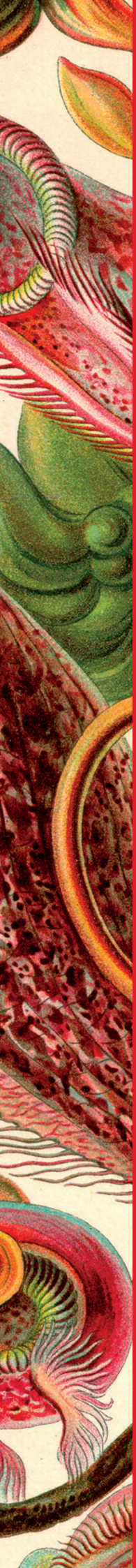

IMPLEMENTATION REVIEW AND SUPPORT SYSTEM (IRSS)

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

OCT 2021

ENG

Report: A critical assessment and analysis of the 2012 and 2016 IPPC general surveys

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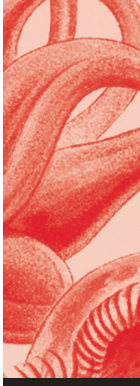

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Figures and tables

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This assessment and analysis was conducted by Sebastiaan HESS and his findings are presented in his report. Sebastiaan Hess works as an independent environmental economist under the name of Hess Environmental Economic Analyst (HEEA). He has 15 years of experience in conducting surveys including the design of questionnaires, their implementation using different modes (face-to-face, online, phone) and the analysis of survey data. He has conducted surveys on a wide range of topics, in recent years mostly focussing on the evaluation of socio-economic effects of nature conservation projects.

Executive summary

The IPPC Secretariat has conducted two general surveys under the Implementation Review and Support System (IRSS). These surveys targeted national plant protection organizations (NPPOs) and tried to gauge the implementation of the International Plant Protection Convention (IPPC) and International Standards for Phytosanitary Measures (ISPMs). Data from the two surveys, held in 2012 and 2016, were analysed separately by the IPPC Secretariat and these findings are posted on the International Phytosanitary Portal (IPP) (2012[1]; 2016[2]). The Implementation and Capacity Development Committee (IC), at its November 2018 meeting, agreed that a Consolidated analysis of two previous IRSS surveys (2012-2013 and 2016) (topic number 2018-53) should be carried conducted under the framework of the Implementation Review and Support System (IRSS). The objective of this analysis was to assess whether changes in implementation levels could be determined. Mr Sebastiaan HESS[3] was engaged to conduct this work.

A draft report was submitted to the IPPC Secretariat and presented by the author to the IC Sub-group on IRSS at their meeting in April 2021, no further comments were received and the report was published.

Description

The study looked at questionnaire design and comparability, survey implementation and response. Both the 2012 and 2016 survey design focused on NPPOs' self-assessment of their implementation of IPPC responsibilities and ISPMs and on the reasons behind high and low implementation. Both questionnaires took a structured approach and covered all NPPO responsibilities and ISPMs. Questions were mostly standardised and respondents were asked to rate the implementation of responsibilities and ISPMs on Likert scales, with answer options running from high to none. Besides the closed multiple choice questions, respondents were asked to explain their answers to part of the questions, but only a minority did. The challenges to implementation of priority ISPMs were also asked about in an open question.

Both questionnaires suffered from several issues. By asking about implementation of NPPO responsibilities *and* ISPMs, the surveys introduced considerable duplication, which was also found in other sections of the questionnaires, or at least in the data they produced. The 2012 design of a section on factors influencing ISPM implementation meant that respondents had to answer many irrelevant questions. An intended remedy to this in the 2016 version inadvertently allowed multiple interpretations of how to answer these questions, which led to exclusion of those data in the current analysis. Other misinterpretations of questions happened relatively frequently, in part because of the uniform approach to asking about different types of responsibilities where this was not always suitable. Additional explanation for some questions could have provided better guidance to respondents on how to answer these and also prevented misinterpretation. All instances of such issues are indicated in the full report. The questionnaires of both surveys do not appear to have been pre-tested, which could have detected some the abovementioned design issues.

There were several changes made to the 2016 questionnaire, for example to the answer scales, intended to improve the 2012 version and in response to participant comments. Although these were seemingly small changes, they did inhibit a clean comparison between the two surveys.

The 2012 and 2016 surveys had respective response rates of 39% and 51% of the IPPC's 182 NPPOs (Figure 1). There were no large sample imbalances with regard to region and income level of the NPPOs. However, it is likely, and the data offer some evidence, that NPPOs participating in the surveys generally implemented the IPPC to a higher degree than non-participating NPPOs. Implementation of the IPPC might therefore in reality be slightly lower than that presented in this report.

While the response rates, especially for 2016, are not unreasonably low, they correspond to relatively small absolute numbers of respondents: 71 in 2012 and 93 in 2016. This made disaggregation, for example to show regional differences, difficult. Moreover, only 45 NPPOs participated in both surveys. This constrained the

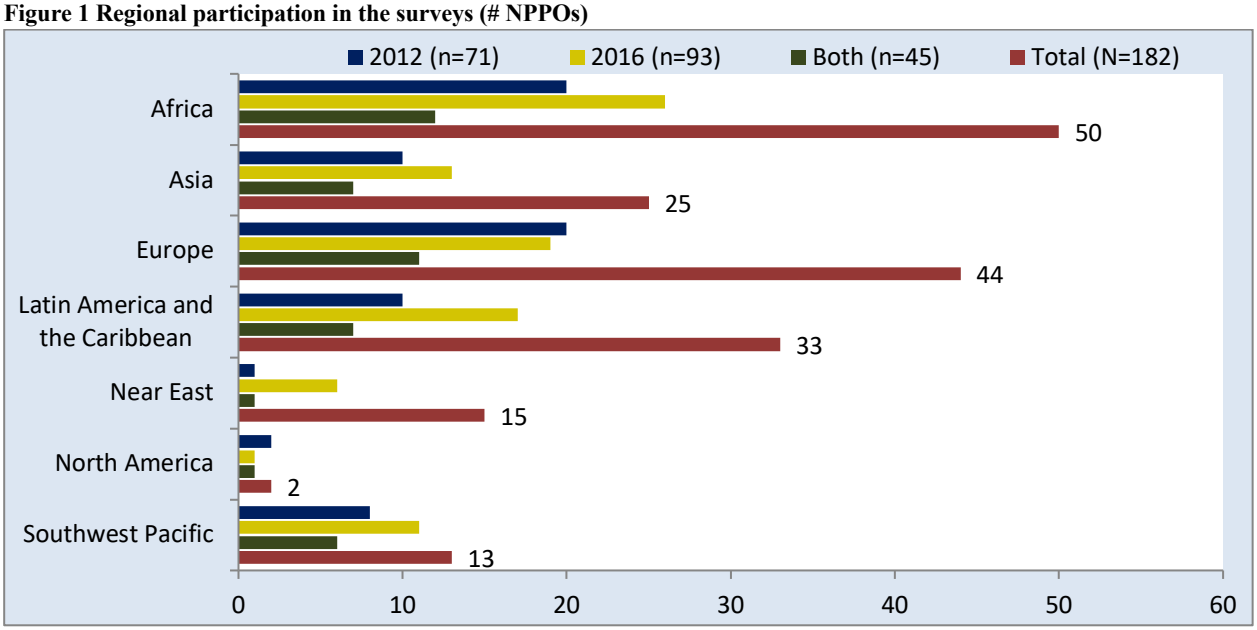
[1] Findings of the general survey of the IPPC and Standards 2012: https://www.ippc.int/en/publications/88309.

[2] 2016: https://www.ippc.int/en/publications/88314/.

[3]Mr Sebastiaan HESS's biography is present under the acknowledgements section.

ability to detect changes between the two surveys. On the one hand, differences between 2012 and 2016 based on data from all respondents could in part be due to the different composition of both samples. On the other hand, restricting the change analysis to the overlapping samples, i.e., to the 45 NPPOs that participated twice, could detect only very large and clear changes that stood out from the 'noise' of small differences in answers that is common in this type of survey.

Figure 1 Regional participation in the surveys (# NPPOs)



Results

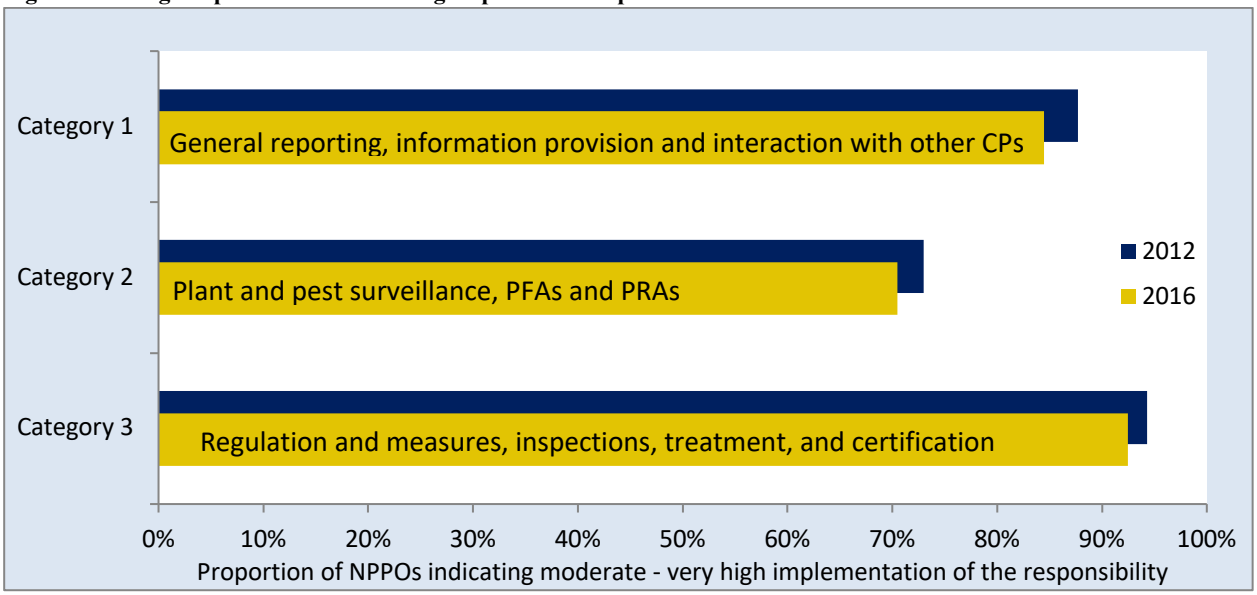
No measureable changes in the implementation of IPPC responsibilities and ISPMs were found between the two surveys. Whether this is due to the issues mentioned above or it reflects reality is not possible to answer based on the survey data.

The pattern of implementation measured in both surveys was very similar. To condense the presentation of results, this report grouped the IPPC responsibilities according to:

(1) General reporting, information provision and interaction with other CPs
(2) Plant and pest surveillance, pest free areas (PFA) and pest risk analysis (PRA)
(3) Regulation and measures, inspections, treatment, and certification

As shown in Figure 2, on average, highest implementation is found for the third group, and eight or nine of the ten most highly implemented responsibilities overall consistently fall within this category, regardless of the year of the survey or the way the responsibilities were ranked. Responsibilities within the second category, relating to surveillance, PFA and PRA were least implemented, on average, and six or even all seven of the questions in this category are among the ten least implemented responsibilities overall, depending on the year and way of comparing implementation.

Figure 2 Average implementation level of grouped IPPC responsibilities



Regarding the implementation of the ISPMs, there is a similar pattern if they are grouped along the same lines. The categorization of ISPMs, however, is less straightforward as they can be very specific, e.g., relating to fruit flies or packing material, and because they sometimes include multiple responsibilities, such as ISPM 19 which refers to listing regulated pests *and* sharing this with other CPs. Furthermore, not all 36/37 ISPMs could be assigned to these three groups.

Overall, the following five ISPMs were most commonly implemented to a high degree in both surveys (all relate to regulation, inspection and certification):

(1) *ISPM 7 (Phytosanitary certification system)*
(2) *ISPM 12 (Phytosanitary certificates)*
(3) *ISPM 15 (Regulation of wood packaging material in international trade)*
(4) *ISPM 20 (Guidelines for a phytosanitary import regulatory system)*
(5) ISPM 23 (Guidelines for inspection)

The following seven ISPMs were least commonly implemented to a high degree in both surveys. Some of these are in this list because the implementation level was generally low, but others were deemed not applicable by relatively many NPPOs, especially ISPM 18 on irradiation (not all countries have irradiation facilities) and the ISPMs relating to fruit flies:

(1) *ISPM 18 (Guidelines for the use of irradiation as a phytosanitary measure)*
(2) *ISPM 22 (Requirements for the establishment of areas of low pest prevalence)*
(3) *ISPM 26 (Establishment of pest free areas for fruit flies)*
(4) *ISPM 29 (Recognition of pest free areas and areas of low pest prevalence)*
(5) *ISPM 30 (Establishment of areas of low pest prevalence for fruit flies)*
(6) *ISPM 33 (Pest free potato (Solanum spp.) micropropagative material and minitubers for international trade)*
(7) ISPM 35 (Systems approaches for pest management of fruit flies)

Factors influencing the level of ISPM implementation were only analysed for 2012 for reasons explained above. Besides the relevance of the ISPM to NPPOs, having sufficient and sufficiently trained personnel clearly comes out as the main determining factor. Other resources (financial and physical) were also indicated, as were factors such as stakeholder cooperation and policy support, but personnel was consistently rated highest (besides relevance). This importance of qualified personnel was confirmed in an open question about challenges to implement priority ISPMs: in this question 70% of respondents (in both surveys)

indicated staff-related challenges, while the second and third most mentioned areas (financial and physical resources) were indicated by between 35% and 57%, depending on the year.

A question about technical assistance towards the implementation of specific ISPMs could again only be analysed reliably for 2012. The ISPMs for which technical assistance was most commonly said to have been received have to do with PRA (ISPM 2), surveillance (ISPM 6), phytosanitary export certification (ISPMs 7 & 12) and inspection (ISPM 23). Nine of the ten ISPMs for which technical assistance was most commonly received were also in the top ten of most commonly *implemented* ISPMs in 2012. It is unclear if these are simply the most important ISPMs, which are therefore both commonly implemented *and* a focal point for technical assistance, or whether the technical assistance provided in the years previous to the survey led to high implementation. Most likely both are true. Unfortunately, due to the low number of overlapping observations and the change in the way ISPM implementation was measured in 2016, it was not possible to analyse whether specific NPPOs improved the implementation of ISPMs for which they had received assistance.

Regional disaggregation of the data and results was difficult as stated above, but some general observations could be made. Average ISPM implementation appeared lowest among NPPOs in the African region and highest among NPPOs in North America (but there was only one North American respondent in each survey that answered the ISPM implementation questions). NPPOs in the Southwest Pacific region appeared to have a higher than average implementation as well. There were too few observations to say whether the implementation pattern according to the thematic grouping of ISPMs holds for the different regions. The same is true for factors influencing implementation, although it can be said that the patterns indicated above largely hold for the regions as well, and no large deviations for specific regions were found.

Considerations for a future general survey

While not a direct objective of the current study, a few comments will be made with regard to lessons learnt for a third general survey. Overall, the data needs and objectives of the survey should be clearly established. Which data exactly are necessary and how will they be used. It should be critically assessed whether the information provided by the existing surveys, as reported here, meets these objectives. Even though it is a general survey, perhaps it does not have to ask about every element or responsibility under the Convention, e.g., if that data is not informative, obvious, not going to be used, or already available elsewhere.

The previous surveys covered the full breadth of the IPPC responsibilities, but did so in a very structured and "legalistic" approach, which closely followed IPPC articles and the individual ISPMs. Perhaps an approach tied in more to the day to day practice of the NPPOs could be designed, also with regard to question order.

Specific suggestions (elaborated in section 5 of the main report):

- Avoid duplication.
- Use skip codes to avoid irrelevant questions.
- Tailor questions and answer scales so they suit the topic of the question.
- Focus on question phrasing and provide sufficient information with a question so it is interpreted uniformly.
- Be cognisant how even small changes in question wording and answer scales affect comparability over time.
- Focus strongly on attaining a high response rate, especially among NPPOs that participated previously.
- Pre-test the questionnaire.
- Consider moving beyond a sole focus on self-assessment.

1. Introduction

The IPPC Secretariat has conducted two general surveys under the Implementation Review and Support System (IRSS). These surveys targeted national plant protection organizations (NPPOs) and tried to gauge the implementation of the International Plant Protection Convention (IPPC) and International Standards for Phytosanitary Measures (ISPMs). Data from the two surveys, held in 2012 and 2016, were analysed separately by the IPPC Secretariat and these findings are posted on the International Phytosanitary Portal (IPP) (20124; 20165). As part of the preparations for the third general survey, the Implementation and Capacity Development Committee (IC), at its November 2018 meeting, agreed that a Consolidated analysis of the two previous IRSS surveys (2012-2013 and 2016) (topic number 2018-53) should be carried conducted under the framework of the Implementation Review and Support System (IRSS). The objective was to assess whether changes in implementation levels could be determined and to establish if there were any trends, to understand the value of the data collected and to help determine which questions from of the previous surveys should be retained in the third general survey. Mr Sebastiaan HESS was engaged to conduct this work[6].

Specifically, the objectives of this study were to:

- critically assess the questionnaires of the 2012 and 2016 surveys
- evaluate the comparability between the 2012 and the 2016 questionnaires
- review the existing analysis reports
- re-analyse the data collected in the 2012 and 2016 surveys
- conduct a comparative analysis of the 2012 and 2016 data to establish whether changes in implementation of the Convention and ISPMs can be determined.

The first two objectives will be the topic of the next section, and results of the re-analysis and comparison of the 2012 and 2016 survey results is dealt with in section 3. Results and conclusions from the existing analysis reports will be referred to throughout the text where relevant, and will be touched upon in the summary and conclusions section. The term survey is used to refer to the whole process of data collection, while the term questionnaire refers to the list of questions used in the surveys, i.e., the survey instrument.

2. Questionnaire design and comparison, survey implementation and response

2.1 Questionnaire design

The 2012 and 2016 general survey question are very similar in their set up. Both took a structured and "legalistic" approach in which questions closely followed the structure of the Convention's articles and ISPMs. Both surveys were solely self-assessments, only asking about the NPPOs own compliance and experiences, not those of other NPPOs (although in open comments, the conduct of other NPPOs was sometimes referred to). This is in line with CPM-3 (2008)[7] where it was stated that the "*Advantages of the IRSS included: the ability to monitor, encourage and support the harmonised implementation of the IPPC and ISPMs by contracting parties; and a means to identify and address emerging and potential implementation problems before they became disputes, through an assistance-based and non-confrontational process*". This self-assessment nature may have led some respondents to give what they perceived to be "desirable" answers (the surveys were not anonymous), and there are some questions where it is hard to imagine a respondent rating its NPPOs performance as poor.[8]

The surveys start with several sections based on the Convention's articles. Responsibilities referred to in these articles were split up into 36 separate questions in which NPPOs were asked to rate their own implementation

[4] Findings of the general survey of the IPPC and Standards 2012: https://www.ippc.int/en/publications/88309.

[5] 2016: https://www.ippc.int/en/publications/88314/.

[6] Mr Sebastiaan HESS's biography is present under the acknowledgements section.

[7] CPM-3 (2008) / REPORT, Para 129.

[8] E.g. questions about measures or additional required declarations to be *technically justified* (questions 5.4 and 6.2).

on a Likert scale[9] from high to none. These sections are structured broadly topically (such as Distribution of information, Phytosanitary certification, Requirements in relation to imports), but as they aimed to cover all responsibilities specified in the IPPC's articles, there is some overlap between the questions,[10] and question order could have been better aligned with NPPOs daily practice. Although the survey structure closely follows the order of the IPPC articles, the questions themselves are phrased as one-line responsibilities, in which important elements of the article text are sometimes omitted.[11] As shown by respondent comments, this led to different respondents answering these questions in different ways, depending on their knowledge of the Convention's text. Another indication that not all respondents were completely familiar with the Convention was already mentioned in the 2012 analysis report itself, which states that the question about *endangered areas* was misinterpreted as *protected areas* by some respondents (IPPC Secretariat, 2014).[12] Such misinterpretations could have been avoided by providing additional explanations with the questions. Further evidence of misinterpretations is discussed at the relevant location in the results sections.

Sections about NPPO responsibilities were followed by one that asked about the implementation level of all ISPMs (in addition, the 2016 survey also included 12 diagnostic protocols annexed to ISPM 27: Diagnostic protocols for regulated pests, and 21 phytosanitary treatments annexed to ISPM 28: Phytosanitary treatments for regulated pests). As the topics of these ISPMs in part overlaps with the responsibilities in the Convention's articles, there is partial duplication. Subsequent sections of the surveys covered factors influencing implementation, technical assistance, ISPM implementation priority and challenges. The 2016 survey also included questions about the implementation of CPM Recommendations. Design issues specific to the individual sections are discussed in the results sections.

Answer options

This section will discuss several issues related to the answer options used in both surveys.

First, in the initial sections dealing with implementation of responsibilities and standards, questions offered multiple choice answer options (Likert scale rates) that were identical within the different sections, but not between all sections.[13] For some responsibilities and standards, this identical format seems less appropriate, making it hard to interpret the answers. For example, how does one rate the level of implementation of ISPM 1 (*Phytosanitary principles*) or ISPM 5 (*Glossary of phytosanitary terms*)?

Second, in both the 2012 and the 2016 surveys some sections used a four-point scale while others used a five-point scale, with the latter splitting *high implementation* into *very high* and *high*.[14] It is not clear why this was done, but it has been shown that scale length influences response (Decastellarnau, 2017). *High* in a four-point scale clearly has a different meaning than the same answer in a five-point scale. Using different answer scales makes it more difficult to compare the implementation of different responsibilities. A duplicate question in the survey allowed a test of these effects, which proved large (see 0).

Third, the type of answer options that were used leave room for interpretation, and where one person may judge implementation to be high, another person might describe the same level of implementation as

[9] A Likert scale is a question which contains a fixed, usually uneven number of response options. The choices for example range from Strongly Agree to Strongly Disagree so the survey maker can get a holistic view of people's opinions and their level of agreement.

[10] E.g. section 3 of the surveys among others asks about Article IV. 2(a) (*Issuance of phytosanitary certificates*), while two sections later, section 5 deals more specifically with certification (based on Article V).

[11] E.g. the text in question 3.9 does not state that this article refers to consignment security *after certification*; question 4.1 does not state that the information distribution relates to the actors *within* the contracting party's country.

[12] The same evidence was found in the 2016 data (no change to the question had been made).

[13] Respondents could add open comments in the initial sections about responsibilities to explain their multiple choice answers, but no room for open comments was given in the section on implementation of ISPMs.

[14] These are the 2016 answer options. In 2012 different wording was used as explained below. In 2012, some of the answer option wording also changed between the sections: in section 3, the highest implementation option was 'full implementation' in a four-point scale, which was then split into 'very strong' and 'strong' in the five-point scale used in sections 4-7. This makes comparison between the two questions more difficult for 2012.

moderate. Even the same person may answer differently on different days. Interpretation of changes over time should therefore take this into account. Especially where a result is based on a small number of observations, there is a risk that apparent changes over time fall within this "margin of interpretation". When the number of observations is sufficiently large, the "arbitrary" movements either way should cancel each other out.

Fourth, for questions about responsibilities in situations that rarely occur, for example, the responsibility to investigate significant cases of non-compliance or to participate in international campaigns for combating pests, the answer options appear to have been interpreted differently by different respondents. Some argued that when such situations arose, responsibilities were met and implementation was therefore high. Others, who judging by open comments met these responsibilities to the same extend, argued that the situation only occurred rarely and implementation was therefore low. This is mentioned where applicable when discussing the results.

Some data entry errors were found in the 2016 database in the course of the analysis, but time did not permit full data entry checks.

2.2 Changes between the 2012 and 2016 surveys

Specific changes to questions and sections will be discussed when presenting the results, but a few general changes will be highlighted here.

First, to rate the implementation of ISPMs, the 2016 questionnaire added the extra answer option *moderate* to those used in 2012: *high, low, not at all, not applicable*. As discussed in the previous section, adding an answer option changes the meaning of the answer categories, which means that the implementation levels in 2012 and 2016 cannot be compared for individual ISPMs. Only differences between the years in rankings of all ISPMs can be assessed.

Second, the 2016 survey changed the section on factors that influence the implementation of ISPMs in such a way that interpretation of the answers becomes uncertain, as will be discussed in results section of this report. Furthermore, the question whether technical assistance had been received was folded into the same section in 2016, where it formed a separate section in the 2012 questionnaire.

Third, the answer option wording was changed between 2012 and 2016. For some questions, the 2012 options *full implementation*, *moderate, weak, none* were changed to *high, moderate, low, none*. As *full* has a different meaning than *high*, this could have influenced response. For other questions, the 2012 scale of *weak/strong* was replaced by *low/high* in 2016. The latter seems less problematic. The 2016 changes made answer options more uniform across sections.

Fourth, in 2016, the questions relating to responsibilities under the IPPC included the Convention's article number on which the question was based. In 2012, this was not the case.[15] As the question phrasing does not always include all elements of the articles, as was mentioned above, this could have affected response.

Finally, an extra section asking about the implementation of CPM recommendations was added to the questionnaire in 2016.

2.3 Survey implementation and response

The target respondents for both surveys were the NPPOs in 182 contracting parties (CPs) to the IPPC.[16] According to the 2016 survey report, respondents were given the option of responding in English online (using the survey software SurveyMonkey) or through submission of a MS Word version of the survey in one of the six official FAO languages. Although the 2012 survey report does not mention the mode of implementation, the 2012 data files show that the 2016 survey most likely copied the 2012 methodology in

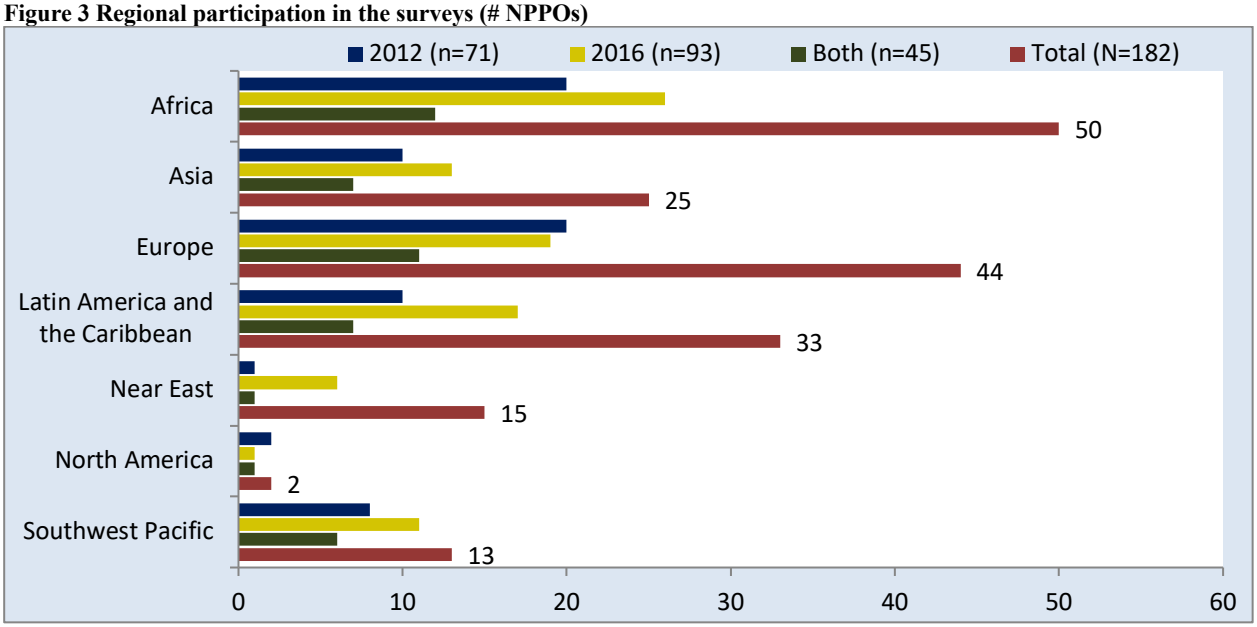
[15] This was not consistently done in all translations of the 2016 survey.

[16] The 2016 survey was also sent to regional plant protection organisations (RPPOs), of which only one answered (NAPPO), but these answers were not used in the current analysis. The 2012 report does not state whether RPPOs were invited to participate in the survey.

this respect. No skip codes, which allow respondents to skip questions that are not relevant to them (based on the answers to earlier questions) were used.[17] Some respondents commented that the survey was too long and that the some questions were not relevant or were repetitive. This could have been improved with the use of skip codes, although the mixed mode – online and offline – character of the survey would have made this very complicated.

In 2012 and 2016, 71 and 93 NPPOs participated respectively with corresponding response rates of 39% and 51% (see 0 for a full list of participating NPPOs (countries) in both surveys).[18] However, only 45 NPPOs filled out both surveys, and not all NPPOs answered all questions, further limiting the number of observations. To reliably determine changes in implementation between 2012 and 2016 the overlapping sample should be used, as differences between the full samples of both surveys could be due to their different composition. The limited size of the overlapping sample, however, only allows large changes to be detected with sufficient certainty. Figure 3 shows the number of respondents from the different regions for both years. Response increased in most regions between 2012 and 2016, but for all regions bar the Near East – with only one respondent in 2012 – a relatively large proportion of NPPOs that participated in the 2012 survey did not in 2016 as shown by shorter mustard colored bar in the figure, which reflects the number of overlapping NPPOs in each region. The total number of NPPOs in each region is also shown in the figure.

Figure 3 Regional participation in the surveys (# NPPOs)



An important question that is difficult to answer is whether those who participated in the surveys represent all NPPOs. Representativeness of the sample can be analysed with respect to the regional distribution of *responding* NPPOs compared to the regional distribution of *all* NPPOs, and the same can be done for the distribution across income groups. This is important to check, because if response rates in a certain region or income group are relatively high, and implementation of the IPPC for this region or group differs from the average, this could bias the overall (i.e., non-disaggregated) survey results. Figure 4 shows there is some regional underrepresentation (especially the Near East in 2012) and overrepresentation (especially the

[17] The online version of the survey was not available for this analysis, but this was judged by looking at the data and the Word version of the survey.

[18] The survey reports of both years mention slightly higher numbers. The 2012 report mentions 73, but the database only contained 72 responses of which there was one duplicate. The 2016 report mentions 100 respondents, but these include 6 countries that did not answer a single question (presumably they opened the online survey tool and thereby created an account), and one RPPO. Three countries that were not contracting parties participated in the 2012 survey and have been included in the analysis. These were Timor-Leste, the Turks and Caicos Islands and French Polynesia. This will slightly bias the figures about the representativeness as these are based on the number of official NPPOs.

Southwest Pacific), but most regions are represented relatively evenly (meaning they had similar response rates). Figure 5 shows that the distribution according to income group was also fairly balanced.

These tests show that the results should not be badly skewed as a result of sample imbalances with regard to region and income. Nevertheless, it is reasonable to assume that NPPOs that responded to the surveys were more likely to have implemented the IPPC and ISPMs to a higher extent than NPPOs that did not participate. To check if there was any relationship between the level of implementation of the Convention and participation in the surveys, the average ISPM implementation level of those NPPOs that participated in both surveys was compared to that of the NPPOs that participated in only one survey. High implementation was indeed slightly more common on average among the group of NPPOs that participated in both the 2012 and 2016 surveys.[19] Although not a perfect test, as nothing is known about NPPOs that did not participate in either survey, it does make it likely that the results presented here slightly overestimate the implementation of the Convention and ISPMs.

Figure 4 Regional distribution of the responding NPPOs compared to the regional distribution of all NPPOs globally

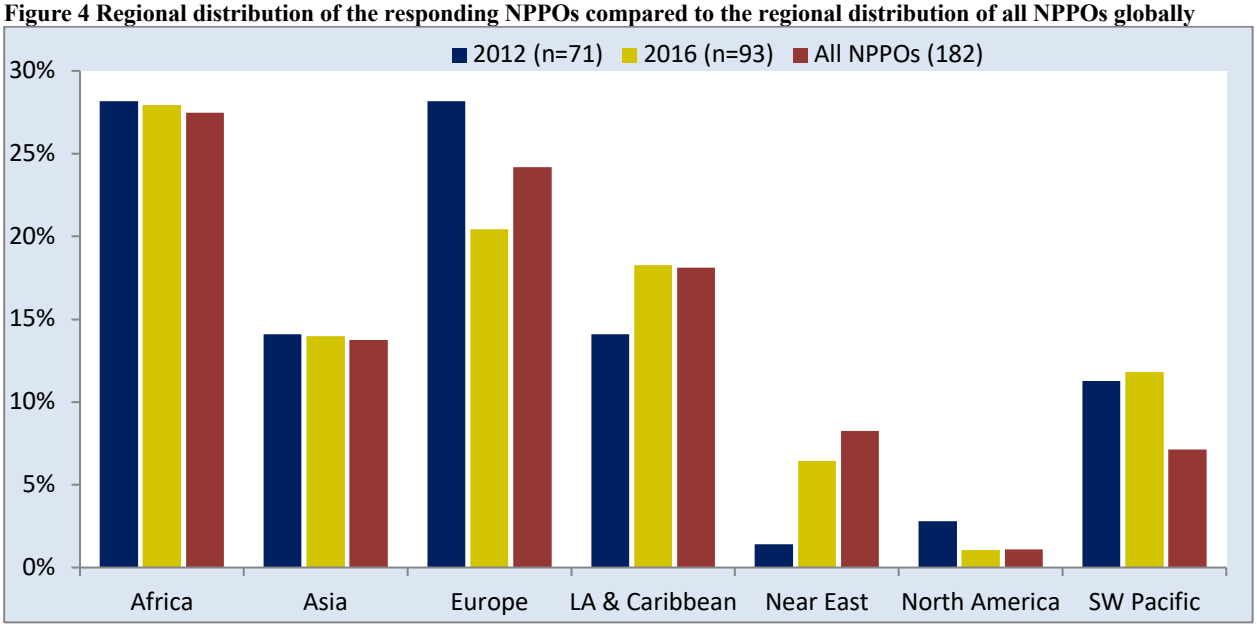
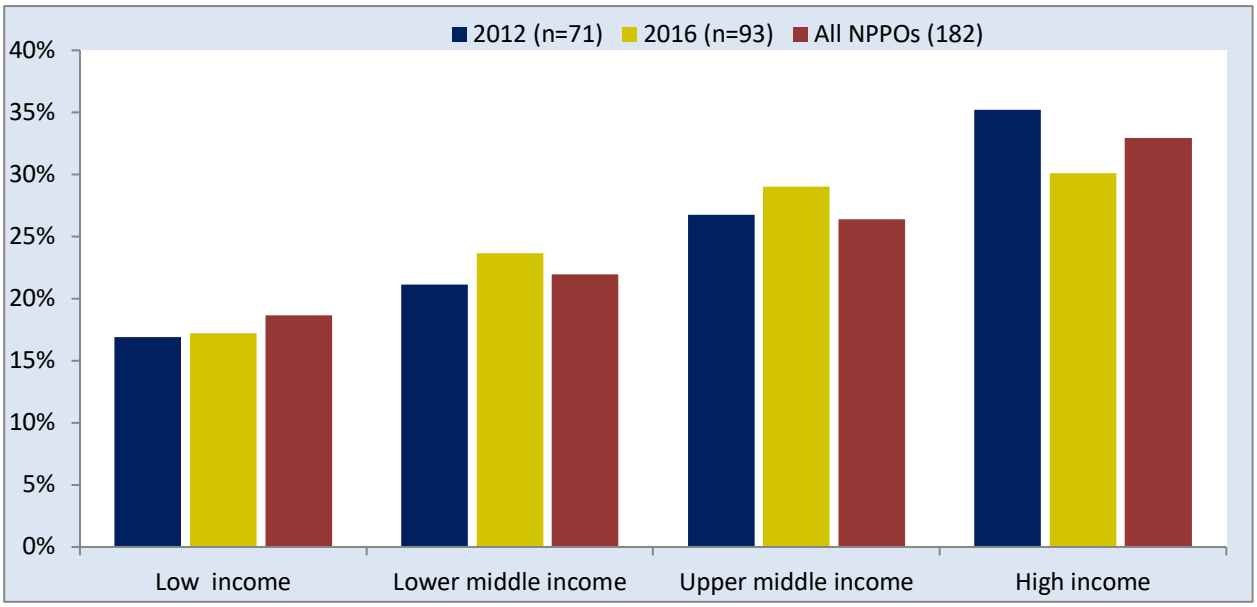


Figure 5 Distribution according to income group of responding NPPOs compared to all NPPOs globally

[19] The difference between both subsamples in the average proportion of NPPOs that implemented the ISPMs to a high degree varied between 4% (2012) and 12% (2016).



3. Analysis results

As stated above, the questionnaires started with a number of sections asking about the implementation of IPPC responsibilities that were outlined in the Convention's articles. Rather than follow the questionnaire order, this report groups these questions and the ISPMs into three broad thematic categories:

(1) General reporting, information provision and interaction with other CPs

(2) Surveillance and pest risk analysis

(3) Regulation and measures, inspections, treatment, and certification[20]

The NPPO responsibilities will be discussed in the next three sub-sections, based on this categorisation, followed by ISPM implementation. Subsequent sections largely follow the questionnaire order and deal with factors influencing ISPM implementation, technical assistance, priority ISPMs and challenges, CPM Recommendations (2016 only) and respondent comments.

3.1 General reporting, information provision and interaction with other contracting parties

All questions that are discussed in the next three sections of this report allowed space for open comments. Where deemed relevant, for example, when they explain a low implementation of a certain responsibility or point to design issues of the questions, these comments are discussed with the results. However, it should be noted that, for any given question, only a minority of respondents made additional comments.

Results of both surveys are presented here together and compared. As mentioned in section 2.3, only 45 NPPOs completed both surveys. The next three sections will therefore both present the overall results for

[20] There is one question about staff training and development that did not fit into these categories and is discussed at the end of the third category. Results of four questions are not presented here: question 2.1, whether a single NPPO has been established, as nearly all respondents said yes; question 2.3, about reported changes to the NPPO, as it is not clear whether changes were made in the first place, making the answers hard to interpret; question 4.4 about "other functions required under the Convention", as it is considered too vague; and question 7.3 about having a designated contact point on the IPP, as the question phrasing was changed in the English 2016 Word version, no longer matching the 2012 question or the IPPC article it refers to and changing its meaning. In the online questionnaire the question is correct. In the translations it also appears to be correct. As there were 26 offline English responses, the influence of the mistake was deemed large enough to warrant exclusion.

both surveys and look at changes over time that are based on the overlapping sample. Not all respondents answered all questions, and the (overlapping) sample size therefore differs per question.

This section will discuss the questions 2.2, 2.4, 4.1, 6.3, 6.4, 6.7–6.9, 7.1, 7.2 and 7.4.[21] The responsibilities covered by these questions relate to publishing general information about the NPPO on the International Phytosanitary Portal (IPP: www.ippc.int) and information provision to stakeholders within the country, but deal mostly with information exchange between CPs. Table 1 presents a summary of the results, while detailed results per question, including the open comments, are discussed subsequently. To provide comparable data, the table presents the joint proportions for the moderate to (very) high answers (see 0 for an explanation).

No robust conclusions can be drawn about changes between 2012 and 2016. Among NPPOs that participated in both surveys, there were some that stated a higher and others a lower implementation in 2016 than in 2012. This was the case for all questions, mostly without a clear direction either way. Some of these movements are most likely due to different interpretations by the different respondents in both years, rather than reflecting actual changes in the level of implementation. A statistical difference between upward and downward movements was found for none of the questions, but this is unsurprising given the low number of observations.[22]

Relative to the other two categories of responsibilities, this group on average is implemented to an intermediary degree. The two responsibilities in this category that were most often implemented to a high degree relate to the availability of information about designated entry points, and the investigation of significant cases of non-compliance, while participation in international campaigns to combat pests and the reporting about pests (occurrence, outbreaks, spread) were least often implemented at high levels. However, the interpretation of low implementation answers is difficult for some of these questions (see discussion at the end of section 2.1).

Table 1 Implementation of responsibilities relating to information exchange – summary table

#	Responsibility	% of moderate to (very) high answers 2012	% of moderate to (very) high answers 2016	Overlapping sample
2.2	Has your NPPO published a description of its official national plant protection organization via the IPP (Art. IV, 4)? (% yes)	69%	72%	**No change**
2.4	Has your NPPO provided a description of its organizational arrangements for plant protection to another contracting party upon request (Art IV, 4)? (% yes)	66%	55%	**No change**
4.1	Distribution of information regarding regulated pests and the means for their prevention and control (Art IV, 3a) (% moderate - very high)	83%	80%	**No change**
6.3	Phytosanitary requirements, restrictions and prohibitions are publicly available to contracting parties (Art. VII, 2b) (% moderate - very high)	89%	90%	**No change**
6.4	Designated points of entry are publicly available to contracting parties (Art. VII, 2d) (% moderate - very high)	96%	89%	**No change**

[21] Only the questionnaire sections, not individual questions were numbered in the offline surveys. The numbering used here is based on section numbers and question sequence within the sections.

[22] This was tested using McNemar's test for paired data on the overlapping sample after creating binominal variables (1=high/very high implementation; 0= moderate/low/no implementation).

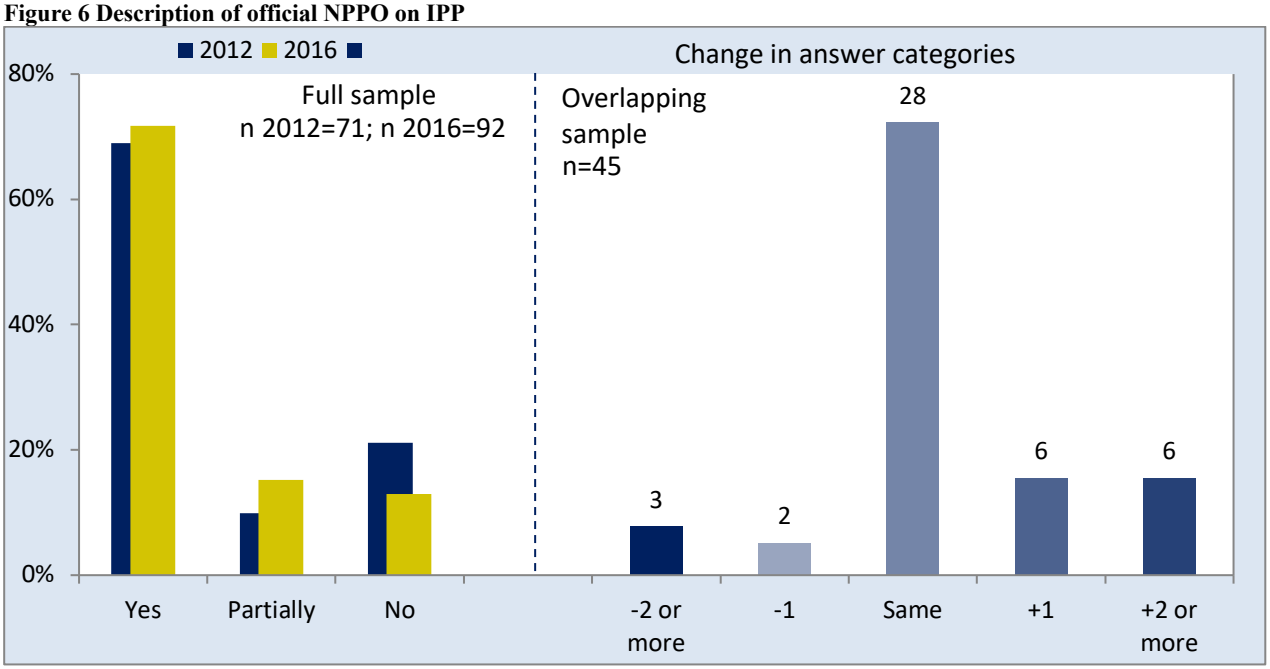
6.7	Exporting contracting parties are notified of significant cases of non-compliance with phytosanitary certification i.e. detection of a regulated pest, deficiencies or absence of a certificate (Art. VII, 2f) (% moderate - very high)	83%	82%	**No change**
6.8	Your country investigates significant cases of non-compliance that are reported by an importing contracting party (Art. VII, 2f) (% moderate - very high)	94%	89%	**No change**
6.9	The result of investigations of significant cases of non-compliance is reported to the importing contracting party concerned (Art. VII, 2f) (% moderate - very high)	91%	87%	**No change**
7.1	Participation in international campaigns for combating pests that may seriously threaten crop protection (Art. VIII, 1b)(Art. VIII, 1a) (% moderate - very high)	84%	80%	**No change**
7.2	Providing technical and biological information for pest risk analysis (Art. VIII, 1c) (% moderate - very high)	83%	79%	**No change**
7.4	Cooperating in the exchange of information – particularly the reporting of the occurrence, outbreak or spread of pests that may be of immediate or potential danger (Art. VIII, 1a) (% moderate - very high)	88%	84%	**No change**

Has your NPPO published a description of its official national plant protection organization via the IPP (Art. IV, 4)? – question 2.2

Most NPPOs in both surveys said they had published a description (see Figure 6, left-hand side). The overall proportion increased slightly from 69% in 2012 to 72% in 2016. To check if this result is influenced by the different composition of the 2012 and 2016 samples, the right-hand side of Figure 6 shows how the answers of NPPOs that participated in both surveys changed between 2012 and 2016. Due to the low number of observations, the actual number of NPPOs is shown rather than percentages. As can be seen, most NPPOs (n=28) gave the same answer in both surveys. Six NPPOs moved up one answer category, for example answering *No* in 2012 and *Partially* in 2016, and another six moved up two answer categories, going from *No* in 2012 to *Yes* in 2016. Five NPPOs shifted from saying *Yes* in 2012 to *No* or *Partially*. It seems unlikely that descriptions would have been removed, so perhaps the 2012 answers in these cases were not correct. The right-hand side of the figure therefore points to a slight improvement, but the small number of observations makes hard conclusions difficult.

As this information can be checked on the IPP, the use of this question in the general survey appears less relevant, unless it is to raise awareness about the NPPOs' obligation to do so.

Figure 6 Description of official NPPO on IPP



Has your NPPO provided a description of its organizational arrangements for plant protection to another contracting party upon request (Art IV, 4)? – question 2.4

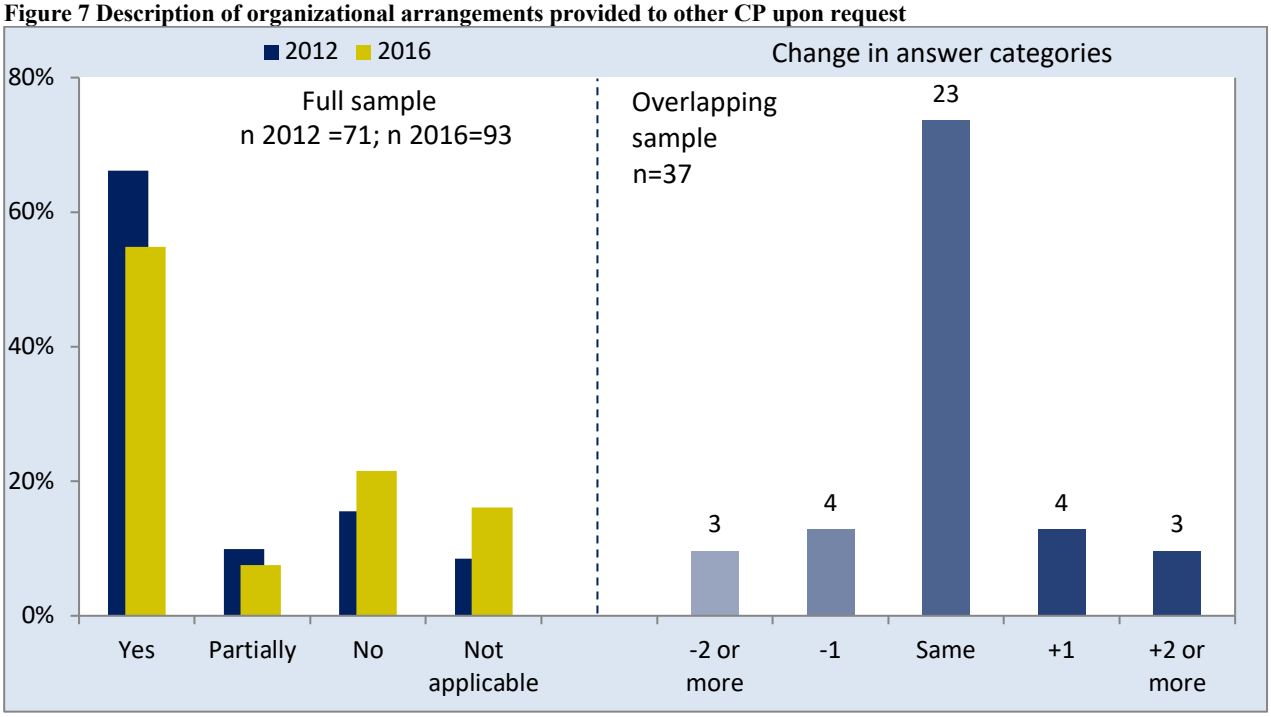
Some NPPOs that answered *No* explained in a comment that no request had been received. These answers were corrected and set to *Not applicable*. However, not all NPPOs that answered *No* left a comment and some of these may also have not received requests. This means that the results in Figure 7 look more negative than they should. On the other hand, again judging by the open comments, not all *Yes* answers seem correct either, as some NPPOs who said *Yes* mentioned they had shared information with others than CPs, or said the information was available on the website or the IPP.[23]

With those caveats noted, 66% of the responding NPPOs in 2012 and 55% in 2016 indicated to have provided its organizational structure to other CPs upon request (left-hand side of Figure 7). The results for the overlapping sample show no large changes (right-hand side of Figure 7), so the 2012-2016 difference between the full samples is most likely due to their different composition.[24]

[23] As the interpretation of the comments is less straightforward for the "Yes" answers (e.g., mentioning another group with which data were shared may just have been additional information besides sharing with CPs), no corrections were made to these answers.

[24] Countries that answered that no requests had been received were not included in the right-hand side of the figure, as it does not include "not applicable" answers, leaving 37 NPPOs in the overlapping sample.

Figure 7 Description of organizational arrangements provided to other CP upon request



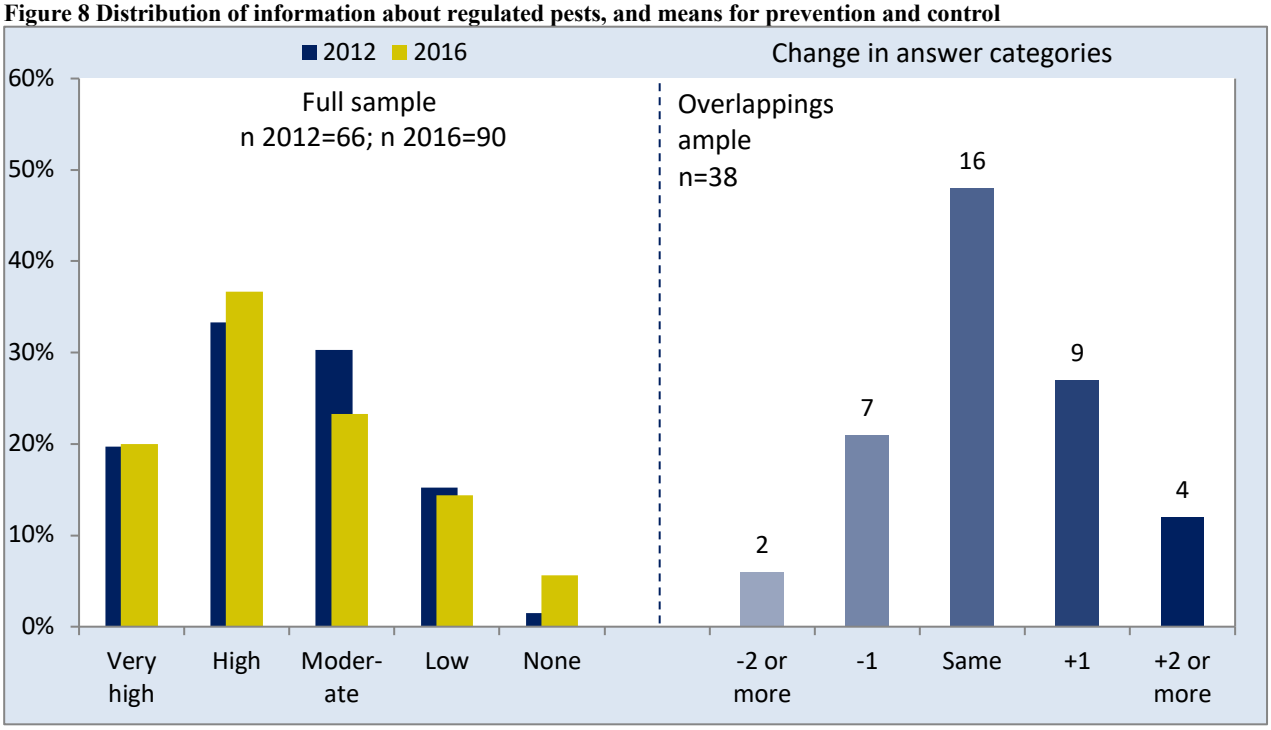
Distribution of information regarding regulated pests and the means for their prevention and control (Art IV, 3a) – question 4.1

The article of the Convention that this question refers to specifies that this responsibility to inform relates to actors within the CPs own territory. From the open comments to this question, it is clear that most indeed interpreted the question this way, and some mentioned pro-active campaigns, while others indicated the information was available on their website. However, there were also NPPOs that referred to making this information available to other CPs or on the IPP. One NPPO also referred to its technical staff having access to this information.

The few open comments relating to low compliance with this responsibility in 2012 mostly refer to having inadequate resources (human, financial). In 2016, NPPOs mostly explained the type of information they provide.

Looking at the full databases, slightly over half the responding NPPOs rated their performance as (very) high (Figure 8, left-hand side). The right-hand side of Figure 8 again shows how the answers of NPPOs that participated in both surveys changed. Overall, 13 NPPOs chose a higher answer category in 2016 compared to 2012, while the opposite was done by 9 NPPOs. Only 38 NPPOs answered this question in both surveys.

Figure 8 Distribution of information about regulated pests, and means for prevention and control

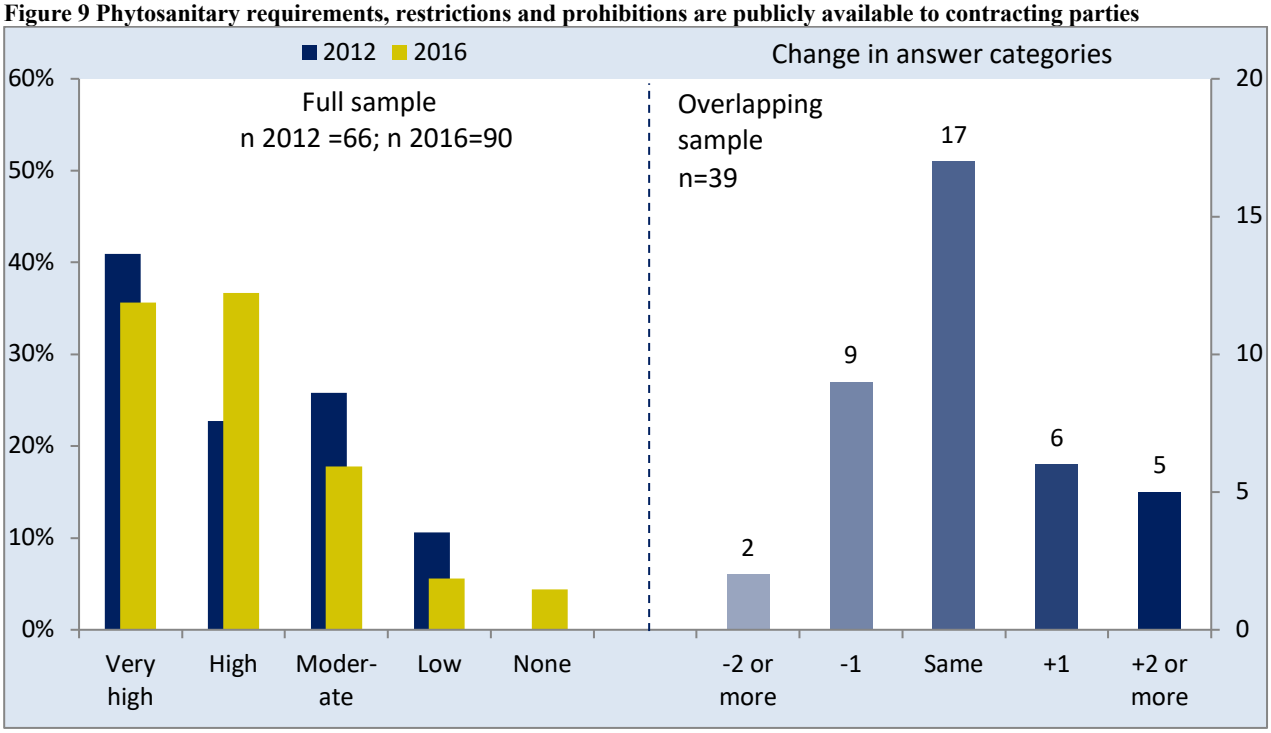


Phytosanitary requirements, restrictions and prohibitions are publicly available to contracting parties (Art. VII, 2b) – question 6.3

The question phrasing is slightly different from the article text, with the latter stressing that this is done in a timely manner as changes occur. In 2012, open comments indicated this information was available on the NPPOs website, and sometimes provided only upon request. There were hardly any comments explaining low compliance. This was similar in 2016.

Ratings in the full-samples were higher in 2016: (very) high answers went up from 64% to 72% (Figure 9, left side). In the overlapping sample, on balance the changes lean to a slight improvement, but the number of observations is too small to give reliable results. Whether these changes in the answers all reflect real shifts or are a result of a different interpretation is hard to say, but it seems odd that information that was publicly available in 2012 would not be in 2016.

Figure 9 Phytosanitary requirements, restrictions and prohibitions are publicly available to contracting parties

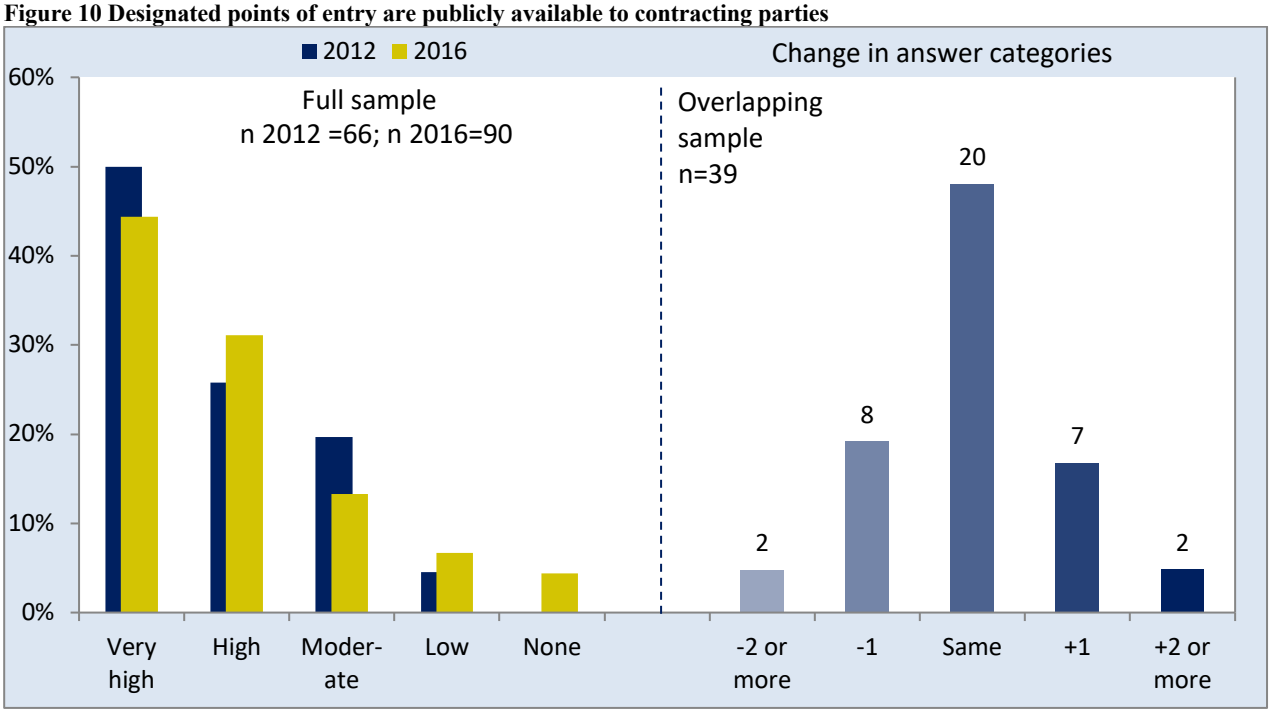


Designated points of entry are publicly available to contracting parties (Art. VII, 2d) – question 6.4

Most open comments indicated this information is available on the IPP or NPPO websites. Some NPPOs also said they provided this information bilaterally to trading partners, or upon request. Little to no explanation was given for low implementation, but only very few NPPOs indicated a low level of compliance with this responsibility.

Stated compliance is relatively high, with 76% of the full sample in both years indicating (very) high implementation; on balance, 20 out of 39 observations in the overlapping sample did not experience any change (Figure 10).

Figure 10 Designated points of entry are publicly available to contracting parties



Exporting contracting parties are notified of significant cases of non-compliance with phytosanitary certification i.e. detection of a regulated pest, deficiencies or absence of a certificate (Art. VII, 2f) – question 6.7

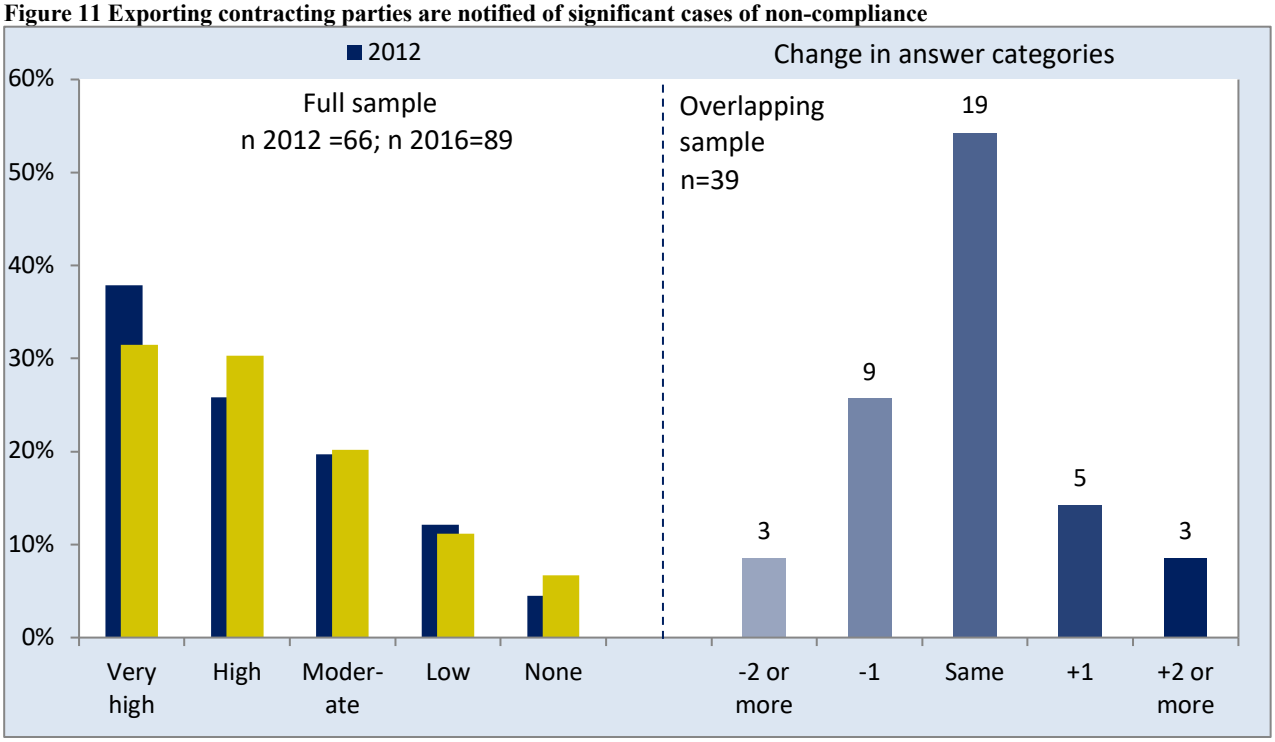
This question is linked with the two following ones that asked about the response to such notifications. Only few comments explain moderate to low compliance. Examples are: difficulty informing officials from other countries (2012); lack of official arrangements (2012); very few instances of non-compliance (2012); insufficient information provided by inspectors (2016); lack of trained personnel (2016).

As shown by these comments, this is one of the questions where rare occurrence of the situation mentioned in the question led to a misinterpretation of how to answer (see discussion in section 2.1).

Examples of other comments are: this happens informally; only to some countries; only if pests are found, but not for missing certificates.

In both years, a little over 60% of NPPOs in the full sample indicated a (very) high level of compliance (Figure 11, left-hand side). As shown on the right side of the figure, in the overlapping sample of 39 changes are again relatively balanced, with both higher and lower answers given.

Figure 11 Exporting contracting parties are notified of significant cases of non-compliance

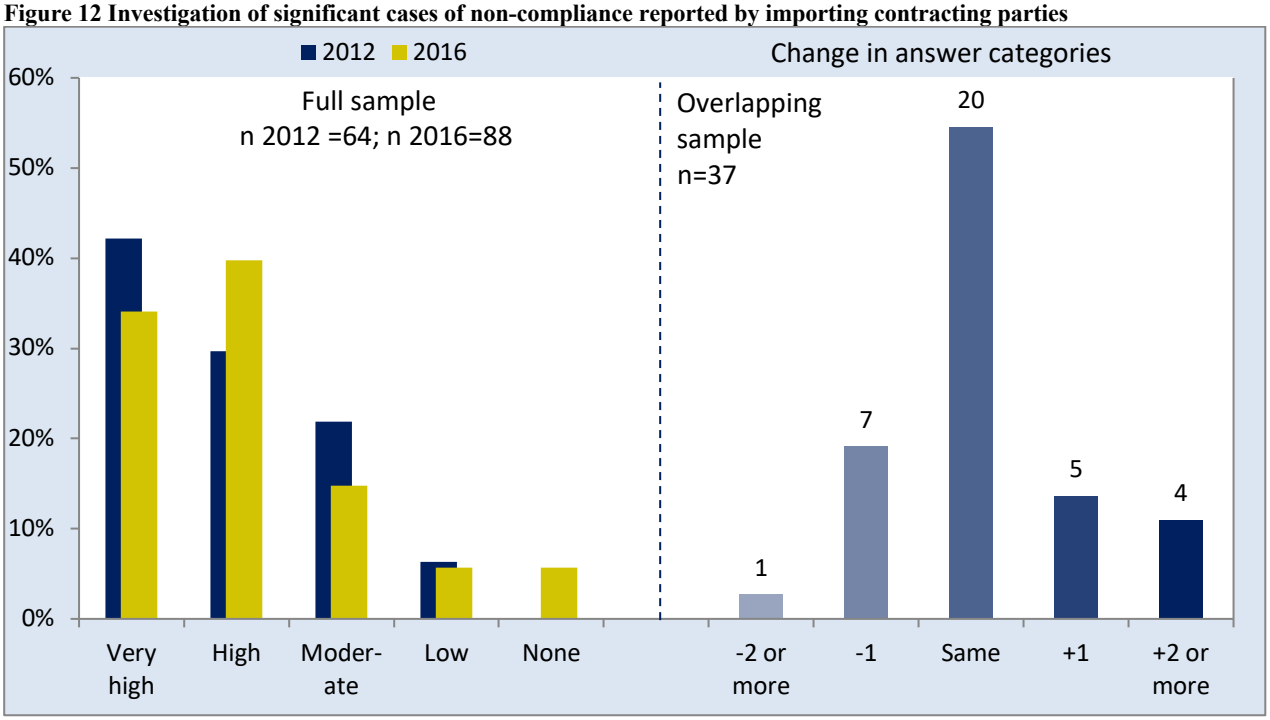


Your country investigates significant cases of non-compliance that are reported by an importing contracting party (Art. VII, 2f) – question 6.8

A *Not applicable* answer option for this question might have been useful, as in comments some NPPOs noted that they had never received such notifications and indicated a low level of compliance. These answers were set to missing in the analysis, but part of the other low compliance answers, where no further details were given, could also reflect this scenario. The interpretation of the low scores is therefore difficult. An additional follow-up question or extra answer options may help with this if this question is retained in the next general survey.

As seen above, only a little more than 60% of NPPOs said they had a good record on providing notices of non-compliance. Investigating *received* notices was rated as (very) high by a slightly larger proportion: 72% and 74% in 2012 and 2016, respectively (Figure 12, left-hand side). Answer in the overlapping sample both moved up and down, without a clear dominating direction (right-hand side).

Figure 12 Investigation of significant cases of non-compliance reported by importing contracting parties

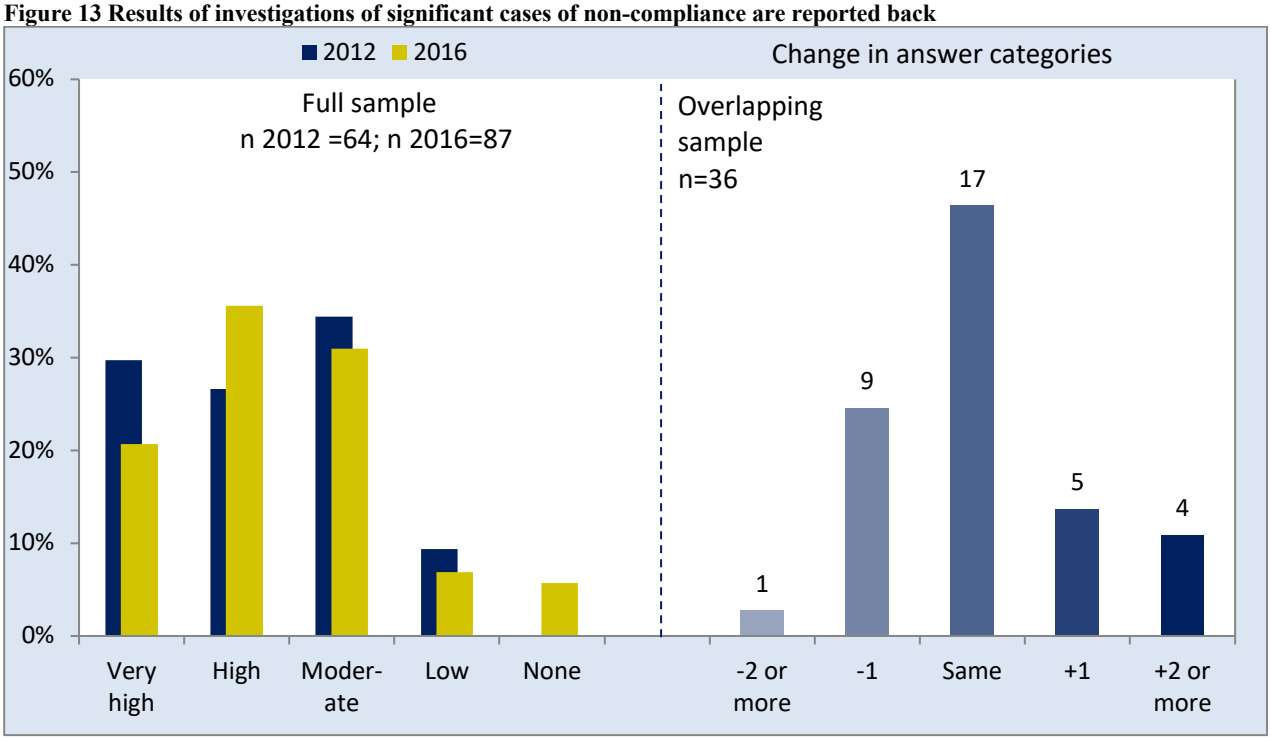


The result of investigations of significant cases of non-compliance is reported to the importing contracting party concerned (Art. VII, 2f) – question 6.9

This is a follow-up question of the previous, so the same applies to NPPOs that did not or rarely receive notices of non-compliance. The article text that the question refers to states that it is only necessary to report back if that is requested by the importing country. Whether respondents always answered this question with that extra element in mind is not known, but in many of the open comments, especially in 2016, it is stated that this is done only upon request. In other comments it was indicated that it was not relevant to report back in all cases.

Given the above, it is not surprising that scores were lower than in the previous question: 56% in the overall samples in both years indicated a (very) high level of implementation (Figure 13, left-hand side). Both upward and downward changes occurred in the overlapping sample (right-hand side). There were only 36 NPPOs in the overlapping sample for this question.

Figure 13 Results of investigations of significant cases of non-compliance are reported back



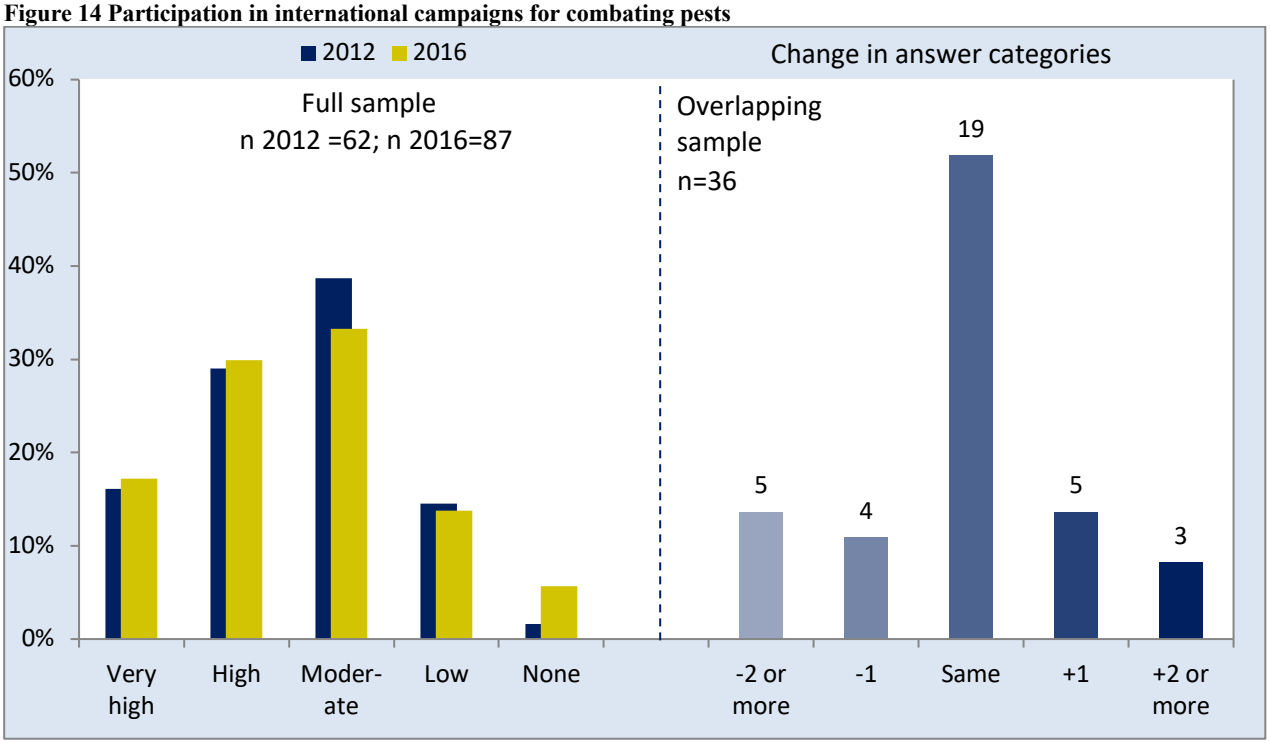
Participation in international campaigns for combating pests that may seriously threaten crop protection (Art. VIII, 1b) – question 7.1

This again is a question where answers are difficult to interpret as a low score could either mean that NPPOs had not or only rarely had to participate in such campaigns, or that if needed did or could not for whatever reason (for example a lack of resources, or difficult relationships with other countries). NPPOs could also give themselves a high score if they felt they would be able to participate in such campaigns, even if to date they had not occurred. Open comments to the question refer to all these situations. The question therefore does not purely measure compliance of this responsibility, and results should be interpreted accordingly. Where comments clearly indicated no occurrence of such events, these NPPOs have been excluded from the analysis (regardless of their scores), but as already mentioned with other questions, comments were left by only a minority of respondents.

Other comments related to the extent of participation, with some NPPOs, for example, referring to specific campaigns, and others specifying that they only participated through the exchange of information.

Compared to other questions the indicated level of implementation is relatively low, but this could be due to the reasons explained above (Figure 14, left-hand side). On balance, response was stable between 2012 and 2016 (right side).

Figure 14 Participation in international campaigns for combating pests



Providing technical and biological information for pest risk analysis (Art. VIII, 1c) – question 7.2

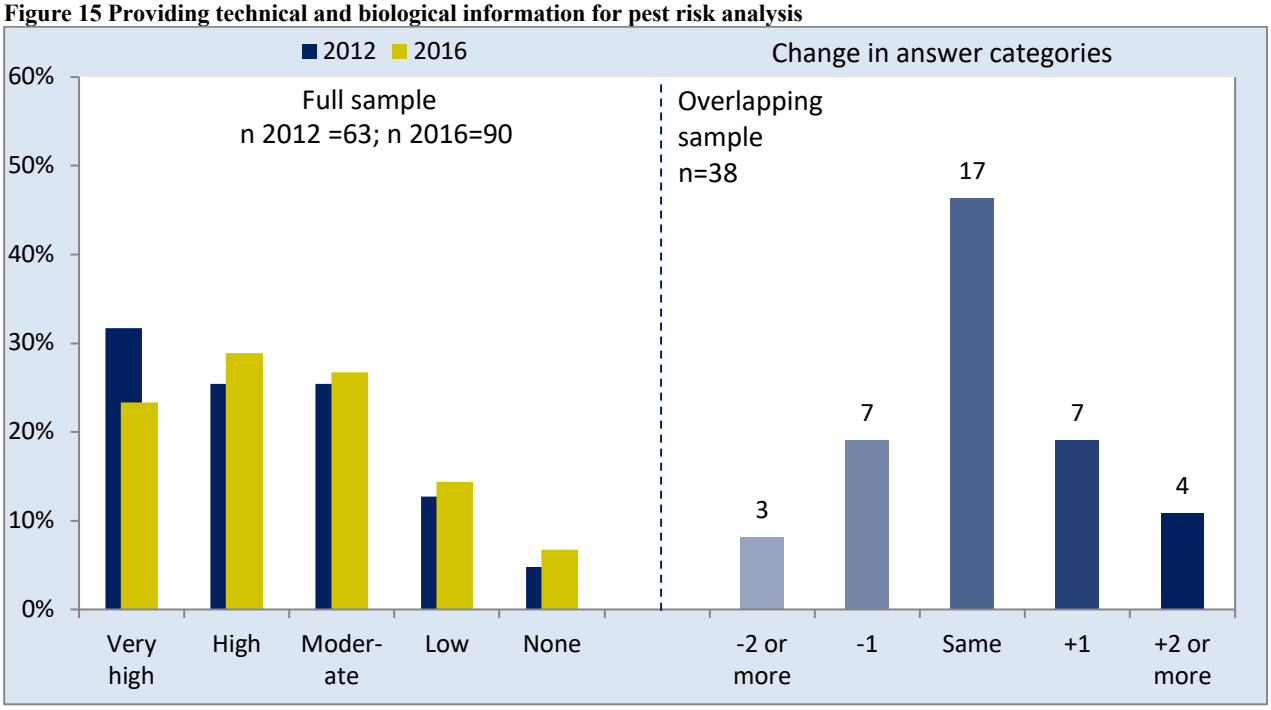
The article on which the question is based additionally mentions that this is related to cooperation between CPs, but as the heading of this section in the questionnaire refers to international cooperation, this should have been understood by respondents.

From the open comments it becomes clear that the answers again depend on whether there was a need or request for such information (see discussion of the previous question).[25] Some comments indicated that this was done upon request, and other NPPOs said this information was publically available and therefore could be used for Pest Risk Analysis (PRA). Finally, one NPPO in 2016 commented that requests for such information were so frequent and the breadth of requested information so wide, that it could not always fulfil the requests in full.

Implementation is again rated relatively low, with 52% and 57% giving a (very) high score in 2012 and 2016, and changes between the years as judged by the overlapping sample are negligible on balance (Figure 15).

[25] Clear indications that such sharing had never been necessary were again left out of the analysis.

Figure 15 Providing technical and biological information for pest risk analysis

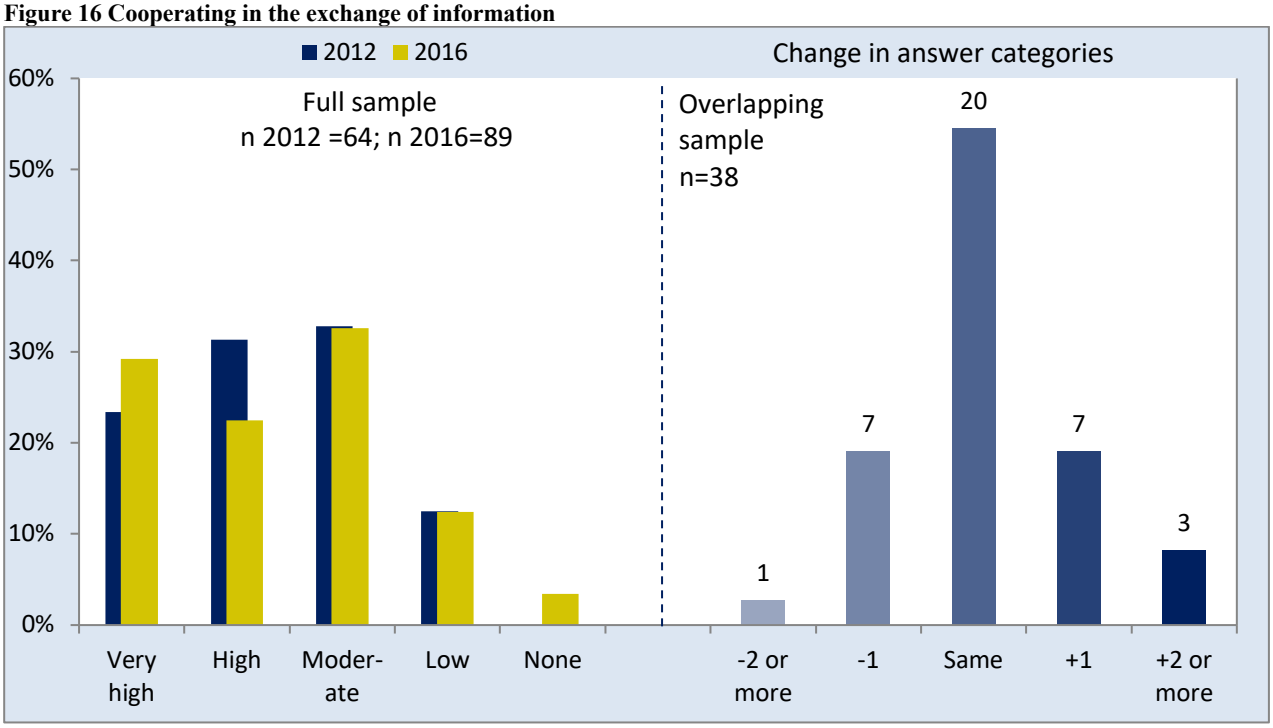


Cooperating in the exchange of information – particularly the reporting of the occurrence, outbreak or spread of pests that may be of immediate or potential danger (Art. VIII, 1a) – question 7.4

Very few comments were made to explain a low implementation. One NPPO in 2012 commented that such events happened rarely, another that it had poor internet access, and a third that it hopes this will improve through access to the IPP. In 2016, several NPPOs mentioned this was done only upon request, while a lack of electronic means of cooperation was also mentioned. It should be stated that only a minority of respondents provided additional comments to their multiple choice answer. This is the case for all questions.

Implementation is relatively low compared to other responsibilities, while this could be said to be one of the more important obligations of NPPOs to prevent the spread of pests. Only slightly more than half the NPPOs indicated a (very) high level of compliance (Figure 16, left-hand side). Looking at the right-hand side of Figure 16, there are again movements in both upward and downward directions, without a clear dominance of either.

Figure 16 Cooperating in the exchange of information



3.2 Plant and pest surveillance, pest free areas and pest risk analysis

In this section, questions 3.2, 6.11, 3.5, 3.6, 3.7 & 6.1, 4.2 will be discussed. The summary results are presented in Table 2 and detailed discussions can be found below. Just as in the previous section, little can be said about changes between 2012 and 2016. For all questions there were NPPOs that gave higher and lower answers, which as a whole largely cancel each other out. None of the differences in the overlapping sample were statistically significant.

The responsibilities in this category have a relatively low average implementation compared to the other two categories, and in a ranking of all responsibilities six or even all seven of the questions in this grouping fall into the ten least implemented, depending on the year and way of comparing implementation. The most commonly implemented responsibility within this group relates to the development and sharing of pest status information, which was implemented to a moderate to very high degree according to at least 80% of the responding NPPOs in both surveys. Plant surveillance was also said to be implemented to at least a moderate degree by more than three quarters of the NPPOs. Least commonly implemented in both surveys was the responsibility relating to Pest Free Areas (PFA).

Table 2 Implementation of responsibilities relating to surveillance, PFA and PRA – summary table

#	Responsibility	% of moderate to (very) high answers 2012	% of moderate to (very) high answers 2016	Overlapping sample
3.2	Surveillance of plants and their growing environment (Art. IV, 2b) (% moderate - very high)	79%	77%	**No change**
6.11	Pest status information is developed, maintained and made available (Art. VII, 2j) (% moderate - very high)	86%	80%	**No change**
3.5	Protection of endangered areas (Art. IV, 2e) (% moderate - very high)	68%	68%	**No change**
3.6	Designation, maintenance and surveillance of pest free areas and areas of low pest prevalence (Art. IV, 2e) (% moderate - very high)	62%	59%	**No change**
3.7	Conduct of pest risk analysis (Art. IV, 2f) (% moderate - very high)	69%	70%	**No change**
4.2	Research and investigation in the field of plant protection (Art. IV, 3b) (% moderate - very high)	74%	69%	**No change**

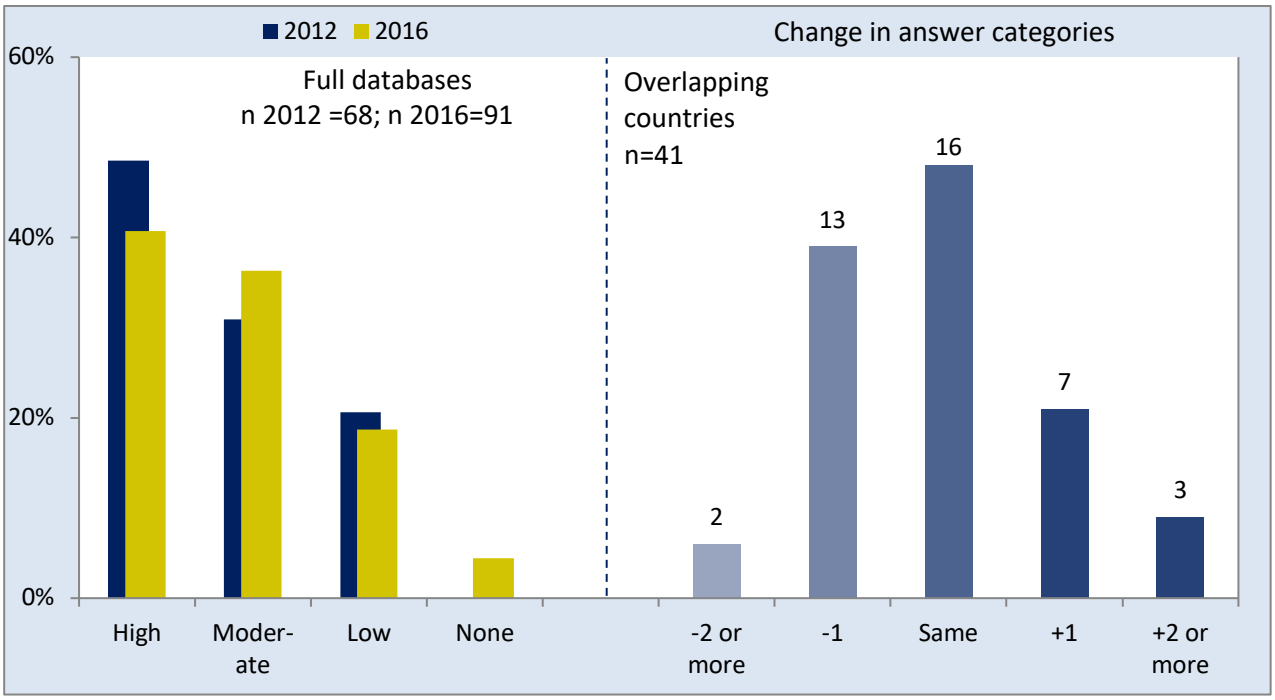
Surveillance of plants and their growing environment (Art. IV, 2b) – question 3.2

The article states that this applies to areas under cultivation, to wild flora and to plants in storage and transport with the specific aim to report on occurrence, outbreak and spread of pests. It therefore also has an element of communication, although that was not included in the question text and it is not certain if respondents included that element in their answers; it was not mentioned in the comments.

The 2012 comments associated with moderate-low implementation mainly mentioned a lack of resources; in 2016, similar comments were made, but some respondents also stated that this was (partly) the responsibility of other government agencies. Some NPPOs said they only focus on part of the growing environment (for example, nurseries, but not commercial crops or wild flora).

The questions in section three of the surveys had four instead of five answer options. Interpretation of the answers is therefore slightly different. High compliance with this responsibility was indicated by less than half of all respondents in both surveys: 49% in 2012 and 41% in 2016 (Figure 17, left-hand side). Looking at the overlapping sample (n=41), there are movements in both directions (right-hand side). The proportion of NPPOs that gave the same answer in both years is relatively small compared to most other questions. It is not directly clear why this would be.

Figure 17 Surveillance of plants and their growing environment



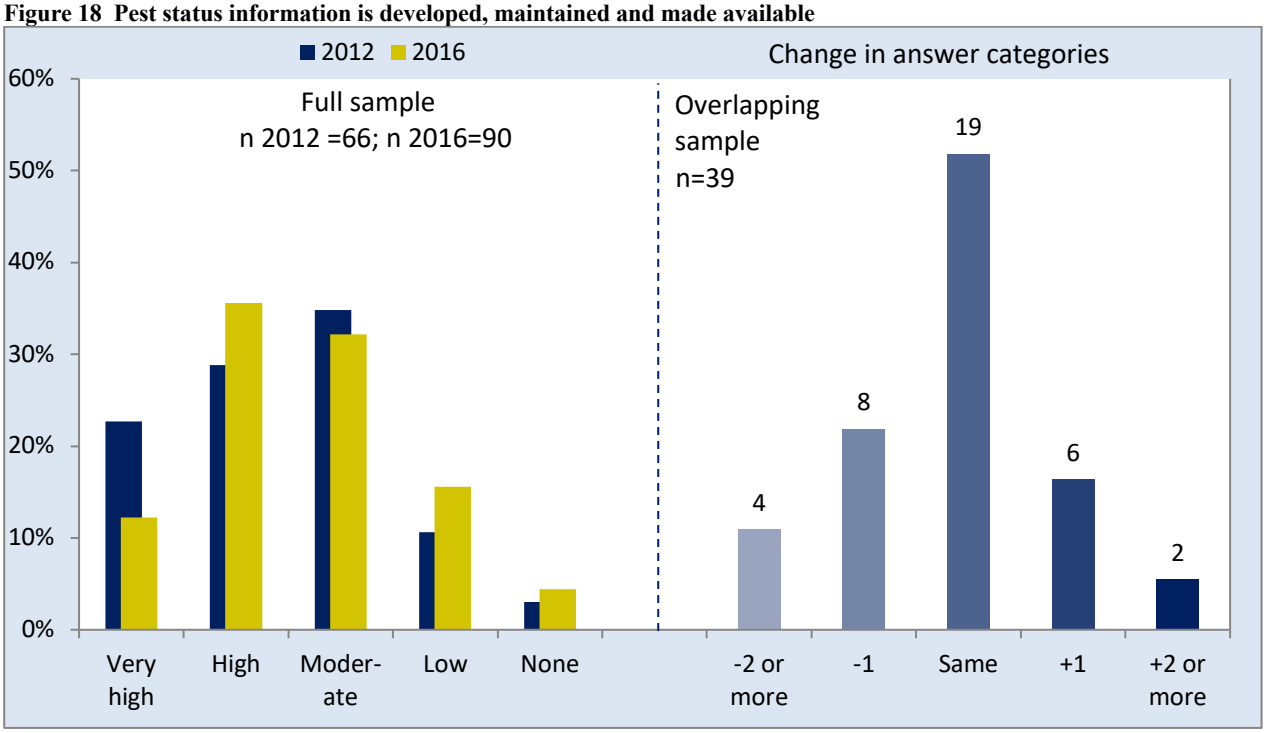
Pest status information is developed, maintained and made available (Art. VII, 2j) – question 6.11

The article in the Convention to which this question refers further states that this information should be based on pest surveillance and that sharing of the information with other CPs should be done upon request. Even without these extra elements, the question has multiple levels – creating and sharing information – which might have made it difficult to answer, and which in turn complicates interpretation of the answers. For example, one NPPO stated in 2016 that funding for surveillance is limited, but information that is available is shared upon request, but other comments related solely to either the development of the information or to making the information available.

Example comments related to low implementation are: "lists exist but are not updated/finalized"; "insufficient resources".

Compliance is relatively low. The proportion of NPPOs doing this to a very high level is especially low (Figure 18, left-hand side). It was mostly, although not solely NPPOs from the African region that indicated a low level of implementation. Looking at changes between 2012 and 2016 in the overlapping sample, there are again movements either way, without a dominant direction (right-hand side).

Figure 18 Pest status information is developed, maintained and made available



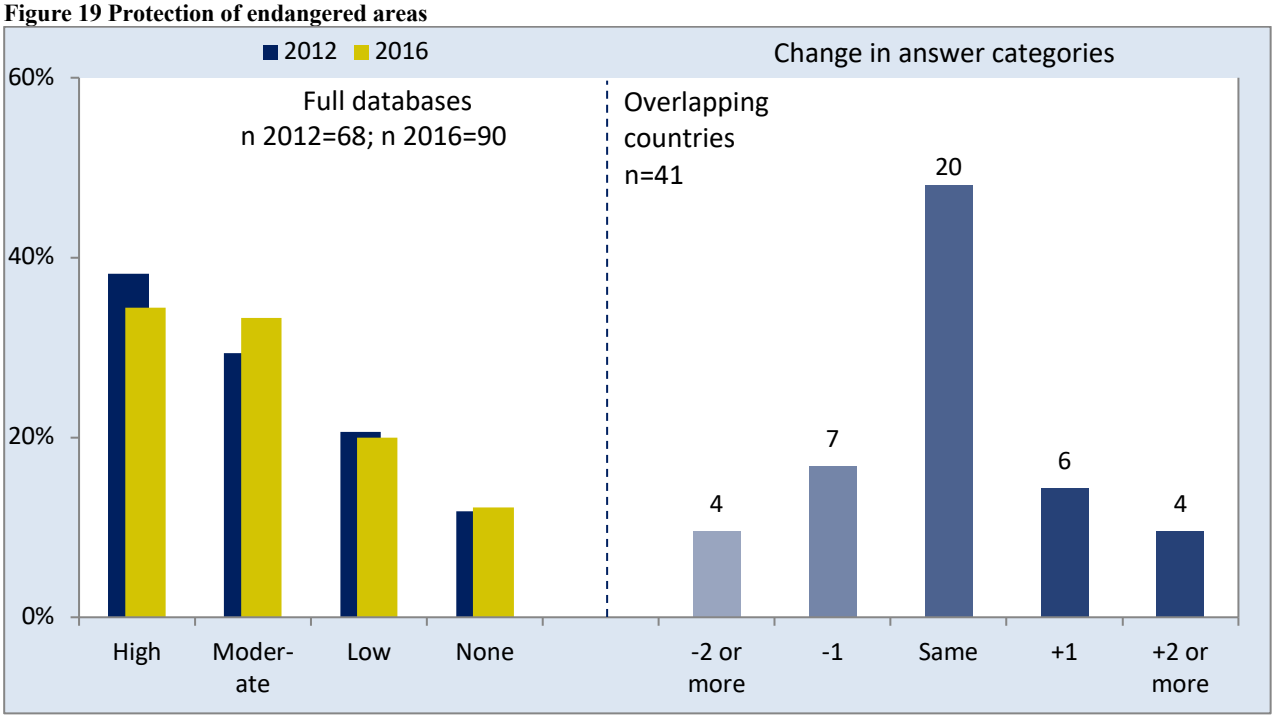
Protection of endangered areas (Art. IV, 2e) – question 3.5

An endangered area is defined in ISPM 5 as "an area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss". The 2012 survey report already mentioned that some respondents mistook endangered areas for environmentally protected areas, because they claimed other government agencies, such as environmental protection agencies or ministries for the environment, were responsible for this task. In 2016, there are similar comments, but comments in both years indicate that most respondents did not misinterpret the question.

Most of those who made the mistake used it as an explanation for a low implementation of this responsibility. Other explanations for low implementation were a lack of resources (financial, human, facilities).

High implementation was indicated by only 38% in 2012 and 34% in 2016 (Figure 19, left-hand side). In the overlapping sample, there were movements in both directions, but some of these seem unrealistic, for example, going from *high* in 2012 to *low* or *none* in 2016.

Figure 19 Protection of endangered areas

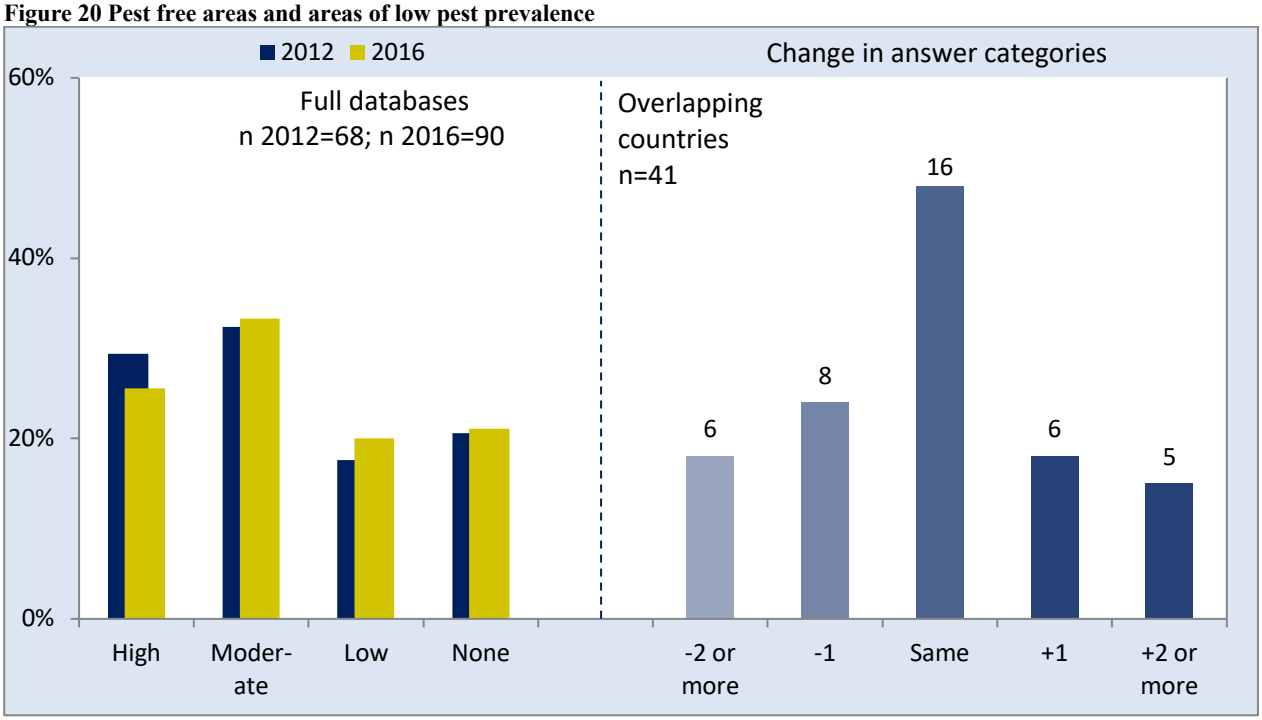


Designation, maintenance and surveillance of pest free areas and areas of low pest prevalence (Art. IV, 2e) – question 3.6

A few NPPOs in 2012 indicated a lack of resources to explain low or moderate compliance. This was the same in 2016, but there were also some NPPOs that said that such areas were not necessary. The interpretation of the answers is therefore not entirely straightforward.

As shown in Figure 20 (left-hand side), relatively many NPPOs said they had no such areas (21%). In the overlapping sample, relatively many NPPOs changed their answer, but on balance, there are no big shifts.

Figure 20 Pest free areas and areas of low pest prevalence



Conduct of pest risk analysis (Art. IV, 2f) –question 3.7 & 6.1

In both surveys, most available comments made in relation to answers of low or moderate implementation relate to a lack of resources, often expertise. Some NPPOs in countries that are part of the EU mentioned this is an EU responsibility.

This question occurs twice in the questionnaire, once under general responsibilities (section 3) and once in the import section (section 6). The phrasing of the question is almost identical. It is not clear if repeating the question was intentional (it is not referred to in the 2012 survey report), but it does allow a consistency check. Oddly, no NPPO in either 2012 or 2016 commented on this question being asked twice. Sections 3 and 6 have different numbers of answer options, and in 2012 different wording in the answer options is used as well. Taking the possible effects of this into account, we still find diverging answers. In 2012, 14% of respondents gave a different answer to both questions, of which 3% (two NPPOs) were strongly diverging.[26] In 2016, 19% gave diverging answers, of which 10% were strongly diverging. In part these could have been mistakes, a consequence of fatigue (with later questions being answered with less concentration), or it could be that the question location within the survey affected the response. Perhaps the first question was interpreted as asking whether PRA was done in general, and the second only upon request by importing countries. If this was the case, higher implementation answers would be expected for the question in the import section, and we do find this tendency although it is not absolute, and the other reasons probably also explain part of the divergence. Because there can be valid reasons for the diverging response, we have not removed any observations from the analysis.

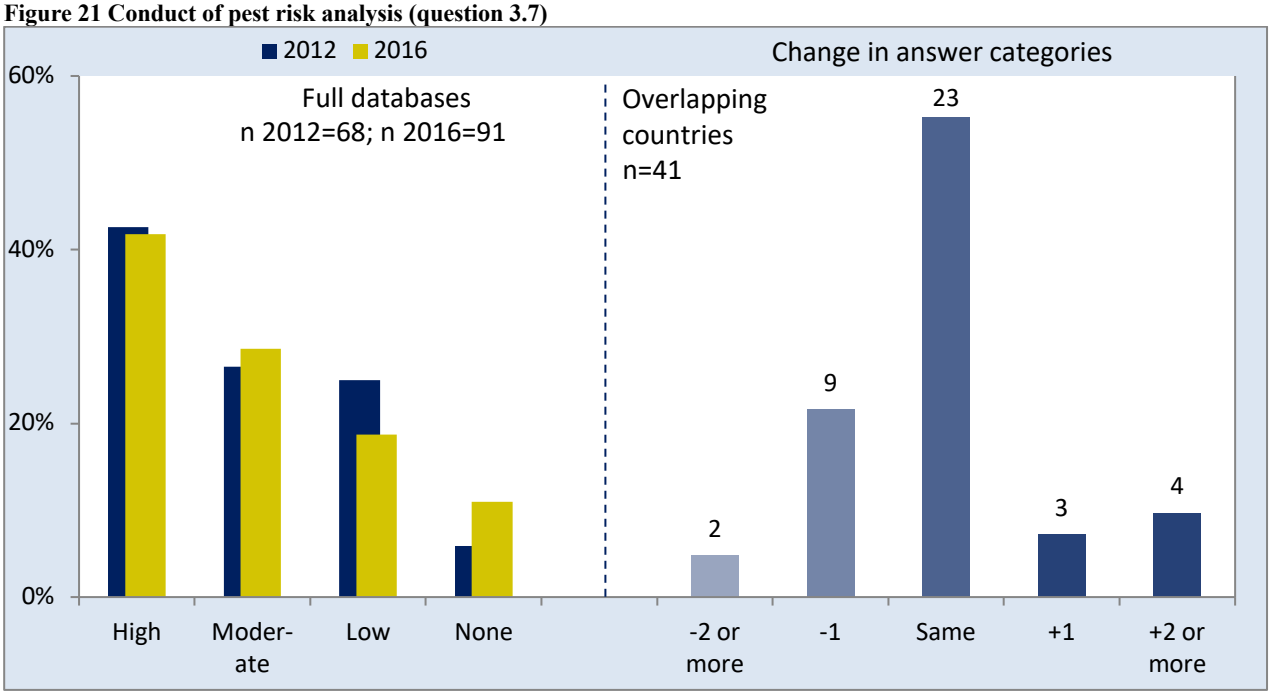
In Figure 21 we show the answers to the first question, which asked about PRA in general. Just over 40% indicated high implementation (in both surveys). In the second PRA question that was asked in the context of imports, we find proportions in the high 50s. The difference is not surprising as it would be expected that some *moderate* answers in the first question (with four-point scale) equal *high* answers in the second question (with a five-point scale). Looking at the combined proportions of *moderate* and (*very*) *high* together (thereby reducing the influence of the scale length), we still find differences between the two questions within the

[26] Examples of weak divergence are: "moderate" in the four-point scale question vs. "very high" in the five-point one; and "low" vs. "none/moderate". Examples of strong divergence are: "none" in one question vs. "moderate" or "high" in the other; "low" vs. "(very) high"; and "moderate" vs. "very high". Combinations of "moderate" (4-point) and "high" (5-point) were not considered inconsistent, as these are a natural consequence of the different scale length.

same survey (69% vs. 79% in 2012; 70% vs.76% in 2016). The potential reasons for these differences were discussed in the previous paragraph.

Looking at the overlapping sample, there are again movement in both directions, without a clear dominance (right-hand side of Figure 21).

Figure 21 Conduct of pest risk analysis (question 3.7)

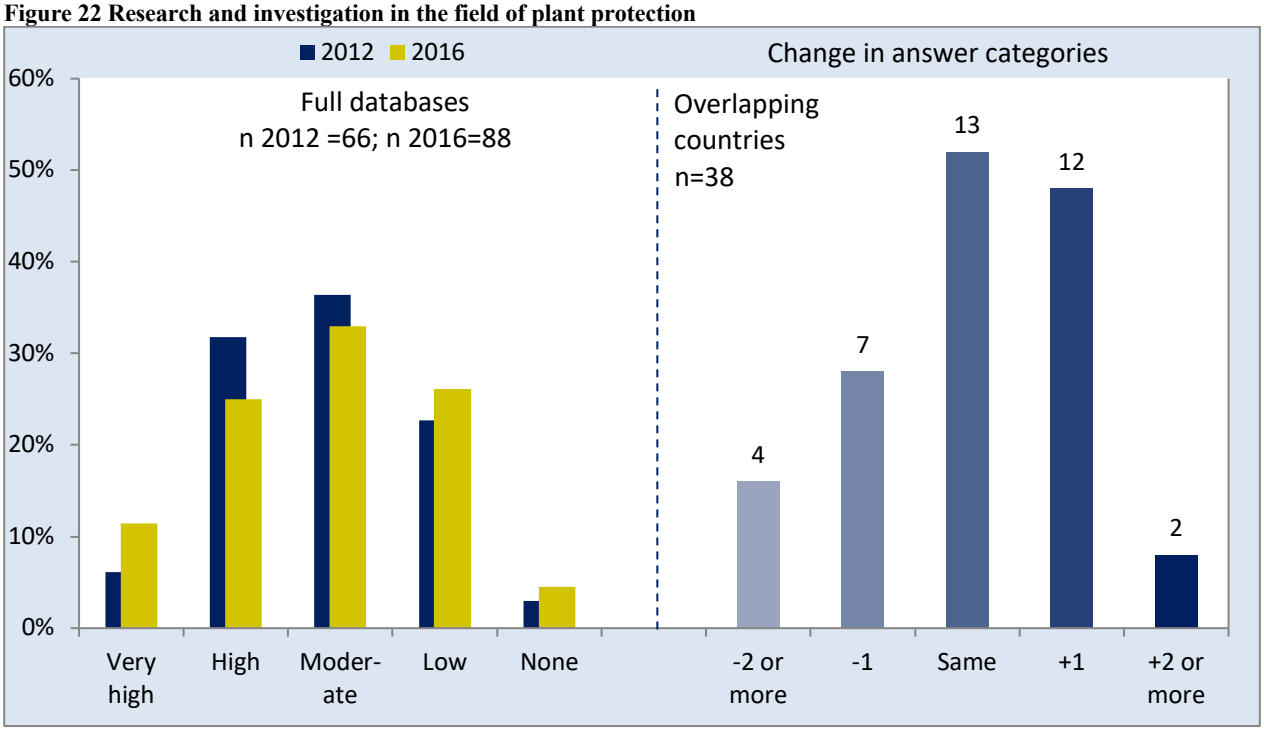


Research and investigation in the field of plant protection (Art. IV, 3b) – question 4.2

Comments referred to a lack of resources to explain low and moderate implementation. Comments also explained that this responsibility sometimes lies with other institutions or is executed by for example universities.

For this responsibility relatively low implementation scores were found: (very) high answers were given by less than 40% in both years (Figure 22, left-hand side). Among NPPOs that participated in both surveys, changes on balance are relatively small, but many NPPOs gave different answers in both years.

Figure 22 Research and investigation in the field of plant protection



3.3 Regulation and measures, inspections, treatment, and certification

In this section, the following questions are discussed: 4.3, 6.2, 6.10 (regulations and measures); 3.3, 6.5, 6.6 (inspections); 3.4 (treatment); 3.1 & 5.1, 5.2, 5.3, 5.4 (certification); and 3.8 (post-certification). Staff development and training (question 3.9 is discussed at the end of this section, as it did not fit in any other classification).

Table 3 summarises the results and detailed discussion of the questions is found below the table. Again, no statistically significant changes were found in the overlapping samples, and for all questions there were upward and downward movements in the answers that mostly cancel each other out. The responsibilities discussed in this section are generally implemented to a higher degree than those in the other two groupings and of the ten most highly implemented responsibilities overall, eight or nine fall within this grouping, depending on the year and how implementation is measured. On most questions more than 90% of respondents indicated at least a moderate level of implementation. The two exceptions are Treatment of consignments, for which some respondents said they were not responsible, and Security of consignments (post-certification). Compared to the other sections, these two questions still received relatively high scores.

Table 3 Implementation of responsibilities relating to regulations, inspections, treatment and certification– summary table

#	Responsibility	% of moderate to (very) high answers 2012	2016	Overlap-ping sample
Regulations and measures				
4.3	Issuance of phytosanitary regulations (Art. IV, 3c) (% moderate-high)	94%	94%	**No change**
6.2	Phytosanitary measures are technically justified (Art. VII, 2a) (% moderate-high)	94%	92%	**No change**
6.10	Phytosanitary measures are modified promptly when technically justified to address phytosanitary risk (Art. VII, 2g & h) (% moderate-high)	94%	87%	**No change**
Inspections				
3.3	Inspection of consignments of plants/plant products moving in international traffic (Art. IV, 2c) (% moderate-high)	94%	93%	**No change**
6.5	Inspection and other phytosanitary procedures take place as promptly as possible (Art. VII, 2e) (% moderate-high)	97%	97%	**No change**

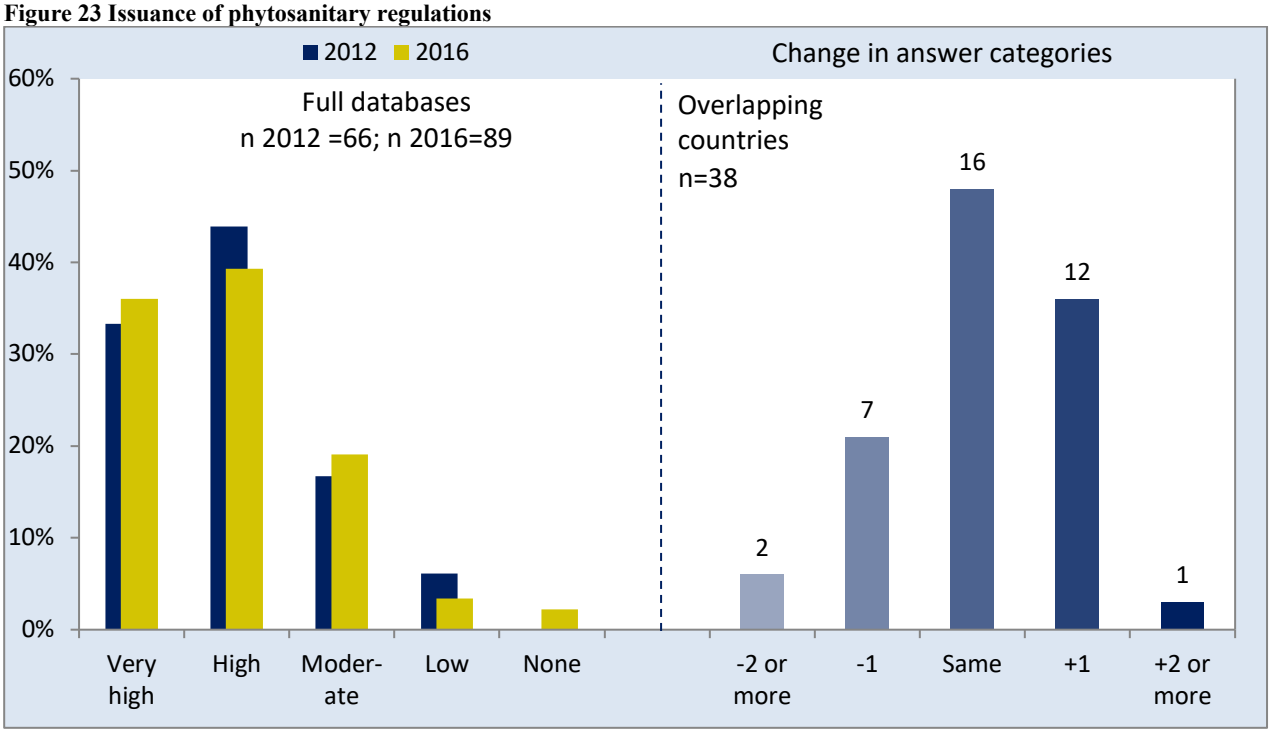
6.6	Inspection and other phytosanitary procedures are prioritized and performed with due regard to their perishability (Art. VII, 2e) (% moderate-high)	96%	94%	**No change**
Treatment				
3.4	Treatment of consignments (Art. IV, 2d) (% moderate-high)	82%	83%	**No change**
Certificates				
3.1	Issuance of phytosanitary certificates (Art. IV, 2a) (% moderate-high)	97%	99%	**No change**
5.2	Issuance of phytosanitary certificates are based on inspection and related activities (Art. V, 2) (% moderate-high)	100%	99%	**No change**
5.3	Phytosanitary certificates are issued by public officers who are technically qualified and duly authorized by the official NPPO (Art. V, 2a) (% moderate-high)	100%	93%	**No change**
5.4	The requirements for additional declarations are limited to those that are technically justified (Art. V, 2a) (% moderate-high)	99%	92%	**No change**
Post-certification				
3.8	Phytosanitary security of consignments ensured through appropriate procedures (Art. IV, 2g) (% moderate-high)	85%	86%	**No change**

Issuance of phytosanitary regulations (Art. IV, 3c) – question 4.3

Most open comment referred to the existing or mentioned upcoming legislation. A few respondents referred to the slowness of the legislative process.

NPPOs rated their issuance of regulations relatively highly: around 75% gave a (very) high score (Figure 23, left side). Small positive changes were seen in the overlapping sample, but as for all questions, there were movements both up and down (right-hand side).

Figure 23 Issuance of phytosanitary regulations

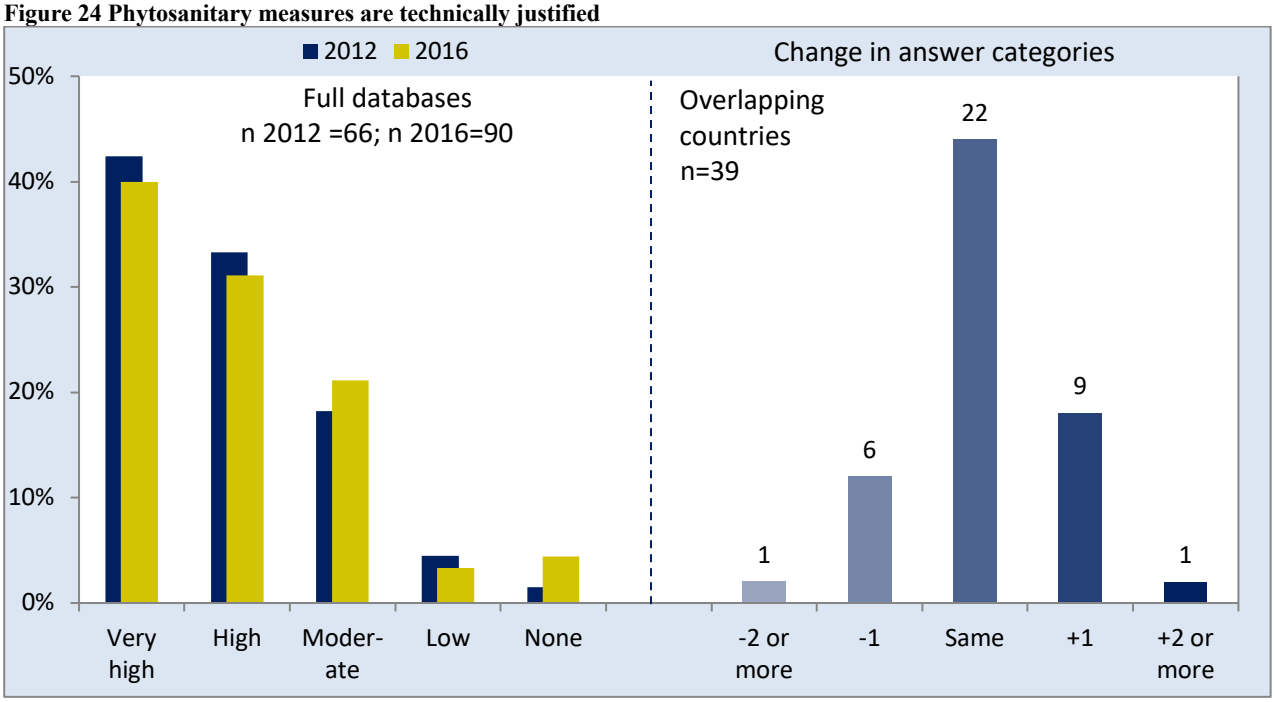


Phytosanitary measures are technically justified (Art. VII, 2a) – question 6.2

The phrasing of the question is likely to lead NPPOs to answer affirmatively, as it is difficult to see NPPOs stating that their measures are not justified. Almost all open comments in both years confirm that measures were based on scientific data, inspections or pest risk analysis.

Stated implementation is relatively high, but not the highest compared to other responsibilities: 76% in 2012 and 71% in 2016 indicated (very) high compliance, while low or non-implementation was indicated by only around 7% (Figure 24, left-hand side). The right-hand part of the graph again shows the changes in the answers within the overlapping sample: 22 NPPOs gave the same answer in both years, while 10 indicated a higher level of implementation and 7 a lower level.

Figure 24 Phytosanitary measures are technically justified



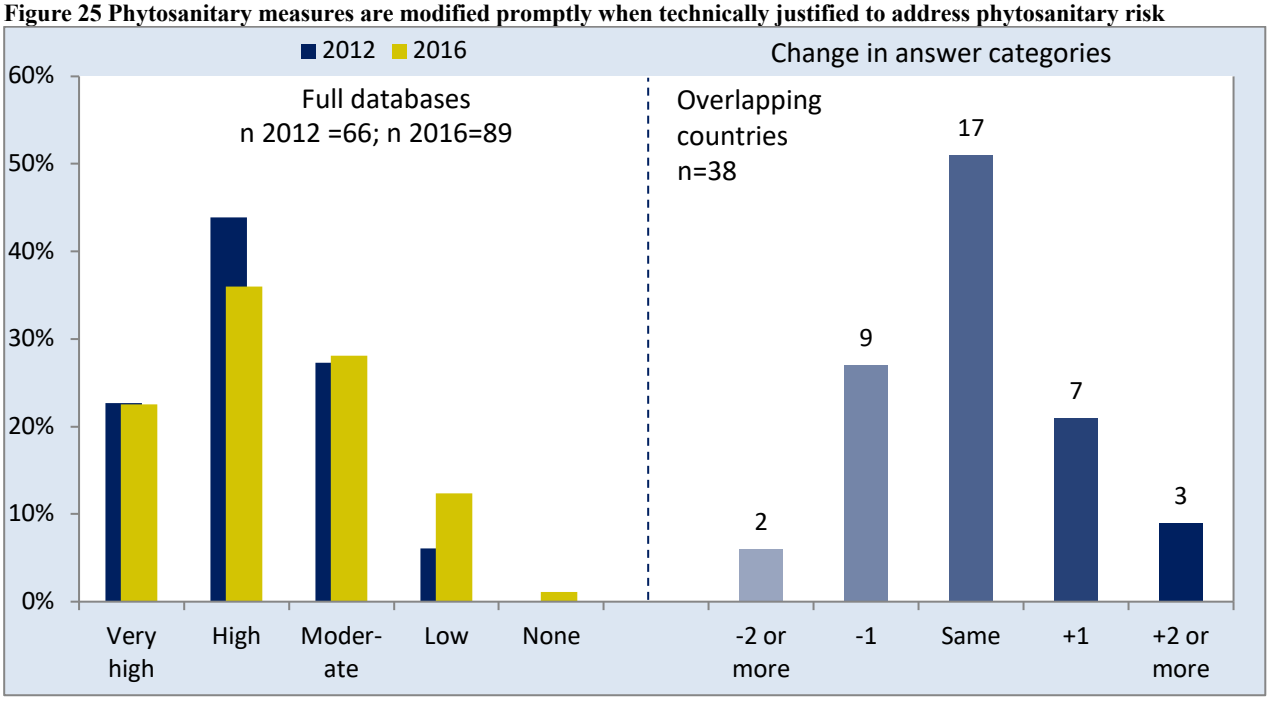
Phytosanitary measures are modified promptly when technically justified to address phytosanitary risk (Art. VII, 2g & h) – question 6.10

This question referenced two paragraphs of the same article, although the focus of the question seems to lie on the second paragraph, which refers to timeliness with which measures should be adapted and removed.

The two comments that relate to weak implementation in 2012 refer to a need for technical support, and a lack of infrastructure. In 2016, it was commented that it takes to change laws and regulations.

Relatively few NPPOs answered with *very high*, just 23% in both years (Figure 25, left-hand side). Changes within the overlapping sample largely cancel each other out (right-hand side of Figure 25).

Figure 25 Phytosanitary measures are modified promptly when technically justified to address phytosanitary risk



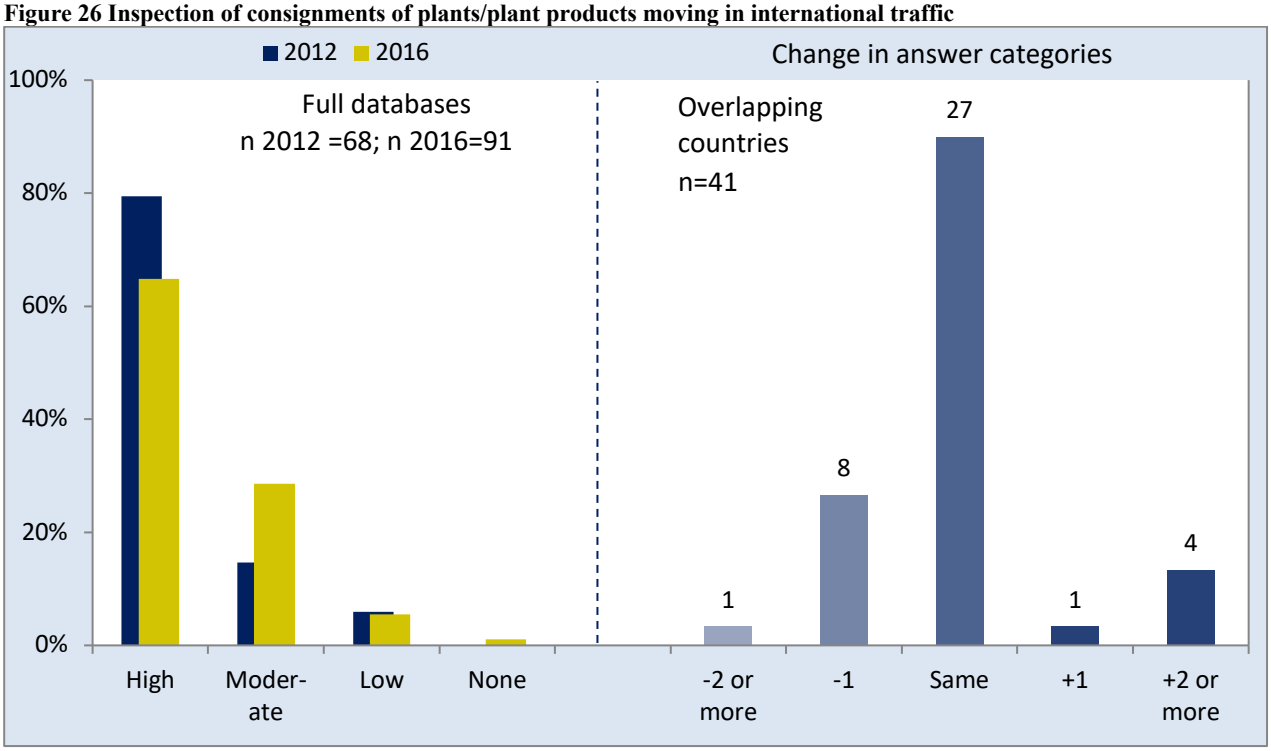
Inspection of consignments of plants/plant products moving in international traffic (Art. IV, 2c) – question 3.3

The few comments in 2012 related to low and moderate implementation point to insufficient staff or low levels of staff training, with one NPPO mentioning conflicts between inspectors and custom officials. In 2016, staff and equipment issues were mentioned as well, and one NPPO said it only checked high risk goods.

Some NPPOs indicated that their answers related solely to either imports or exports, while others referred to inspections of both imports and exports.

Especially in 2012, many respondents indicated they complied with this responsibility at a high level (Figure 26). As can be seen in the right part of the figure, changes go both ways, without a clearly dominating direction.

Figure 26 Inspection of consignments of plants/plant products moving in international traffic

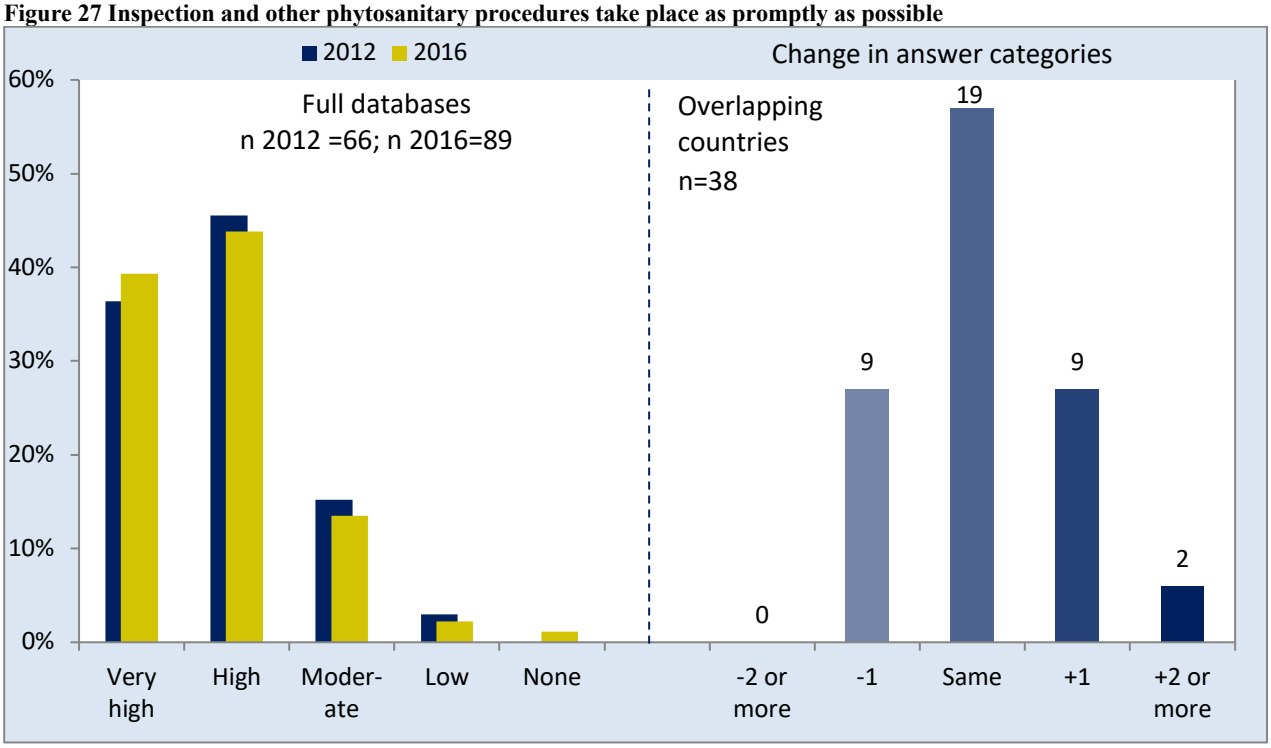


Inspection and other phytosanitary procedures take place as promptly as possible (Art. VII, 2e) – question 6.5

In both years, a handful of NPPOs listed a shortage of manpower, lack of facilities, or financial resources in the open comments.

Figure 27 shows most NPPOs said they meet this requirement: high or very high implementation was indicated by more than 80% of the responding NPPOs in the overall databases. The right-hand side of the figure shows that answers moved up and down without big shifts either way.

Figure 27 Inspection and other phytosanitary procedures take place as promptly as possible

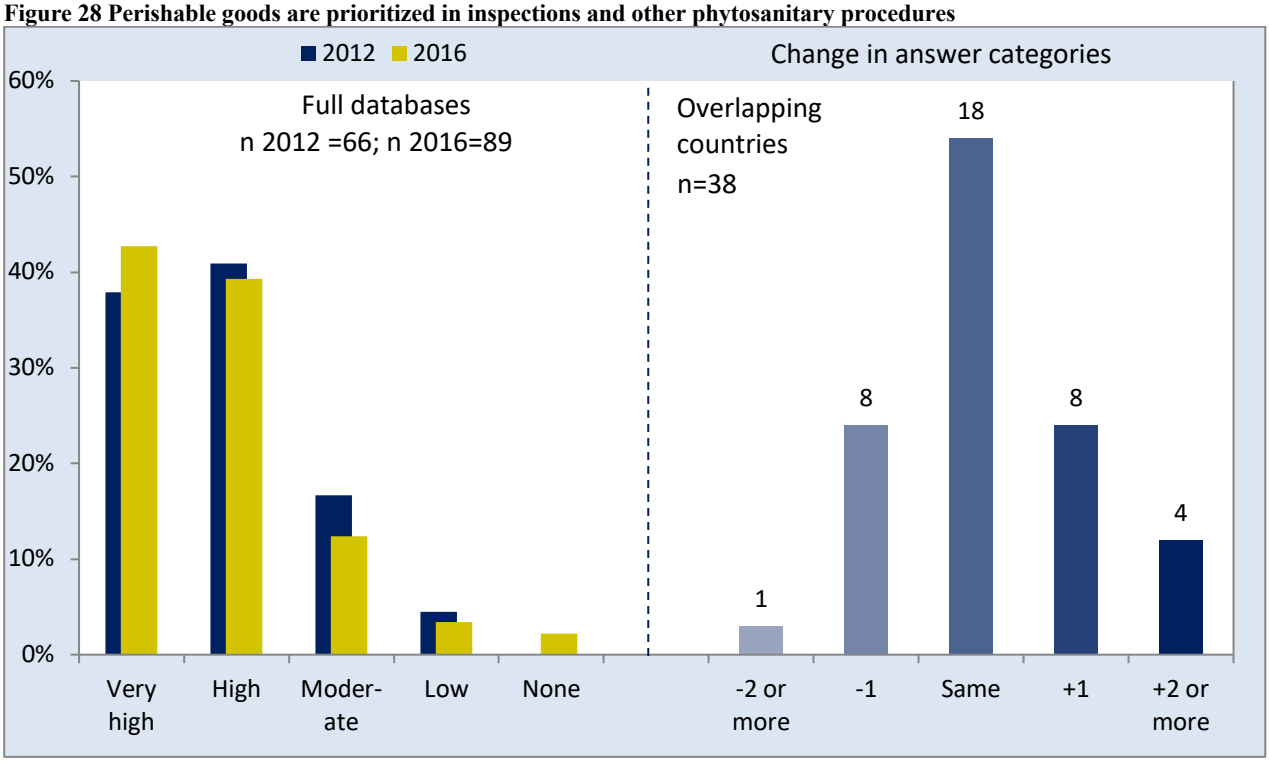


Inspection and other phytosanitary procedures are prioritized and performed with due regard to their perishability (Art. VII, 2e) – question 6.6

This question is based on the same article and paragraph as the previous question. A lack of resources to explain low to moderate scores was mentioned by one or two NPPOs in both surveys; in 2012 some NPPOs with low to moderate scores also said all inspections are fast, making prioritization unnecessary. That means low scores do not necessarily mean that perishables are not inspected quickly.

Low scores are the exception however, as around 80% of NPPOs indicate high or very high implementation (Figure 28). Changes in the restricted database are again fairly balanced.

Figure 28 Perishable goods are prioritized in inspections and other phytosanitary procedures



Treatment of consignments (Art. IV, 2d) – question 3.4

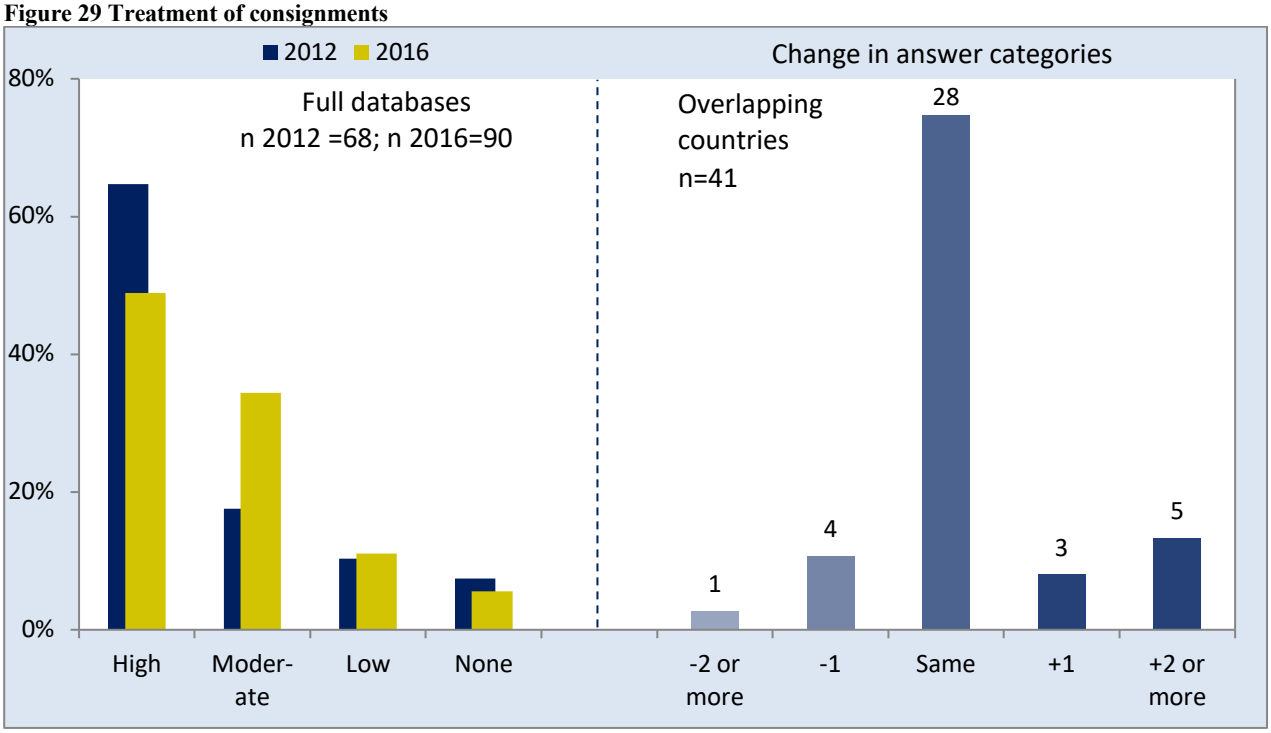
For this question the open comments again indicate that NPPOs differentiate between imports and exports, e.g.: "Our reply ['none'] refers to treatments of imported consignments; required treatments of exported consignments are implemented″ (2012); "Complying to import conditions of importing countries" (*high*; 2016).

In some countries, it is not the NPPO that carries out the treatment itself: "The NPPO does not treat consignments, except in emergencies" (*none*; 2012); "Treatment is considered to be the responsibility of the industry" (*none*; 2012); "Treatments are conducted by accredited service providers, while [the NPPO] will supervise on request or in case of quarantine pest(s) intercepted during import" (*none*; 2016); "Treatment of consignments are performed by the private companies. They have no officially authorization from the NPPO" (*moderate*; 2016).

Another NPPO indicated they have never received requests for treatment (*none*; 2012). Comments also referred to a lack of facilities to fulfil full treatment needs, or NPPOs pointed to specific limitations, for example, not being able to perform radiation treatment, or only being able to base treatment on visual inspections.

Judging by these comments, interpretation of the self-reported ratings is clearly difficult, as different interpretations can lead to different responses for the same level of implementation. Looking only at the *high implementation* answers, there are big differences between 2012 and 2016, but the overlapping sample shows only limited shifts, so the former changes may be due to the different composition of the samples (Figure 29). Moreover, even in the full samples, the proportion of NPPOs with *low* and *none* answers are almost identical.

Figure 29 Treatment of consignments

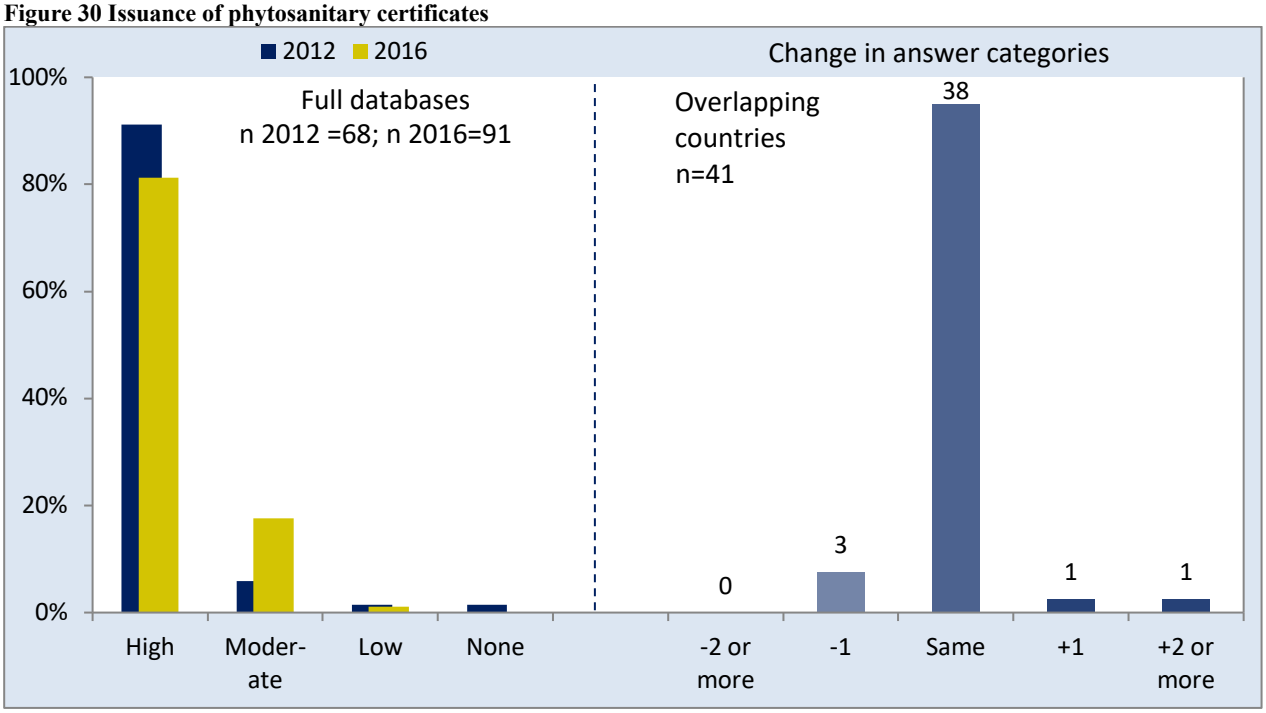


Issuance of phytosanitary certificates (Art. IV, 2a) – question 3.1

This question seems to largely overlap with the first question in section 5, which as a whole deals with certification. Question 5.1 reads: "Arrangements are in place to enable phytosanitary certification (Art. V,1)".

Figure 30 shows the results of question 3.1: 91% in 2012 and 81% in 2016 chose the answer options *full implementation* and *high*, respectively, and very few NPPOs in the restricted database changed their answer in the second survey (right-hand side of the figure). Question 5.1 also resulted in high ratings. The answers for these two questions were mostly consistent (6% in 2012 and 8% in 2016 gave inconsistent answers). The results of question 5.1 are not separately shown.

Figure 30 Issuance of phytosanitary certificates

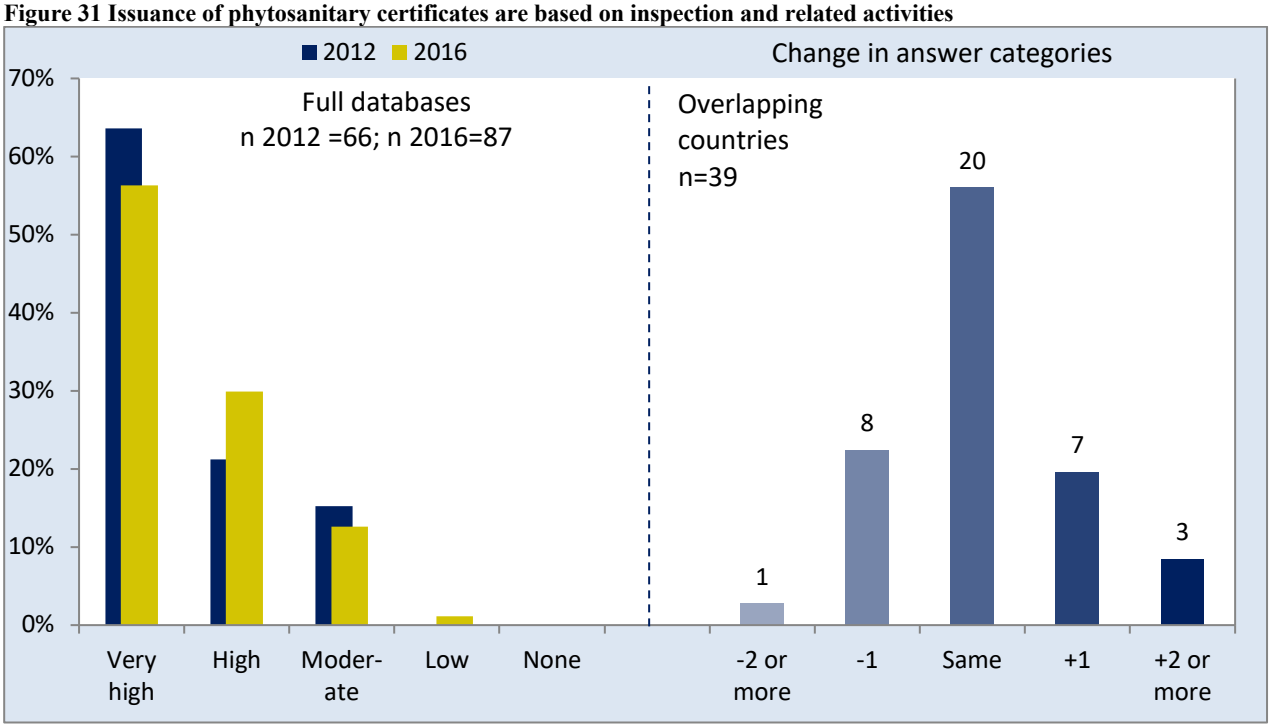


Issuance of phytosanitary certificates are based on inspection and related activities (Art. V, 2) – question 5.2

Some explanations were given in the open comments for *moderate* answers: "Only visual inspections due to a lack of equipment" (2012); "Only for specific consignments" (2012); "Limited number of staff and facilities to serve the entire country" (2012).

Around 85% in both years answered with high or very high, and almost no-one gave a *low/none* answer (Figure 31, left-hand side). Relatively many NPPOs changed their answer in 2016 compared to 2012, but most by only one category and the up and down shifts largely cancel each other out.

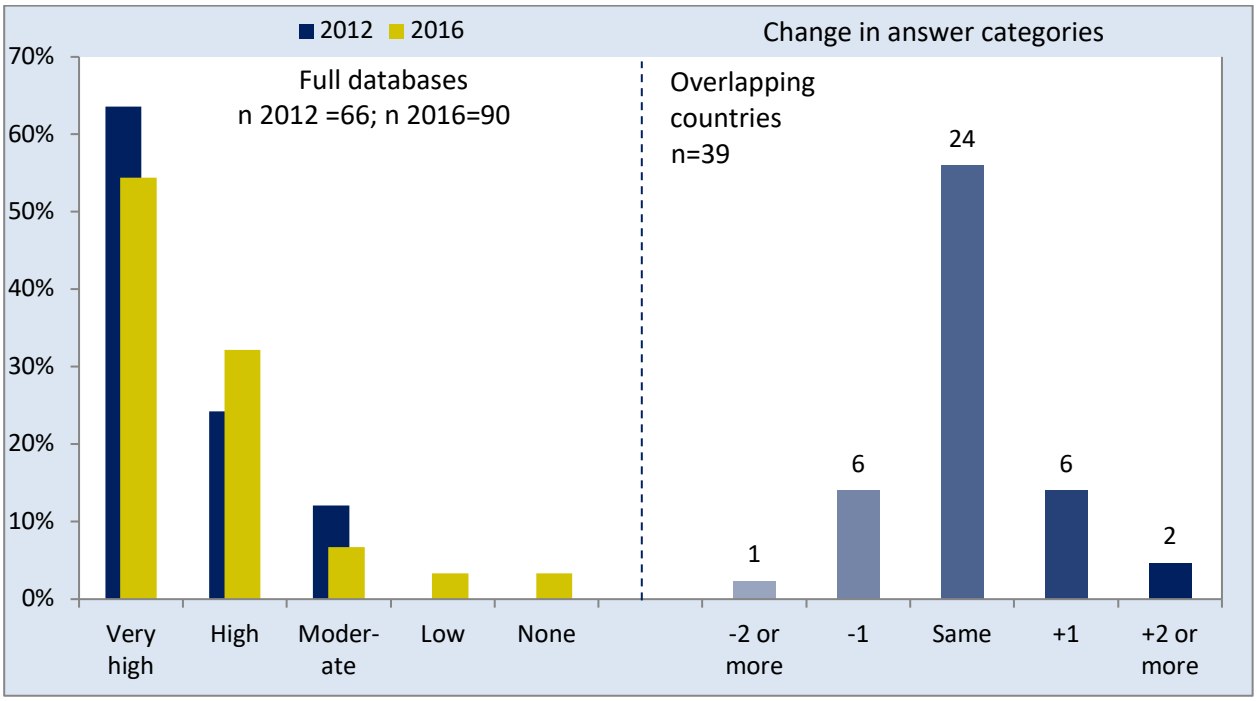
Figure 31 Issuance of phytosanitary certificates are based on inspection and related activities



Phytosanitary certificates are issued by public officers who are technically qualified and duly authorized by the official NPPO (Art. V, 2a) – question 5.3

Just as with the previous questions relating to certification, stated implementation is very high, with almost 90% of the NPPOs selecting the two top answers (Figure 32). In the overlapping sample upward and downward shifts are balanced.

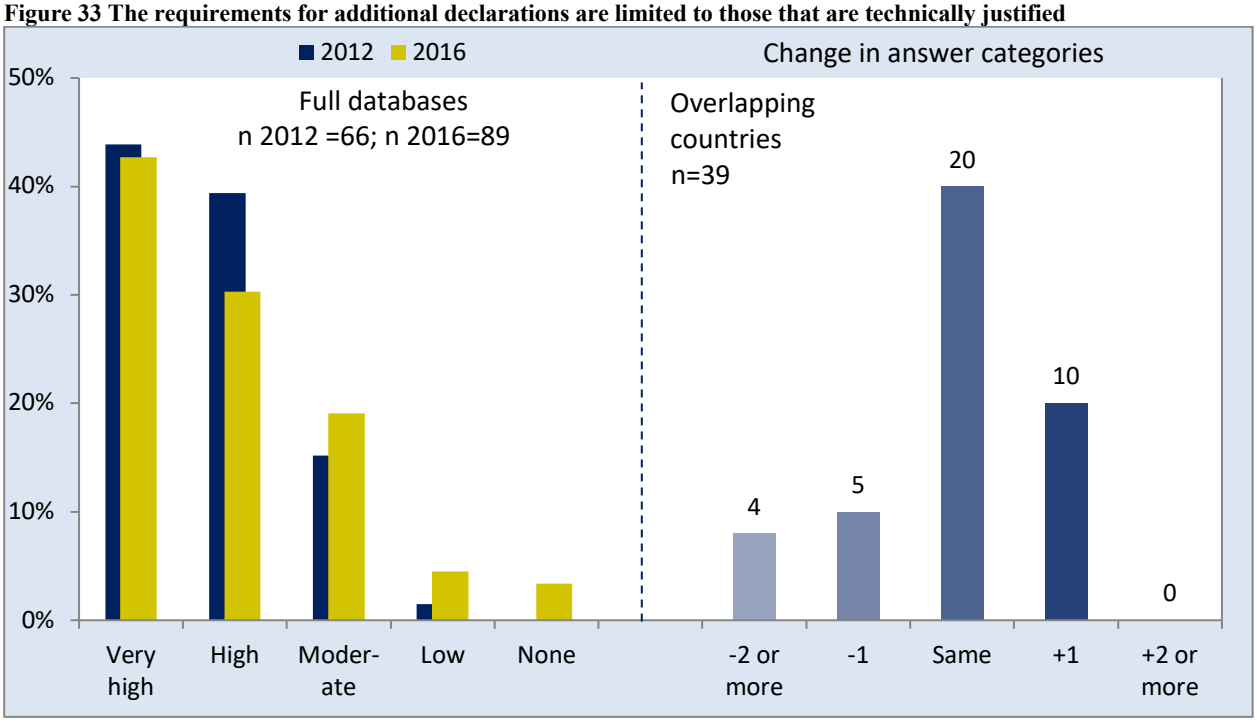
Figure 32 Phytosanitary certificates are issued by technically qualified and duly authorized public officers



The requirements for additional declarations are limited to those that are technically justified (Art. V, 2a) – question 5.4

Those NPPOs that left comments with their answers mostly confirmed that they indeed comply with this. The ratings are again relatively high, with 83% and 73% of the NPPOs selecting the top categories, in the 2012 and 2016 databases (Figure 33). Within the restricted database there are again both NPPOs that gave a better score and those that gave a lower one. On balance, there is little change (right side of the figure).

Figure 33 The requirements for additional declarations are limited to those that are technically justified



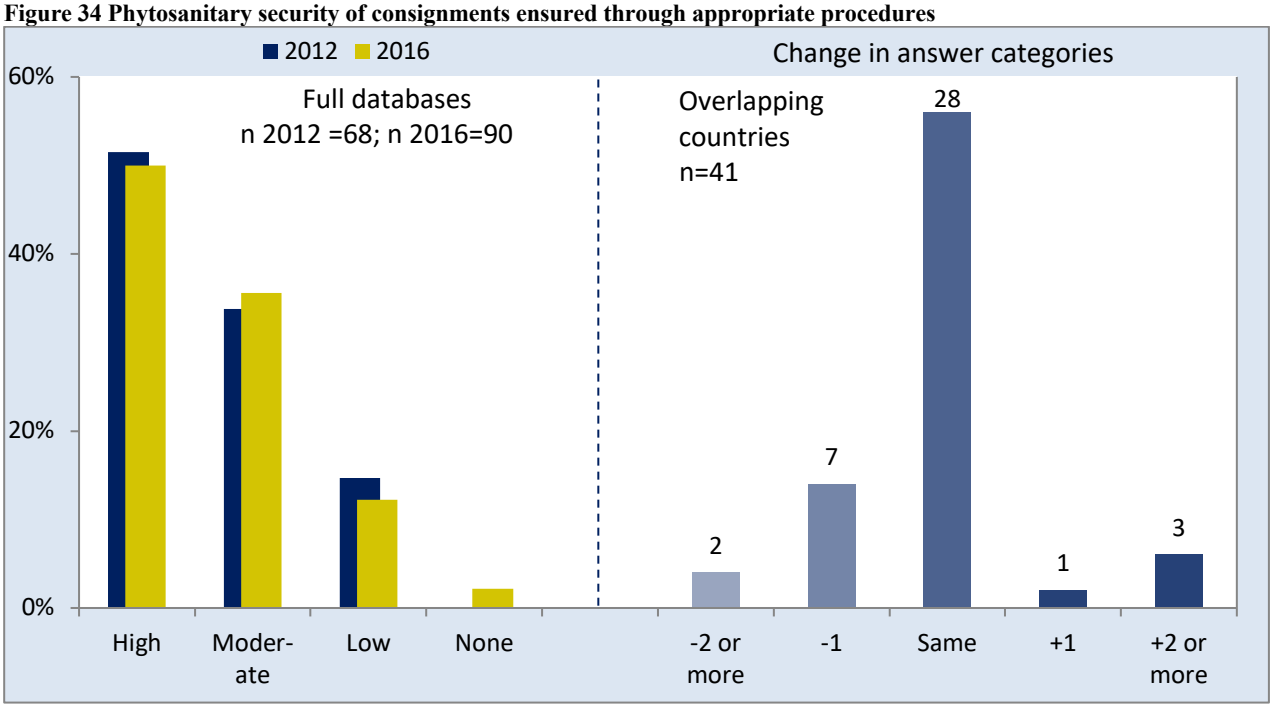
Phytosanitary security of consignments ensured through appropriate procedures (Art. IV, 2g) – question 3.8

The article on which this question was based deals with security of consignments *after* certification to make sure there is not (re)infestation. It is not clear if the question was intended to focus on this, or whether the broader context created by this omission was intentional. Open comments indicate that some respondents answered following the article text, but others for example mention post-harvest protection, which seems to go beyond the article text. It is likely that the interpretation was therefore mixed.

Especially in 2016 some NPPOs indicated difficulties with this responsibility, for example, due to a lack of human resources or basic facilities. One NPPO also said that after certification the consignment is out of their hands, which most likely means the question was not fully understood.

High implementation is only indicated by about 50% of responding NPPOs in both years (Figure 34). There are slightly more NPPOs that gave a lower score in 2016 than in 2012, than vice versa, but the overall result hardly changes (right-hand side of Figure 34).

Figure 34 Phytosanitary security of consignments ensured through appropriate procedures

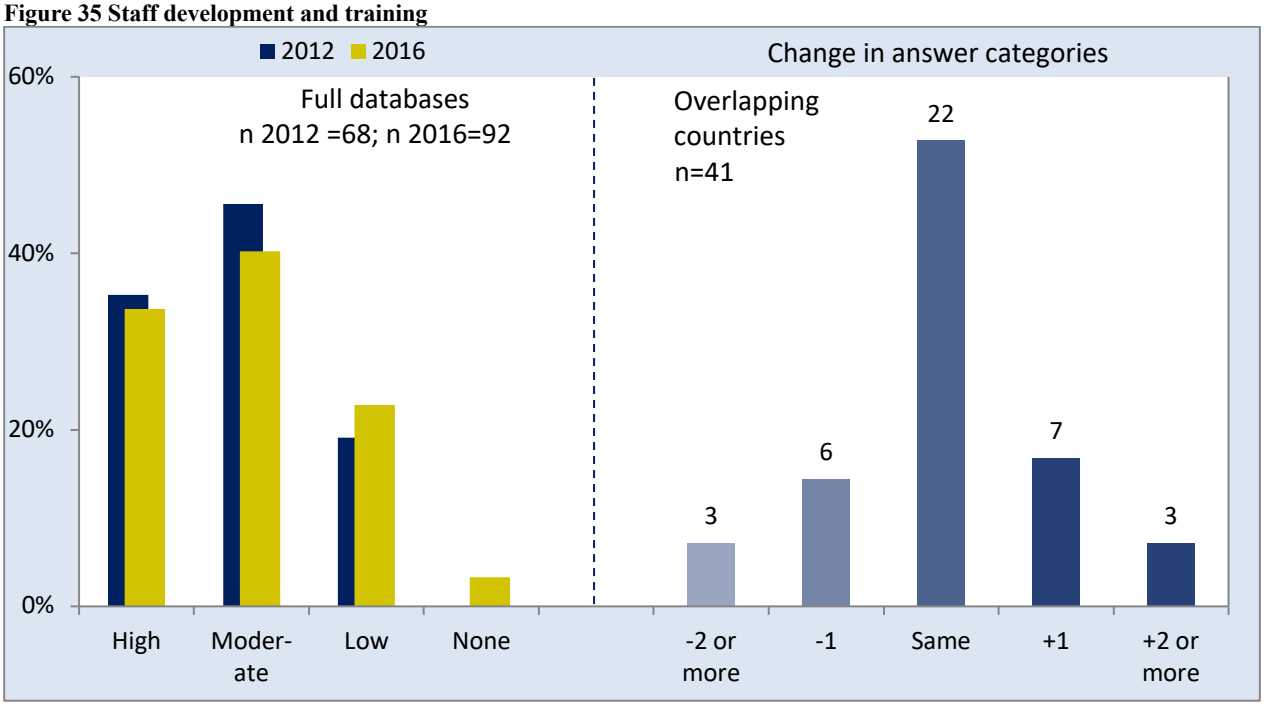


Staff development and training (Art. IV, 2h) – question 3.9

Comments given together with weak ratings and some moderate ratings in 2012 mainly referred to insufficient budgets. In 2016, similar comments were made; some NPPOs also indicated that they received outside assistance with staff training.

NPPOs on average gave themselves a relatively low rating: only around 35% selected *high* (Figure 35). Upward and downward changes for individual NPPOs meant there was little overall change between the surveys.

Figure 35 Staff development and training



3.4 Implementation of standards

NPPOs were asked to indicate to which level they had implemented each of the ISPMs.[27] Here, the questionnaires provided no space for open comments or elaborations of the multiple choice answers. In 2012, the answer options were: *High degree of implementation*; *Low degree of implementation*, *Not at all*, and *Not applicable*. After comments to the 2012 survey that an intermediate level would be useful, the categories were changed in 2016 to: *High*, *Moderate*, *Low*, *None*, and *Not applicable*. This change means that the scores in the different years cannot be sensibly compared for individual standards. However, the ranking of standards based on the proportion of NPPOs choosing a high or low level can be compared between the years. First, the ISPMs with the highest and lowest implementation overall will be highlighted, before showing regional differences in overall implementation and looking at ISPM implementation by thematic category.

Highest and lowest implementation

Figure 36 shows the proportions of NPPOs that selected the category *High degree of implementation* in 2012 and *High* in 2016.[28] ISPM 1 and ISPM 5, about principles and terms & definitions are not included in this graph, as it was felt that these do not lend themselves well to this type of question.[29] The effect of the additional mid-answer category in 2016 shows itself in the lower proportions of all 2016 ratings.[30] The same ISPMs make up the 'top five' in both years. For all these, the *High* answer was selected by at least 75% of responding NPPOs in 2012 and by at least 50% in 2016. These are:

(1) *ISPM 7 (Phytosanitary certification system)*

[27] There were 36 ISPMs in the 2012 survey, and in 2016 there were 37 ISPMs plus 33 Annexes to ISPMs 27 (DPs) and ISPM 28 (DPs). The 2016 responses to PTs and DPs are not included in this report. For their implementation see the 2016 analysis report (IPPC Secretariat, 2017).

[28] Alternatives for the ranking were also tried: ranking the lowest proportions of *None/Not applicable* answers gives almost the same 'top ten'.

[29] This was also mentioned by one respondent in the general comments in 2012. This respondent also included ISPM 2: Framework for pest risk analysis as an example of such ISPMs.

[30] Part of those who would have chosen *Moderate* in 2012 had that option been available, were forced to choose between *Low* and *High*, leading to higher proportions of both those options in 2012.

(2) *ISPM 12 (Phytosanitary certificates)*
(3) *ISPM 15 (Regulation of wood packaging material in international trade)*
(4) *ISPM 20 (Guidelines for a phytosanitary import regulatory system)*
(5) *ISPM 23 (Guidelines for inspection)*

Four of these five deal with certification, regulations and inspection, all topics that also scored highly in the earlier sections about responsibilities.

Figure 36 Implementation of ISPMs – highest highlighted

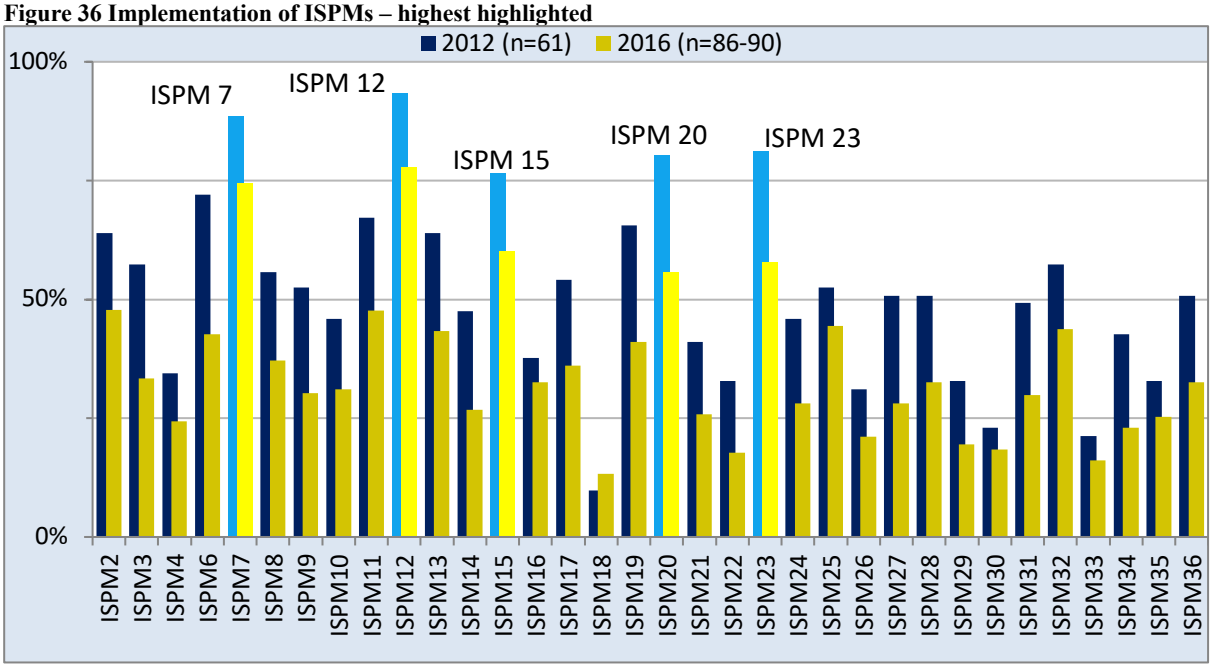


Figure 37 shows the same data, but now highlighting the ISPMs with the lowest ranking (lowest proportion of *High* answers).[31] Seven instead of five ISPM are highlighted, as places 5-7 had the same proportions in 2012:

(1) *ISPM 18 (Guidelines for the use of irradiation as a phytosanitary measure)*
(2) *ISPM 22 (Requirements for the establishment of areas of low pest prevalence)*
(3) *ISPM 26 (Establishment of pest free areas for fruit flies)*
(4) *ISPM 29 (Recognition of pest free areas and areas of low pest prevalence)*
(5) *ISPM 30 (Establishment of areas of low pest prevalence for fruit flies)*
(6) *ISPM 33 (Pest free potato (Solanum spp.) micropropagative material and minitubers for international trade)*
(7) *ISPM 35 (Systems approaches for pest management of fruit flies)*

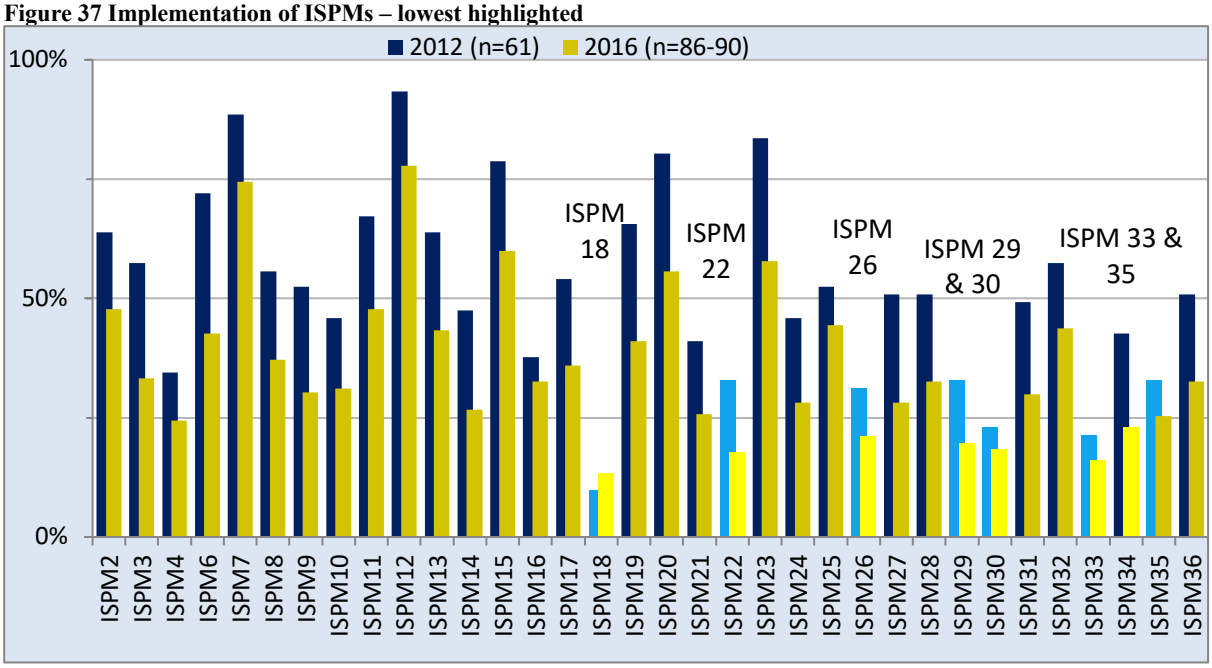
Three of the seven lowest scoring ISPMs relate to fruit flies (between 14% and 22% of respondents in 2016 said these standards were not applicable). The pest free potato standard also received relatively many *Not applicable* answers. The infrequent implementation of the irradiation guidelines standard (ISPM 18) could in part be explained by the absence of irradiation facilities in many countries: in both surveys around 30% indicated the ISPM was not applicable – no other ISPM received a higher proportion of this answer.

Another area where relatively few NPPOs indicated a high level of implementation relates to Pest Free Areas and Areas of Low Pest Prevalence (ISPM 4 about requirements for the establishment of PFAs came 8th lowest in both years). The relative proportions of *Not applicable* answers for these standards was lower than for the

[31] Basing the ranking on highest proportions of *None/Not applicable* answers gives largely the same results: in 2012, ISPM 34 would have replaced ISPM 29 in the bottom seven, and in 2016, ISPM 35 would have replaced ISPM 34.

fruit fly-related ISPMs, indicating other reasons for low implementation. This is consistent with the earlier section that dealt with NPPO's responsibilities under the Convention.

Figure 37 Implementation of ISPMs – lowest highlighted



Regional overall implementation

[1] To show how regional implementation differed, Figure 38 and

Figure 39 present the average (over all ISPMs) proportions of NPPOs that implemented the ISPMs at a high level for 2012 and 2016 respectively. The error bars in the graphs show the 95% confidence intervals, which are large because the proportions are based on small numbers of respondents.[32] The percentages in parentheses show the regional response rates (e.g., 30% of all NPPOs in the Africa region took part in the 2012 survey).

Africa had the lowest and North America the highest implementation in 2012, but the large confidence intervals indicate the precise ranking could be different. In 2016, the same top and bottom regions are found, but confidence intervals are again large and overlap for all regions.

[32] No confidence interval (CI) is shown for North America as there was only one respondent in each survey (both NPPOs in the North American region participated in the 2012 survey, but only one answered the ISPM implementation questions). The CIs are based on the number of respondents.

Figure 38 Average proportion of NPPOs that implemented ISPMs at a high level – 2012 (% of all NPPOs in that region)

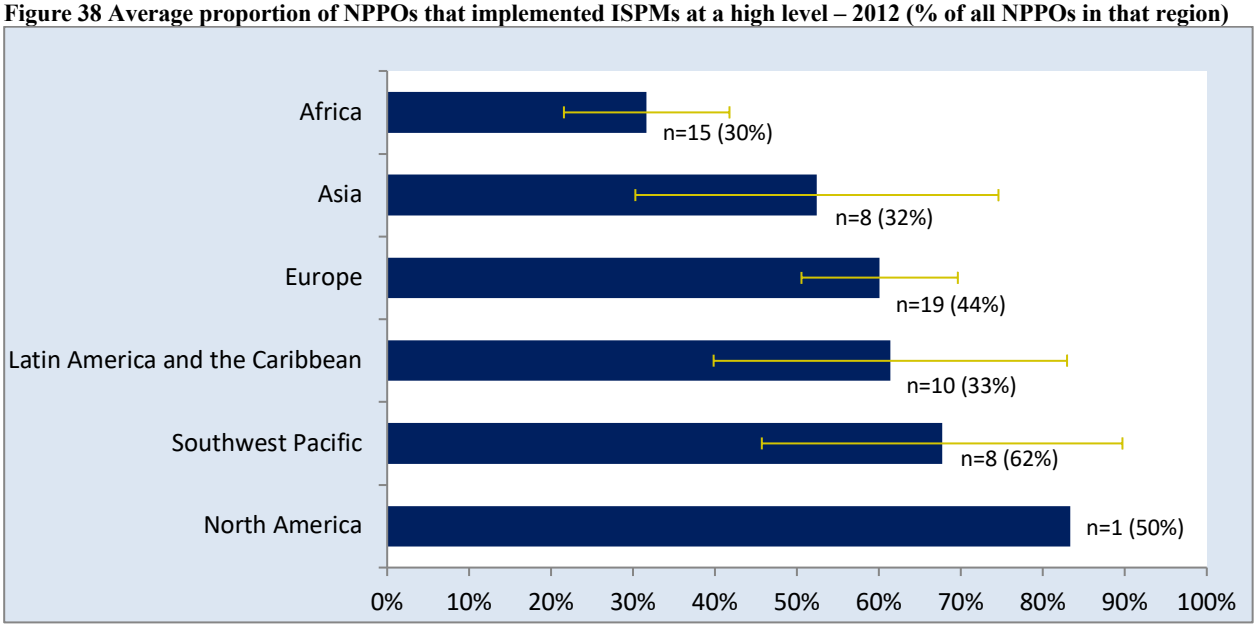
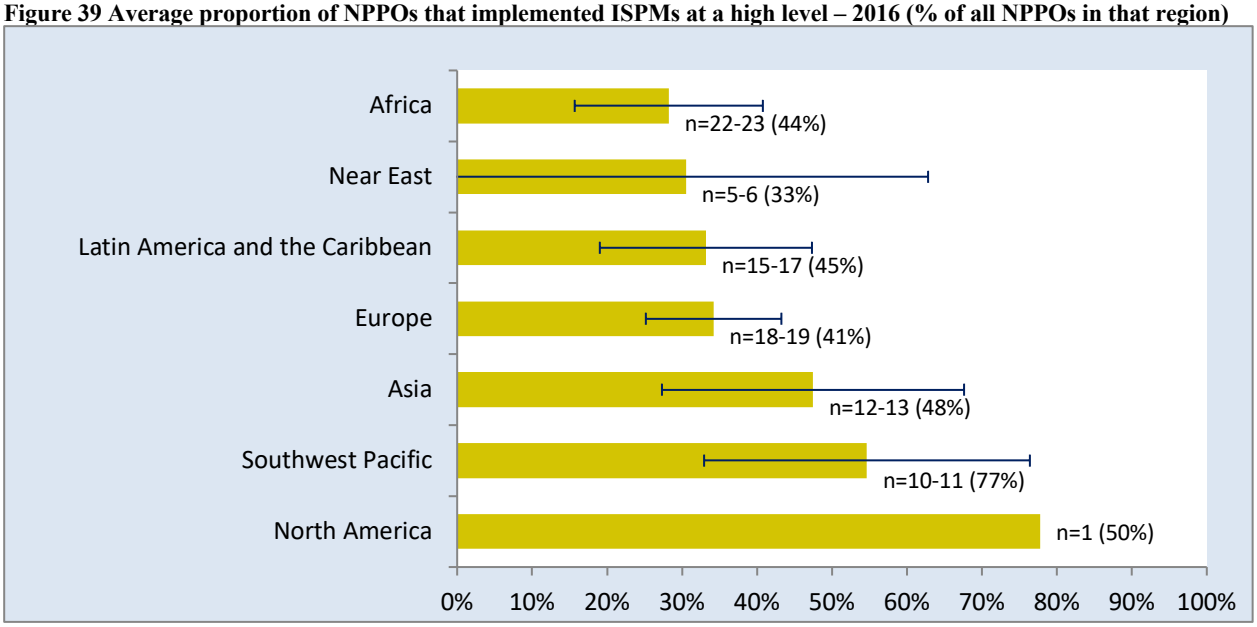


Figure 39 Average proportion of NPPOs that implemented ISPMs at a high level – 2016 (% of all NPPOs in that region)



ISPM implementation by thematic group

The ISPMs were grouped into the thematic categories described in section 3:

(1) General reporting, information provision and interaction with other CPs
(2) Plant and pest surveillance, pest free areas (PFA) and pest risk analysis (PRA)
(3) Regulation and measures, inspections, treatment, and certification

Table 4 shows the ISPM grouping (only 20 of the 36/37 ISPMs could be grouped into these three categories).[33]

[33] ISPMs that are related to these categories but that focus on a particular pest, e.g. ISPM 26 (Establishment of pest free areas for fruit flies (Tephritidae)) were not included in the grouping. Similarly, although ISPM 15 has to do with regulations (of wood packaging materials) it was not included in grouping 3 due to its specific focus.

Table 4 ISPM thematic grouping

Category 1
ISPM 13 (Guidelines for the notification of non-compliance and emergency action)
ISPM 17 (Pest reporting)
ISPM 19 (Guidelines on lists of regulated pests)
Category 2
ISPM 2 (Framework for pest risk analysis)
ISPM 4 (Requirements for the establishment of pest free areas)
ISPM 6 (Guidelines for surveillance)
ISPM 8 (Determination of pest status in an area)
ISPM 10 (Requirements for the establishment of pest free places of production and pest free production sites)
ISPM 11 (Pest risk analysis for quarantine pests)
ISPM 21 (Pest risk analysis for regulated non-quarantine pests)
ISPM 22 (Requirements for the establishment of areas of low pest prevalence)
ISPM 29 (Recognition of pest free areas and areas of low pest prevalence)
Category 3
ISPM 7 (Phytosanitary certification system)
ISPM 12 (Phytosanitary certificates)
ISPM 20 (Guidelines for a phytosanitary import regulatory system)
ISPM 23 (Guidelines for inspection)
ISPM 24 (Guidelines for the determination and recognition of equivalence of phytosanitary measures)
ISPM 25 (Consignments in transit)
ISPM 27 (Diagnostic protocols for regulated pests)
ISPM 28 (Phytosanitary treatments for regulated pests)

Figure 40 and Figure 41 show the average proportion of NPPOs that implemented the ISPMs to a high degree for the three thematic groups for 2012 and 2016, respectively. Also shown are the 95% confidence intervals around the averages. In both surveys, category 3 had the highest and category 2 the lowest average implementation in both years, and as shown by the non-overlapping confidence intervals, there was a significant difference between these averages. On the contrary, the average of category 1 cannot be said with certainty to differ from that of either of the other groups. These results therefore overlap with those on the implementation of responsibilities discussed in sections 3.1 to 0, but the results here are less clear cut and differences *within* the categories are much larger. For example, three of the nine ISPMs in category 2 (ISPMs 2, 6 and 11) were implemented to a relatively high degree, while four of the eight ISPMs in category 3 had below average implementation (ISPMs 24, 25, 27 and 28).

Figure 40 Average proportion of NPPOs that selected high implementation – 2012

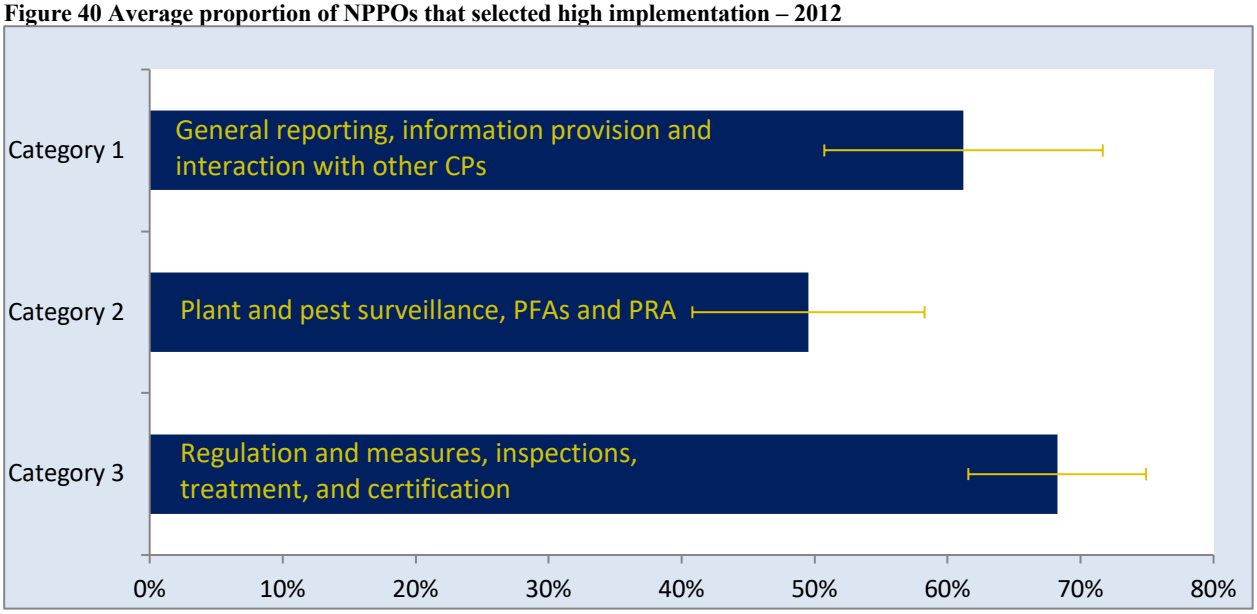
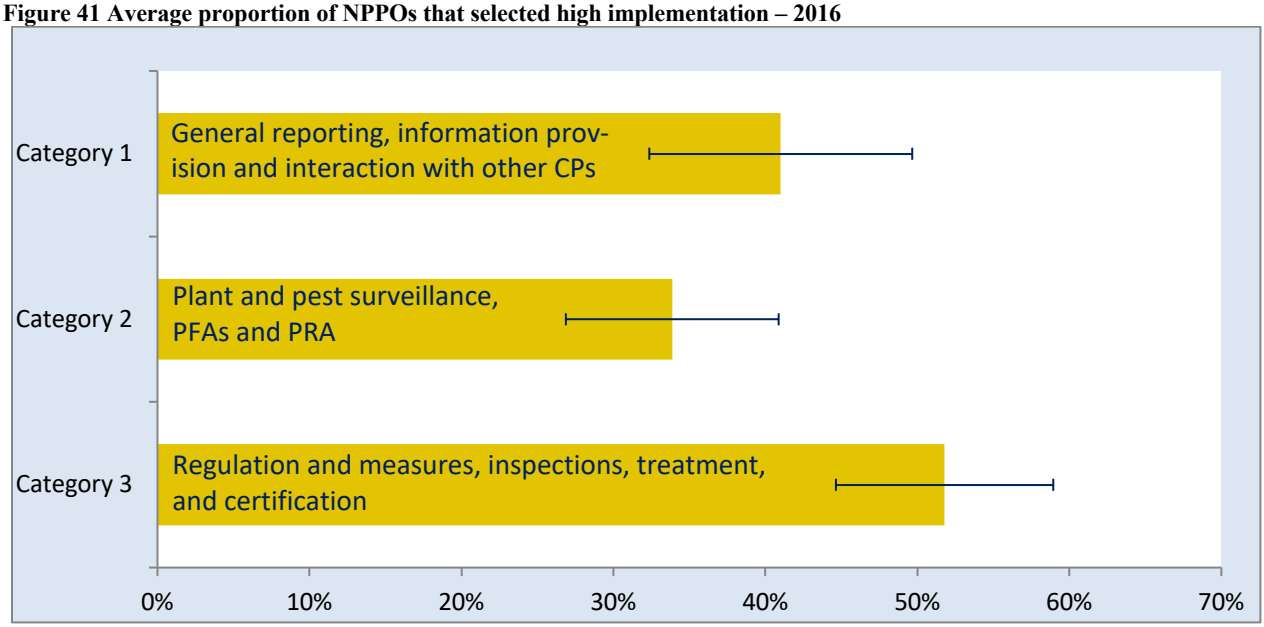


Figure 41 Average proportion of NPPOs that selected high implementation – 2016



3.5 Factors influencing implementation

The surveys in both years contained a section that asked which factors attributed to a high or low implementation of each ISPM. The prelisted factors were (as included in 2012):

- This ISPM is not very relevant
- This ISPM is highly or moderately relevant
- This standard is easy/difficult to implement
- There are (in)sufficient qualified personnel to support implementation
- (In)sufficient support for financial resources (such as budget and funding)
- (In)sufficient infrastructure supporting the implementation of this ISPM
- (In)sufficient facilities supporting the implementation of this ISPM[34]
- Insufficient/good communication and coordination among stakeholders
- (Non-)availability of long-term supporting policies and operational plans

Respondents had to repeatedly select among these factors for each of the 36 ISPMs in 2012, and for 37 ISPMs plus 33 Annexes to ISPM 27 and 28 in 2016. This was a considerable task: in 2012 respondents were in fact asked 648 yes/no questions, and in 2016 630 questions.[35]

Only the 2012 results will be presented below, as the 2016 question had critical design problems (to be discussed below) that made interpretation of the answers too uncertain to present. The lists of factors were mostly identical in both surveys, with only minor changes to wording, but the organization of the sections differed, as did the phrasing of the introductory question. In 2012, regardless of the level of implementation they had selected for the ISPMs in the preceding section, all respondents were first asked which factors contributed to high implementation (for each ISPM), and then which factors attributed to low implementation (again for each ISPM). In the first question the factors were phrased in the positive, and in the second they were stated in the negative. Only the first two factors, referring to the relevance of the ISPMs, remained unchanged. It must have been confusing for respondents to be asked which factors contributed to a high implementation, when in fact they had just indicated a low level and vice versa.[36] Perhaps NPPOs were intended to selectively answer these questions, but no explanation to this effect was provided to respondents and most filled out both tables for all ISPMs. Besides the potential for confusion, it also meant NPPOs were

[34] Several respondents noted that the distinction between infrastructure and facilities was not entirely clear.

[35] In 2012, they were asked to select factors twice, as will be explained in the text below.

[36] This was also mentioned in respondents' final comments on the survey.

asked to select factors twice for all ISPMs.[37] To deal with the issue of having two sets of answers for each ISPM and to prevent the amount of presented results to inundate the reader, this report will only present those answer combinations that make most sense: for ISPMs that were implemented to a *high* degree by an NPPO, only the answers about factors contributing to *high* implementation will be shown and vice versa.

The 2016 survey tried to fold both questions into one. In a single table respondents were asked to select the factors that both helped or hindered implementation, but instead of entering *helped/hindered* they were asked to enter *yes/no* without further explanation. All factors, except the first, were now phrased in the positive. This design allowed different interpretations of how to answer this question, in part depending on the level of implementation the respondent had previously selected for the ISPM (and the data shows this occurred):

- For some respondents *yes* will have indicated the factor either helped or hindered, with the meaning determined by the level of implementation, and *no* indicating the factor was not important for implementation.
- For others, as all but one of the factors were phrased in the positive, *yes* could have meant *helped* and *no* could have meant *hindered*. With this interpretation, the potential for confusion was exacerbated by the first factor, the only one stated in the negative ("This ISPM has a low level of relevance") for which a *yes* answer would more logically indicate a hindrance, while for the other factors *yes* would more logically indicate a help.
- The way the factors were phrased also invites them to be answered as a kind of "stand-alone" questions, with respondents simply answering *whether* they felt the ISPM was relevant, or *whether or not* they had sufficient staff to implement this ISPM. Answered this way, it becomes less clear whether these were key factors determining the level of implementation.

It proved impractical or even impossible to disentangle how specific respondents interpreted the answer options, especially since the interpretation could have differed depending on the level of implementation of an ISPM, and respondents could have changed their interpretation in the course of answering this question 70 times (for 37 ISPMs and 33 Annexes ISPMs 27 and 28). As the different interpretations lead to contrary meanings of *yes/no* answers, no reliable results could be produced for the 2016 survey and only the 2012 results will be presented below. However, as stated above, the 2012 version had its issues as well.

2012 results

In 2012, 59 of the 71 responding NPPOs selected factors that contributed to high implementation, but only 33 selected factors for all of the 36 ISPMs. Factors contributing to low implementation were selected by 51 NPPOs, of which 24 selected factors for all 36 ISPMs. To present all results of this section would lead to an overload of information. Therefore only the factors for the ISPMs with the highest and lowest implementation – those ISPMs that were highlighted in section 0 – will be shown here. Additionally, the overall order of the nine influencing factors taken over all ISPMs will be shown to present which factors were deemed important for implementation in general.

Table 5 shows the most commonly selected factors for the five ISPMs with the highest implementation levels.[38] For all these ISPMs, their relevance was most often selected as the factor contributing to high implementation, and this factor was chosen especially often for ISPM 23. Having sufficient qualified staff is the second most selected factor for all five, and especially important for ISPM 7, 12, 23. Stakeholder relationships, sufficient finances, infrastructure and long-term supporting policies formed the third most commonly selected factors for these five ISPMs, but the differences between third, fourth and fifth factors were often small, and it is mainly the first two (relevance and personnel) that stand out.

More interesting perhaps would be to know which factors were mentioned by NPPOs that had indicated a low level of implementation of these five standards, but there were too few observations to draw meaningful conclusions.

[37] Especially asking about the relevance of an ISPM twice seems to make little sense.

[38] The three most commonly selected factors are shown.

Table 5 Main factors that influence the degree of implementation in 2012– ISPMs most often implemented to a high degree

ISPM	Factors that contributed to high implementation	n
ISPM 7: Phytosanitary certification system	- This ISPM is highly or moderately relevant (67%) - Sufficient qualified personnel (54%) - Sufficient support for financial resources (38%)	52
ISPM 12: Phytosanitary certificates	- This ISPM is highly or moderately relevant (67%) - Sufficient qualified personnel (64%) - Good communication/ coordination among stakeholders (51%)	55
ISPM 15: Regulation of wood packaging material in international trade	- This ISPM is highly or moderately relevant (67%) - Sufficient qualified personnel (43%) - Good communication/ coordination among stakeholders (43%)	46
ISPM 20: Guidelines for a phytosanitary import regulatory system	- This ISPM is highly or moderately relevant (68%) - Sufficient qualified personnel (49%) - Sufficient infrastructure (36%) - Good communication/ coordination among stakeholders (36%)	47
ISPM 23: Guidelines for inspection	- This ISPM is highly or moderately relevant (74%) - Sufficient qualified personnel (56%) - Availability of long-term supporting policies and operational plans (40%)	50

The proportions of all nine factors that were selected as contributing to high implementation taken over all ISPMs that were implemented to a high degree are shown in Table 6. The same two factors (high to moderate relevance and sufficient qualified staff) come out on top, while there isn't much difference between the remaining factors. A few NPPOs indicated low ISPM relevance as a factor contributing to high implementation, which either indicates a mistake or misinterpretation of the question.[39]

No large regional variation in the factors' order of importance was found; the number of observations for the individual regions is too small to present separately.[40]

Table 6 Overall order of factors that contribute to a high implementation in 2012 – all ISPMs

Factors that contributed to high implementation	
This ISPM is highly or moderately relevant	24%
There are sufficient qualified personnel to support implementation	16%
Availability of long-term supporting policies and operational plans	11%
Good communication and coordination among stakeholders	11%
Sufficient infrastructure supporting the implementation of this ISPM	10%
Sufficient support for financial resources	10%
Sufficient facilities supporting the implementation of this ISPM	9%
This standard is easy to implement	9%
This ISPM is not very relevant	1%
n = 1141 ISPM*NPPO combinations (59 NPPOs)	

[2]

[39] It is possible that they wanted to indicate a low relevance for the ISPM even if that could not have been a factor contributing to high implementation. This factor was selected 16 times in total by 12 NPPOs (most of the 12 NPPOs only selected this factor for one ISPM, indicating a likely mistake; the other 4 NPPOs may have misinterpreted the question).

[40] The number of observations per region varied between 1 and 17.

Table 7 shows the main factors contributing to low implementation for the seven ISPMs that were least commonly implemented (to a high degree).[41] The low number of observations (n=23-31) means these results are not precise, as a shift in one or two answers has a big effect on the proportions. As can be seen there are no factors that clearly dominate all others. A lack of qualified staff and financial resources were among the most commonly mentioned factors for all seven ISPMs. For some ISPMs having insufficient access to facilities and infrastructure were most often mentioned, as was a lack of long-term supporting policies and operational plans. Stakeholder cooperation was indicated less often for these ISPMs (between 8% and 25%).

Between 7% and 19% of NPPOs indicated a *high or moderate* relevance of these ISPMs as a factor contributing to *low* implementation. It seems odd that this factor was included in this section of the questionnaire in the first place, but it also shows respondents did not always answer the question as intended. Perhaps they wanted to avoid giving the impression that the ISPMs were not relevant to them, but it is hard to understand how a high or moderate relevance would contribute to low implementation. In comparison, for all but one of these seven ISPMs (far) fewer NPPOs indicated a *low* relevance of the ISPM as a factor (selected by 3% to 13%), while this answer would be consistent with the question.

There were generally insufficient NPPOs that implemented these ISPMs to a high degree to draw solid conclusions,[42] but a moderate to high relevance was always the top factor selected by these respondents, which might indicate that perceived relevance is an important factor for the implementation of these ISPMs.

[41] Only answers of NPPOs that implemented the ISPMs at a low level or not at all were included. Results for seven instead of five ISPMs are shown, as implementation was the same for the bottom three of these. The three most commonly selected factors are shown, except when the proportions of the third and four placed factor were identical. In that case, four factors are shown.

[42] This varied from 6 to 20 NPPOs.

Table 7 Main factors that influence the degree of implementation in 2012 - ISPMs least often implemented to a high degree

ISPM	Factors that contributed to low implementation	n
ISPM 18: Guidelines for the use of irradiation as a phytosanitary measure	- Insufficient qualified personnel (52%) - Insufficient support for financial resources (52%) - Insufficient infrastructure (45%) - Insufficient facilities (45%)	31
ISPM 22: Requirements for the establishment of areas of low pest prevalence	- Insufficient support for financial resources (48%) - Insufficient qualified personnel (45%) - Insufficient infrastructure (42%)	31
ISPM 26: Establishment of pest free areas for fruit flies	- Insufficient qualified personnel(48%) - Insufficient support for financial resources (48%) - Insufficient facilities (43%)	23
ISPM 29: Recognition of pest free areas and areas of low pest prevalence	- Insufficient infrastructure (41%) - Insufficient support for financial resources (38%) - Insufficient qualified personnel (34%) - Lack of long-term supporting policies and operational plans (34%)	29
ISPM 30: Establishment of areas of low pest prevalence for fruit flies	- Insufficient support for financial resources (48%) - Insufficient qualified personnel(37%) - Insufficient facilities (30%)	27
ISPM 33: Pest free potato (Solanum spp.) micropropagative material and minitubers for international trade	- Insufficient qualified personnel (41%) - Insufficient facilities (41%) - Insufficient support for financial resources (37%)	27
ISPM 35: Systems approaches for pest management of fruit flies	- Insufficient qualified personnel (42%) - Insufficient support for financial resources (42%) - Insufficient facilities (38%) - Lack of long-term supporting policies and operational plans (38%)	24

Table 8 shows the relative importance of all nine factors that were selected as contributing to low implementation taken over all ISPMs that were implemented to a low degree or were not implemented at all. We see a similar pattern as for the ISPMs with the lowest implementation, with a lack of qualified staff and financial resources coming out on top, and having insufficient facilities, infrastructure and long-term policy support following closely. The relatively common incongruous selection of the high to moderate relevance factor was already referred to above.[43]

Again, the low number of observations per region does not allow a regionally disaggregated presentation of these results, but these generally match the overall results.

Table 8 Overall order of factors that contribute to a low implementation in 2012 – all ISPMs

Factors that contributed to low implementation	
There are insufficient qualified personnel to support implementation	18%
Insufficient support for financial resources (such as budget and funding)	17%
Insufficient facilities supporting the implementation of this ISPM	14%
Insufficient infrastructure supporting the implementation of this ISPM	13%
Non-availability of long-term supporting policies and operational plans	12%
This ISPM is highly or moderately relevant	9%
Insufficient communication and coordination among stakeholders	9%
This standard is difficult to implement	6%
This ISPM is not very relevant	2%
n = 712 ISPM*NPPO combinations (49 NPPOs)	

[43] In total 21 NPPOs made this selection for between 1 and 25 ISPMs.

3.6 Technical assistance

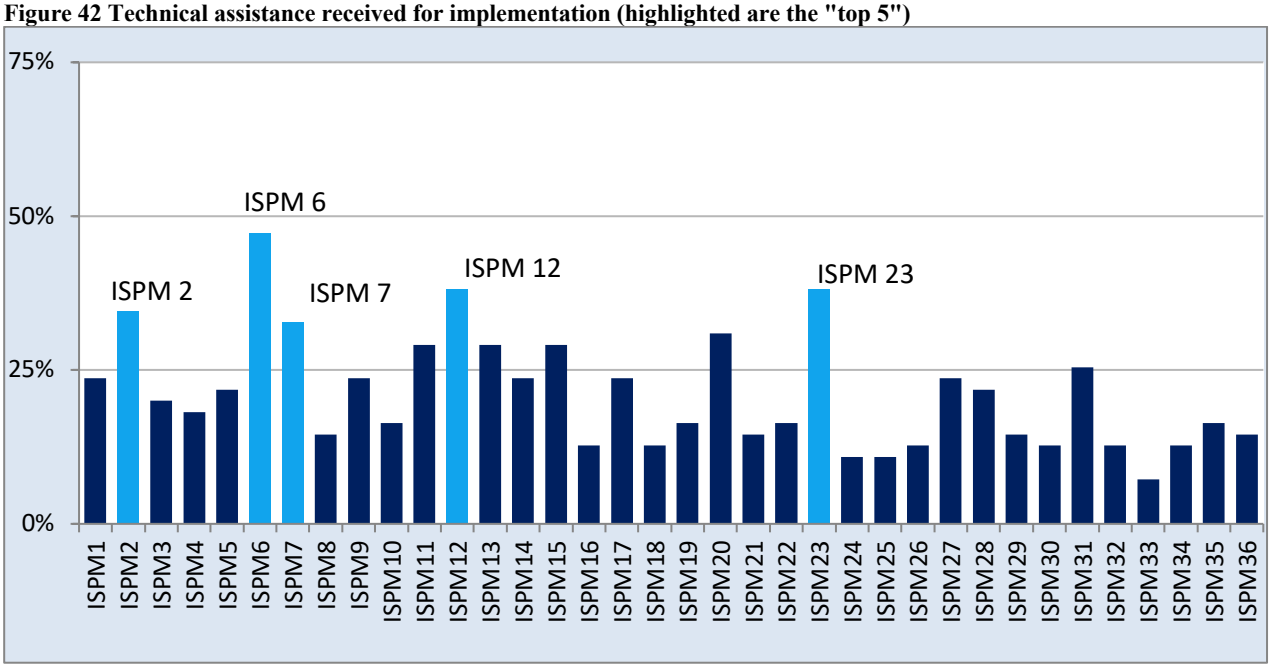
Both the 2012 and the 2016 surveys asked for each of the ISPMs (and in 2016 for the Annexes to ISPM 27 and 28) whether technical assistance had been received in the previous five years to help with implementation. Again there are differences in the way this information was elicited. In 2012 this was a stand-alone question, with answer options *Yes, No, Don't know, Not applicable*, while in 2016 it was integrated into the question discussed above about key factors that aided or hindered implementation, with reduced answer options *Yes/No*. As explained in the previous section, the 2016 data are too problematic to provide reliable results and are not presented here.

In 2012, 55 of the 71 responding NPPOs (77%) answered this question. The results are presented in Figure 42. The five ISPMs for which technical assistance was indicated most commonly were:

(1) *ISPM 2 (Framework for pest risk analysis)*
(2) *ISPM 6 (Guidelines for surveillance)*
(3) *ISPM 7 (Phytosanitary certification system)*
(4) *ISPM 12 (Phytosanitary certificates)*
(5) *ISPM 23 (Guidelines for inspection)*

It would have been most interesting to analyse whether received technical assistance helped actual implementation. However, such analysis requires the level of implementation to be known for both 2012 and 2016, and the number of NPPOs for which this information is available is too small for reliable results (n=38).[44] Moreover, the change between the surveys in the number of answer categories with which to indicate the level of implementation further complicates such an analysis (see section 0).

Figure 42 Technical assistance received for implementation (highlighted are the "top 5")



3.7 Implementation priority and main challenges to implementation

Both the 2012 and 2016 surveys asked NPPOs which ISPMs had the highest implementation priority and what the main challenges were to their implementation. Before presenting the results, several questionnaire and data comparability issues will be discussed.

[44] This group would have to be split in two based on whether assistance was received or not (as indicated in the 2016 survey), leading to very low numbers, especially in the group of countries that received assistance.

Questionnaire design and comparability

There were some differences between the 2012 and 2016 surveys. In 2012, NPPOs were asked in an open question to describe the three main challenges to the implementation of those ISPMs that were considered most relevant, and then to select the ISPMs deemed to have the highest implementation priority.[45] In 2016, the order of the two questions was reversed, and question wording was harmonised between the two questions, with both referring to "highest implementation priority" rather than using "most relevant" in the question about challenges as was done in 2012. Neither survey restricted the number of priority ISPMs that could be selected.

As mentioned in the introduction, respondents in 2016 could choose whether to participate online through a SurveyMonkey questionnaire, or fill out an MS Word version offline. For unknown reasons there were differences in this section between the two survey modes. First, the selection question of highest priority ISPMs seems to have been asked twice in the online version (with some NPPOs selecting exactly the same ISPMs twice or skipping the second question, and some giving different answers to both questions[46]). Furthermore, the 33 Annexes to ISPMs 27 and 28 were included in the online but not in the offline version.

No explanation was provided about whether this question referred to ISPMs that were yet to be implemented (to a high degree) or to all ISPMs regardless of the existing level of implementation. The data show that both interpretations probably occurred. On the one hand there is considerable overlap between ISPMs that were highly implemented and ISPMs selected as high priority, but there are also differences, with the most highly implemented areas receiving slightly lower priority and vice versa.

In 2012, 55 of the 71 responding NPPOs indicated high priority ISPMs, but only 37 of these also mentioned challenges. In 2016, 74 of the 93 responding NPPOs indicated priority ISPMs and 65 listed challenges. In both years, there were NPPOs that only selected one or two ISPMs and others that selected all.[47]

Highest and lowest priority ISPMs

[3]

Figure 43 presents the proportions of NPPOs that selected the ISPMs as high priority for both full samples. Despite the generally lower proportions in 2016 (see discussion below), the five ISPMs that were selected most often as having a high priority were almost the same in both years (Table 9). As mentioned above, all of these had relatively high actual implementation levels as well, and ISPM 7 and 23 were among those that were most commonly implemented to a high degree (see section 0). Three of the five ISPMs that were mentioned least often as high priority also overlapped in both surveys. These three were among the least implemented ISPMs as well in both surveys.[48]

Table 9 ISPMs most often and least often selected as high priority for implementation

ISPMs most often selected as high priority	2012	2016
ISPM 2: Framework for pest risk analysis	69%	62%
ISPM 6: Guidelines for surveillance	73%	66%
ISPM 7: Phytosanitary certification system	71%	55%
ISPM 11: Pest risk analysis for quarantine pests	64%	66%
ISPM 23: Guidelines for inspection	71%	55%

[45] This is the only question in 2012 that disaggregated ISPM 28's phytosanitary treatments (ISPM 27 was not disaggregated). The 2016 survey usually disaggregated both ISPM 27 and 28, but in this question only did so in the online version.

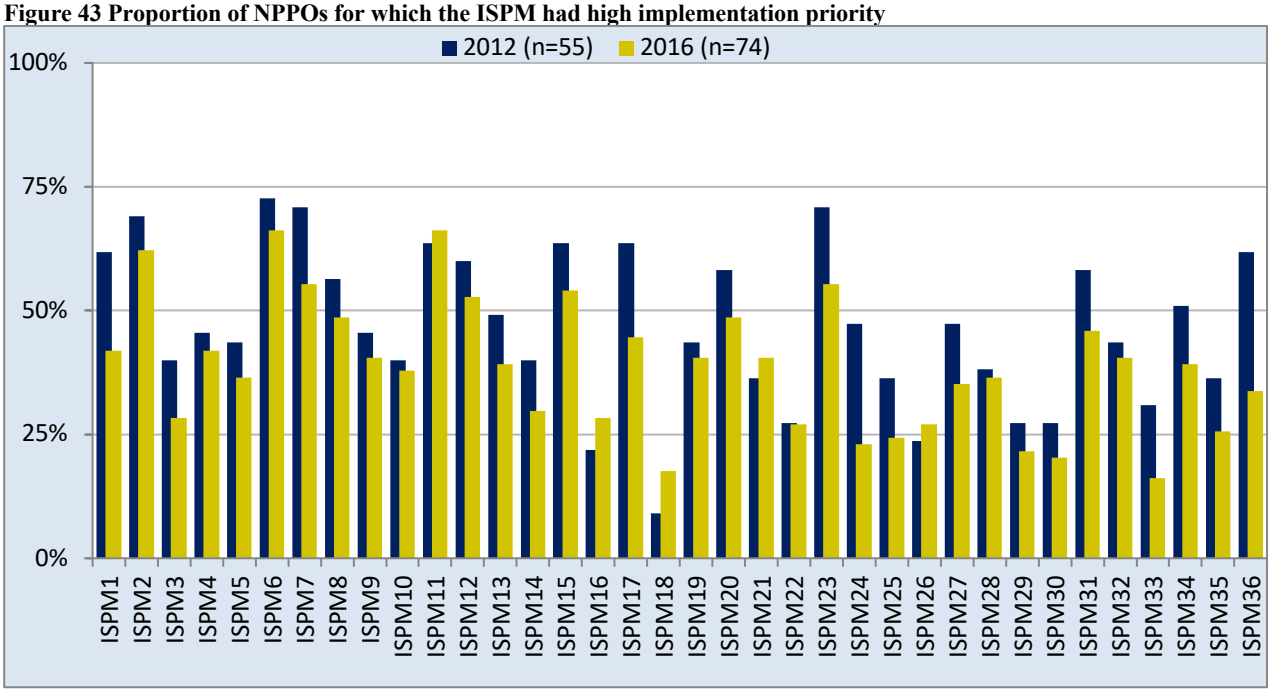
[46] In the cases where differences were found, the data were kept as originally entered. It is not known if these issues occurred in the 2012 survey as well.

[47] This does not include the specifications of ISPMs 27 and 28, which were selected relatively infrequently in both surveys.

[48] The similarities in high/low priority between 2012 and 2016 are also present in the overlapping sample of 30 NPPOs that answered this question.

ISPMs least often selected as high priority	2012	2016
ISPM 18: Guidelines for the use of irradiation	9%	18%
ISPM 29: Recognition of pest free areas and areas of low pest prevalence	27%	22%
ISPM 30: Establishment of areas of low pest prevalence for fruit flies	27%	20%
n	55	74

Figure 43 Proportion of NPPOs for which the ISPM had high implementation priority



Difference between actual implementation vs priority status

There is significant overlap between the ranking of ISPMs based on high actual implementation and a ranking based on high priority selection.[49] The ten ISPMs most commonly implemented to a high degree largely overlap with the ten ISPMs most often selected as having a high priority for implementation, and the opposite is also the case.[50] This was found for both 2012 and 2016.

The overlap mentioned above is not complete and for some ISPMs the answers differed considerably. The ISPMs for which the rankings differed most (in both surveys) are listed below:

(1) ISPM 4 (Requirements for the establishment of pest free areas)
(2) ISPM 5 (Glossary of phytosanitary terms)
(3) ISPM 25 (Consignments in transit)
(4) ISPM 31 (Methodologies for sampling consignments)
(5) ISPM 34 (Design and operation of post-entry quarantine stations for plants)

ISPMs 4, 31 and 34 had a higher ranking based on priority than actual implementation, and the opposite was true for ISPMs 5 and 25.

[49] Correlation between the rankings was analysed for 2012 and 2016 separately using Kendall's rank correlation or tau coefficient. For 2012, the correlation coefficient based on the ranking of the 36 ISPMs was 0.6 ($p<0.001$); for 2016, a coefficient of 0.5 ($p<0.001$) was found.

[50] Out of the 10 highest priority ISPMS, 7 also are in the top 10 implemented ISPMs (in both years and vice versa). Of the 5 least priority ISPMs, 4 are also in the bottom 5 for implementation (in both years and vice versa).

Further differences become clear when again grouping the ISPMs according to the three categories presented in earlier sections. The thematic groupings are presented here again: [51]

(1) General reporting, information provision and interaction with other CPs
(2) Plant and pest surveillance, pest free areas (PFA) and pest risk analysis (PRA)
(3) Regulation and measures, inspections, treatment, and certification

For *actual implementation*, grouping 3 had the highest rates, grouping 2 the lowest, and the average ratings in category 1 lay in between these, although there were relatively large differences within all categories (see section 0). Classifying the ISPMs according to the proportions of NPPOs that assigned them as *high priority* gives much smaller differences between the categories, with no clear grouping jumping out as high or low. Within-category differences are generally similar as found for actual implementation. All the ISPMs in grouping 2 scored relatively higher in the priority ratings than in actual implementation, and the opposite is true for grouping 3. Potentially this is caused by part of the respondents interpreting the priority question as relating to ISPMs not yet implemented (to a high degree) and part of the respondents assigning high priority to ISPMs already implemented to a high degree. It would be natural in this case for highly implemented ISPMs to receive lower priority than ISPMs that are not yet highly implemented, but to also show considerable overlap.

2012 – 2016 comparison of priority ISPMs

For unknown reasons, almost all ISPMs were selected by a slightly smaller proportion of NPPOs in 2016 than in 2012 (on average, the proportions were 11% lower).[52] Below, the ISPMs with the biggest differences are listed, but as these are based on answers from only 30 overlapping NPPOs they should be interpreted with care.[53] ISPMs that were mentioned by at least 20% more often in 2012 were:

- *ISPM 3 (Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms): selected by 43% in 2012 vs 23% in 2016*
- *ISPM 5 (Glossary of phytosanitary terms): 57% vs 33% in 2016*
- *ISPM 7 (Phytosanitary certification system): 70% vs 47% in 2016*
- *ISPM 17 (Pest reporting): 60% vs 33% in 2016*
- *ISPM 23 (Guidelines for inspection) :67% vs 47% in 2016*
- ISPM 36 (Integrated measures for plants for planting): 67% vs 40% in 2016

The only ISPMs with a higher implementation priority in 2016 were:

- *ISPM 11 (Pest risk analysis for quarantine pests): selected by 67% in 2016 vs 60% in 2012*
- *ISPM16 (Regulated non-quarantine pests: concept and application): 30% vs 23% in 2012*
- *ISPM 18: (Guidelines for the use of irradiation as a phytosanitary measure): 17% vs 10% in 2012*

The reasons behind these differences cannot be determined by the survey results themselves.

Challenges to implementation of priority ISPMs

The challenges related to the implementation of high priority ISPMs were mostly phrased in general terms, but some NPPOs listed challenges related to specific ISPMs, and a few just listed certain ISPMs without indicating why their implementation posed a challenge. There is considerable overlap with the results presented in the earlier section about which factors contributed to high and low ISPM implementation, and the answers might in part have been prompted by these factors. The most commonly mentioned challenges

[51] See Table 4 in section 0 for the grouping of ISPMs (only 20 of the 36/37 ISPMs were grouped).

[52] This comparison is based on the overlapping sample of 30 NPPOs that participated in both surveys and answered this question. In the full samples similar differences were found.

[53] Only one of the differences is statistically significant (ISPM 36) as tested using McNemar's test for paired data.

in both surveys are presented in Annex 3. First, by some margin, comes a lack of trained staff, which was mentioned by around 70% of the NPPOs that responded to this question in both surveys. A few quotes are included below to provide more context:

- "Some ISPMs require highly trained personnel"
- "Capacity building of phytosanitary officers in the areas of pest reporting, pest identifications and surveillance tools"
- "Skilled resources to complete diagnostics to species level, applies to surveillance (ISPM 6) and reporting non-compliance (ISPM 13)"
- "Although there is adequate technical staff within the institution, this is not enough to cover the demand for all activities and responsibility involved in compliance and maintenance of ISPMs. In addition, there is no generational relief plan that guarantees the long-term transfer of information and experience."
- "Lack of the staff for preparation of PRAs, moreover the specialists must have an adequate experience in preparation of PRA."

The other most commonly mentioned challenges in both surveys were financial and physical resources (facilities, infrastructure and equipment), and several NPPOs also mentioned "resources" without further specification. Insufficient stakeholder communication or participation was also mentioned in both surveys. In 2012, a lack of policy support or long-term policies was mentioned by several NPPOs but was not mentioned in 2016. On the other hand, there were several NPPOs in 2016 – but none in 2012 – that referred to issues with national legal frameworks, such as the need to update legislation.

There were many other challenges that were mentioned by only one or just a few NPPOs. Such other answers were given by almost 50% of responding NPPOs in 2012 and almost 60% in 2016. All mentioned challenges are provided in 0.

Table 10 Most commonly mentioned challenges for implementing high priority ISPMs[54]

Challenge	2012	2016
Human resources/ qualified staff/ staff training	70%	69%
Financial resources	57%	42%
Facilities, equipment and infrastructure	35%	43%
Policy support/ long term policies	14%	-
Stakeholder participation/coordination	11%	11%
Resources (unspecified)	8%	14%
National legal framework	-	14%
n	37	65

3.8 CPM Recommendations (2016 only)

In 2016 a new section was added to the questionnaire asking about the level of implementation of the following CPM Recommendations[55]:

- Recommendation concerning Information Exchange (ICPM-2/1999)
- The Role of IPPC Contact Points (CPM-1/2006)
- R-01: LMOs, Biosecurity and Alien Invasive Species (ICPM-3/2001)
- R-02: Threats to Biodiversity posed by Alien Invasive Species: Actions within the Framework of the IPPC (ICPM-1/2005)
- R-03: Replacement or reduction of the use of methyl bromide as a phytosanitary measure (CPM-3/2008)

[54] Percentages add up to more than 100% as NPPOs could mention more than one challenge.

[55] CPM Recommendations were reorganized and those without R numbers were revoked in 2017: https://www.ippc.int/en/core-activities/governance/cpm/cpm-recommendations-1/cpm-recommendations/

- R-04: IPPC Coverage of Aquatic Plants (CPM-9/2014/1)
- R-05: Internet Trade (e-ommerce) in Plants and other Regulated Articles (CPM-9/2014/2)
- R-06: Sea Containers (CPM-10/2015)
- R-07: The Importance of Pest Diagnostics (CPM-11/2016)

The answers are shown in Figure 44. Response varied between 73 and 77 of the 93 participating NPPOs. Respondents could also leave comments about barriers to implementation of the CPM Recommendations but relatively few did. Some left general comments, pointing to shortages of staff or other resources.

A few commented that the ministry of environment was responsible for the recommendations about LMOs (R-01) and alien invasive species (R-02), or that legislation lacked or had not been implemented yet.

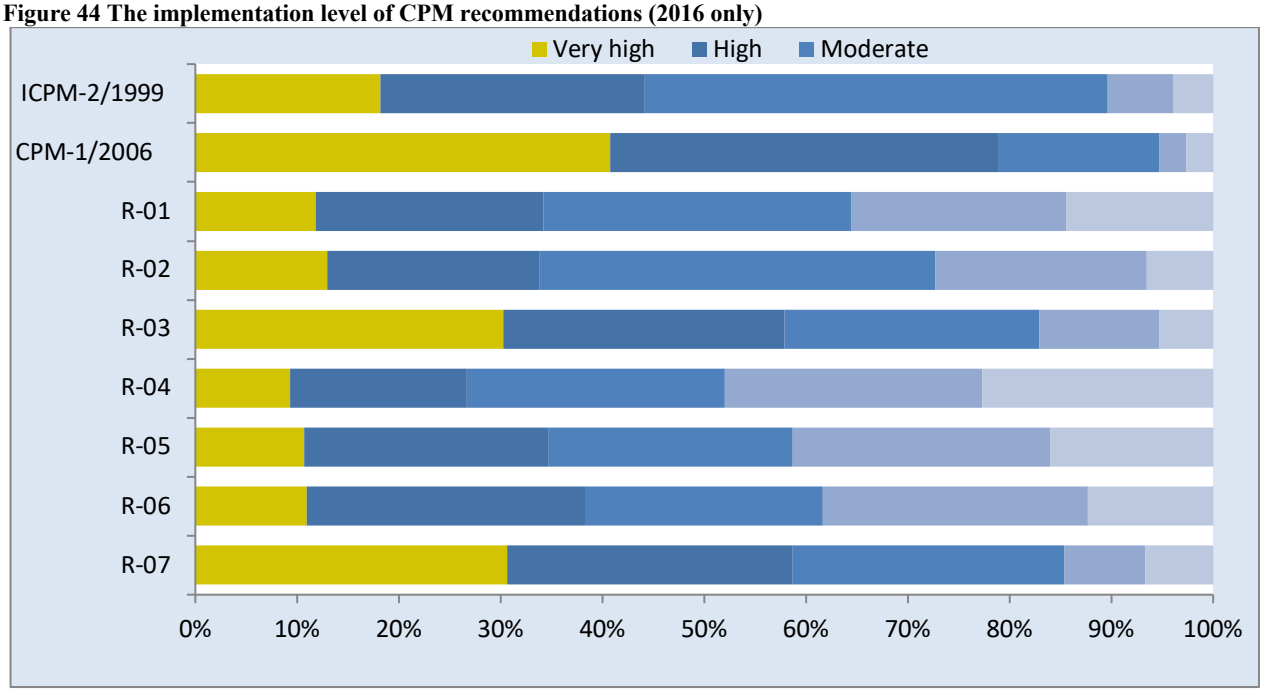
Comments relating to the recommendation about methyl bromide (R-03) go in different directions: some said that despite research there are no real alternatives, while others indicated such alternatives did exist and their countries banned the use of methyl bromide. One of the latter expressed frustration about other countries still requesting it as an import requirement.

Despite the recommendation about aquatic plants (R-04) being least commonly implemented, the comments provide little explanation (it is the recommendation with the lowest number of comments), perhaps indicating a low priority. One NPPO said its country traded little in aquatic plants.

The E-commerce recommendation (R-05) was also among those with relatively low implementation. One or two NPPOs commented that E-commerce had not or only just started in their country. Others said this kind of traffic was difficult to control or they did not yet have the capacity to deal with this issue.

Another recommendation with relatively low implementation was the one on sea containers (R-06). Just as with the other recommendations, few comments were left, but some pointed to the scale of container trade that made implementation difficult.

Figure 44 The implementation level of CPM recommendations (2016 only)



3.9 Final respondent comments

At the end of the surveys, respondents could enter general comments. Where these related to individual sections of the survey they have been mentioned in the corresponding location. A summary of the comments is given here and all comments can be found in 0. In 2012, 19 of the 71 responding NPPOs left a comment, most of which related to design issues of the questionnaire, for example, saying that some questions were

repetitive, difficult to answer or illogical, that the survey was too long and that the limited multiple choice answer categories did not fit real life complexities. A few NPPOs asked for more assistance with implementation.

In 2016, 25 of the 93 NPPOs left one or more comments. Most again were about the design of the survey, for example asking for skip codes and criticising that some questions were open to multiple interpretation. Repetitiveness of some questions was complained about again, as was the length of the questionnaire. One respondent commented it was hard to objectively judge one's own performance and would prefer assessing experiences about other NPPOs. Requests for assistance with implementation were also made again. In both years, several respondents asked for a printable version of the survey to facilitate discussion with colleagues.

4. Summary and concluding remarks

The objectives of this study were to:

- critically assess the questions in the 2012 and 2016 surveys
- evaluate the comparability between the 2012 and 2016 surveys
- review the existing analysis reports
- re-analyse the 2012 and 2016 data
- conduct a comparative analysis of the 2012 and 2016 data.

How these objectives were met is summarised below.

4.1 Critical assessment of questionnaire design and 2012-2016 comparability

The surveys' design focussed on NPPOs' self-assessment of their implementation of the IPPC responsibilities and ISPMs and on the reasons behind high and low implementation. Respondents were asked to rate the implementation of responsibilities and ISPMs on Likert scales, from high to none. The responsibilities were covered in 36 questions based on the Convention's articles and ISPM implementation was elicited in a table with 36 ISPMs in 2012, and 37 ISPMs plus 33 Annexes to ISPMs 27 and 28 in 2016. Factors that influenced high and low implementation then had to be selected for each ISPM in a large matrix table: it measured 36 (ISPMs) times 9 (factors) in 2012, and 70 (37 ISPMs plus 33 Annexes) times 10 (factors) in 2016. This table included technical assistance as a factor in 2016, while it was a separate question in 2012. This was followed by the request to list priority ISPMs and indicate challenges to their implementation, and in 2016 respondents were additionally asked to rate the implementation of a number of CPM Recommendations.

Besides the closed multiple choice Likert scale questions, respondents were asked to explain their answers in open comments to the first 36 rating questions about responsibilities, which a minority did. The challenges to implementation of the priority ISPMs were asked about in a further open question. Finally, the respondents could leave open comments about the survey.

The chosen questionnaire design covers the breadth of NPPO responsibilities under the Convention, but also leads to a questionnaire with many repetitive questions, that in part duplicate each other. Many of the responsibilities listed in the Convention's articles come back in the ISPMs, and the results about factors influencing ISPM implementation and the challenges to ISPM implementation also cover largely the same topics, with the latter, being an open question, providing a broader range of answers. Large tables in which the same exercise has to be repeated many times over can become tedious and lead to loss of concentration, especially if respondents feel they are asked about the same topics twice, as some respondents said they did. The questionnaire did not include skip codes to circumvent irrelevant questions depending on earlier answers, which can also lead to respondent frustration, as some respondents said it did.

Generally, more explanation at question level could have provided better guidance to respondents on how to answer the questions, which might have prevented the misinterpretations that were found for a considerable number of questions. In part, these misinterpretations may also have been caused by the uniform answer options with which respondents were asked to rate different types of responsibilities and ISPMs. Uniform answer options allow an apparently easy quantitative comparison of the implementation of different responsibilities, but not all responsibilities allow themselves to be rated in the same manner. On the other

hand, different answer scales for different sections of the questionnaires were used that, while not offering a more tailored approach to the topics of the questions, do limit comparability across sections. No pre-tests of the questionnaires were mentioned in the analyses reports, and no other evidence for pre-tests was found in the data files. Some of the abovementioned design issues might have been detected in a pre-test.

There were several seemingly small changes made to the 2016 questionnaire, that although clearly intended to deal with some weaknesses in the 2012 version, prevented a clean comparison between the two surveys in several areas:

- First, the answer scale length was changed in the section on ISPM implementation to allow more diversified answers (and meet a request made by 2012 respondents). While this was an improvement, it meant the implementation level of individual ISPMs could not be compared between the surveys.
- Second, a cumbersome 2012 section on factors that influenced ISPM implementation was redesigned to prevent duplication and the asking of irrelevant questions. However, this was done in a way that allowed multiple, contradictory interpretations of how to answer this section, which could not be reconstructed ex post, leading the results to become uninterpretable. The 2016 data from this section had to be omitted from this report.
- Third, a 2012 stand-alone section about technical assistance was folded into the redesign of the previously mentioned section. Even if that question would have generated consistent answers, this change would have affected the meaning of the question and would have made comparability with 2012 difficult.

Smaller changes included improvements to harmonise answer scale wording throughout the questionnaire and the addition of references to the numbers of the Convention's articles on which the questions were based.[56] These changes could have also affected respondents' answers and cross-survey comparability, but to a smaller extent.

4.2 Existing survey reports

2012

The 2012 report topically grouped the presentation of results, but did not clearly specify which questions and ISPMs fell into which group, which makes it difficult to replicate and assess their findings. Examples of conclusions that were not completely supported by the data as analysed for the current report are:

- In the 2012 report it was stated that pest surveillance (ISPM 6) was the most commonly selected priority ISPM and most technical assistance went to its implementation, but it did not feature among the mostly highly implemented ISPMs. The two first statements are true, but implementation came in at a relatively high sixth place. Actually, in the 2016 data there was higher divergence between priority and technical assistance on the one hand (which were still among the highest), and implementation (11^{th} most commonly implemented ISPM at a high level).
- The report states that pest risk analysis ISPMs (ISPM 2 and ISPM 11) were considered high priority standards and technical assistance often went to help with their implementation, but that PRA in general was only moderately implemented. Both statements are true, but the latter one appears to include ISPM 21 in the average implementation level, while the former statement about prioritisation and technical assistance does not. In fact, the implementation ranking of ISPMs 2 and 11 are also relatively high (9^{th} and 7^{th}), while prioritisation and technical assistance for ISPM 21 are only moderate (in line with its implementation). The suggested deviation between prioritisation and technical assistance for PRA on the one hand and implementation on the other is therefore not supported by the data.

[56] Article references were not consistently added in all translations.

The key findings of the report are based solely on implementation of the ISPMs and related prioritisation and technical assistance. The results from the questions relating to responsibilities are only mentioned in the detailed findings.

No mention is made in the report of the inconsistency that respondents had to select factors that contributed to both high and low implementation, regardless of their indicated level of implementation. The factors influencing low implementation that are highlighted in the report differ in both order and proportion from this report for some of the ISPMs.[57] It is not clear how these proportions were determined in 2012, but it must have taken a different approach to dealing with the somewhat complicated questioning of this section in the questionnaire.

The 2012 report in the detailed findings splits the presentation of the implementation level of ISPMs into high, low, not at all, and not applicable. In this report only two groups were presented, high on the one hand and low, not at all, not applicable on the other. This was done to reduce the amount of presented data, although it somewhat reduces the information available in the data.

The main challenges related to the implementation of high priority ISPMs differ from the ones found in this report. On the one hand, the proportions reported in 2012 are lower, which indicates that the 2012 analysis treated non-response differently (most likely assuming implicitly that a missing answer meant there were no challenges), but the order of the ranking was also different. The latter could be due to a different categorisation or treatment of the open answers.

The conclusions of the 2012 report focus on the high implementation of standards related to import and export regulatory systems and cautiously mention the relatively common technical assistance received for these ISPMs as a possible reason for this. Technical assistance was indeed not included as a causal factor for high implementation in the 2012 questionnaire, which makes it difficult to know how much technical assistance contributed to high implementation of these standards. Focus in the conclusions also lies on the relatively low implementation of pest status related standards despite receiving moderate technical assistance. The stated reasons for this low implementation in the survey of limited personnel and financial support are linked in the conclusions to NPPOs potentially being undervalued in their national context. This however seems based on only a few open comments by respondents (as also stated in the 2012 conclusions).

2016

The 2016 report appears not to have evolved beyond a draft stage, which may explain some of its weaknesses described below.

The response rate is slightly overstated in the report. It mentions 100 responses from CPs and 1 from a regional plant protection organisations (RPPO). However, in the database only 94 entries were found that had at least answered one question, and this number includes the response from the RPPO. None of the presented results in the 2016 report are based on more than 93 responses.

Unlike the 2012 report that structured the results topically, the 2016 structure strictly follows that of the questionnaire, and thereby provides a less coherent presentation. Results of the different sections of the questionnaire were drawn together in only a limited way in the conclusions, for example, the divergence or overlap of actual implementation to implementation priority was discussed only scarcely or to describe whether answers from the responsibilities and ISPM sections of the questionnaire that overlap were consistent.

Open comments are summarised relatively extensively in the report, but are presented in a way that suggests these are representative of all NPPOs. Given the low number of open comments for most questions relative to the number of answers overall, more caution on how to interpret these would have been warranted. Furthermore, little or no attention was paid to where these comments point to misinterpretations or differing

[57] For factors contributing to high implementation, results are very similar between the 2012 analysis and the one of this report. The small differences that do exist are likely due to the duplicate response from one NPPO that seems to be included in the 2012 reporting.

interpretations of the questions (for example on the question about endangered areas) and no explicit link between comments and the level of implementation (the quantitative part of the answer to which the comment pertains) was made.

No mention is made of the problems relating to the section about factors that helped of hindered implementation of ISPMs. No explanation is given either of how the yes/no answers were interpreted. The factors relating to high or low relevance of the ISPMs are excluded from the results without an explanation (but it is assumed they must have been deemed problematic, as was found in this report). The question whether technical assistance was received for ISPM implementation was integrated into this section of the questionnaire, changing it meaning and preventing a simple interpretation of the answers. No mention is made of this in the report and the results are presented as if it had been a stand-alone question.

In all, the 2016 analysis report appears less integrated than the 2012 one, but as said, this is likely related to never moving beyond the draft stage.

4.3 Survey results and 2012-2016 changes

One of the goals of this assessment was to see whether there had been changes to implementation levels of the Convention and its standards between 2012 and 2016. As already said, changes to the 2016 questionnaire impeded comparability for a number of questions. However, a more general problem for such a comparison was the low overlap of NPPOs that participated in both surveys. In 2012, 71 NPPOs participated in the survey, and in 2016, 93 did, but only 45 NPPOs took part in both surveys. As not all NPPOs answered all questions, for some questions there were only 30 overlapping respondents. With such small numbers, only very large changes can be detected reliably, and smaller changes disappear in the normal margins of error and interpretation that go with such surveys. Not a single statistically significant difference was determined in the comparisons of individual questions, and for all comparable questions changes were found in both upward and downward direction, which mostly cancelled each other out. What can be said is that the overall picture painted by both surveys is very similar. Implementation in both years and samples is highest for largely the same ISPMs and areas of responsibility, and very similar challenges to implementation were found.

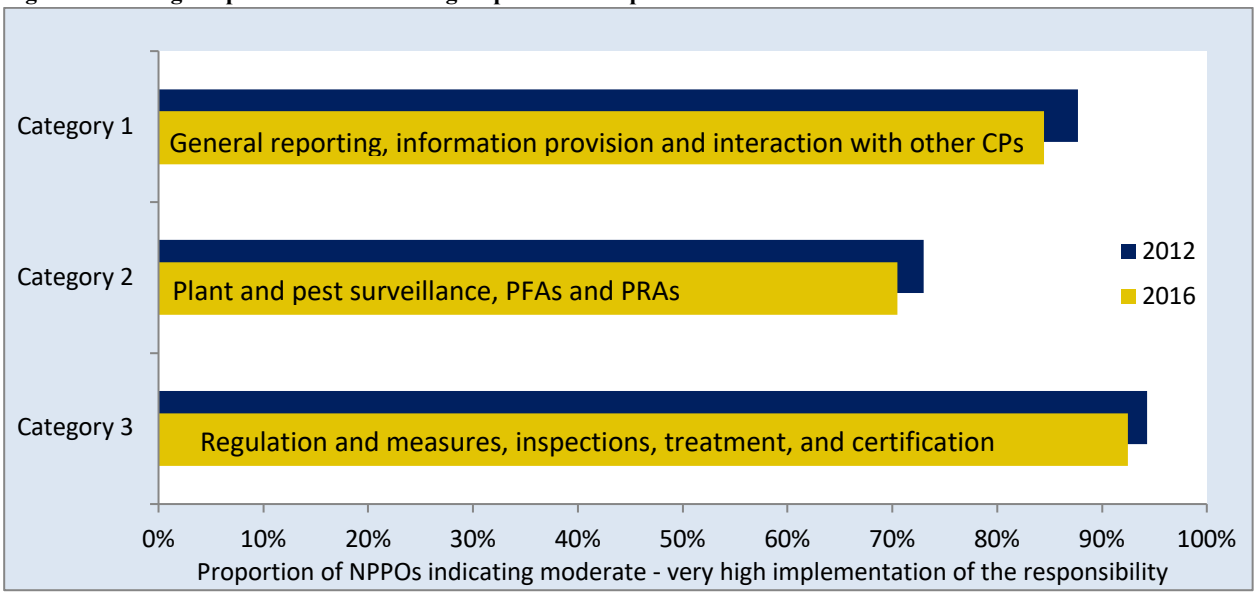
Before summarizing the main results, it should be said that low response was an issue more generally. With response rates of 39% and 51%, for 2012 and 2016 respectively, results may not be representative of all CPs' situations. There were no large sample imbalances with regard to region and income, but it is likely, and the data offer some evidence, that NPPOs participating in the surveys have generally implemented the Convention to a higher degree, and that overall NPPO implementation is therefore lower than that presented in this report.

The questionnaire started with six sections on NPPO responsibilities. For this analysis, the 36 questions in these sections were grouped into three thematic categories:

(1) General reporting, information provision and interaction with other CPs
(2) Plant and pest surveillance, pest free areas (PFA) and pest risk analysis (PRA)
(3) Regulation and measures, inspections, treatment, and certification

As shown in Figure 45, on average, the highest implementation is found for the third group, and eight or nine of the ten most highly implemented responsibilities overall consistently fall within this category, regardless of the year of the survey or the way the responsibilities were ranked. Responsibilities within the second category of surveillance, PFA and PRA were least implemented, on average, and six or even all seven of the questions in this grouping fall into the ten least implemented, depending on the year and way of comparing implementation. To show the difference, an average of 26% and 29% of NPPOs (depending on the year) indicated a low or no implementation for the surveillance, PFA and PRA responsibilities, while for category 3 responsibilities this was only 5% and 7%. For responsibilities within the first group an average of 12% and 15% indicated low or no implementation.

Figure 45 Average implementation level of grouped IPPC responsibilities



In the data about the implementation of ISPMs, the same general results hold, but there are exceptions. Among those ISPMs that could be grouped into the same three categories, the average level of implementation is again highest in the third group and lowest in the second. However, there are also ISPMs related to surveillance (ISPM 6) and PRA (ISPMs 2 and 11) that were often implemented to a high degree, and, in contrast, some ISPMs in the third group were not implemented to a high degree (ISPMs 24, 27 and 28). Among the five most implemented ISPMs overall, only ISPM 15 did not fall within group 3.[58] The following are the five most implemented ISPMs:

(1) *ISPM 7 (Phytosanitary certification system)*
(2) *ISPM 12 (Phytosanitary certificates)*
(3) *ISPM 15 (Regulation of wood packaging material in international trade)*
(4) *ISPM 20 (Guidelines for a phytosanitary import regulatory system)*
(5) *ISPM 23 (Guidelines for inspection)*

Looking at the least implemented ISPMs overall, many again fall into the second category, but some of these are also or specifically related to fruit flies. The latter ISPMs were not applicable said 14% to 22% of the NPPOs. The least implemented ISPM had to do with irradiation, which was indicated not to be applicable by around 30% of the respondents and some respondents mentioned national regulation did not allow irradiation. The seven least implemented ISPMs again overlapped in both surveys[59]:

(1) *ISPM 18 (Guidelines for the use of irradiation as a phytosanitary measure)*
(2) *ISPM 22 (Requirements for the establishment of areas of low pest prevalence)*
(3) *ISPM 26 (Establishment of pest free areas for fruit flies)*
(4) *ISPM 29 (Recognition of pest free areas and areas of low pest prevalence)*
(5) *ISPM 30 (Establishment of areas of low pest prevalence for fruit flies)*
(6) *ISPM 33 (Pest free potato (Solanum spp.) micropropagative material and minitubers for international trade)*
(7) *ISPM 35 (Systems approaches for pest management of fruit flies)*

NPPOs were also asked which ISPMs had the highest implementation priority, but from the way the question was phrased, this could have either included or excluded ISPMs already implemented (to a high degree),

[58] Although ISPM 15 has to do with regulation, it was not included in group 3 due to its specific focus on wood products.

[59] The lowest 7 instead of 5 are shown here as the implementation levels for the 5th-7th were identical in 2012.

depending on the interpretation of the respondent. Results of this question show a similar ranking of ISPMs as for actual implementation, but there were also differences, with ISPMs in category 2 generally having a higher priority ranking than implementation, and those in category 3 generally having a lower priority ranking than implementation.

Besides the relevance of the ISPMs to NPPOs, having sufficient and sufficiently trained personnel clearly comes out as the main factor determining the level of implementation.[60] Other resources (financial and physical) were also indicated, as were factors such as stakeholder cooperation and policy support, but personnel was consistently on top in different questions and for different groupings of ISPMs. The importance of qualified personnel was confirmed in an open question about challenges to implement priority ISPMs, in which staff-related challenges were mentioned by 70% of the respondents, while the second and third most mentioned areas (financial and physical resources) were mentioned by between 35% and 57%, depending on the year.

A question about technical assistance towards the implementation of specific ISPMs could only be analysed reliably for 2012. The ISPMs for which technical assistance was most commonly said to have been received have to do with PRA, surveillance, certification and inspection. Nine of the ten ISPMs for which technical assistance was most commonly received were also in the top ten of most commonly implemented ISPMs in 2012. It is unclear if these are simply the most important ISPMs, which are therefore both commonly implemented and a focus for technical assistance, or whether the technical assistance provided in the years previous to the survey led to high implementation. Most likely both are true. Unfortunately, due to the low number of overlapping observations and the change in the way ISPM implementation was measured in 2016, it was not possible to analyse whether specific NPPOs improved the implementation of ISPMs for which they had received assistance.

Regional disaggregation of the data and results was difficult, again, due to the low number of observations. Where results were disaggregated regionally, the results are very imprecise as a result of this. Average ISPM implementation appeared lowest among NPPOs in the African region and highest among NPPOs in North America, but there was only one North American respondent in each survey that answered the ISPM implementation questions. NPPOs in the Southwest Pacific region appeared to have a higher than average implementation as well. There were too few observations to say whether the implementation pattern according to the thematic grouping of ISPMs holds for the different regions. The same is true for factors influencing implementation, although it can be said that the pattern for the overall data generally holds for the regions as well, and there were no large deviations for specific regions.

5. Considerations for a follow-up survey

While not a direct objective of this report, a few comments will be made with regard to a potential third general survey. Overall, the data needs and objectives of the survey should be clearly established. Which data exactly are necessary and how will they be used. It should be critically assessed whether the information provided by the existing surveys that was reported here meets these objectives. Even though it is a general survey, it does not necessarily have to cover every element of the Convention, if that data is not informative, obvious, not going to be used, or already available elsewhere, e.g., on the IPP. The previous surveys covered the full breadth of the IPPC responsibilities, but did so in a very structured and "legalistic" approach, which closely followed IPPC articles and the individual ISPMs. Perhaps an approach tied in more to the day to day practice of the NPPOs could be designed, also with regard to question order.

Something that can be learned from the previous surveys is where overlap exists. This occurred in two main areas. First, there was considerable overlap between the questions about implementation of responsibilities and implementation of the ISPMs, as both cover the same topics. Similarly, there was overlap between the sections asking about "factors influencing the implementation level" and "challenges to implementation". Both sections provided similar results. Duplication adds unnecessarily to questionnaire length and makes participation less interesting.

[60] Only analysed for 2012, as the 2016 question did not allow a reliable interpretation of the answers.

Skip codes should be used in future surveys to avoid asking irrelevant questions as happened in both previous surveys.

It should also be decided how much use is made of uniform answer options. They allow a quantitative comparison of the responsibilities and ISPMs, but do not offer much in-depth information about actual implementation. Moreover, the same answer options or questions are not suitable to all responsibilities. A more tailored approach are likely to provide better data and make participation in the survey more interesting.

Related to the previous item, questions should be worded in a way that does not allow different interpretations. Tailoring the questions and response options helps with this, but providing additional explanation can also be helpful.

If elements of the previous questionnaires are retained in a third survey, answer options and answer scale length should be considered, both with regard to comparability to the earlier surveys and to intra-survey comparability. As shown by the current analysis, any changes to answer scale length limit comparability. For example, splitting *high* into *high* and *very high* also changes the interpretation of the lower answer options, and the *moderate* answer option in both scenarios does not mean the same.

An important question for future surveys is how to raise the response rate to a level that is high enough for a reliable analysis of change. While a response rate of close to 50%, as was achieved in 2016, seems reasonable for this type of survey, having low overlapping responses limited a robust comparison between the surveys. Perhaps extra effort can be put in obtaining repeat responses.

Besides being implemented through an online survey tool, both the 2012 and 2016 surveys allowed offline participation. Why this was decided is not known. It is possible that it was done to allow participation of NPPOs with bad internet access, or because translation of the online tool was problematic. Regardless of the reason, it probably helped the response rate, as NPPOs had a choice of how to participate. However, this mixed mode approach has the important drawback that the survey cannot be tailored to the respondents by using automatic skip codes that only allow relevant questions to be put to respondents based on their previous answers. Besides helping question relevance, this also shortens the survey for most respondents, but this is only possible if it is only run online. Given the improvements to internet connectivity globally, the disadvantages of having an online-only survey should decrease over time. Providing an option to print the questionnaire was requested in the previous surveys, and should be considered as participation in this survey can be a multi-person effort, and this allows the questions to be discussed before being answered online.

It was unclear from the existing survey reports if this was done in the previous surveys, but thorough pre-testing of the questionnaire should be part of a future survey, including analysis of pre-test results to show whether data needs are met (this can even be done before an actual pre-test, drafting mock tables and figures to show the type of results that a questionnaire will provide).

Finally, it is impossible to know from the data alone whether the self-assessment character of the survey led to biased answers. Respondents could have given overly optimistic answers to improve the image of their NPPO, or understated implementation in the hope for more assistance, or both. One respondent indicated that it was difficult to give objective answers, and suggested also asking about experiences with other NPPOs instead of solely focusing on self-evaluation. It could also be considered to include other stakeholders in the evaluation.

6. References

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Annex 1: Test on the effect of additional answer category "very high"

As stated in the main text, while the initial sections of the survey all asked about the level of implementation of the Convention's responsibilities, not all sections used the same answer categories. Section 3 used four-point scale questions (high, moderate, low, none), while sections 4-7 used a five-point scale in which the answer category "very high" was added.[61] It was expected that this would influence respondents' answers in such a way that would make a comparison of questions from the different sections difficult. Such a comparison would be useful to assess to what level different responsibilities are implemented, and where improvements are most necessary.

A question that appeared twice in almost identical wording, once in section 3 and once in section 6, allows an analysis of the effect of the different answer scales and whether an ex-post conversion can resolve the problem.

The easiest way to make the answer scales comparable would be to join the two top categories "high" and "very high" in the five-point scale into a single category "high" that would then be comparable to the "high" category in the four-point scale. Figure 46 shows this is problematic because it leads to higher proportions of "high" answers in the converted five-point scale than in the four-point scale. Most likely some respondents who felt their NPPO's implementation was good but not excellent chose the second highest answer option in both questions, with less meaning attached to the labels of the answer categories.

[4] The problems are smaller when the top three categories are joined in the five point scale and the top two in the four-point scale as shown in

Figure 47. The proportions of top answers are still higher in the converted five-point question, but as explained with the discussion of the questions in section 0 of this report, there may be other reasons for this. This conversion clearly reduces the differentiation between answers, as moderate and high implementation are not distinguished, but offers a more valid way to compare implementation levels of responsibilities measured with the different answer scales.

As a final check, a ranking based on the implementation level of all questions asked in sections 3-7 in the surveys was created using both conversions (not shown). The position in these ranking of most questions does not change much, but a few jump considerably, showing that it matters how these scales are compared. In this report, the second conversion option was adopted.

[61] This is the wording of the 2016 answer categories. The 2012 survey used "full, moderate, weak, none" in section 3 and "very strong, strong, moderate, weak, not at all" in sections 4-7. Due to the additional change in wording within (from "full" to "strong"), the 2016 survey offers a cleaner test of the effect of adding an additional answer category.

Figure 46 Testing the effect of aligning 4-point and 5-point answer scales – joining "high" and "very high" (questions 3.7 & 6.1)

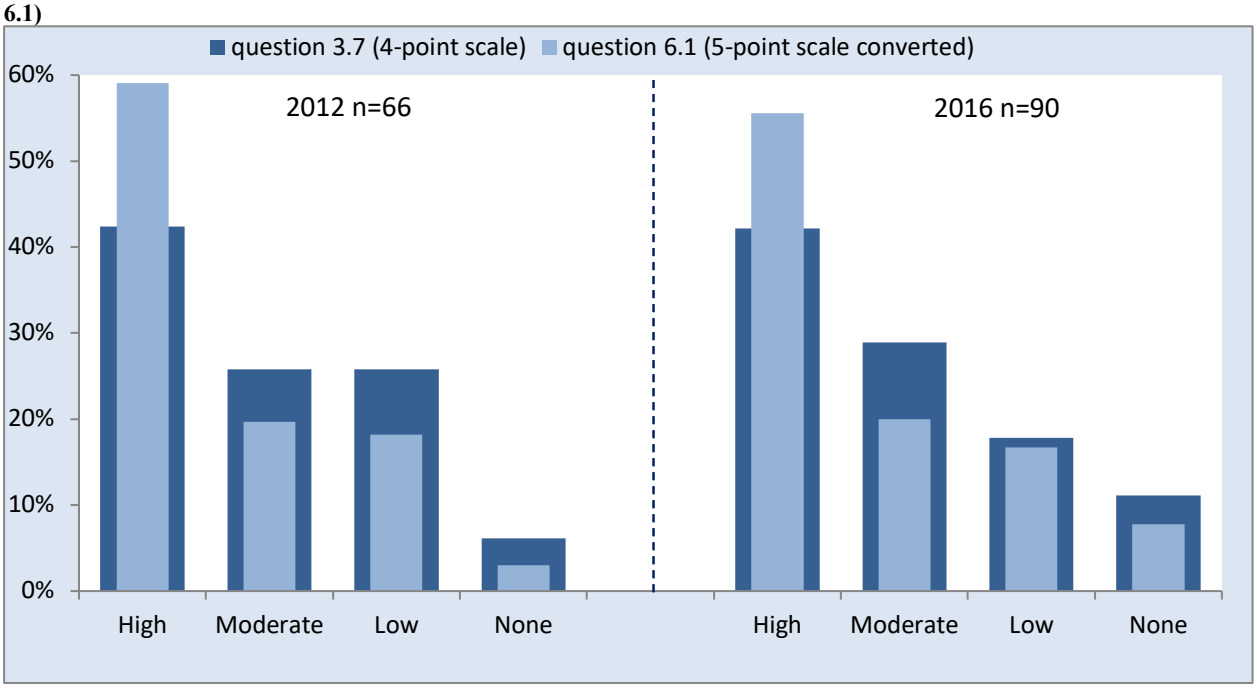
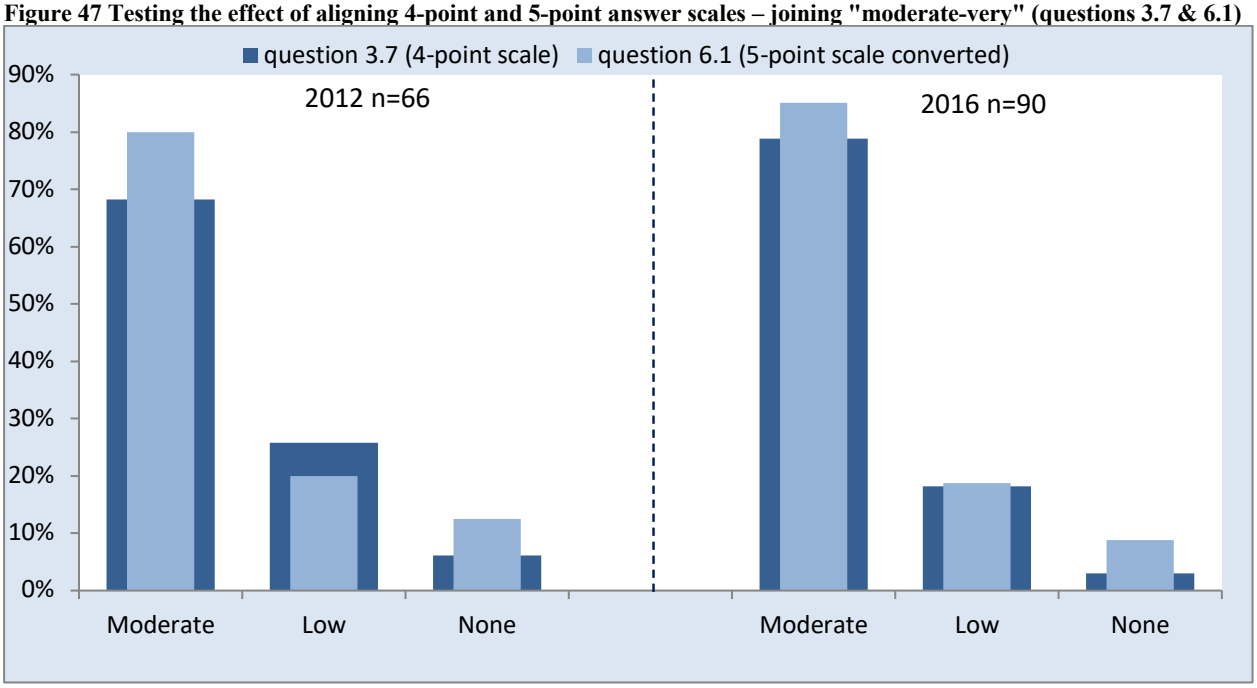


Figure 47 Testing the effect of aligning 4-point and 5-point answer scales – joining "moderate-very" (questions 3.7 & 6.1)



Annex 2: Survey participation

Table 11 Participating countries in the 2012 survey

Africa	Asia	Europe	Latin america & Carribean
Algeria	China	Austria	Antigua and Barbuda
Benin	Korea	Azerbaijan	Argentina
Burkina Faso	Lao PDR	Belarus	Costa Rica
Burundi	Malaysia	Belgium	Guyana
Cameroon	Nepal	Bosnia and Herzegovina	Honduras
Côte d'Ivoire	Philippines	Bulgaria	Jamaica
Eritrea	Singapore	Czech Republic	Mexico
Ethiopia	Sri Lanka	Georgia	Nicaragua
Ghana	Thailand	Germany	St. Kitts and Nevis
Guinea-Bissau	Timor-Leste*	Ireland	Turks and Caicos Islands*
Kenya	Soutwest Pacific	Israel	Near East
Madagascar	Australia	Malta	Iraq
Morocco	Cook Islands	Montenegro	North America
Namibia	Fiji	Netherlands	Canada
Niger	French Polynesia*	Norway	United States of America
Nigeria	New Zealand	Poland	
Seychelles	Niue	Slovenia	
Togo	Papua New Guinea	Spain	
Tunisia	Samoa	Sweden	
Uganda		United Kingdom	

* indicates countries that are not contracting parties

Table 12 Participating countries in the 2016 survey

Africa	Asia	Europe	Latin america & Carribean
Algeria	Bhutan	Austria	Antigua and Barbuda
Botswana	China	Azerbaijan	Barbados
Burundi	Japan	Belarus	Bolivia
Cameroon	Korea	Belgium	Chile
Chad	Kyrgyz Republic	Croatia	Colombia
Congo, Rep.	Moldova	Cyprus	Costa Rica
Eritrea	Myanmar	Denmark	Cuba
Ethiopia	Nepal	Estonia	Dominica
Gabon	Philippines	Georgia	Ecuador
Gambia	Singapore	Iceland	Grenada
Ghana	Sri Lanka	Lithuania	Guyana
Guinea	Thailand	Luxembourg	Jamaica
Kenya	Viet Nam	Malta	Mexico
Lesotho	Soutwest Pacific	Netherlands	Nicaragua
Malawi	Australia	Norway	Paraguay
Mali	Cook Islands	Slovenia	St. Kitts and Nevis
Morocco	Fiji	Spain	Trinidad and Tobago
Namibia	Micronesia	Sweden	Near East
Nigeria	New Zealand	Ukraine	Bahrain
São Tomé and Principe	Niue		Egypt
Senegal	Palau		Iraq
South Sudan	Samoa		Libya
Sudan	Tonga		Oman
Togo	Tuvalu		Syria
Uganda	Vanuatu		North America
Zimbabwe			United States of America

Annex 3: Challenges for the implementation of high priority ISPMs

Table 13 Full list of mentioned challenges related to the implementation of priority ISPMs: 2012

The difficulty of implementing all of the requirements contained in the ISPM; Inadequate human resources; The lack of assistance.
Insufficient staff and little capacity building; Lack of procedure manuals; Lack of material, technical and financial resources / budget
Insufficient financial resources for surveillance (ISPM 6); Insufficient equipment and infrastructure; Insufficient qualified staff
Insufficient funds; Insufficient infrastructure; Insufficient qualified personnel
Funding support; Long-term policy support; Infrastructure and technical capability support
Time required for the development of internal policies and programs to support the implementation of ISPMs; ensuring a consistent approach with affected stakeholders; communication and outreach to affected stakeholders
Applicability of the standards to the situation in the country; Getting the management support
Enough trained official personnel; Enough budget support; More coordination with stakeholders
Financial Resources; Long term supporting policies; Consistent support from supporting agencies
ignorance and lack of training of the scope of the ISPMs; Costs and the infrastructure necessary for the implementation of some ISPM are high; Some ISPM´s require highly trained personnel
Improvement of system of collection, storage and retrieval of information on the pests of the phytosanitary concern (to ISPM No. 6); Preparation of contingency plans (to ISPM No. 9); Improvement of pest reporting as regards providing express PRAs (to ISPM No. 17)
Inadequate funding to undertake surveillance and maintenance of pest free zones; High cost of training personnel; infrastructure
Inadequate staff; Limited Finance; Lack of adequate/appropriate infrastructure
lack of qualified personnel to implement the majority of the ISPMs; insufficient funds in the national budget to support the programs that need to be executed; poor organizational structure and remuneration available for persons in this field of work
Modification of the Mexican Regulatory Framework to be faster; Insufficient support for financial resources; Insufficient personnel and insufficient facilities
Policy; Transparency; Expertise
Qualified Human Resource; Sufficient Finances; Long Term Policies
Ability to implement consistently across several regions and jurisdictions; Effective collection of non-compliance data; Ability to quickly identify pests
Availability of sufficient resources growing diversity in commodities and trade partners/countries
Capacity, lack of staff in NPPO
In some cases a lack of resources and training
In general, there are no problems with the implementation of ISPMs, but there are occasions where more personnel, economic resources and infrastructure are necessary
Gaining agreement of the risks to be managed
Insufficient financial support such as budget and funding; insufficient infrastructure support
Insufficient trained staff/ no programme for staff development and training; Insufficient financial resources; Insufficient infrastructure/ and facilities
Lack of financial resources, lack of human resources for conducting survey and inspection of consignments and sampling
Lack of funding for implementation and awareness; Lack or appropriate personnel to implement the standards
Lack of qualified personnel poor stakeholder participation insufficient facilities and infrastructures
Manpower & budget
Low qualified staff, low financial means, lack of infrastructure
Staff Qualification; Equipment; Infrastructure and finance
Resources, human and financial
Resources; political constraints
Staff and technical competence; Scientific facilities
Staff resources; budget resources; duplication of work within EU and IPPC

Sufficient human & financial resources; Amount of different rules in the field (for inspectors & stakeholders); Costs

Table 14 Full list of mentioned challenges related to the implementation of priority ISPMs: 2016

Spatial establishment of pest free areas and requirements because of the current circumstances; The use of irradiation phytosanitary requirements due to the lack; The design of a stone post-entry and operation of plants
The establishment of integrated measures for plants for planting i.e local nurseries is dependent on competing land requirements and prioritisation i.e. land for other needs.; [Our country] can't be too restrictive in import requirements as we are dependent on imports. ; The value of plants is viewed more as an aesthetic than agricultural production. This has resulted in lesser emphasis and resource planning on safeguarding plant health in [our country].
Total application of ISPMs; System maintenance
As a developed country, [our country] does not have specific challenges to the implementation of relevant ISPMs
Revision of standards is needed; Need for capacity and resources
ISPM 19 - Pest distribution, biology, and taxonomy is dynamic. Likewise, our ability to detect and identify pests is variable and constantly changing. The categorization process is easily applied to pests that are well-known, anticipated, or frequently encountered but to be consistent with the principles of managed risk and technical justification, the regulatory status (the action determination) must also be consistent with the risk for a given situation. This means that although a pest may meet the defining criteria for a quarantine pest (reportable/actionable for PPQ), it may not require action, or it may require different levels of action depending on the pathway and circumstances; 23 and 31 – different from what we have done for 100 years.
ISPM 16: Regulated non-quarantine pests: concept and application It is difficult to introduce immediately official control in related to specific plants for planting as the concept of regulated non-quarantine pests has not been introduced domestically; ISPM 17: Pest reporting It is difficult to determine the scope of the pest for reporting; ISPM 18: Guidelines for the use of irradiation as a phytosanitary measure ISPM 18 is not implemented as the use of irradiation for food is not permitted under domestic regulations concerning food safety.
Protected zone is established primarily to protect the respective zone itself, in other words to prevent the introduction of a pest to that zone, while PFA is established to enable the export of certain plants from that area. For PFA it is not enough that the status of the pest in the area is "not established" because the possibility that the pest still occurs in the area is not excluded. Status "not established" can refer to a number of different statuses; discovering regulated non quarantine pests, reporting on the presence, introduction and spread, developing and proposing preventive measures and measures for their control; The facilities are adequate for the current number of samples and for any foreseeable increase in sample numbers. Three separate bio-chambers are independently controlled (temperature, humidity, day/night duration and illumination) and can be used for several test procedures simultaneously. One chamber is assigned for cultivating healthy test plants, and two will be used for testing.
Follow-up to fraudulent Certificates (No. 12); Import inspection of WPM (No. 15); Risk assessment for RNQPs and decision on risk management (No. 16)
The ability of the [...] NPPO to adapt to the guidelines set out in ISPM 4 in the recognition of free areas for important pests with the aim of facilitating export campaigns for plant products.; To increase communication with the other countries in order to harmonize the sampling methodologies identified in ISPM 31 and to apply them equally to all IPPC member countries; How will the different countries address the phytosanitary activities described in ISPMs in the face of changing circumstances arising from the WTO Agreement on Trade Facilitation (WTO) which aims to accelerate the movement, uprising and dispatch of goods, including goods in transit?
Lack of coping legislation developments, and the multiplicity of the relevant authorities phytosanitary and conflict of jurisdiction and enforcement; Lack of qualified human element in all the relevant authorities provide) the lack of familiarity with the standards; Lack of material resources.
Legislation to be amended (ongoing); Updating regulated pest list is difficult due to lack of dedicated surveillance staff and resources; Systems to be implemented. Timely and reliable identification of pest /pathogen is time consuming and costly.
Strengthen regulatory framework; Recycling and Continuing Education; Mobilization of financing

The need of some necessary technical legislations & regulations; Scarcity of sufficient qualifications, facilities and financial supports; Technical assistance and training opportunities are scarce especially in the field of pest detection, diagnosis, and phytosanitary certification systems.
There is no phytosanitary legal framework; There are insufficient technically qualified staff to implement phytosanitary requirements; Insufficient budget
Collating and analysing surveillance information in supporting pest status; Skilled resources to complete diagnostics to species level, applies to surveillance (ISPM 6) and reporting non-compliance (ISPM 13); Difficulty in developing pest lists due to the size and diversity in Australia.
Have trained and specialized human resources; Sufficient human resource; Comprehensive understanding of the concepts and scope of the standard to achieve ARPs prepared with all the necessary elements that support the phytosanitary requirements with technical justification
Inadequate specialization in plant protection training: technological packages insufficiency of existing staff which requires capacity building; Lack of adequate Equipment, materials and infrastructures and other means to deal with plant health; Lack of strategies to improve basic phytosanitary activities
The organizational structure of NPPOs does not comply with the provisions of Article 4 of the IPPC (merging of all plant protection tasks) to allow for effective participation in the standards development process and CMP. In [our country], plant protection missions are shared between the Plant Protection Office (ONPV), which carries out surveillance, alert and intervention missions and the National Directorate of Agriculture (DNA), which manages the mission Of Phytosanitary Control. This constitutes a legal shortcoming resulting in ineffective NPPO activities. Efforts should be made to draft legislation taking into account all the provisions of the International Plant Protection Convention (IPPC); Insufficient qualified staff in the field. Specialist needs in the various fields of plant protection; Inadequate infrastructure and equipment.
The organizational structure of the NPPO is not suited for the agency to carry out its mandate; The human resource capacity to implement the standards is severely limited; The facilities provided to the NPPO to carry out its mandate in extremely inadequate. A project submitted 8 years ago to construct a purpose-built facility is currently not funded.
Availability of resources; Personnel with technical experience; Availability of facilities
Availability of sufficient resources; Increasing diversity in combinations of commodities and trading partners and the associated diversity in import requirements; The enormous amount of information requested for PRAs by importing countries.
Lack of resources such as funds and manpower to fully adopt the ISPMs; Crafting of new guidelines, rules, and regulations in line with the ISPMs; Coordination and cooperation of other government agencies in implementing these ISPMs, as well as cooperation and understanding of the different stakeholders.
Provide resources, financial, material and human resources in quantity and quality; Provide training for staff; Provide an effective mechanism for the exchange of information between the NPPO and the various departments of the Ministry of Agriculture and between the NPPO and the other stakeholders involved in phytosanitary matters.
Requires information for ARP; Lack of resources on the spot; Requires a significant number of staff.
Resources; Technical assistance; Availability of qualified staff or personnel
Lack of infrastructure to perform quarantine treatments with irradiation; Lack of trained personnel in the different issues that involve the application of the regulations mentioned above; Budgetary limitation for the execution of activities that allow us to strengthen the processes and to fulfil the goals set according to the regulations.
Lack of materials, training, financial resources and infrastructure; Implementation of ISPMs; Application of PHYTO risk analyses for quarantine organisms.
Lack of modern equipment for inspection and sampling in the course of inspection of imported goods (ISPM 20, para. 5.2.3); The lack of information about on what grounds (reasons) can be considered marked as invalid, and a clear procedure for establishing invalidity of markings on packaging (ISPM 15); The absence of (or failure to update) the phytosanitary requirements of the partner countries on the MFP; lack of information about the requirements for hand-luggage.
There is no possibility of the fumigation of wood-packaging material; There are no drugs in the processing of fruit, other treatments are not widely used due to their high cost.
due to budget constraints, there are difficulties in developing guideline and procedure in the national context; Due to lack of infrastructure and facilities, phytosanitary treatments are not able to perform as required; The NPPO must recruit qualified inspectors for carrying out inspection and PSC certification
Enough financial and human resources for pest risk analysis at import - to prevent introduction and spread of pests at increasing international trade; Enough financial resources and facilities for efficient official

controls of import consignments, including those, coming via border inspection posts in other Member States; Prompt and efficient implementation of phytosanitary measures for eradication and/or prevention of spread of emerging pests.
Financial Resource; Human Resource; Material Resource
Financial resources; Insufficient bilateral communication among NPPOs; Insufficient frank and open discussions at global level (e.g. at CPM, TC or Workshops) on implementation issues and the interpretation of IPPC and ISPMs
Financial support; Lack of personnel
Inadequate funding for implementation of the ISPMs; Lack of special equipment for irradiation treatment which is very key; Lack of state of the art infrastructure in the border posts and airports
Inadequate funding to carry out adequate surveillance therefore the need for technical assistance in determination of pest status and host status; phytosanitary certification challenges such as forgery; inadequate capacity for phytosanitary treatments therefore the need for technical assistance in areas such as irradiation.
ISPM8: 1. More detailed instructions on the pest status definitions 2. Availability of survey data(budget & people) 3. Tools to encourage (early) reporting of notifiable pests/diseases and new emerging problems ISPM 10: 1. (technical and scientific) justification on buffer zones 2. Budget to develop such a system ISPM 11: 1. Small country and EU harmonization/ we rely on PRA's from other bodies (efsa, Eppo ,EU countries), 2. Budget for a whole team not justifiable
Lack of financial support eg. money; Lack of expertise in related field - always rely on technical personnel from outside; Poor resources and the turnover of staff
Limited Financial Resource; Limited Human capacity; Infrastructural challenges
Limited resources like funds posing challenges to have facilities; Limited qualified staff due to staff turnover; Capacity building largely training and some equipment.
There are no sufficient financial resources supporting for the implementation of ISPMs; There are no sufficient qualified Taxonomist for pest identification; Need technical Assistance to support for implementation of ISPMs.
There is insufficient financial resources supporting the implementation of this ISPM; There are insufficient facilities supporting the implementation of this ISPM, e.g. information management system, database of updating pest status.; There is no system or official procedures to communicate and coordinate among stakeholders such as farmers, local officials, educational institution
Capacity; Funding; Facility
Capacity Building- Knowledge to implement the ISPM ; Infrastructure- Facility and building availability; Technologies- Lack equipment's, gears for detections and operational works etc.
Capacity building of phytosanitary officers in the areas of pest reporting, pest identifications and surveillance tools; Upgrading of laboratory equipment in post entry stations and utility infrastructure like vehicles, power etc.; ICT (internet facilities) and communication tools.
Economic, logistical and administrative resources for compliance, implementation and maintenance of ISPMs. Although there is adequate technical staff within the institution, this is not enough to cover the demand for all activities and responsibility involved in compliance and maintenance of ISPMs. In addition, there is no generational relief plan that guarantees the long-term transfer of information and experience; The legislation has legal gaps that do not allow the implementation of pest risk mitigation strategies, such as irradiation, which would allow the expansion of the country's exportable supply of fresh agricultural products; The lack of organization of the productive sector including producers, packers and exporters makes it difficult to implement, implement and maintain ISPMs as a strategy to expand the country's exportable supply of fresh produce. The above, considering that there is no culture of association and company, agricultural production is dispersed and access to technological packages is limited, causing the implementation of export work plans involving IPPC regulations is slow and inefficient.
For the certification department, its challenges are: Training and training of phytosanitary inspectors in the inspection and sampling processes of commodity exports. 1. Greater coverage of phytosanitary inspectors to ensure better quality in container-level inspections and reduce time.

2. Guarantee an automated system from the inspection request and phytosanitary pre-certification. 3. Establish security in shipments through the use of security mark after certification For the area of Plant Protection Surveillance, the strengthening of technical capacities in emerging pests in the face of climate change is of paramount importance. Strengthening of the phytosanitary surveillance system through the adoption of new monitoring techniques, diagnosis of rapid field tests; For the quarantine area the strengthening of technical capacities and infrastructure and equipment is essential to keep the country free of pests.
Insufficient human resources and weak staff capacities that need to be strengthened; Insufficient infrastructure and appropriate equipment; Weakness in the implementation of sustainable operational policies and plans, as well as communication, cooperation and adequate technical assistance from development partners
Lack of competence on national level (assessment of economic, social, environment impact); Lack of communication on regional level; Lack of data for PRA
Lack of financial resources; Infrastructure and equipment are lacking; Insufficient technical staff.
Lack of qualified staff; Lack of material and technical means to carry out some of the ISPM; Some ISPM have a low level of significance for us
Lack of skilled personnel; Lack of laboratory diagnostic equipment & related facilities; Lack of financial resource
Lack of sufficient qualified personnel in specific areas; adequate structure not in place; engaging stakeholder co-operation
Lack of sufficiently trained technical personnel; Insufficient financing; inadequate equipment/tools
Lack of the staff for preparation of PRAs, moreover the specialists must have an adequate experience in preparation of PRA; Interpretation and implementation of ISPM 7 and ISPM 12 in relation with very specific requirements of some contracting parties; ISPM 22: Requirements for the establishment of areas of low pest prevalence. The standard is not fully transposed into national legal acts yet. Although elements of this ISPM is in use for a long period of time.
Limited and lack Institutional infrastructure (human, financial and facility); Lack of qualifies human resources and budgetary support for programs; Limited policy, procedures , sops, and legislative framework
Qualified personnel (human resources); Financial resources; Infrastructure and facilities supporting
Severe staff shortage; Inadequate facilitation to inspectors and lack of collaborative mechanism among the able stakeholders; Lack of enabling environment
There are not sufficient qualified personnel supporting the implementation of this ISPM; There is no sufficient financial resources supporting the implementation of this ISPM; There is no sufficient infrastructure supporting the implementation of this ISPM
There is not enough qualified staff to implement the ISPM; There is insufficient financial resources to implement the ISPM (eg budget or other funding); There is insufficient equipment to implement the ISPM
Unavailability of qualified personals, having technical knowhow on detection, identification and management of pests, developing import regulations, policies, Performing PRAs, and Pest Surveillance; Lack of updated technology and inadequacy of financial resources to continuously manage facilities

Annex 4: General respondent comments

Table 15 2012 general comments

Scoring for moderate response instead of low & high only.
Design different surveys for developing countries to actually identify their critical needs. They are really the weak link in IPPC implementation.
The options to choose from are limited.
It's a good questionnaire
Some questions are not clear, can be interpreted in different ways. This may again reduce the quality of the answers and the value of the survey. The total amount of questions is very high, questions seems to be partly overlapping and repetitive.
Some sections irrelevant e.g., based on responses to previous section (sections 8-11) should prompt N/A response to sections 12-14. Section 15 - should be generic N/A available for those countries that don't receive technical assistance but provide it
[Our NPPO] needs to strengthens all its phytosanitary actions through the support of the International Organizations, especially in technical advice and training opportunities.
Too long. In question 16 why were phytosanitary treatments listed and diagnostic protocols not?
As with previous IPPC surveys the questions are difficult to answer. These surveys need to be tested with someone who is actually going to fill in the responses. Some questions are not logical, e.g. why ask if a standard is relevant when it is listed as having a high degree of implementation? That question should only apply to those with a low degree of implementation. There are many shades of grey between a low and high degree of implementation, similarly between sufficient resources and insufficient resources. What is the difference between "infrastructure" and "facilities" – i.e., why have two separate questions? The survey also fails to recognize that many IPPC standards do not have to be “implemented” as such – i.e. they do not have to be included in a country’s legislation. e.g., no 1, 2 or no 5. Finally, the means of filling in the survey make it very difficult for those filling in the responses to consult with colleagues on possible answers. The Doc or Docx version has many inbuilt constraints to easy use.
It would be prudent to make two surveys instead of a lengthy one. In that way, the participant can complete them at leisure at different times.
There are two sections: "Key factors contributing to a high degree of implementation" that is the opposite to the other section (Key factors contributing to a low degree of implementation". In this case, a country can provide only one answer and not two different answers because this would be contradictory.
There is quite some ambiguity in the questionnaire, e.g. in questions 11 and 12, that we have doubts about the usefulness of the information collected. In a lot of cases the situation is more complex that needs background information that cannot be investigated through this survey.
Thank you for this phytosanitary capacity assessment. We are seeking support from FAO to assist countries to implement ISPMs especially where deficits are noted. [translated from French using Google Translate]
Some of the questions were not well articulated and clarity would have been helpful to ensure that the survey was completed as accurately as possible. In certain cases, the category "This ISPM not very relevant" did not accurately depict our selection. The category "This ISPM is not very useful" would have been more reflective of the intent we wanted to convey.
It would have been interesting to point 8 to integrate assessment levels: level moderate
It is exhaustive, but it is OK, if we are asked the same question from different point of view.
The IPPC is an essential tool for harmonizing common principles for the implementation of essential plant protection measures. However, material, human and financial resources as well as quarantine and diagnostic and analysis infrastructures are lacking for many NPPOs, including [our country]. Technical assistance and support to the NPPOs is a major guarantee of success for the contracting parties in the effective protection of crop production. All aspects of the survey are relevant. For its improvement, it is necessary to facilitate the access to the tables for a good filling [translated from French using Google Translate]
It should be noted that some policy areas fall within the competence of the EU and therefore the implementation on national level may be rated as moderate or low
Provide enough space in text boxes in the word format of the questionnaire. Ensure that the data in the PDF can be saved.

Table 16 2016 general comments

Training of personnel and manuals of procedures (manual) for controllers and training on Laboratory Screening Techniques (PCR)

The completed survey should be available in a printable format.
We need technical and Financial assistance to implement ISPMs. We need to see the prioritization of ISPMs region by region. Thank you for this survey but we need to see how the implementation aspect can be enhanced.
Consider making forms with frozen top flap to facilitate navigation in the page. Provide conditional answers
The IPPC, in spite of its limited resources, is constantly assisting the contracting parties in its implementation, but we are seeking more assistance, especially for African countries that are truly behind schedule.
Useful for future work and a very detailed questionnaire; very similar questions and it is hard to remain concentrated.
1. As we all know the main function of the IPPC is to develop ISPMs. Nonetheless, as the ISPMs are getting bigger and bigger in number their implementation become critically challenging particularly to poorer countries, which have quite limited technical and financial resources. The IPPC should thus seek ways and means on how these technical and financial challenges are addressed. 2. The IPPC should make efforts to raise awareness at the ministerial level. The IPPC should organize ministerial meeting in order to raise profile of the IPPC globally and at the national level. To our knowledge so such meeting has been organized in the past by the IPPC.
This is the most comprehensive survey I have ever done. By all means I have learned a lot and I have more conclusive vision about the deficiencies of our National Agricultural Quarantine System. I hope we will get the technical & financial supports on time to rehabilitate our system and be able to support the International Communities for Better & Safer Food / Enviroment. Great Job
The survey was very extensive yet it was extremely important for Developing Country to provide this sort of feedback. A mechanism should be provided for developing countries to respond, maybe an extended period for response.
There is need for technical assistance for implementation of some of the ISPMs in form of trainings, equipment, infrastructure and financial support
The survey is very long. It is necessary to have a button to save the survey because when you start, you have to finish it. You cannot get back again to the survey because if you exit of the survey, you lose the information.
Require capacity building.
Please add the issue of land lock country and open border with traditional trans-border trade management. Due to land lock country we always depend on [our neighbour] for our trade. One ISPM should issue to address about open border with traditional trans-border trade management.
The questions on the application of ISPMs (section 10) are too extensive and there is no opportunity to add comments per ISPM.
Survey to long. Short summarised surveys better to understand and to fill in
It is not easy to interpret all the questions and we would assume that countries may have interpreted differently. We miss a possibility to print out our draft and finished replies
Surveillance is high priority but not easy to implement well. One reason is several organizations share responsibility without good coordination. Sampling is hard to implement in some quarantine situation. Irradiation is acceptable as quarantine treatment but not implemented due to conflict with food safety regulation. There are too many questions and some of them overlap.
It's a bit too repetitive to some questions but overall is ok.
Yes/No questions about ISPMs could have one of these values already filled in (probably Yes)
It is expedient and relevant to put in place a phytosanitary legal framework for [our country] to enhance international trade and improve food security for the country.
Some questions in this survey are duplicate and has the error in section 7 and 8: Section 7: "Your country has designated a contact point and posted on the IPP (Art. VIII, 2)" Section 8 : "DP09: Genus Anastrapha Anastrepha Schiner"
I thank the team for involving me in this survey. I look forward to future support to enable Uganda fulfil the IPPC obligations.
Difficult to judge objectively from your country's standpoint. Way it is designed is not objective – would be good to have survey on other countries, to be able to provide examples anonymously. For section 8, It would be helpful if more specific criteria and better explanations. Suggest having the CDC develop the survey next year.

IPPC

The International Plant Protection Convention (IPPC) is an international plant health agreement that aims to protect global plant resources and facilitate safe trade. The IPPC vision is that all countries have the capacity to implement harmonized measures to prevent pest introductions and spread, and minimize the impacts of pests on food security, trade, economic growth, and the environment.

Organization

- There are over 180 IPPC contracting parties.
- Each contracting party has a national plant protection organization (NPPO) and an Official IPPC contact point.
- 10 regional plant protection organizations (RPPOs) have been established to coordinate NPPOs in various regions of the world.
- IPPC liaises with relevant international organizations to help build regional and national capacities.
- The Secretariat is provided by the Food and Agriculture Organization of the United Nations (FAO)

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