

EPPO technical workshop for inspectors on risk-based sampling and inspection

Swiss Federal Office for Agriculture
Schwarzenburgstrasse 165, 3097
Liebefeld, Bern
Switzerland

2023-04-26/28



Workshop 2023





Acknowledgements

Eppo gratefully acknowledges our local Workshop organisers



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
Federal Office for Agriculture FOAG

Eppo gratefully acknowledges our organising committee and collaborators on the Workshop



Animal &
Plant Health
Agency



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
Federal Office for Agriculture FOAG



Ministry of Food, Agriculture
and Fisheries of Denmark
Danish Agricultural Agency



Table of contents

Programme	4
Book of abstracts: oral presentations and practical sessions	
Oral presentations	
The role of EPPO in supporting risk-based sampling and inspection	7
What is risk-based sampling?	8
Risk-based sampling: the statistics behind the scene	9
Reduced checks of plants and plant products at import: a risk-based and data driven system	10
Introduction to scenario exercise: critical points for risk-based surveys	11
Oral presentations	
Risk-based survey of <i>Agilus planipennis</i> in Estonia	12
Risk-based inspection of plans for planting for the detection of EU-pests	13
Evaluating a risk-based sampling inspection scheme for plant pests and diseases on Mexican produce imported by truck	14
Pleasures and Pains of Risk-Based Sampling	15
NoBa Landcover Retriever helps determine areas to be used for EFSA tools	16
Practical session 1: Risk-based versus percentage-based sampling	17
Practical session 2: EU member State survey using EFSA tools	22
Practical session 3: Risk-based sampling of consignments	23
Risk based sampling of woody plants	24
Risk based sampling of tomato seed: ToBRFV	25
Risk based sampling of wood samples	26
Risk based sampling of fruit and vegetables	27
Oral presentations	
Survey programme in Lombardy: criteria and tools for planning sampling and data collection	28
Rapid testing technologies – can they help plant health inspectors?	29
Discussion session: technologies for risk-based sampling	30
Notes	31
Useful information	33
Information on EPPO	38



Programme

Technical Workshop for inspectors on risk-based sampling and inspection

Wednesday, April 26

13:00 **Registration**

14:00 **Opening**

Risk-based sampling: setting the scene (Chair: Andreas von Felten)

14:10 **The role of EPPO in supporting risk-based sampling and inspection**

Nico Horn, EPPO

14:30 **What is risk-based sampling?**

Derek McCann, GB

14:40 **Risk-based sampling: the statistics behind the scene**

José Cortiñas Abrahantes, IT, EFSA

15:00 **Reduced checks of plants and plant products at import: a risk-based and data driven system**

Jeroen Stellingwerf, NL

15:20 **Introduction to scenario exercise: Critical points for risk-based surveys**

Rob Tanner, EPPO

15:30 **Coffee**

Case studies (Chair: Nico Horn)

16:00 **Risk-based survey of *Agrilus planipennis* in Estonia**

Mart Kinkar, EE

16:20 **Risk-based inspection of plants for planting for the detection of EU-pests**

Michiel Koning, NL

16:40 **Evaluating a risk-based sampling inspection scheme for plant pests and diseases on Mexican produce imported by truck**

Barney Caton, US

Practical session 1

17:00 **Practical session: risk-based vs percentage-based sampling**

Rob Tanner, EPPO

18:30 **Close of day**



Programme

Technical Workshop for inspectors on risk-based sampling and inspection

Thursday, April 27

Case studies (Chair: Lis Stenstrup)

- 08:45 **Pleasures and pains of risk-based sampling**
Andrew Robinson, AU
- 09:05 **NoBa Landcover Retriever helps determining areas to be used for EFSA tools**
Aino-Maija Alanko, Juha Tuomola, Salla Hannunen, FI

Practical session 2

- 09:30 **EU Member State survey using EFSA tools**
Sybren Vos (IT), Tomasz Kaluski (IT), Ignazio Graziosi (IT), José Cortiñas Abrahantes (IT)
- 11:00 **Coffee**
- 11:20 **Resume EFSA session**
- 12:00 **Group feedback and discussion**
- 13:00 **Lunch**

Practical session 3

- 14:00 **General introduction to the session and common elements**
(TBC)
- 14:15 **Risk-based sampling of consignments**
Andreas von Felten (CH), Carmen Escudero-Sanchez (GB)
- 15:15 **Coffee**
- 15:45 **Continue Risk-based sampling of consignments**
- 16:45 **Re-set (Kelvin Hughes, GB)**
- 17:00 **Close of day**
- 18:45 **Walk around the city**
- 20:00 **Workshop dinner**



Programme

Technical Workshop for inspectors on risk-based sampling and inspection

Friday, April 28

Discussion session 1: Risk-based Scenario

08:45 **Summary and discussion of the scenario board**

Discussion session 2: Technologies for risk-based sampling (Chair: Sybren Vos)

09:45 **Survey programme in Lombardy: criteria and tools for planning sampling and data collection**
Mariangela Ciampitti, IT

10:05 **Rapid testing technologies- can they help plant health inspectors?**
Neil Boonham, GB

10:25 **Coffee**

11:00 **Brain storming – World Café**

12:15 **Wrap up of brainstorming**

12:50 **Final observations and conclusions**

13:00 **Close**

Acknowledgements

Eppo would like to acknowledge and thank the local organisers for all of their work in preparing and facilitating this inspectors Workshop



Book of Abstracts Oral Presentation

The role of EPPO in supporting risk-based sampling and inspection

Nico Horn, EPPO

The European and Mediterranean Plant Protection Organization (EPPO) is responsible for cooperation and harmonization in plant protection within the European and Mediterranean region. EPPO's regional inspection Standards are part of a series called PM 3 *Phytosanitary Procedures*. Standards in this series describe methods for performing inspections of commodities moving in trade, field inspections or surveys for quarantine pests. They include guidance on risk-based inspection and sampling for the detection of pests of concern for the EPPO region. Other elements of EPPO's work, important for risk-based inspection and sampling, include pest risk analysis (PRA), horizon scanning, up-to-date information on pest biology and pest distribution, and interception reports along specific pathways. EPPO conducts PRAs and pathway analyses and develops pest lists to inform member countries. These activities assist NPPOs in the region to determine where to target their plant health resources and what legislative changes to implement in order to effectively deal with current and emerging plant health threats. One of the basic questions for countries is which pests to be concerned with. To address this concern, EPPO maintains lists of pests recommended for regulation. The EPPO A1 list includes pests which are absent from the EPPO region and considered to have an unacceptably high risk to the region. The A2 list includes species that are present in some but not all EPPO countries and that have been shown to have an unacceptably high risk. Another valuable tool for risk-based inspection and Risk-Based Sampling in the EPPO region is the EPPO Global Database. The database provides pest-specific information produced or collected by EPPO. Information of specific relevance to inspectors includes geographic distribution useful in targeting inspection on imports from high-risk origins, on specific host plants or host commodities. In EPPO Global Database, detailed information is available on more than 1800 pest species. Finally, summary notifications of non-compliance from EPPO member countries are published in the EPPO Reporting Service. This also helps inspectors to target import inspections.



Book of Abstracts Oral Presentation

What is risk-based sampling?

Derek McCann, GB

In this talk I will attempt to introduce definitions surrounding Risk-Based Sampling and Survey and provide examples of its application in the United Kingdom. As inspectors we cannot inspect every plant, tree or produce that is grown commercially, is imported or exported, or is already present in the wider environment. If we can't inspect everything, we have to accept that we may miss some things so decisions are needed on where to direct efforts with the resources available accepting a level of risk. Risk-Based Sampling can be defined as 'an inspection design that takes account of the probability of detection to determine the sample size for inspection. It consistently achieves a specific level of detection and confidence and is adjusted to correspond to the different levels of risk' (NAPPO) and Risk-Based Surveillance can be defined as 'a survey design that allows differentiated sampling efforts based on risk factors and targets the survey effort in the corresponding proportion of the target population' (EFSA). In practice this means that the number of plants, trees or produce inspected in a consignment will vary depending on the level of infestation that the inspection is aiming to find, the size of the consignment to be inspected and the pest risk based on previous inspections. In addition, survey to determine presence, absence or population change can be directed to locations with a higher likelihood of pest presence making best use of valuable resources.



Book of Abstracts Oral Presentation

Risk based sampling: the statistics behind the scene

Jose Cortinas Abrahantes, IT

When planning and conducting risk-based surveillance or sampling, specific statistical principles need to be used. The principles should be based on a probabilistic assessment that uses the binomial distribution. This ensures that the sampling representing the part of the population that is more at risk contributes in a more substantial way to the confidence in absence than the part of the population that is less at risk. Then based also on binomial principles, the samples from each group can be combined to ensure specific confidence of freedom for the overall population under investigation.



Book of Abstracts Oral Presentation

Reduced checks of plants and plant products at import: a risk-based and data driven system

Jeroen Stellingwerf, NL

As a basis products which are subjected to inspection at import should follow a 100% checking regime including identity and physical checks. In reference to Regulation (EU) 2017/625, the regulation (EU) 2022/2389 establishes the rules under which reduced frequencies of these checks are established. As stipulated by the regulation the frequencies are under continuous, at least annually, review and may be adjusted based on the determined risks. In this presentation an overview of the system will be provided including the risk assessment methodology applied. The presentation will also highlight the advantages and limitations of the system.



Scenario exercise Critical points for risk-based surveys

Throughout the Workshop there will be a board placed in the main meeting room and on it the following scenario:

It is Friday lunch time and a grower has reported the following to the inspection service:

'Following the harvest of apples, his workers have noticed some worrying symptoms, I have some samples here. However, they did not keep the fruits apart nor did they mark which trees the fruit and leaves with symptoms were collected. The orchard is 100 hectares. They are very concerned and want some immediate action'.

Participants are asked to add comments on post-it notes under each heading in the matrix to identify aspects in your working environment that will promote or limit your ability to carry out the required task.

The headings are:

Resources	Information	Equipment/tools
Training	Diagnostics	Communication

During the discussion session 1, on Friday morning, we will summarise the main findings and discuss the main barriers.



Malus domestica (MABSD) - <https://gd.eppo.int>



Book of Abstracts Oral Presentation

Risk-based survey of *Agrilus planipennis* in Estonia

Mart Kinkar, EE

Agrilus planipennis (Coleoptera: Buprestidae) is an EPPO A2 Pest. It is native to Asia and has spread to North America and the EPPO region. In North America, *A. planipennis* was first reported in 2002 and as of 2020 it was found in 35 US States and five Canadian provinces. In the EPPO region, it occurs in Russia and Ukraine. *A. planipennis* has infested and killed ash trees in Asia where the pest is native as well as in Europe and North America where it has been introduced. The presentation will give an overview of the planning and implementation of the *A. planipennis* survey in Estonia. In 2020, *A. planipennis* was found in Russia, Petrodvorets region, about 110 km from the Estonian border. Therefore, in recent years the survey of *A. planipennis* in Estonia has been mainly focused near the Russian border, where the probability of finding the pest is highest. To determine the location of host trees we have conducted a general survey of ash trees in the high-risk area. This information has proved to be most useful when allocating the traps and survey sites within the survey area. So far *A. planipennis* has not been detected in Estonia.



Book of Abstracts Oral Presentation

Risk-based inspection of plants for planting for the detection of EU pests

Michiel Koning, NL

As quarantine and Regulated Non-Quarantine Pests continue to increase within the European Union's borders, the risk of those pests finding their way to other EU countries also increases. To limit the risk of pests establishing in a country, it is important to know what pests may enter and from what countries these possible threats are coming from. In addition, it is important to know what host plants are imported from those areas into the EU. To carry out the role of a Plant Health inspector today, it is not only important to inspect plants imported from non-EU countries, but also plants that are shipped within the EU. Therefore, this presentation will give an overview of the pests that are a threat to the plants for planting I inspect on a day-to-day basis (trees, shrubs and perennials). This presentation will provide insights on the current situation within EU borders and how to prevent establishment of these pests in the future.



Book of Abstracts Oral Presentation

Evaluating a risk-based sampling inspection scheme for plant pests and diseases on Mexican produce imported by truck

Barney Caton, US

We evaluated outcomes from a risk-based sampling (RBS) inspection trial for pests and diseases on four Mexican commodities imported by truck into the United States of America. In the RBS scheme used, frequencies of inspection were dynamically adjusted for commodities in response to detections or consecutive pest-free exams. Here we evaluated results from September 2018, to December 2020, for four commodities: avocado, broccoli and cauliflower (combined), celery, and papaya. Some commodities were managed by region (Texas versus Arizona and California). We compared rates per shipment for pest actions, inspections, and leakage (clearing potentially infested shipments), as well as time savings and the pest diversity before and during the trial. We found few significant differences in overall or monthly mean pest action rates under RBS. Thus, RBS did not affect detection rates, but incentives also did not improve quality during the trial. Inspection rates under RBS dropped greatly for avocado and papaya but were more variable for broccoli+cauliflower and celery. Estimated leakage per month increased only slightly during the trial, and only significantly for celery. Mean monthly inspection times over all commodities decreased by 59 percent and were significant for all except Texas region celery. Taxonomic diversity of pests changed only for papaya during the trial, but for all commodities the top taxa detected were usually no different before and during. We had few recommendations for improving the RBS inspection scheme, which seems well suited to broader application to improve agricultural safeguarding.



Book of Abstracts Oral Presentation

Pleasures and Pains of Risk-Based Sampling

Andrew Robinson, AU

The Australian federal Department of Agriculture, Fisheries and Forestry implemented Dodge's Continuous Sampling Plan (version 3) as part of a regulatory package for its compliance-based inspection scheme (CBIS) about 10 years ago. This initiative arose from close engagement with the Centre of Excellence for Biosecurity Risk Analysis (CEBRA, called ACERA at the time). In the past 10 years the savings of time and border effort have been considerable: nearly 100 000 hours of low-risk inspections have been redirected, amounting to a savings of more than 15 millions of dollars of inspectorate effort. The program has been expanded to cover 68 plant commodities or unique import pathways and can be considered an outrageous success. However, the interface between CBIS and regulatory infrastructure has been challenging, and the downside risks and impediments are not negligible. I will talk about the background, successes, and challenges of the DAFF CBIS program and the learnings arising for independent research providers.



Book of Abstracts Oral Presentation

NoBa Landcover Retriever helps determining areas to be used for EFSA Tools

Aino-Maija Alanko, Juha Tuomola, Salla Hannunen, FL

Statistical assessment and planning of quarantine pest surveys require data on the target population and the potential entry sites of the pest, which is often impossible to get without GIS skills and special programs. We have developed an open access easy-to-use web application called NoBa Land Cover Retriever (NoBa LCR), which can be used for retrieving such data from the Corine Land Cover inventory. The countries currently included in the app are Estonia, Finland, Lithuania, Norway and Sweden.

NoBa LCR has been tailored for retrieving the data needed for analyzing and planning risk-based surveys in which a) the relative risk of each administrative region depends on the area or number of entry sites in the region, or b) the target population is divided into risk areas that are close to entry sites and baseline areas that are further away from entry sites. The results can be explored on an interactive map and downloaded in the different formats. In my presentation I will show, how the app works and how can we use it in survey planning.



Practical session 1

Risk-based versus percentage-based sampling

Inspections traditionally conducted at ports of entry are based on sampling a percentage of the consignment. Traditional inspections usually stop when the inspector finds a pest, irrespective of whether the entire sample was inspected or not.

For Risk-Based Sampling (RBS) it is necessary to calculate the sample size based on the consignment size taking into consideration a maximum acceptable infestation level or percent infestation to be detected in a consignment (for example, 10 %). In this type of sampling, the level of confidence and the probability that a consignment with a degree of infestation higher than the detection level will be detected are also defined. A 95% confidence level indicates that sampling will detect a non-compliant consignment an average of 95 out of 100 times.

The objective of this exercise is to demonstrate how percentage-based sampling and RBS differ with respect to efficacy and consistency of results. For this exercise we will compare percentage-based sampling at 2 % (as used in some countries) with RBS: Below we list the required materials and instructions on how to conduct the exercise.

Conducting the exercise:

Materials

Five bags labelled:

- (1) Consignment size 100
- (2) Consignment size 500
- (3) Consignment size 1000
- (4) Consignment size 2000
- (5) Consignment size 5000

Conducting the exercise

Percentage based sampling (2 %)

Sample size calculation: Calculate a sample size of 2 % for each consignment

Consignment or lot size	2% sample = # of beans to sample from each bag
100	2
500	10
1 000	20
2 000	40
5 000	100



Sampling procedure

- Work with one consignment size at a time.
- To take a sample, remove a single bean out of the bag.
- Do not return the beans to the bag until you finish your sample.
- If you find a dark-colored bean (= an infestation) before completing your 2% sample (see table above), record the number of beans you removed before finding the infestation in the results table below. Return all the beans to the bag and shake the bag before resampling.
- If you complete your 2% sample without finding an infestation, record your result as "no detection." Return all the beans to the bag and shake the bag before resampling.
- Repeat the process 3 different times for each consignment size.

Calculate the results

- For each consignment size, calculate the mean number of beans you sampled before detecting the infestation. See example below for a consignment size of 5 000:

Assay 1 = 23 samples (beans) taken before finding a dark bean

Assay 2 = 28 samples (beans) taken "..."

Assay 3 = 27 samples (beans) taken "..."

Calculate the mean: $23+28+27=78/3=26$

- Now calculate the mean percentage sampled:

$$26/5000 = 0.0052$$

$$0.0052 * 100 = 0.52\%$$

In this example, 0.52% was the true percentage sampled to find the infestation in the consignment.

If the result of one or more of your assays was "no detection" for a determined consignment size, then record "no detection" for that sample size.

Acknowledgements

EPPO would like to acknowledge and thank USDA for permitting the use of this practical exercise and text

Practical session 1



Recording and presenting the data

Use the table below to record your sampling data, including the mean and the true percentage sampled. See example below for a consignment size of 5,000.

Consignment size	Sample size 2 % rate	Number of samples taken before finding the infestation			Results	
		Assay 1	Assay 2	Assay 3	Mean	True percentage sampled
100	2					
500	10					
1 000	20					
2 000	40					
5 000	100	23	28	27	26	0.52%

Risk-Based sampling - RBS

Calculate the sample size: use RiBESS+ to calculate the sample size. Use a 10 % detection level and a 95 % confidence level. These parameters result in the following sample size per consignment:

Consignment or lot size	Sample size
100	25
500	28
1 000	29
2 000	29
5 000	29

Practical session 1



Sampling procedure

- As before, for each consignment and without looking inside the bag, remove one bean at a time until you find an infestation or until completing the sample size indicated in the table.
- When you find a dark bean, count the number of beans sampled before finding the infestation and record the data in the table and continue sampling until you reach the calculated sample size.
- Return all beans to their bag and mix them up before repeating the assay.
- Repeat the sampling process for each consignment three times.

Calculate the results

- As above, calculate the mean samples taken from each consignment.
- Then, divide the mean by the total number of beans in the consignment.
- Multiply that number by 100 to determine the percentage of beans sampled before finding the infestation.
- If the result is "no detection" in any of the assays for a specific consignment size, then record "no detection" for that consignment size.

Recording and presenting the data

As above, record your results in the table below

Consignment size	Sample size	Number of samples taken before finding the infestation			Results	
		Assay 1	Assay 2	Assay 3	Average	Percentage
100	25					
500	28					
1 000	29					
2 000	29					
5 000	29					

EU Member State survey using EFSA tools

This is a practical session for survey design of risk-based surveys. The aim of this session is to guide the participants through the five different steps of a survey process i.e.:

- (1) Initiation,**
- (2) Preparation,**
- (3) Design,**
- (4) Implementation,**
- (5) Conclusion.**

Following this process enables the surveyors to conduct robust surveys that are statistically sound and risk based allowing to compare in time and space the conclusions of the surveys, thus harmonising the surveys for a specific pest. The practical session will focus on the preparation and design of detection surveys for different pests of general interest using the **RiPEST** application (that is currently in piloting phase). The participants will learn how to make estimations of a survey effort that would provide a good representation of their survey area, that would allow to infer the conclusions to the entire survey area.

Using the Pest survey cards and their expert knowledge the participants will characterise

- 1. The plant pest and understand the life cycle of the pest**
- 2. The target population and its structure estimating the size of the host population for each subdivision**
- 1. The detection method for estimating its performance in terms of method sensitivity**

Using the RiPEST application this information will be captured in the tool indicating the assumptions and the survey effort can be calculated in number of inspections, visual examinations, sampling and testing.

The participants will be divided into smaller groups and will work through the exercise together. Each group will present their results and discuss their results with all during a feedback session.

- Scenario: *Agilus planipennis* available [here](#)
- Scenario: ToBRFV available [here](#)
- Scenario: *Bursaphelenchus xylophilus* available [here](#)

Preparatory materials are openly available at:
<https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/index>

An EFSA glossary of terms and definitions relevant for the EFSA tool kit can be found [here](#)





Practical session 3

Risk-based sampling of consignments

This session will provide participants with practical experience of sampling several different commodities using risk-based sampling. Participants will be divided into groups and will move around workstations where they will be presented with commodities packaged according to their composition.

Participants will identify and describe the relevant pests and symptoms on different consignments, visual examination on detecting pests:

- (1) Sampling of woody plants, including leaf sampling
- (2) Seed sampling from seed bags
- (3) Wood sampling for pine wood nematodes
- (4) Sampling of fruits and vegetables

Participants will also need to consider other factors which may have an influence on the risk of introducing pests: experience with origin/shipper, experience with the results of previous inspections, quality of the consignment (different lots), commodity and intended use; The ability to detect in a consistent manner the presence of a regulated pest with the desired confidence level requires practical and statistical considerations, such as the probability of detecting the pest, the number of units making up the lot, the desired confidence level, and the sample size (i.e. the intensity of inspection).





Practical session 3

Risk based sampling of woody plants for planting

Background

This session will focus on implementing risk-based sampling and inspection procedures primarily aimed at preventing the introduction of harmful organisms that are of regulatory interest into the EPPO region via imported consignments of woody plants for planting.

A good knowledge of pests and their symptoms is necessary in order to carry out a thorough physical inspection. Detailed information for pest species that are of regulatory interest can be found in the [EPPO Global Database](#). It provides information such as the geographical distribution (with a world map), host plants, categorization (quarantine status), and pictures.

Sampling for physical checks shall be carried out considering ISPM31 Standard – Methodologies for sampling of consignments. This standard provides guidance to national plant protection organizations (NPPOs) in selecting appropriate sampling methodologies for inspection or testing of consignments to verify compliance with phytosanitary requirements. The sampling methodologies include parameters such as acceptance level, level of detection, confidence level, efficacy of detection and sample size.

During this practical demonstration, participants will:

- Discuss aspects of risk-based sampling of consignments of woody plants for planting,
- Review factors to consider when planning and evaluating the phytosanitary risk of consignments,
- Review aspects to perform physical checks on imports consignments: lot identification, risk-based sample rate, and inspection techniques
- Gain hands on experience in sampling and conducting physical checks on woody plants for planting (potential pests and symptoms to look for).
- Discuss and apply measures on the packaging of samples to ensure they arrive in good condition to ensure an accurate diagnosis.

Useful references

[EPPO \(2021\) PM3/76 \(2\) Trees of *Malus*, *Pyrus*, *Cydonia* and *Prunus* spp.: Inspection of places of production EPPO Bulletin 51, 354-386.](#)

[EPPO \(2022\) PM 3/81 \(3\) Inspection of consignments for *Xylella fastidiosa*. EPPO Bulletin 52, 544-556.](#)

[EPPO \(2022\) PM 3/82 \(3\) Inspection of places of production for *Xylella fastidiosa*. EPPO Bulletin 52, 557-571.](#)



Practical session 3

Risk based sampling of tomato seed: Tomato brown rugose fruit virus (ToBRFV)

Background

ToBRFV is an EPPO A2 pest. ToBRFV has a wide range of symptoms on leaves, pedicels and fruits. However, symptoms are not visible on seeds. Tomato (*Solanum lycopersicum*) and pepper (*Capsicum annuum*) are the only confirmed natural hosts of ToBRFV. ToBRFV was also detected infecting naturally growing weed species (*Chenopodium murale* and *Solanum nigrum*) in infected tomato crops in Israel. In inoculation trials, various plants proved to be artificial hosts. Sampling tomato seed should be carried out according to EPPO (2021). As seed infestations generally do not produce visible symptoms on tomato seed, representative samples from consignments should be taken to the laboratory for detection of infection and for identification. The size of the submitted sample and the number of seeds in a working sample for laboratory testing are independent of the size of the consignment when representative sampling in the consignment is carried out according to the ISTA rules. Generic RT-PCR tests may be used for screening but they also detect other tobamoviruses. Specific molecular tests may also be used for the detection of ToBRFV. A technique for the detection of plant viruses that relies on the serological method enzyme-linked immunosorbent assay (ELISA) was adapted successfully for the detection of tobamoviruses. ELISA is considered to be a robust technique and enables the detection of viral capsid protein subunits of tobamoviruses. Commercial serological kits are available; however, these ELISA kits are not species-specific; ToBRFV antisera were found to cross-react with other tobamoviruses.

During this practical demonstration, participants will:

- Discuss aspects of risk-based sampling of large and small lots of seed,
- Calculate the amount of seed to be tested by the laboratory,
- Review the methods of sending samples,
- Consider composite sampling for hosts of ToBRFV,
- Gain hands on experience in sampling seed lots,
- Discuss and apply measures to ensure good hygiene practices during the inspection

Useful references

[EPPO \(2023\) *Tomato brown rugose fruit virus*. EPPO datasheets on pests recommended for regulation.](#)

[EFSA \(2022\) Pest survey card on Tomato brown rugose fruit virus.](#)

[EPPO \(2022\) PM 7/146 \(2\) *Tomato brown rugose fruit virus*. *EPPO Bulletin* **52** 665-692.](#)

[EPPO \(2020\) Pest risk analysis for tomato brown rugose fruit virus. EPPO, Paris.](#)

[EPPO \(2021\) PM 3/80 \(2\) Consignment inspection of seed of *Solanum lycopersicum* and its hybrids. *EPPO Bulletin*, **51**, 397-403.](#)

[ISTA \(2023\) International Rules for Seed Testing, Vol. 2021, Chapter 2 Sampling, i244\(52\)](#)



Practical session 3

Risk based sampling of wood for *Bursaphelenchus xylophilus*

Background

This session will focus on implementing risk-based sampling and inspection procedures primarily aimed at preventing the introduction of *Bursaphelenchus xylophilus* into the EPPO region via imported consignments of wood.

Bursaphelenchus xylophilus is an EPPO A2 pest that is vectored by *Monochamus* spp. The nematode is mainly found in *Pinus* species. Other conifers (*Abies*, *Cedrus*, *Larix*, *Picea* and *Pseudotsuga*) can also act as hosts but reports of damage are rare. Living *B. xylophilus* can be found in various types of wood of host species, including standing or fallen trees, round wood, sawn wood, and wood products such as coniferous wood packaging material, as well as in sawdust, wood chips and particles, wood waste, untreated furniture and handicrafts. Infected wood is the most probable mean of international transport of *B. xylophilus*, and the species has been intercepted on a few occasions on sawn wood, round wood and wood chips imported into the EPPO region from the USA, Canada and Asia.

Generally, no symptoms would be evident on wood commodities. Wood with larval tunnels, oval entrance holes and circular grub holes (emergence holes) can provide indications of the vector but in sawn wood normally no exit holes will be visible, but larval tunnels may be seen. Guidance on sampling is given in EPPO Standard PM 9/1 (6). Nematodes can be extracted from the samples using the standard nematode extraction method (Baermann funnel method) or modifications for 48 h.

During this practical demonstration, participants will:

- Discuss aspects of risk-based sampling of wood,
- Calculate the amount of woodchips to be tested by the laboratory,
- Review the methods of sending samples,
- Gain hands on experience in sampling wood material,
- Discuss and apply measures to ensure good hygiene practices during the inspection

Useful references

[EPPO \(2020\) EPPO Datasheet: *Bursaphelenchus xylophilus*. EPPO Global Database](#)

[EPPO \(2019\) PM 3/87 Monitoring and consignment inspection of wood chips, hogwood and bark for quarantine pests. EPPO Bulletin, 49, 505-523.](#)

[EPPO \(2013\) PM 7/119 Nematode extraction. EPPO Bulletin, 43, 471-495.](#)

[ISPM 27 Annex 10 DP:10 *Bursaphelenchus xylophilus*. FAO, Rome IT](#)



Practical session 3

Risk based sampling of fruit and vegetables

Background

This session will focus on implementing risk-based sampling and inspection procedures primarily aimed at preventing the introduction of harmful organisms that are of regulatory interest into the EPPO region via imported consignments of fruit and vegetables. Specimens of the most common regularly intercepted fruit and vegetables will be used in this practical exercise, concentrating in the pest species regularly intercepted on them (included in EPPO A1 and A2 lists).

A good knowledge of pests and their symptoms is necessary in order to carry out a thorough physical inspection. Detailed information for pest species that are of regulatory interest can be found in the [EPPO Global Database](#). It provides information such as the geographical distribution (with a world map), host plants, categorization (quarantine status), and pictures.

Sampling for physical checks shall be carried out considering ISPM31 Standard – Methodologies for sampling of consignments. This Standard provides guidance to national plant protection organizations (NPPOs) in selecting appropriate sampling methodologies for inspection or testing of consignments to verify compliance with phytosanitary requirements. The sampling methodologies include parameters such as acceptance level, level of detection, confidence level, efficacy of detection and sample size.

During this practical demonstration, participants will:

- Discuss aspects of risk-based sampling of fruit and vegetables consignments,
- Review factors to consider when planning and evaluating the phytosanitary risk of consignments,
- Review aspects to perform physical checks on imports consignments: lot identification, risk-based sample rate, and inspection techniques
- Gain hands on experience in sampling and conducting physical checks on fruit and vegetables (potential pests and symptoms to look for).
- Discuss and apply measures on the packaging of samples to ensure they arrive in good condition to ensure an accurate diagnosis.

Useful references

[EPPO \(2020\) PM 3/ 90 \(1\) Inspection of citrus fruit consignments, EPPO Bulletin, 50 383-400.](#)

[EPPO \(2021\) PM 3/92 \(1\) Consignment inspection of fresh fruit and vegetables for fruit flies EPPO Bulletin 51, 406-417.](#)

[IPPC \(2016\) ISPM 31 Methodologies for Sampling of Consignments](#)

[IPPC \(2016\) ISPM 23 Guidelines for inspection](#)

[IPPC \(2017\) ISPM 20 Guidelines for a phytosanitary import regulatory system](#)

[IPPC \(2019\) ISPM 5 Glossary of phytosanitary terms](#)



Survey programme in Lombardy: criteria and tools for planning sampling and data collection

Mariangela Ciampitti, IT

In Lombardy (Italy), the ability to plan pest surveillance and related sampling activities has been refined over the years. The field data processed, and the risk assessment conducted on a multidisciplinary level form the basis of the annual and multiannual planning. The experience gained by field technicians as well as data managers, combined with the need for reporting survey data according to EU regulations, enabled the development of a web application for data collection. During the presentation, the tools used in Lombardy will be illustrated and practically demonstrated.



Rapid testing technologies – can they help plant health inspectors?

Neil Boonham, GB

Over the last twenty years there has been a revolution in the use of technology in diagnostic testing laboratories. Primarily, as methods based on molecular biology methods have started to become more widely adopted. These methods have contributed in many areas including identification (DNA-barcoding, PCR and qPCR), surveillance (qPCR) and early detection (qPCR). They typically provide benefits in terms of reducing the speed of testing, increasing the precision and reducing the costs. In the last decade high throughput sequencing (HTS) methods have changed our approach to virology (detection, discovery and surveillance) and will undoubtedly revolutionise all diagnostic disciplines in the coming years. The SARS-COV2 pandemic has improved everyone's literacy and use of modern diagnostic tools, with Lateral Flow Devices (LFDs) becoming commonly used in the home and wider discussions around the relative benefits compared to PCR. Work has progressed on the development of identification tools for use in the field by inspectors. Primarily based on LFD and Loop mediated AMPlification (LAMP) technologies, yet despite providing results with a comparable degree of accuracy to laboratory methods, adoption has been slow. Other technologies (automatic surveillance using drones, smart phones, machine learning, artificial intelligence, and novel sensor technologies) are becoming common place in farming and show significant potential for aspects of inspector work. The talk will explore the various technologies available, the potential applications and benefits and will seek to initiate a conversation about technology use and future uptake by plant health inspectors.



Discussion session: Technologies for risk-based sampling

Within this interactive session, participants will be divided into small group and discuss key areas in phytosanitary inspections where additional tools or information will help support their roles in risk-based sampling.

Specifically, each group will discuss, and answer questions based around:

- (a) DNA/LFD based identification methods
- (b) Remote imaging techniques
- (c) Volatile detection techniques
- (d) Smart surveillance technologies
- (e) Statistical RBS tools
- (f) 'Dream' technologies

The three questions are:

- (1) How could (a-e) support field inspections of known and unknown targets of interest?
- (2) How can sampling linked to (a-e) be improved to increase sensitivity of detection?
- (3) What restrictions may there be when applying each technology if applied in the field and how could these be overcome?

Towards the end of the sessions each group will present their answers to the whole group and this information will be highlighted at the next EPPO Panel on Phytosanitary Inspections.

Technique used: World Café

Some explanation on the World Café

A World Café or Knowledge Café is a structured conversational process in which groups of people discuss a topic at several tables, with individuals switching tables periodically and getting introduced to the previous discussion at their new table by a "table host". A café ambience is created in order to facilitate conversation. As well as speaking and listening, individuals are encouraged to write or doodle on the tablecloth so that when people change tables, they can see what previous members have written as well as hearing the table host's view of what has been happening.




Useful Information

Travel to Bern

Every 30 minutes there is a direct train from the airports in Zürich (1hour 15 minutes) or in Geneva (about 2 hours) to Bern. The train departures can be consulted on the following webpage: <http://www.sbb.ch/en/home.html>.

Using public transport in Bern

With the hotel reservation you will receive also the Bern ticket, which is a free ticket for the public transport in the centre of Bern. You will receive a Bern ticket for each day of your stay.

To get the ticket you have to download the "Welcome Bern" App  in the play store or APP store and you need your booking number of the hotel. Details of the procedure to activate your tickets can be found using the link below.

[Bern Ticket Instructions - Bern Welcome](#)

Travel from Bern main station to the meeting venue

Public transport:

Train:

Take train S 6 on platform 13 direction Schwarzenburg till **stop Liebfeld** (Second stop, about 6 minutes). Trains are leaving every 30 minutes at XX:06 or XX:36. For details see: <http://www.sbb.ch/en/home.html>

(Important: The Bern ticket cannot be used in trains and a separate ticket is therefore needed!)

Bus:

Take bus 10 at "Kante I" close to Loeb (Figure 1) till **stop Liebfeld, Liebfeld Park** (about 10 minutes). The buses leave every few minutes.

Useful Information

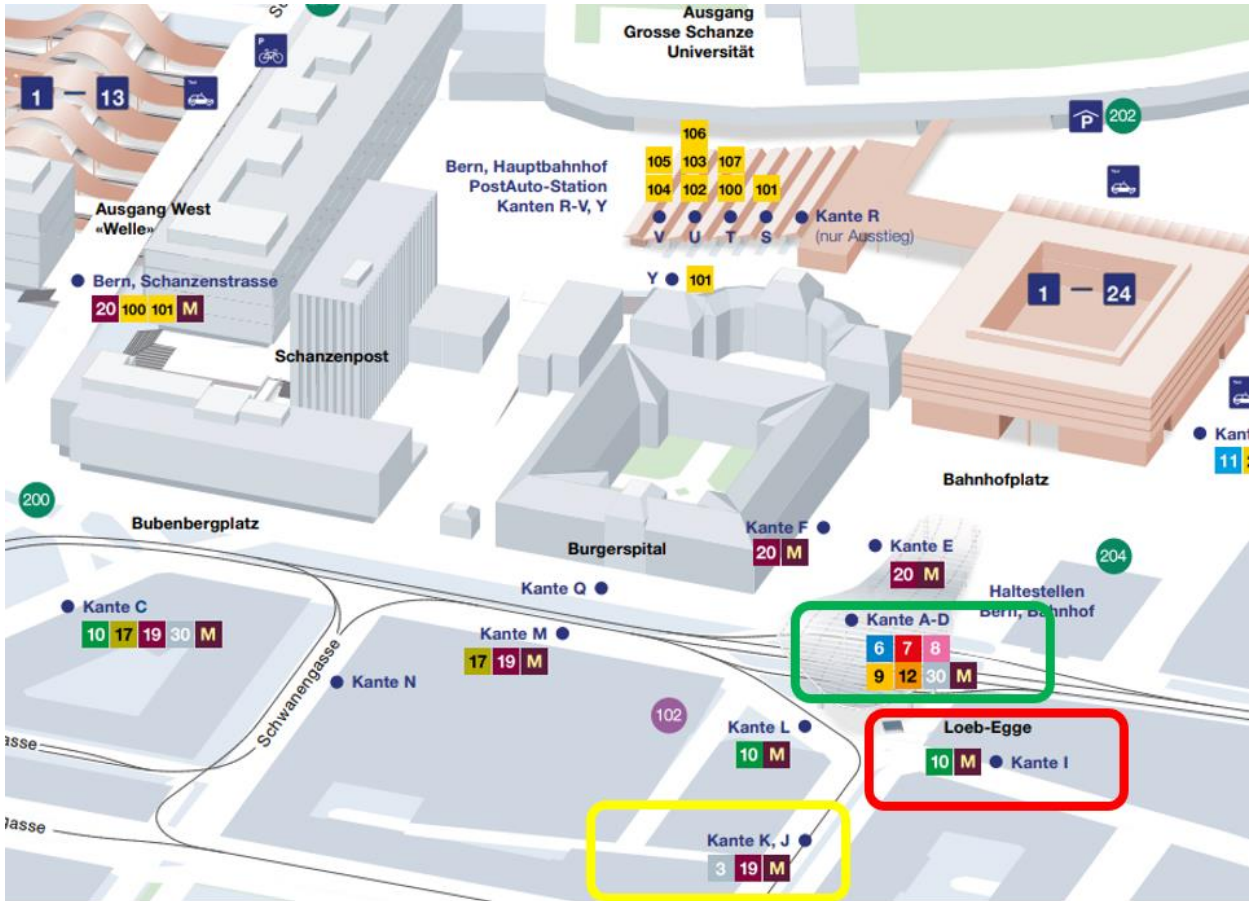


Fig. 1 Overview of Bern main station: In red place of departure of bus 10 (meeting venue) and in green place of departure of tram 9 and bus 19 (Ambassador).

Travel form Bern main station to Hotel Ambassador

Tram: Use tram Nr. 9 at the Tram stop at the trains station (main exit, see Figure 1).

Bus: Use bus 19 (Ambassador).

Useful Information

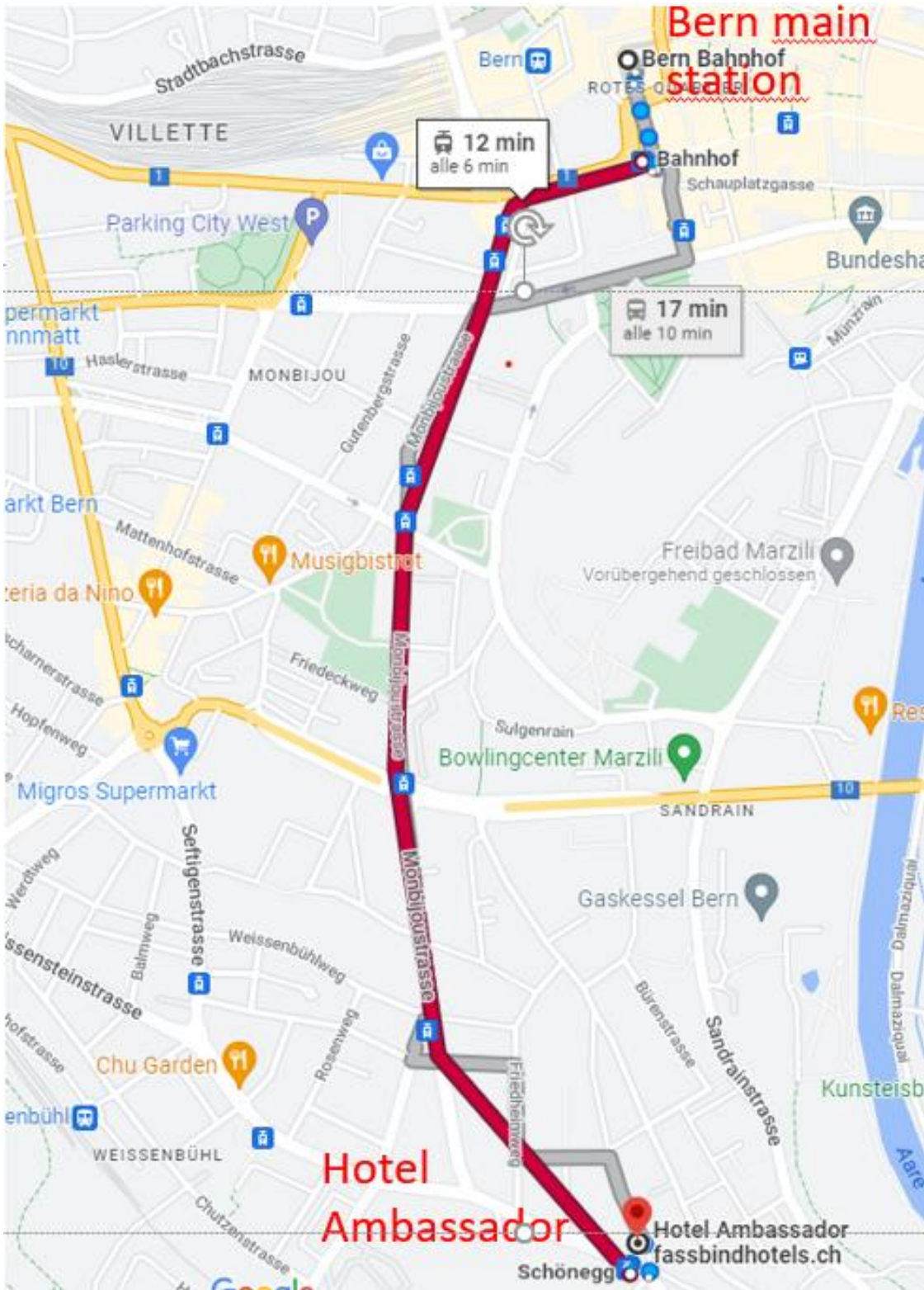


Fig. 2. Travel from the train station to the Hotel. Tram 9 (stop Schöneegg) or Bus 19 (stop Wander) can be used.

Useful Information

Travel from Hotel Ambassador to the meeting venue

Take tram 9 (stop Schöneegg; Fig. 2) for three stops till stop Monbijou. Change to bus 10 for 4 stops till Liebefled, Liebefeld Park.

Meeting venue at Liebefeld

The Meeting reception will be at the official entry of the Campus area at Schwarzenburgstrasse 153 (Figure 3).

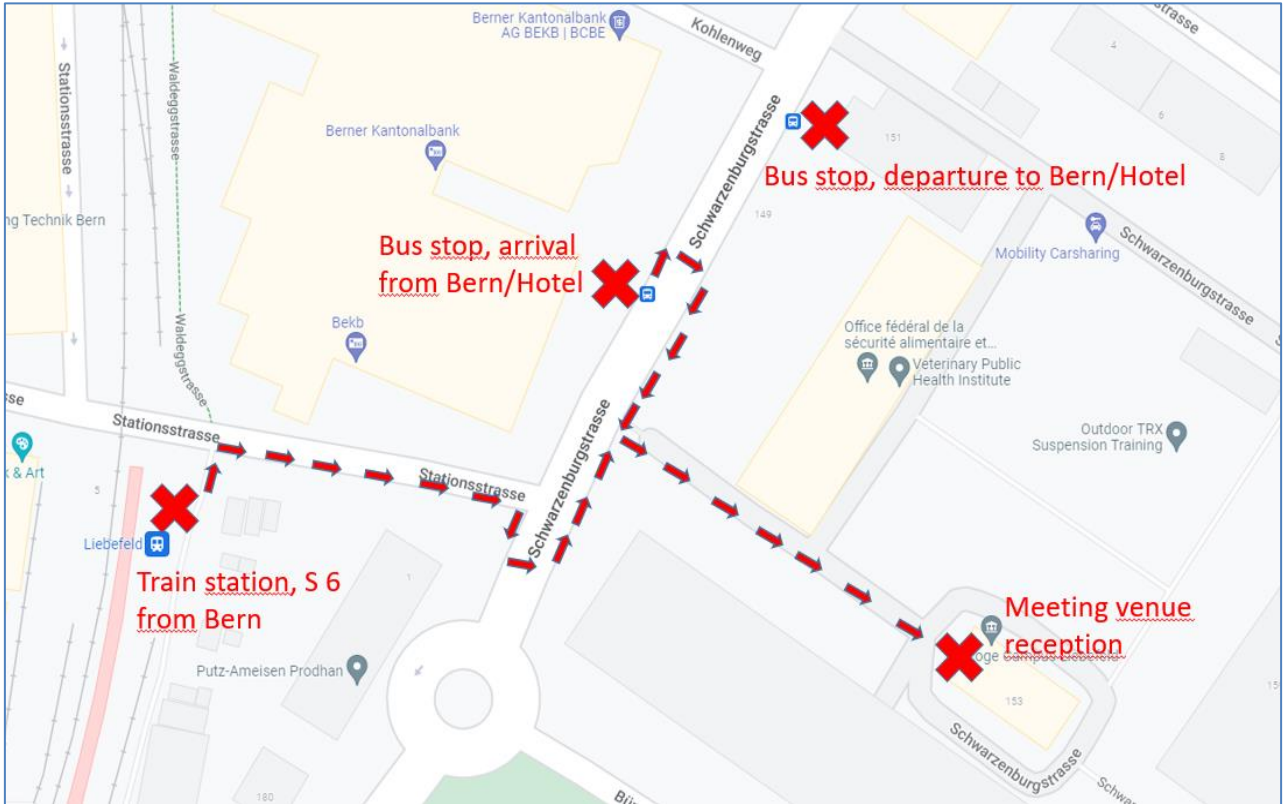


Fig. 3 Reception of the Meeting venue will be at Schwarzenburgstrasse 153. From the train station in Liebefeld and the Bus stop it can be reached on foot in about 4-5 min.

Useful Information

Laptops

Participants are requested to bring their laptops to the Workshop

Plug adaptors

IMPORTANT ! Please note that you will need to bring plug adaptors for any electrical devices you want to use in Switzerland.

Type J (CH electrical socket/electrical plug)

The Type J plug **has three round pins, including an earth pin**. Even though it looks very much like the Brazilian Type N plug, it is not compatible with Type N sockets because the earth pin is further away from the center line. However, Type C plugs fit into Type J sockets.



WiFi

There is free WiFi available. Delegates will register for access to the internet when at the venue by connecting their phone/laptop to the venues WiFi. Access is given for individuals.

Coats/Bags

Coats may be stored on the coat rack in the meeting venue. Please keep bags/suitcases with you in the meeting room.

On-site Restaurant

Delegates are welcome to use the on-site restaurant. A cash till is available at the front of the restaurant.

City walk

A city walk is arranged for the evening of the 27th April. **Bring some comfortable shoes!**

Workshop Dinner

The Workshop dinner will be held at Altes Tramdepot (Brauerei Restaurant AG Grosser Muristalden 6 3006 Bern <https://altestramdepot.ch/>) on Thursday 27th April.

Information for presenters

Please send your presentations to rt@epo.int ahead of the Workshop in both PowerPoint and PDF format.

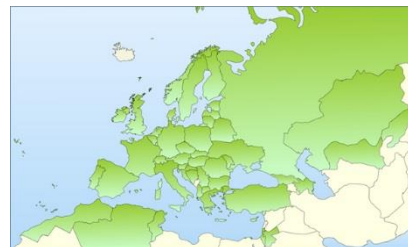
The European and Mediterranean Plant Protection Organization



What is EPPO?

EPPO is an intergovernmental organization responsible for international cooperation in plant protection in the European and Mediterranean region. In the sense of the article IX of the FAO International Plant Protection Convention (IPPC), it is the Regional Plant Protection Organization for Europe.

Founded in 1951 with 15 member governments, it now has 52 member governments including nearly every country of Western and Eastern Europe and the Mediterranean region (in green on the map).



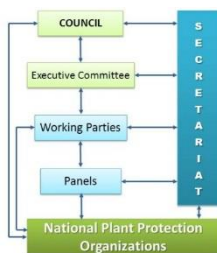
Aims of EPPO

EPPO has two main areas of activity: plant quarantine and pest control. Its main aims are:

- To protect plant health in agriculture, forestry and the uncultivated environment.
- To develop an international strategy against the introduction and spread of pests (including invasive alien plants) that damage cultivated and wild plants, in natural and agricultural ecosystems.
- To encourage harmonization of phytosanitary regulations and all other areas of official plant protection action.
- To promote the use of modern, safe, and effective pest control methods.
- To provide a documentation service on plant protection.

EPPO Structure

The Organization is administered by its Council (representatives of all member governments) and Executive Committee (7 governments elected on a rotational basis). A Secretariat of 14 persons is based in Paris. EPPO is financed directly by annual contributions from its member governments. Its official languages are English, French and for certain purposes Russian. The technical work is overseen by the Working Parties and Panels (experts are nominated by their National Plant Protection Organization).



EPPO Council Session

EPPO Standards

As a result of the work being done within the different technical bodies, EPPO makes recommendations to the National Plant Protection Organizations of its member governments. These recommendations are considered as Regional Standards in the sense of the IPPC.

Standards on plant protection products:

- Efficacy evaluation of plant protection products
- Good plant protection practice
- Environmental risk assessment of plant protection products

Standards on phytosanitary measures:

- General phytosanitary measures
- Phytosanitary procedures
- Production of healthy plants for planting
- Pest Risk Analysis (PRA)
- Safe use of biological control
- Diagnostic protocols
- Commodity-specific phytosanitary measures
- National regulatory control systems
- Phytosanitary treatments

EPPO information services

EPPO provides many information services to its members, most of them are freely available from the EPPO website:

www.eppo.int

Examples of EPPO publications and databases:

- EPPO Bulletin (official journal of the Organization)
- EPPO Global Database / PQR (the EPPO database on quarantine pests)
- Pest Risk Analyses and CAPRA software
- EPPO database on diagnostic expertise
- EPPO Reporting Service (monthly newsletter)
- Datasheets on quarantine pests and pictures
- EPPO Alert List ...