the phytosanitary certificate and plant passport (especially for P1, P2), pest recognition and reporting (P2, P3), and plant purchase best practices (P2), knowledge transmission on the importance of plant health and the related good practices (P3). Plant sector stakeholder will be involved in activities mainly linked to the phytosanitary certificate and plant passport, as well as pest recognition.

In relation to pest reporting, the situational analysis raised the difficulty in retrieving information on how citizens can report pests to the competent authority. Finding ways to make it clear how and to whom to report pests at the national or regional level will thus be key, exploring potential collaboration with existing apps or tools where available and relevant.

The key strengths of this campaign approach include:

- Flexible and modular campaign, allowing MSs to fully localise the national implementation and join the campaign throughout its 3-year course.
- Awareness on plant health will be raised for a large portion of the European population (broad yet manageable TA).
- P1 and P2 will be guided through the full communication funnel (personas with potentially riskier behaviour, more likely to be mobilised and to act as an advocate).
- Cross-cutting focus on plant health topics, plus in-depth focus on specific themes, such as the phytosanitary certificate, the plant passport, pest recognition and pest reporting.
- The campaign will act as a catalyst for discussion on, and as a mechanism to raise awareness of European citizens and stakeholders about the importance of PH and the risks linked to it.

Table 2: Campaign outline (Michi et al., 2023)

	Y1	Y2	Y3
Target audience	P1, P2, P3	P1, P2, P3	P1, P2, P3
Objectives	Inform and raise awareness	Trigger critical thinking	P1, P2: Activation and advocacy P3: Trigger critical thinking
Topics	P1, P2, P3: Correlation between plant health and food security/safety, plant health and heritage, plant health and biodiversity, plant health and the economy P1, P2, P3: Phytosanitary certificate	P1, P2: Social responsibility to prevent pests spreading; plant import and purchase (phytosanitary certificate, plant passport) P1, P2, P3: Pest recognition and reporting P3: Knowledge transmission on the importance of plant health and on good practices	P1, P2, P3: Phytosanitary certificate, plant passport Plant purchase best practices Pest recognition and reporting P3: Knowledge transmission on the importance of plant health and on good practices



3.2.3.1 COMMUNICATION TACTICS

Based on the approach detailed above, a series of tactics (tools and channels) have been suggested to achieve the campaign objectives throughout its 3-year implementation. These tactics could change during the implementation phase upon discussion with the communication agency that will support EFSA and MSs in implementing the campaign, especially in consideration of the number of MSs participating in the campaign during each year and of the related resources implications, as well as of the lessons learnt during the campaign roll-out.

The tactics are listed below based on the integrated PESO model used:

Paid media

- Media partnership (targeting P1-P2-P3): Partnerships with EU and national relevant media (specialised and relevant generalist media, including TV) will be established. Advertorials (paid editorials) will be featured in magazines of airlines and transport companies (P1) or thematic magazines on gardening and nature (P2). Materials will include the campaign video, op-eds, feature stories.
- Social media advertising (targeting P1-P2-P3): In parallel with organic posting on social media, a paid advertising campaign will be set up. Based on the insights of the social research and on the mapping of influencers, interested platforms will include YouTube, Instagram, Facebook, Twitter, LinkedIn; additional platforms shall be considered on a national basis.
- Participation in fairs (targeting P1-P2): High-profile fairs and exhibitions on gardening, plant products, outdoor sports in the participating countries will be mapped and participation with an info stand will be organised.
- Billboards (targeting P1): Billboards along public transport routes used by European travellers (comprising bus and train stations, airports serving as hubs for international travel).
- Search engine marketing – SEM (targeting P1-P2-P3): A SEM strategy will be designed to drive traffic to the campaign website. Search engine advertising and cookies can be targeted for keywords searches; travelling to/from targeted countries; specific plants; visited websites. Localised keywords shall be chosen besides the English ones.
- Online travel agencies/websites (targeting P1): Advertising space will be bought on online travel agencies/travel websites, linking to the campaign website.

Earned media

- Media relations (targeting P1-P2-P3): Content will be pitched to the most relevant media according to the campaign phase, topic, understanding of the topic by outlet and journalist. Specialised TV shows including morning shows, lifestyle programmes, specialised programmes on travels, health, gardening, parenting will be approached.
- Cooperation with private entities (targeting P1-P2-P3): Collaboration with travel operators including airlines, shipping and train companies operating services from outside Europe will be sought to disseminate the campaign messages (P1). Materials for travel agencies will be produced (e.g. posters and leaflets) (P1).
- Training activities:
 - For hobby farmers and small producers (targeting P2): Training for hobby farmers who exchange, buy and sell plants and seeds from their informal networks and online. The objective is to build shared knowledge and spread good practices, as well as turning participants into advocates of good practices within their community. The training will give access to a certification that could be exhibited



- both online and in physical exchanges, representing a guarantee for the people receiving plants and seeds.
 - For park guides (P1, P3): Training sessions will focus on how to recognise pest symptoms and on how to include plant health topics (pest recognition) in guided tours for tourists and families.
 - For customs officers (P1): Training sessions will focus on the phytosanitary certificate.
- Q&A session with EFSA and National PH experts (targeting plant sector operators): Regular activity covering each time a specific topic (e.g. the phytosanitary certificate) with a brief expert presentation, followed by Q&A time. Participants will receive information material ahead of the session. The promotion of the session shall be supported by plant operators' associations (see stakeholder mapping).
- Activities with schools (targeting P3): As highlighted in the target audience segmentation, children can also influence P3 via the so-called "reversed influence" mechanisms. Schools, besides families, have a crucial role in laying the foundations of a solid education in which learning to respect our planet is an important subject. Children will be incentivised to share the knowledge acquired with their families. The development of a board game based on the *Xylella* comic will be considered.
- Plant exchange events (targeting P2): Events targeting local, informal communities of home gardeners and hobby farmers who usually exchange, buy and sell plants and seeds from their informal networks and online. The aim is to inform them of best practices and prevent hazardous behaviours, while supporting them to act as advocates of plant-health good practices when exchanging, buying or selling their plants and seeds.
- Plant life protection events (targeting P1): Events targeting travellers who are or could be willing to visit specific non-EU countries. The aim is to prevent hazardous behaviours and to make this selected audience act as advocates of plant-health good practices while travelling. The effort needed for the organisation of these events is high, as they can potentially reach a limited but very committed number of people, who are very likely to be activated. Influencers involved in the campaign and successful among the TA could be involved.
- Partnership with protected natural areas and national parks (targeting P3, P1): Natural areas can be involved in training the guides in recognising and signalling pests, and in the organisation of events and guided tours. Informative materials and pest recognition boards could be made available.
- Cooperation with plant nurseries (targeting P2): Informative material (e.g. posters) on phytosanitary certificate and plant passport.
- Cooperation with Natural History Museums (targeting P3): Informative material and gadgets can be made available to visitors, and a dedicated visit with a focus on PH might be designed for children and families.

Shared media

- Social media organic campaign (targeting P1-P2-P3): An editorial calendar for the organic social media campaign will be set up for EFSA and each participating MS. The campaign materials will be used in alignment with the campaign phase.
- Influencers: (targeting P1-P2-P3, the collaboration could also require a budget): Specific categories of influencers will be involved to reach out to different TAs (including traveller



communities and bloggers – P1, garden designers, urban farmers, urban gardeners – P2, young parent bloggers – P3).

Owned media

- Website (targeting P1-P2-P3): At the launch of the campaign, a multilingual website will be created in all EU languages to serve as one of the main sources on the campaign's topic. The website will be updated throughout the campaign implementation. Both EFSA's logo and the logo of the MS national authority responsible for plant health will be present on the localised page, to strengthen the idea of a reliable source for users. The website will have informative and news sections, as well as the toolbox for MSs, affiliated entities, and media that will include all campaign materials (in English and the localised versions). The website will link to existing material on PH developed by national and international authorities, in the EU and beyond; establishing a link with existing resources, materials and efforts of the implementing countries in the localised versions of the website will be particularly important).

Testing will be integrated in the development of the campaign materials. For example, A/B testing will be launched before deploying the full social media advertising campaign to compare the response to two different posts (copy and visual). Based on the results, the most successful ad will be used. That will be done in all participating MSs.

Table 3: Communication tactics (adapted from Michi et al., 2023)

	Y1	Y2	Y3
Tactics	Website (P1, P2, P3)	Website (P1, P2, P3)	Website (P1, P2, P3)
	Social Media organic activities (P1, P2, P3)	Social Media organic activities (P1, P2, P3)	Social Media organic activities (P1, P2, P3)
	Social Media Advertising (P1, P2, P3)	Social Media Advertising (P1, P2, P3)	Social Media Advertising (P1, P2, P3)
	Media partnership (P1, P2, P3)	Media partnership (P1, P2, P3)	Media partnership (P1, P2, P3)
	Media relations (P1, P2, P3)	Media relations (P1, P2, P3)	Media relations (P1, P2, P3)
	Influencers (P1, P2, P3)	Influencers (P1, P2, P3)	Influencers (P1, P2)
	SEM (P1, P2, P3)	SEM (P1, P2, P3)	Plant exchange events (P2)
	Billboards/posters (P1)	Cooperation with private entities: Airports/travel agencies (P1)	Cooperation with private entities: Airports/travel agencies (P1)
		Training for hobby farmers and small producers (P2)	Training for hobby farmers and small producers (P2)
		Training program for custom officers (P1), park guides (P3)	Cooperation with plant nurseries (P2)
		Partnership with protected natural areas and national parks (P1, P3)	Plant life protection - physical events and workshops (P1)
		Joint activities with schools (P3)	Joint activities with schools (P3)
		Participation in fairs (P1, P2)	Cooperation with Natural History Museums (P3)
			Participation in fairs (P1, P2)



3.2.3.2 MONITORING AND EVALUATION

An evaluation methodology is proposed for the campaign, which will be refined in collaboration with the company implementing the campaign based on tactics selected. Two key principles guiding the design of the methodology are cost-effectiveness and comparability of data. The evaluation methodology suggested is based on the following three evaluative domains:

- Process evaluation: Measuring the direct outputs of the multi-year campaign – what and how much has been accomplished (e.g. number of videos produced).
- Outcome evaluation: Measuring the success of the campaign action against the objectives set (e.g., at least n. impressions).
- Impact evaluation: Measuring whether the multi-year campaign has achieved its objectives and providing information about the observed changes produced –in knowledge, understanding, attitudes, perception, and behaviour. It has to be noted that despite the campaign not being a behavioural change initiative, a set of KPIs will evaluate certain behaviours related to plant health.

Specific KPIs to measure the domains described above are suggested and will be regularly monitored to optimise the effectiveness of the campaign throughout its implementation. The list of KPIs for each evaluative domain are included in Annex B (Michi et al, 2023), which is structured as follows:

- Process - Output KPIs
 - Campaign-specific Output KPIs
- Outcome KPIs
 - Objective-specific Outcome KPIs
 - Campaign-specific Outcome KPIs
 - Behaviour-specific Outcome KPIs
- Impact KPIs
 - Objective-specific Impact KPIs
 - Behaviour-specific Impact KPIs.

The evaluation will bring together all qualitative and quantitative data collected throughout the campaign. The key sources to inform the campaign evaluation are:

- Pre-campaign research summarised in this report;
- Performance data gathered by the company implementing the campaign and teams working at national level, and as reported by partners and key stakeholders;
- Qualitative research: it is suggested that at the end of each year of implementation, the following actions are implemented:
 - a campaign survey;
 - in-depth interviews with stakeholders exposed to the campaign representing the three target audiences of the campaign (P1, P2, P3) and plant sector operators to further contextualise the survey findings. The number of minimum interviews to be carried out will be defined based on the number of participating countries.

4 Conclusion

Despite the potential devastating environmental and economic effects of some pests on cultivated and wild plants, the available evidence shows low awareness and knowledge of plant health and



associated risks among citizens. In this regard, results from the social science research and audience segmentation as well as the communication strategy work provided important strategic considerations for an EU awareness-raising communication campaign on plant health risks. Namely, four potential audience segments for targeting were identified through the mixed methods research carried out (i.e. analysis of existing survey data, literature review and in-depth interviews). The four segments are presented in the form of personas to facilitate an “audience-first approach” in designing the communication strategy and content, as well as make the key characteristics of the segments more salient and memorable.

In short, the four identified personas are the: i) “curious traveller” (P1): Interested in bringing plants home from their trips abroad and environmentally conscious; positive attitude towards plant health, although they do not feel well informed (phytosanitary certificate); ii) “home gardener and hobby farmer” (P2): Interested in growing healthy and sustainable plants in their own gardens; positive attitude towards plant health, and moderately informed; the motives underlying their interest are diverse (beauty, sustainability, biodiversity, human health); iii) “conscious young parent” (P3): Interested in plant health, sustainable lifestyle and in local food supply, as well as in passing their values to their children; positive attitude towards plant health, and moderately informed; food safety is top of mind; and the iv) the “adventurous and green foodie” (P4): Passionate about sustainable and local food supply, and likely to be aware about their health, and the quality of food they eat; positive attitude towards plant health, and sustainability and organically produced food are important to them; taste prevails over safety when buying foods. These four segments can be seen as ‘higher risk’ and/or ‘more willing’, and thus present the type of target groups that are particularly relevant according to the literature.

To inform appropriate choices and topics for awareness-raising and risk communications on plant health in the EU, each segment was characterized on relevant aspects for tailored communication strategies. Accordingly, based on insights from the available research, details of each persona are presented in the main text and encompass the segment’s understanding and perceptions in relation to different aspects of plant health, preferred information sources and messages, and trust in actors involved in plant health activities in the EU. Further, insights are provided regarding specific themes relevant to each of the identified personas to guide the definition of messages content. Depending on the segment, these included aspects related to plant health’s importance for availability of food, sustainability, wellbeing of future generations, or (family/own) health and nutrition, among others. This formed the evidence needed for the communication strategy, in view of being able to target communication activities to specific audience segments and using appropriate content, actors, and sources.

To complement the findings of the social research, a situational analysis and a stakeholder mapping were carried out. The three inform the communication strategy of the 3-year campaign detailed in the report, including the campaign target audiences, the objectives of the different years of the campaign per target audience, the tactics and the evaluation methodology. The strategy is designed to create a common framework allowing MSs to fully localise the national implementation based on the specific context and needs, allowing them to join the campaign throughout its 3-year course.

Since the social research shows that raising awareness on plant health risks is not sufficient to promote safer risk perceptions and behaviour, the campaign will target P1, P2 and P3 (representing a broad yet manageable portion of the target audience). For P1 and P2, the target audiences with potentially riskier behaviour linked to plant health, but also more likely to be mobilised and to act as advocates for PH topics within their communities, the campaign will create a communication journey in three steps aimed at raising their awareness in Y1, triggering their critical thinking in Y2, and activating and creating advocacy in Y3. P3 will be targeted in view of their role in children education and of the reverse influence children can have on parents. This TA is involved in a shorter communication funnel, leading to critical thinking (the second step). A crucial role in the campaign will be played by plant sector operators, who will be involved in dedicated activities and act as touchpoints and amplifiers for P1 and P2.



The campaign will start by raising awareness of the link of plant health with citizens everyday life, including its correlation with food security, food safety, heritage, and the economy. Activities to raise TAs awareness of the phytosanitary certificate will also start in Y1. During Y2, the campaign will focus on specific topics to trigger TAs critical thinking by providing them more specific and engaging activities. Topics will include the phytosanitary certificate, pest recognition and reporting, the plant passport, and the knowledge transmission on the importance of plant health and the related good practices. During Y3, the campaign will focus on the phytosanitary certificate and plant passport, pest recognition and reporting, plant purchase best practices, knowledge transmission on the importance of plant health and the related good practices. In Y2-3, plant sector stakeholder will be involved in activities mainly linked to the phytosanitary certificate and plant passport, as well as pest recognition.

The suggested tactics include the creation of a campaign website, social media organic and paid activities, media partnership and relations, collaboration with influencers, search engine marketing, cooperation with private entities, training activities, participation in fairs, billboards, activities with schools, and live events. These are linked to the findings of the stakeholder and partner mapping which covered P1, P2, P3, P4 and plant sectors stakeholders, leading to the creation of priority maps of stakeholders to be engaged for each target audience. It is recommended to involve at an early stage stakeholders that have a high impact on the specific target. Testing will be integrated in the development of the campaign materials.

EFSA plans to launch the campaign in 2023 in collaboration with an external company. The tactics suggested could be revised based on their feedback, with the objective of maximising outreach, impact, and resource-effectiveness.

An evaluation methodology is proposed for the campaign, which will be refined in collaboration with the company implementing the campaign based on the tactics selected. Two key principles guiding the design of the methodology are cost-effectiveness and comparability of data. The evaluation methodology is based on the following three evaluative domains: process evaluation, outcome evaluation, and impact evaluation. Specific KPIs to measure the three domains are listed for regular monitoring. For the evaluation, it is suggested to conduct a campaign survey and in-depth interviews with stakeholders exposed to the campaign representing the three target audiences of the campaign (P1, P2, P3) and plant sector operators at the end of each year of implementation.

5 Recommendations

The literature review revealed that only a limited number of studies focused on some of the topics of interest for the present work and the available studies often covered a single or a small subset of countries. Further, analysis of two cross-country surveys provided a wealth of data from large European samples but was constrained by design to the set of available questions available for segmentation and audience characterisation (e.g. limited available set of contextual and plant-health related questions). Additional studies could thus help overcome gaps in the literature and gather cross-country insights, as well as provide additional, more detailed data on different segments of citizens. This could include expanding the evidence available on citizens' knowledge of plant health issues and their consequences, knowledge of the phytosanitary certificate and quantification of the risk of the introduction of new pests by international (air) travellers as well as current compliance levels, or citizens' awareness regarding the process of reporting plant health issues, among others.

Additionally, the evaluation of the campaign will also help to understand the potential need for future awareness raising initiatives on Plant Health in the EU including, for example, broadening the scope of the campaign based on new research findings that may emerge, or results of the campaign monitoring activities.



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Abbreviations

PEST	political, economic, social and technological factors
TA	target audience
PESO	paid, earned, shared and owned (media)
MS	Member State
P1	the curious traveller
P2	the home gardener and hobby farmer
P3	the conscious young parent
P4	the adventurous and green foodie
Y	year

Appendix A – Infographics of the four personas

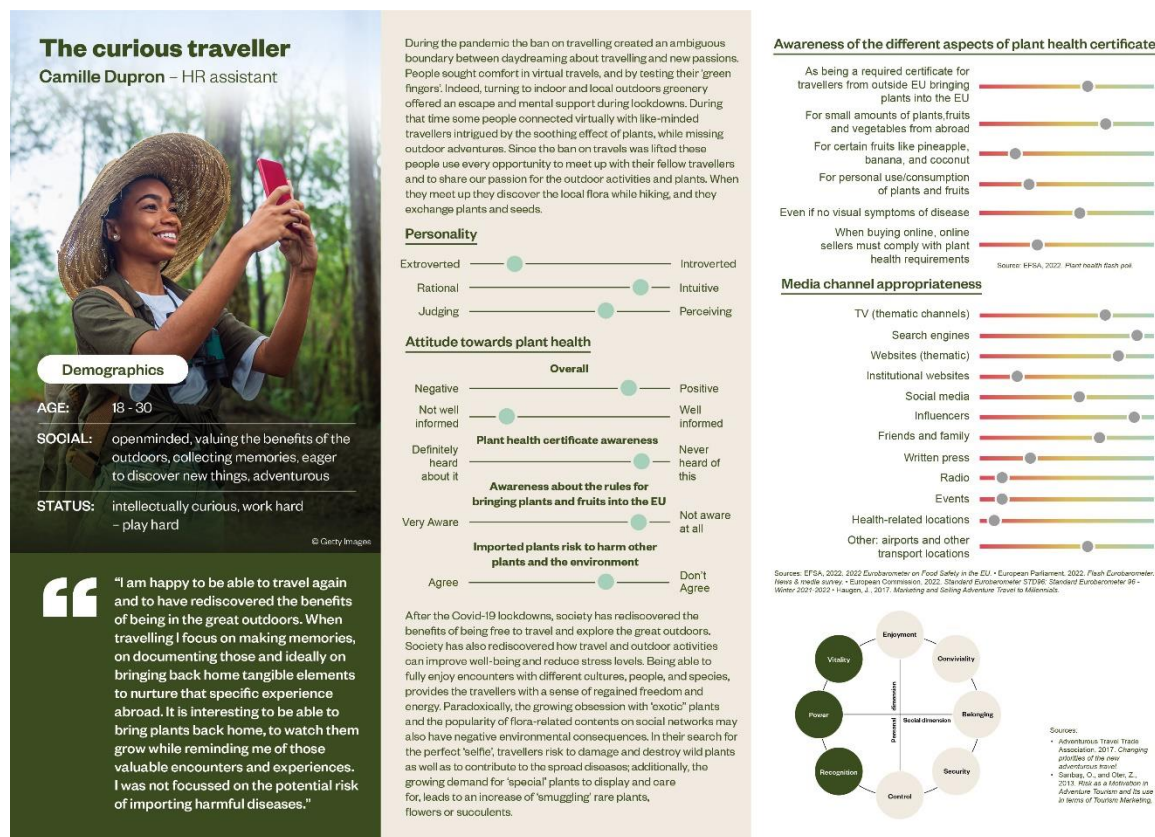


Figure A.1: The curious traveller (Porta et al., 2023)

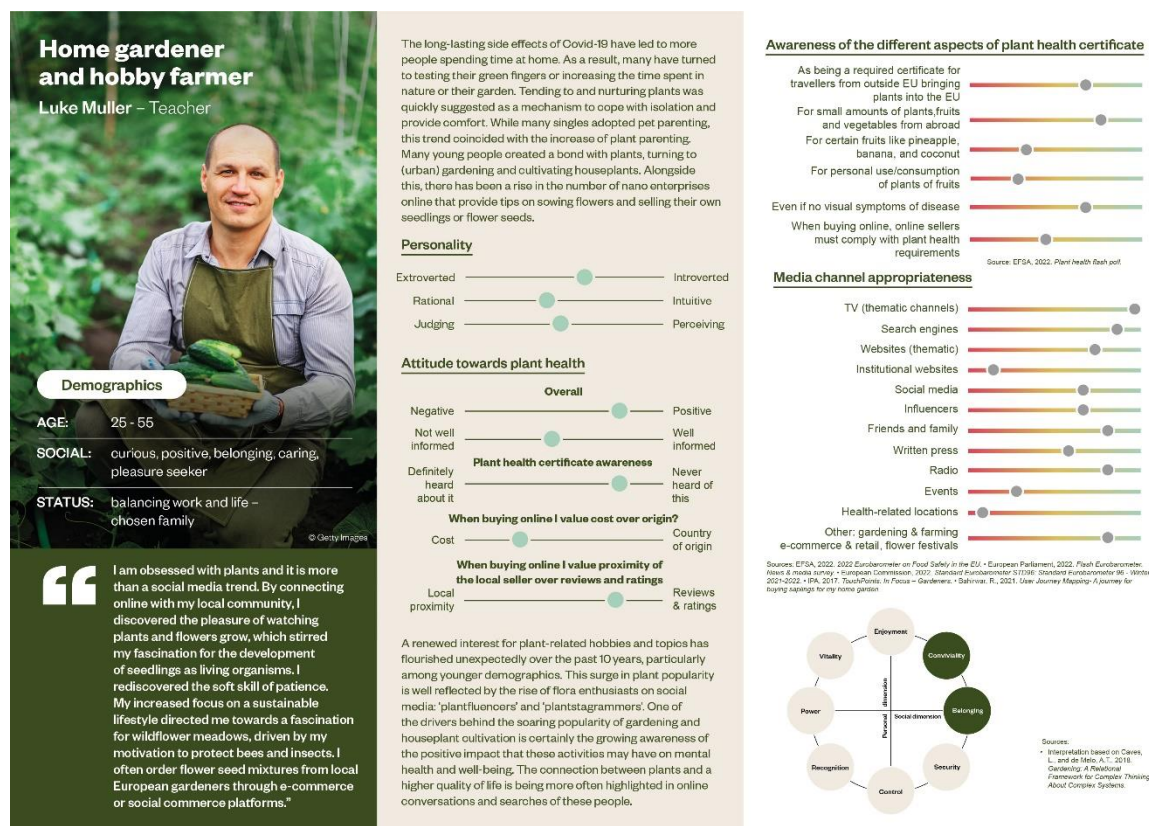


Figure A.2: The home gardener and hobby farmer (Porta et al., 2023)

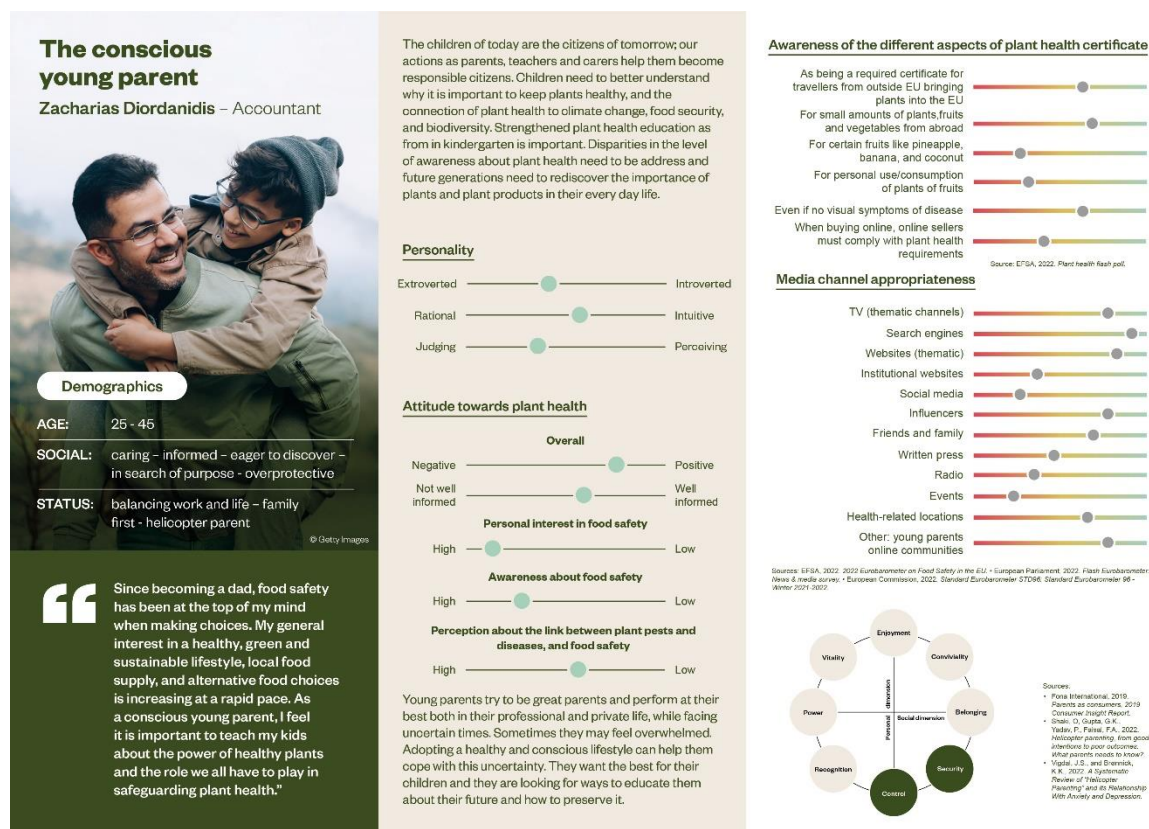


Figure A.3: The conscious young parent (Porta et al., 2023)

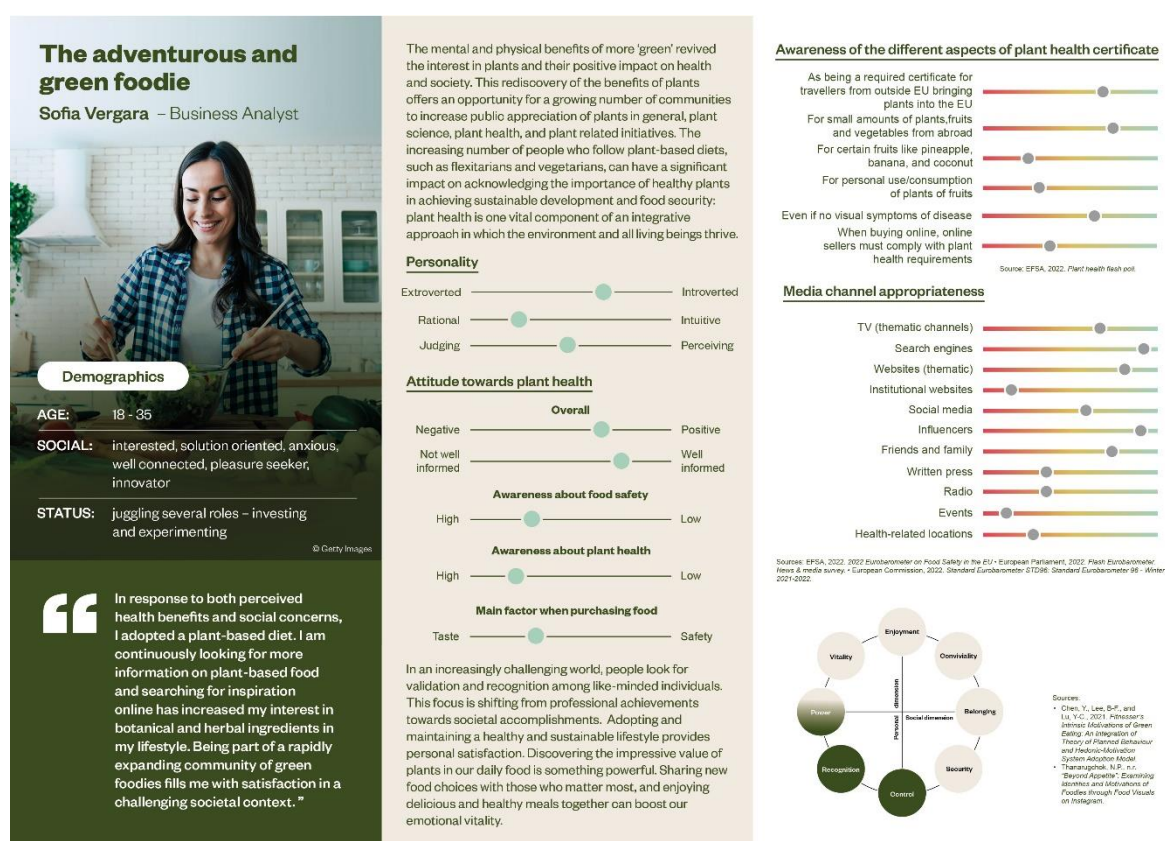


Figure A.4: The adventurous and green foodie (Porta et al., 2023)

Appendix B – Population size estimates for the target audience segments

Table B.1 below provides population size estimates for each of the four personas. A note these estimates are rough proxies based on the available data. In particular, the target audience size may be lower than the estimates provided in each case, since the latter are based on the total target audience age groups without further segmentation (e.g., the total number of travellers in the age group was used for the curious traveller, but not all of them are not all 'curious' travellers' as per the characteristics outlined in the persona definition).²⁵

Table B.1: Population size estimates for the target audience segments/personas (Porta et al., 2023)

Segment/ Persona	Age group	EU27 population in age group	'Segment element'	'Segment element' within age group	Segment's population size estimate ^(a)
Curious traveller	18-30	64.797.112	Travel	40%	25.918.845
Home gardener and hobby farmer	25-55	185.088.638	Have a garden	58%	107.351.410
Conscious young parent	25-45	120.761.403	Parent with kids under 12 years old	42%	50.719.789
Adventurous and green foodie	18-35	93.334.595	Adventurous and green foodie	28%	26.133.687

(a): (EU27 population in age group] x [% segment element within age group])

Appendix C – Supplementary findings from the research

C.1. Personas

Tables C.1 and C.2 below provide additional highlights from the research relating to the "curious traveller" and "home gardener and hobby farmer" personas, respectively.

Table C.1: Snapshot of additional highlights from the research relating to the curious traveller

Author(s) (date; country /ies) ^(a)	Brief description of relevant findings
Pace et al. (2022; IT)	Reports on invasive species intercepted at three Border Control Points (BCPs; two ports and one airport) in Italy (Campania region) from 2016 to 2021. Results showed that relative to ports, incoming airport plant material showed a greater diversity of plant species although in limited amounts. Further, the authors suggest that air passengers

²⁵ Details on the calculations to produce the estimates of the target audience population size for each of the four personas can be found in Porta et al. (2023; see Appendix F).



	are often unaware that carrying fruits and vegetables can be a threat for introducing new organisms into the destination countries.
Porta et al. (2023; HU, IT, NL)	Reports on interviews with three custom officers. Two of the officers indicated that " passengers /travellers tend to import plants and plant products that they receive from their families and friends. It is likely that the willingness to bring in the EU products that "make them feeling home" impact the perception of the risk linked to that import." One of the officers also "reported that when regular checks were conducted on flights coming from certain third countries, infringements diminished. However, when those checks were suspended for a period of time, illicit activities in the import of plants and plant products grew again [...] reported that this is very likely linked to the strong network of people among specific communities that exchanged information about the possibility of importing plants via certain airports."
Oude Lansink et al. (2011; NL)	Reviews key weaknesses for addressing plant health. Suggests that management of plant health is complicated by the presence of asymmetric information, as buyers and sellers do not have access to the same information about risks and prices. E.g. current phytosanitary standards and regulation information is inconsistent across plant health stakeholders. This can help explain the lack of knowledge of some international passengers bringing allowed plants and plant products without the certificate or forbidden products.
Melly & Hanrahan (2020; IE)	Surveys tourists in Ireland (N=457) about the risks of the spread of diseases and invasive species linked to outdoor activities. Results showed low awareness of biosecurity risks related to plants: Nine in ten tourists participated in outdoor recreational activities while on holiday in Ireland, but 71% of them were not aware of any biosecurity measures. Results also showed that signage in high-risk environments, including signage on boat ramps (52%) or road (43%), was the most frequent form of biosecurity communication they recalled seeing (vs. 2% for airport signage, leaflet, or social media). However, qualitative data suggested that tourists perceived some shortcoming regarding this communication, including it being uninformative regarding the relevant biosecurity measures to follow or being provided when it was already too late for tourists to undertake the recommended actions.

(a): Content based on evidence reported in Porta et al. (2023)

Table C.2: Snapshot of additional highlights from the research relating to the home gardener and hobby farmer

Author(s) (date; country /ies) ^(a)	Brief description of relevant findings
Dunn et al. (2020; UK)	Survey with plant buyers (N=1,500) showed that their awareness of the threats posed to the UK's trees and woodlands from newly introduced pests and diseases was slightly higher than that of citizens, as assessed in comparable studies (i.e., Fuller et al., 2016; Urquhart et al., 2017). 10% of had never heard of newly introduced pests and disease, and a further 62% reported to have heard of the problem but know little about it. The study also covered awareness of eight specific pests and diseases, and found that awareness varied depending on the pest: two-thirds of the participants (66%) had some knowledge of Dutch elm disease, but only slightly over one-third (37%) of the ash dieback (ADB); for the other pests covered ²⁶ , only 20% indicated they had knowledge about them.
Dunn et al. (2020; UK)	Survey with plant buyers (N=1,500) found that the extent to which they considered the presence of biosecurity measures an important factor when deciding from which source to obtain their plants varied negatively with age: For those aged 25-54 (i.e., age range of the home gardener and hobby farmer, approximately), between 32% and 58% of respondents indicated that the presence of biosecurity measures was a (very) important factor. This was higher (68%) for those aged 18-24, and lower (between 25% and 33%) for those aged 55+.

²⁶ These pests are not reported in the study.



Urquhart et al. (2017; GB)	Survey with citizens (N=1,334) found that “membership of environmental organisations and strong place identity are likely to engender higher awareness and levels of concern about tree pests and diseases. Further, those who visit woodlands regularly are likely to be more aware than non-visitors, and gardeners are more likely to be concerned than non-gardeners.” They were also more likely to report willingness to adopt biosecurity measures .
Dunn et al. (2020; UK)	Survey with plant buyers (N=1,500) found that friends, family, and neighbours were the most used sources for advice and guidance when buying plants (50% respondents). Other commonly used sources included the internet (42%) and the advice of those selling the plants (40%). Media, gardening shows and events, national, and local clubs/associations were less relied upon by a much smaller share (17%).

(a): Content based on evidence reported in Porta et al. (2023)

C.2. Plant health stakeholders and the plant passport

Available evidence regarding awareness about the plant passport²⁷ among stakeholders was very limited.²⁸ The interviews carried out in the context of the present study allowed to partly fill this evidence gap. The two business associations interviewed indicated that the sectors they represent are aware about the existence and usage of the plant passport. However, infringements take place according to reports by the customs officers interviewed, and issues with faulty documentation are a significant issue. One of the officers indicated that “out of 1,500 inspections carried out on commercial cargos in 2021, 5% of non-compliances” were linked to it”. Other pointed that half of the yearly non-compliances detected in commercial cargos are documental (mainly wrong or only partial compilation of the required documents, as opposed to their absence), with the other half are linked to the presence of harmful pests. According to another custom officer, “companies know about the rules and infringe them for economic reasons as well as speeding up the processes, as the goods can get damage from the waiting time”. One of the business association representatives furthermore mentioned that inspections differ within the EU, which may lead to rerouting of certain cargos by the importers, if it is known that a port is difficult to enter (Porta et al., 2023).

Two of the custom officers additionally mentioned that lack of communication from the departure countries’ offices is the main reason for the documental infringements in commercial transports. This is in line with insights from an interview with a public sector stakeholder, who pointed out that “import requirements are based on European legislation published in the EU Official Journal, but there is no centralised database where third countries’ officials and businesses can type in the product they want to export, the country of origin, and get the mandatory trade requirements. To get the full set of requirements exporters might have to look on different places and on various pieces of legislation.” The interviewee added that insufficient control at the place of export may additionally contribute to issues, due to the limited capacity of some third countries to control the consignments pre-exports/at production sites (Porta et al., 2023).

Additionally, the two business associations interviewed mentioned that operators in their sectors are aware of the trade obligations, but they had different views on the trade requirements and restrictions. One indicated that “while professionals understand the importance of trade requirements around plant health, they feel that the trade burden should be reduced, as plant health requirements can generate confusions and double work”. The other indicated the type of reaction by plant sector operators depends on whether they are affected by requirements and restrictions, i.e. “if they are not affected by a pest they might have a more pro-restriction

²⁷ Plant passports are “issued to accompany the plants, products and other objects once they have passed all the EU checks.” (European Commission, n.d.)
²⁸ “White et al. (2019) conducted semi-structured interviews with 10 scientists and 21 wider stakeholders (including NGO, tree nursery and government staff, and conservation volunteers) in the UK and found that respondents were often aware that pre-border certification, testing or inspection were available, but they were not aware of any particular European legislation surrounding the transportation of plants (such as the one related to phytosanitary certificate).” (Porta et al., 2023)



approach compared to the colleagues that have been affected.” (Porta et al., 2023). This suggests an economic angle, which is in line with previous studies with horticulturalists (Marzano et al., 2017), potato and wheat growers (Ilbery et al., 2012), and plant nurseries (Marzano et al., 2021), which found that concerns about economic impact of biosecurity measures can hinder professionals’ willingness to adopt them. Further, results from Marzano et al. (2021) suggest that another barrier is a perception that their individual action may be ineffective or put them at a competitive disadvantage if collective implementation of biosecurity measures by sector operators does not take place.

Appendix D – Overview of the surveys samples

EFSA’s 2022 Special Eurobarometer Survey on Food Safety comprised a sample of 26,509 respondents (aged 15 years and over) across all 27 EU Member States. The survey was carried out using face-to-face and computer-assisted web interviewing in respondents’ mother tongue. In most countries, the sample comprised at least 1,000 respondents (see Table D.1 below). “The basic sample design applied in all countries and territories is a multi-stage, random (probability) one. [...] [For each country] Weights are used to match the responding sample to the universe on gender by age, region and degree of urbanisation” (EFSA, 2022a).

EFSA’s Plant Health Flash Poll comprised a sample of 8,600 respondents (aged 15 years and over) across 24 European countries (i.e. EU-27 minus Cyprus, Luxembourg). The survey was carried out using computer-assisted web interviewing in respondents’ mother tongue. In each country, the sample comprised between 300 and 500 respondents (see Table D.1 below). Respondents were recruited from online market research panels in each country, and country-based age and gender quotas are monitored during the fieldwork to try to match the responding sample to the universe on age and gender to the extent possible. The overall sample comprised approximately 52% female and 48% male respondents. Regarding age, approximately 9% were aged 15-24 years-old, 30% were between 25 and 39 years-old, 28% between 40 and to 54 years-old, and 33% were 55 years-old or older (EFSA, 2022b).

Table D.1: Overview of the sample sizes per country for the 2022 Eurobarometer and Flash Poll surveys.

Countries	Population 15+	Proportion EU27 ^(a)	2022 Eurobarometer: N respondents	2022 Flash Poll: N respondents
Austria	7,844,329	2.00%	1,011	300
Belgium	9,915,439	2.53%	1,019	400
Bulgaria	6,094,974	1.55%	1,040	300
Croatia	3,569,904	0.91%	996	300
Czechia	9,190,342	2.34%	1,034	400
Denmark	4,994,008	1.27%	1,058	300
Estonia	1,145,208	0.29%	1,008	300
Finland	4,805,266	1.22%	1,011	300
France	57,553,554	14.66%	1,034	500
Germany	74,162,306	18.89%	1,519	500
Greece	9,568,462	2.44%	1,013	400
Hungary	8,547,786	2.18%	1,016	300
Ireland	4,039,401	1.03%	1,011	300
Italy	54,102,101	13.78%	1,018	500
Latvia	1,649,459	0.42%	1,014	300



Lithuania	2,445,153	0.62%	1,006	300
Luxembourg	538,288	0.14%	507	na
Malta	455,041	0.12%	553	na
Netherlands	15,067,518	3.84%	1,004	400
Poland	32,904,839	8.38%	1,009	400
Portugal	9,221,533	2.35%	1,006	300
Rep. Of Cyprus	759,844	0.19%	505	na
Romania	16,701,193	4.25%	1,038	400
Slovakia	4,677,729	1.19%	1,009	300
Slovenia	1,834,195	0.47%	1,006	300
Spain	42,022,835	10.70%	1,003	500
Sweden	8,756,024	2.23%	1,061	300
Total	392,566,731	100.00%	26,509	8,600

(a): Total percentages shown may exceed 100% due to rounding. Except for the last column referring to the Flash Poll (EFSA, 2022b), table adapted from EFSA (2022a).