



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139

Grant agreement N. 773139

DELIVERABLE N° 6.8

Title: Report on the organisation of training activities (webinars, video tutorial, practical training sessions)



Validation of diagnostic tests to support plant health



Due date:	Month 40
Actual submission date	30-08-2021 (Month M40)
Start date of the project	01-05-2018
Deliverable lead contractor (organization name)	EPPO
Participants (Partners short names)	All partners
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Level of dissemination	Public
Deliverable status	Report

Abstract:

This deliverable presents the training activities organized in the framework of the VALITEST project. Due to the Covid-19 pandemic, the physical workshops planned for diagnostic laboratories could not be organised. All the training activities were held online in the format of webinars, practical training sessions and videos. Three series of activities covering different topics were organised: one on the concept of test validation in plant health, one on TPS organisation and one on the use and validation of High Throughput sequencing (HTS) tests for diagnostics of plant pests. The participation to those series and satisfaction of the participants are also described in this deliverable.

EPPO and all partners

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TERMS, ABBREVIATIONS AND DEFINITIONS

EPPO: European and Mediterranean Plant Protection Organization

EU: European Union

CREA: Council for Agricultural Research and Economics (IT)

HTS: High Throughput Sequencing

NIB: National Institute of Biology (SI)

NPPO: National Plant Protection Organisation

NVWA: Netherlands Food and Consumer Product Safety Authority (NL)

TPS: Test Performance Study

ULG: University of Liège (BE)

WUR: Wageningen University Research (NL)

WP: Work Package

1 Purpose

The aim of this deliverable is to present the training activities (webinars, online practical training sessions and videos) prepared by the VALITEST consortium to disseminate the results of the project and share the experience gained through the project.

2 Scope

This deliverable covers the activities described in the Section 5.1 of the Training and Dissemination Plan (version 2). Because of the Covid-19 pandemic, the physical workshops originally planned were cancelled and replaced by online activities.

3 Organisation of VALITEST training activities

3.1 Organisation/cancellation of the workshops

Dissemination/training workshops for diagnostics laboratories were initially planned at two different levels to minimise travel costs:

- A large training event organized at the end of the project at EU level.
- At least 3 European and regional workshops gathering VALITEST end-users from different sectors and countries organised towards the end of the project, one for Eastern/Central Europe Organized in Poland (Glorin), one in Italy organized by CREA & NIB, and one in the Netherlands organized by WUR & Fera.

To organise those events, several meetings took place during the first half of 2020, first with leaders of WP1, WP3, WP6, and WP7 (2020-02-26) and then with the organising committee composed of partners from Glorin, CREA, NIB, WUR, FERA, EPPO, ULG and Ipadlab (2020-04-08, 2020-05-29 and 2020-09-01). A first version of the agenda and the announcement of the events was prepared. In parallel, a survey was sent to all partners in June 2020 to identify the potential participating laboratories. A first announcement of the regional training workshops (Annex 1) was prepared and sent to the EPPO Panels on Diagnostics, to the contact point of the diagnostics laboratories of the EPPO database on diagnostic expertise, to NPPOs, to the International Seed Health Initiative for Vegetable Crops (ISHI-Veg) and shared on twitter on the 1st of July 2020. An article was also published in the EPPO reporting service [n°8 - 2020](#). This announcement included a short survey to evaluate the number of potential participants to the different regional training events and whether participants would be interested by online events if the regional workshops could not be organised physically due to the Covid-19 pandemics. Seventy-four persons, mostly from public diagnostic laboratories, expressed their interest in participating in the regional training workshops, 73 being also interested by online workshops. Based on these results and given the travel restrictions due to Covid-19 pandemic existing in many

countries, the organising committee decided in early September 2020 to organise online events. This decision was validated by the Steering Committee on the 4th of September 2020 and by the Management Board on the 15th of October 2020. A communication announcing the cancellation of the regional training events and the organisation of online activities was prepared and circulated on the 20th of October 2020 on twitter and by email to those who expressed their interest in participating to the regional training workshops (Annex 1).

3.2 Organisation of the online training activities

During the meeting of the organising committee on the 1st of September 2020, the overall organisation of the online activities was discussed. It was decided to organise 3 webinar series on the main concepts / results obtained during the project. The first series would focus on the concept of test validation in plant health, the second one on the organisation of TPS and the third one on high throughput sequencing. Between September 2020 and November 2020, 3 meetings (2020-09-24, 2020-11-02 and 2020-11-09) were organised to finalise the agenda of the online training activities (list of the webinars, practical training activities and videos to organise for the 3 series planned (see section 4)). For each activity, leaders were identified and a backbone detailing the content, timing, presenters etc was prepared. The EPPO Secretariat was in charge of leading and coordinating all the activities.

3.2.1 Communication strategy

For the announcement and registration to the training activities, a specific webpage was created on the project website: https://www.valitest.eu/training/activities_and_webinars. This webpage gathers all the information on the 3 series of activities planned, i.e. the objectives and format, information on the targeted participants and on the registration process. The agendas of the series were detailed including the list of activities (webinars, practical sessions and videos), the date and time, details on the content and links to register. At the end of each activity, the registration links were replaced by links to the presentation in pdf format, to the recording and when relevant to videos.

On the 1st December 2020, the opening of the registration to the series of activities on the concept of test validation in plant health was announced to the people that expressed their interest in participating to the workshops. On the 2nd of December, the announcement was sent to the diagnostic laboratories registered to the EPPO database on diagnostic expertise, twitter, NPPOs and to the VALITEST partners who were asked to further circulate the information within their network.

The announcement of the series on HTS was delayed because it was planned after the original end-date of the project so it was decided to wait for the approval of the extension of the project to announce the series. The announcement was circulated on the 15th of March 2021 to the diagnostic laboratories registered to the EPPO database on diagnostic expertise and on twitter.

Reminders about each training activities were announced on twitter a few days before the events. Besides, links to the recordings were also shared on twitter after each webinar.

3.2.2 Technical aspects of the organisation of each activity

3.2.2.1 Webinars

For the webinars, the Gotowebinar platform was used as the EPPO Secretariat had some experience with this platform. The purchased licence allowed the participation of up to 500 attendees to each webinar. Registrations were managed directly in the Gotowebinar platform (allowing automatic reminders to be sent one day and one hour before the event). The EPPO Secretariat coordinated the organisation of each event and the technical aspects related to the use of the platform. Training sessions were organised to ensure that panellists were able to connect, had a good connection and knew how to use the tools of the platform. For most of the webinars, polls were prepared to increase the interaction with the audience. For some webinars, videos were also prepared and showed during the webinars. Attendees had the possibility to ask questions in the question box during and at the end of the webinar. Each webinar ended with a ~ 15 min 'questions and answers' session during which the attendees could ask their questions by either using the chat or directly by turning on their microphones.

Details on the numbers of views of the recordings per Webinar on 2021-07-30 are given in Annex 2.

3.2.2.2 Practical training sessions

For the practical training sessions, it was decided that the leader of the activity could choose the platform and tools that best met his/her needs and with which he/she was the most familiar. Teams, Zoom and Webex were used. For those sessions, the interactivity with the participants was considered important. As a consequence, for each activity, a maximum number of participants was defined beforehand by the leader. It was decided that places would be filled on a first come first served basis. However, if the number of applicants exceeded the limit, priority was given to participants from EPPO countries and participation was limited to a given number of applicants per organisation. Other criteria (experience, participation to specific webinars...), specific to each activity, were also defined and announced in advance if needed. Registrations were managed using a specific registration tool of the EPPO Secretariat. When deadlines for registration were passed, the list of participants were sent to the leaders of the training activity and selection and/or dispatch of the participants to the different sessions was made. Depending on the activities, further communication with the participants was handled either by the EPPO Secretariat or by the leader of the activity.

3.2.2.3 Videos

Several videos (see Table 1) were specifically prepared by the partners to:

- Illustrate and describe the whole project.
- Illustrate specific steps in the process of TPS organisation and share experience from the TPS organisers.
- Explain specific notions related to the statistical analysis of TPS data.

Videos were uploaded on the EPPO YouTube account in a [playlist specific to VALITEST](#) to be more easily disseminated. Videos were shared on twitter, on the website and sometimes used during some of the webinars.

In addition to those videos, all webinars were recorded, and videos made available on the website to ensure the maximal dissemination of the results of the project. At the end of the project, the videos will be made available on the EPPO YouTube account in the playlist specific to VALITEST.

Table 1: List of videos prepared for the online training activities

Video name	Partners involved in the preparation of the video*
Presentation of the VALITEST project	EPPO
What is a Test Performance Study?	EPPO, NVWA
Selection of pests and TPS organisers	EPPO (NIB / FERA)
Interviews on the preparation of the TPS plan	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)
Interviews on the selection of tests	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)
Interviews regarding the selection of participants	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)
Interviews on the preparation & dispatch of samples	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)
Interviews on the guidelines developed by WP3 on the production of reference material	EPPO (ANSES, UNITO, CREA)
Interviews on the analysis of TPS results	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)
The analysis of TPS results – video 1 – Introduction and sample panel	ULG
The analysis of TPS results – video 2 – Confidence intervals	ULG
The analysis of TPS results – video 3 – Analytical sensitivity	ULG
The analysis of TPS results – video 4 – Repeatability and reproducibility	ULG
The analysis of TPS results – video 5 – Introduction and sample panel	ULG

* Partners in parenthesis were interviewed.

Details on the numbers of views on 2021-07-30 are given in Annex 2

3.2.3 Evaluation of the success of the activities

The number of registrations and participants were recorded. At the end of each activity, a satisfactory survey was sent by email to the participants to evaluate their general satisfaction, whether they would recommend colleagues to watch the recording of a session (for webinars), the percentage of information that was new to them and when the information they learnt would be useful to them. For webinars, the satisfaction survey was also automatically launched at the end of the webinar. Results are presented in section 4. Participants could also provide general comments on the activities. When suggestions for improvement were made, they were considered for the next activities. For example, during the first webinar series, some participants suggested that the results of the polls should be commented more by the presenter and so this point was recalled to the panellists of the second webinar series.

4 Online training activities organised in the framework of VALITEST

Three series of webinars and training activities are organised in the framework of VALITEST:

- One on the concept of test validation in Plant Health
- One on the organisation of Test Performance Studies (TPS)
- One on the guidelines for the development, validation, and routine use of High Throughput Sequencing (HTS) tests for diagnostics of plant pests.

4.1 The concept of test validation in Plant Health

4.1.1 Objective of the series and description of the activities

The objectives of this webinar series and activities were:

- To introduce the concept of validation and present the state of the art in terms of choice of a test and analysis of the results of performance evaluation
- To train experts on the use of kits (including on-site and field tests)

The activities consisted of 5 webinars (1h) and 2 practical training sessions. Each of these activities are further described in Table 2.

Table 2: Agenda of the series on the concept of test validation in Plant Health (Timings are CET time zone)

	Title of the webinar	Date and time	Information	Links
Webinar 1	What is test validation and why it matters for reliable diagnostics?	Monday 11 th January, 2 pm	<u>Content of the webinar:</u> The objective of this webinar is to present what is meant by validation of a test in Plant Health and why it is important to have reliable diagnostics. <u>Presenter:</u> Françoise Petter (EPPO)	Presentation Recording
Webinar 2	How to adopt a new test in your laboratory?	Friday 15 th January, 2 pm	<u>Content of the webinar:</u> During this webinar, the general steps that should be considered when adopting a new test in the laboratory were presented. Then examples of the main challenges experienced by the VALITEST partners when adopting a new test were presented. <u>Presenters:</u> Tanja Dreo (NIB), Mathieu Rolland (ANSES), Denise Altenbach (BIOREBA), Camilo Gianinazzi (IpadLab) and Marta Santos (ClearDetections)	Presentation Recording
Webinar 3	The use and validation of on-site tests	Wednesday 20 th January, 2 pm	<u>Content of the webinar:</u> This webinar will present the specificities of using and validating on-site tests compare to standard laboratory tests. The experience from a kit producing company and from a diagnostic laboratory will be shared. <u>Presenters:</u> Denise Altenbach (BIOREBA) and Jean-Philippe Renvoisé (ANSES)	Presentation Recording
Practical training session 1	Analysis of performance characteristics	Tuesday 26 th of January, 2 pm to 4:30 pm	<u>Objective of the activities:</u> Every diagnostic test has its performance characteristics. The choice to use a certain test for a certain intended use is largely made on basis of these characteristics. This implies that the importance of different performance criteria is dependent on the scope of a diagnostic test. In this interactive meeting we will explore the importance of the scope of a diagnostic test, to find out which performance criteria are important in different testing situations and why. <u>Facilitators:</u> Jose van Beckhoven (Prime Diagnostics) and other partners from the project	Presentation
Webinar 4	How do companies handle quality control and validation of products and how will the EPDIA charter help in improving this task?	Monday 1 st of February, 2 pm	<u>Content of the webinar:</u> This webinar will present how companies handle product development, validation and production quality control and how the European Plant Diagnostics Industry Association (EPDIA) quality charter respond to the need of having a harmonized approach for quality. <u>Presenters:</u> Caroline Freye (LOEWE), Marta Santos (ClearDetections), Camilo Gianinazzi (IpadLab)	Presentation Recording
Webinar 5	Why is communication on test selection between risk managers and diagnostic laboratories important?	Monday 15 th of February, 2 pm	<u>Content of the webinar:</u> The choice of diagnostic tests is usually made by national reference laboratories based on the performance characteristics of the tests. In this webinar the presenters will discuss why in some circumstances, the risk managers should also be involved in the final decision. <u>Presenters:</u> Barbara Agstner (FERA Science Ltd.) and Françoise Petter (EPPO)	Presentation Recording
Practical training session 2	The use of kits: training and demonstration	Thursday 22nd of April, 2 pm to 3:30 pm	<u>Objective of the activities:</u> The objective of this activity is to discuss the use of kits based on ELISA or molecular technologies. For this training activity, participants will have the opportunity to test in advance one kit produced by one of the companies that are VALITEST partners and to provide feedback on the use of this kit. If possible, feedback should be sent in advance. During the training	Presentations

		<p>session, companies will present the advantages and limitations of the two different technologies. Practical sessions will be organised to discuss the use of the kits and the feedbacks sent by the participants</p> <p><u>Organization</u>: The participants registering to this activity have the possibility to test one kit from one of the companies and to provide feedback to the company. The kit will be sent mid-February. The all-inclusive kits will be supplied for free by the companies, but the shipment costs will be billed to the participants. Participants must use the kit only for the purpose of the VALITEST practical training session and must test it before the practical training session.</p> <p><u>Presenters/facilitators</u>: Theoretical session: Caroline Freye (LOEWE), Marieke Beltman (ClearDetections), Camilo Gianinazzi (IpadLab), Denise Altenbach (BIOREBA), Marco Kaiser (BIOREBA) Practical session: all companies of WP7.</p>	
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4.1.2 Participation to the series

4.1.2.1 Targeted participants

The VALITEST training activities were targeting stakeholders working in Plant Health and interested in the concept of test validation (e.g. technical staff of public and private diagnostic laboratories and of companies producing diagnostic kits, scientific community, policy makers, end-users of kits and on-site tests).

4.1.2.2 Registrations and attendance

In total, 325 participants (from 49 countries) registered to the webinars and 260 (from 37 countries) attended at least one webinar which corresponds to an attendance rate of 80%. The highest numbers of attendees were recorded for the Netherlands, Germany, France, United Kingdom, Italy, Spain, Slovenia, Poland, Latvia and the United States and 83% of the attendees were from EU countries (see Fig. 1).

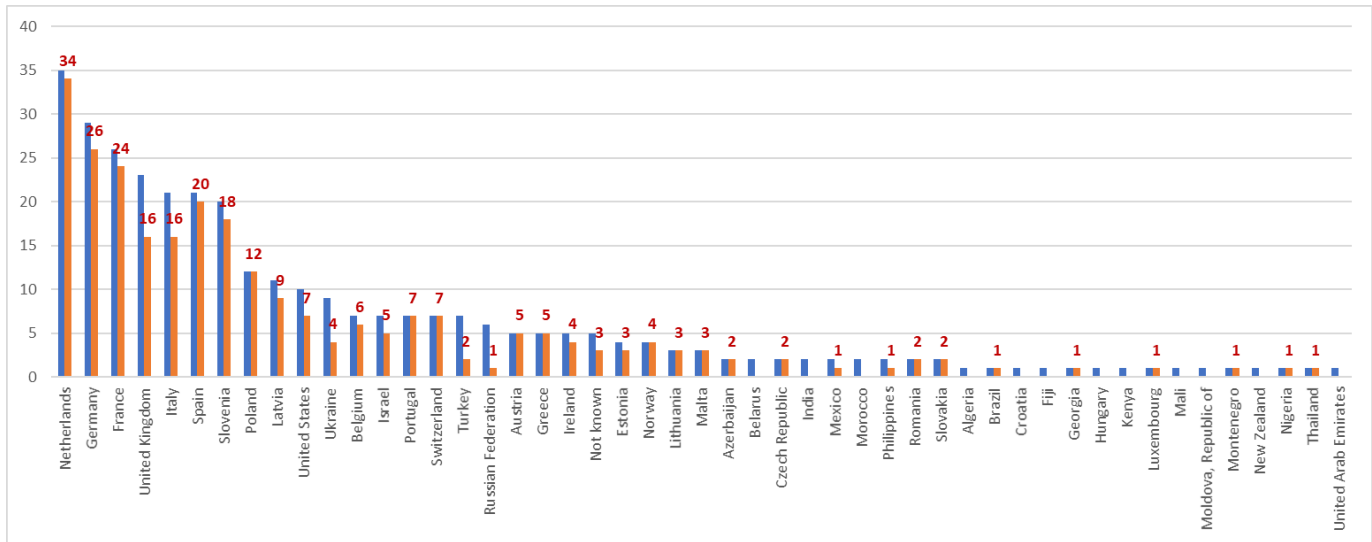


Fig. 1: Number of people that registered (blue) or attended (red) at least one webinar of the series per country.

Most of the people registered attended only one webinar (22%) (Fig. 2). More than half of them attended one of the two first webinars which were a bit more general, and a quarter attended the webinar on communication with stakeholders which was targeting a slightly different audience (NPPOs).

79 people registered to the 5 webinars of the series but at the end only 31 attended all of them. However, 43% of the attendees followed at least 3 webinars. Overall, the participation data suggest that the whole series was of interest for many people, but some could not always attend webinars for professional or personal reasons.

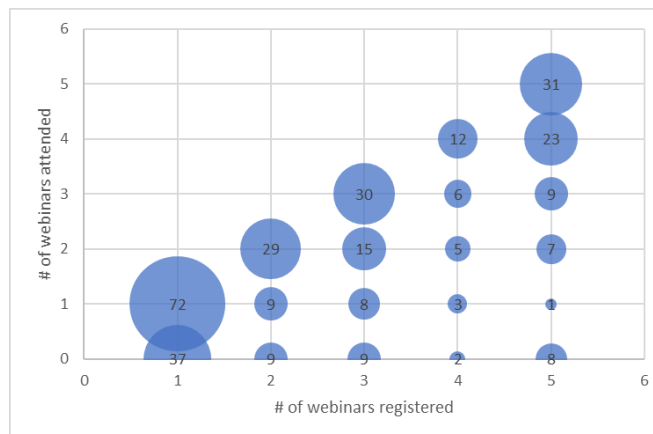


Fig. 2: Number of people that registered or attended to 1 to 5 of the webinars.

Regarding the practical training activities, all those that registered to the activities (65 and 64 respectively) could participate but at the end only 69% and 66% of the people did attend despite the reminders sent.

Registration and attendance details for each webinar and training activity are indicated in Table 3.

Table 3: Participation to the webinar series on the concept of test validation in Plant Health.

	<i>Webinar 1</i>	<i>Webinar 2</i>	<i>Webinar 3</i>	<i>Webinar 4</i>	<i>Webinar 5</i>	<i>Training activity 1</i>	<i>Training activity 2</i>
Registered	209	237	175	122	159	65	64
Attending	165	173	120	77	106	45	42
Attendance rate	79%	73%	69%	63%	67%	69%	66%
Poll	3	3	2	6	7	NA	NA
Survey participation	59%	50%	56%	22%	49%	56%	45%

4.1.2.3 *Satisfaction of the participants*

About 50 to 60 % of the attendees responded to the satisfaction survey except for webinar 4 for which only 22% of the attendees responded. This poor survey participation is explained by the fact that the survey was not set to be automatically launched at the end of the webinar and only sent by email after the webinar.

In general, attendees that responded to the satisfaction survey were satisfied by the activities with 89% answering that the session was good or excellent compared to their expectations and more that 87 % answering that they were very likely or likely to recommend the session to a colleague.

Most of the attendees that responded to the satisfaction survey (39%) considered that 25-50% of the information presented was new to them. The percentage of information that was new for attendees varies from one webinar to the next. For example, in the webinar introducing the concept of validation, people learnt less new information than for other webinars, which was expected.

Finally, more than 87% of the attendees that responded to the satisfaction survey will use the information they learnt immediately or in the next year meaning that the information provided during the webinars is very useful.

Results of the satisfactory surveys for each webinar and training activity are indicated in Table 4.

Details on the numbers of views (on 2021-07-30) of the recordings per Webinar of this series are given in Annex 2.

Table 4: Results of the satisfaction surveys of the activities of the webinar series on the concept of test validation in plant health.

	Webinar 1	Webinar 2	Webinar 3	Webinar 4	Webinar 5	Training activity 1	Training activity 2	All activities
How did the session compare to your expectations?								
Excellent	34%	33%	33%	41%	27%	25%	24%	31%
Good	63%	60%	55%	53%	63%	50%	66%	58%
Fair	3%	7%	9%	6%	10%	25%	8%	10%
Poor	0%	0%	3%	0%	0%	0%	2%	1%
How likely are you to recommend this session to a colleague?								
Very likely	54%	47%	45%	47%	47%			48%
Likely	37%	48%	42%	35%	32%			39%
Possibly	9%	5%	11%	18%	19%			12%
Unlikely	0%	0%	2%	0%	2%			1%
What percentage of information was new to you?								
More than 75%	9%	8%	18%	18%	16%	0%	0%	10%
50-75%	24%	35%	33%	35%	33%	16%	21%	28%
25-50%	34%	36%	38%	35%	29%	60%	42%	39%
0-25%	33%	21%	11%	12%	22%	24%	37%	23%
When will the information you learnt be useful to you?								
Immediately	69%	67%	34%	53%	57%	48%	68%	57%
In the next year	29%	28%	35%	29%	31%	47%	16%	30%
In the next 5 years	2%	5%	26%	18%	10%	5%	16%	12%
Never	0%	0%	5%	0%	2%	0%	0%	1%

4.2 Test Performance Studies organisation

4.2.1 Objective of the series and description of the activities

The objectives of this webinar series and activities were:

- To present the state of the art in term of organization and analysis of Test Performance Studies (TPS)
- To present results and experience gained during the VALITEST project (12 TPS were organised in the framework of the project).

These activities consisted of educational videos, 8 webinars (1h) and 2 practical training sessions. Each of these activities are further described in Table 5.

Table 5: Agenda of the series on the organisation of TPS (timings are CET time zone except when stated otherwise)

	Title of the webinar	Date and time	Information	Links
Video 1	What is a TPS?	18 th of February	This video explains what a Test Performance Study (TPS) is and introduces the VALITEST webinar series on TPS organisation.	Video
Video 2	VALITEST TPS: selection of the pests and of the TPS organizers	22 nd of February	In this video, the process for the selection of the pests and organisers for the VALITEST test performance studies is described.	Video
Webinar 1	Preparing the TPS plan	Friday 19 th February, 11 am	<u>Content of the webinar:</u> During this webinar, the objectives and the content of the TPS plan were presented. Experience from VALITEST TPS organisers was shared. <u>Presenters:</u> Françoise Petter & Charlotte Trontin (EPPO) with the support of Géraldine Anthoine (ANSES)	Presentation Recording Interview
Webinar 2	Selection of the tests and associated documents	Wednesday 24 th February, 2 pm	<u>Content of the webinar:</u> During this webinar, the workflow for test selection (including definition of the TPS scope, the inventory of tests available, the selection of criteria and the preliminary studies) was presented. Experience from VALITEST TPS organisers was shared. <u>Presenter:</u> Hanna Mouaziz (ANSES)	Presentation Recording Interview
Webinar 3	Selection of participants and contract	Monday 1 st March, 2 pm	<u>Content of the webinar:</u> This webinar presented the workflow used in the framework of VALITEST to select the participants of the TPS. Experience from VALITEST TPS organisers was shared. <u>Presenter:</u> Hanna Mouaziz (ANSES)	Presentation Recording Interview
Webinar 4	Preparation and dispatch of samples	Friday 5 th of March, 11 am	<u>Content of the webinar:</u> This webinar described how to prepare the panel of samples based on the scope of the validation, the access to biological material, the performance criteria of interest etc. Recommendations from WP 2 on an optimal theoretical panel for statistical analysis of the results was also presented. Experience from VALITEST TPS organisers was shared. <u>Presenter:</u> Mathieu Rolland (ANSES)	Presentation Recording Interview
Webinar 5	Production of reference material for TPS	Wednesday 10 th of March, 2 pm	<u>Content of the webinar:</u> This webinar presented a list of descriptors for reference materials that was established in the framework of VALITEST WP 3 and the minimum requirement for each of these descriptors. Then a Standard Operating Procedure (SOP) for the production of reference material was presented. <u>Presenter:</u> René van der Vlugt (WUR)	Presentation Recording Interview
Practical training sessions	How to organise Test Performance Studies?	Monday 15 th - Wednesday 17 th of March - 9 am to 3 pm (3 one-day sessions)	<u>Content of the activity:</u> Participants went in detail through the different steps of the organisation of a TPS. The TPSs on ToBRFV or TSWV were used to illustrate the activities. <u>Prerequisite:</u> Participants were asked to attend the webinars 1 to 5 (or watch the recordings once released) to participate in this practical training session. <u>Facilitators:</u> Nataša Mehle (NIB) and Sabrina Bertin and Anna Taglienti (CREA)	Presentation on ToBRFV Presentation on TSWV

Webinar 6	How to tackle the analysis of TPS results?	Monday 22 nd of March, 2 pm	<p><u>Content of the webinar:</u> This webinar presented how to define whether the results from a laboratory are acceptable or not and how to define outliers. It quickly showed how to present and interpret the obtained results. Experience from VALITEST TPS organisers was shared.</p> <p><u>Presenter:</u> Jenny Tomlinson (FERA)</p>	Presentation Recording Interview
Videos	Calculate performance characteristics of a test and get useful information from your validation data by statistical analysis.	Released on the week of the 22 nd of March.	<p>In a series of five videos, developed in the framework of the VALITEST project, partners from WP 2 explained the importance of the statistical analysis when designing Test Performance Studies (TPS) and analysing the results.</p> <p><u>Video 1:</u> This introductory video focuses on the importance of the statistical analysis to define the panel of samples to include in the TPS.</p> <p><u>Video 2:</u> The second video focuses on the concept of confidence intervals.</p> <p><u>Video 3:</u> The third video focuses on how to estimate analytical sensitivity using the probability of detection.</p> <p><u>Video 4:</u> The fourth video focuses on how to do the calculation of repeatability and reproducibility.</p> <p><u>Video 5:</u> The fifth video is going deeper into the analysis by introducing other performance criteria (diagnostic sensitivity, diagnostic specificity, Accuracy, diagnostic odd ratios, false positive and false negative rates, positive and negative predictive values and likelihood ratios).</p>	Video 1 Video 2 Video 3 Video 4 Video 5
Webinar 7	Q&A session: the statistical analysis of TPS results	Monday 29 th of March, 2 pm CEST	<p><u>Content of the webinar:</u> Based on the videos to be released on the website on how to calculate different performance characteristics, this webinar was a Q&A session on how to perform the statistical analysis of the TPS results.</p> <p><u>Presenters:</u> Sébastien Massart (ULG) and Yves Brostaux (ULG), Jenny Tomlinson (FERA)</p>	Recording
Practical training sessions	How to analyse the results of Test Performance Studies?	30 th – 31 st of March - 10 am to 3:30 pm CEST (two one-day sessions)	<p><u>Content of the activity:</u> Participants had to analyse the results of a TPS and calculate the performance characteristics of different tests.</p> <p><u>Prerequisite:</u> Participants were asked to attend the webinars 6 and 7 (or watch the recordings once released) and to watch the videos ‘Calculate performance characteristics and get useful information from your validation data by statistical analyses’ to participate in this session.</p> <p><u>Facilitator:</u> Jenny Tomlinson, Marc Kennedy and Roy Macarthur (FERA)</p>	Presentation 1 Presentation 2
Webinar 8	From TPS organisation to analysis of the results: example of the TPS on ToBRFV	Wednesday 7 th of April, 2 pm CEST	<p><u>Content of the webinar:</u> This webinar described the entire process of organising a TPS and analysing the results using the TPS on ToBRFV as an illustration.</p> <p><u>Presenter:</u> Francesco Faggioli and Marta Luigi (CREA)</p>	Presentation Recording

4.2.2 Participation to the series

4.2.2.1 Targeted participants

The VALITEST training activities are targeting staff of public and private (diagnostic) laboratories that are organising test performance studies.

4.2.2.2 Registrations and attendance

In total, 168 different people (from 33 countries) registered to the webinars and 139 (from 27 countries) attended at least one webinar which corresponds to an attendance rate of 83%. The highest numbers of attendees were recorded Italy, France, Germany, Spain, United Kingdom, the Netherlands, Slovenia, Poland, Switzerland, and Portugal and 80% of the attendees were from EU countries (see Fig. 3).

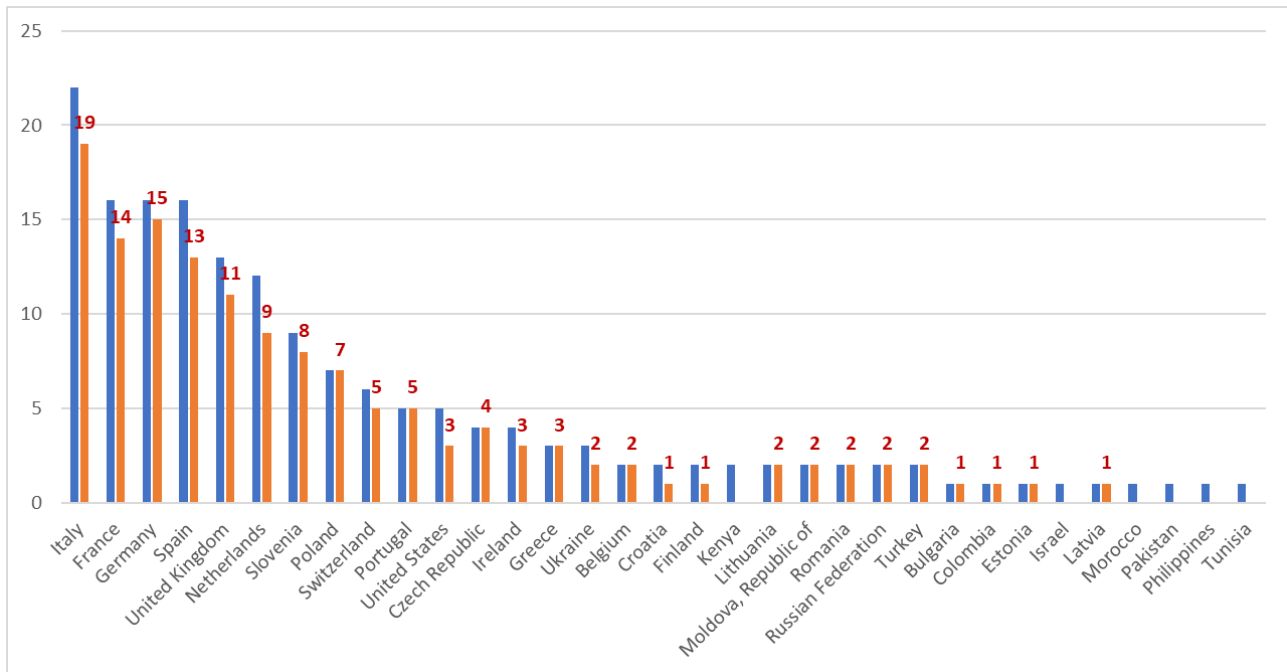


Fig. 3: Number of people that registered (blue) or attended (red) at least one webinar of the series per country.

Most of the people registered attended only one webinar (29%) (Fig 4). About half attended the webinar on the production of reference material which was broader than the other webinars. 39 people registered to the 8 webinars of the series but at the end only 10 attended all of them. However, a quarter of the attendees followed at least 6 webinars. Overall, the participation data suggest that the whole series was of interest for many but people could not always attend webinars for professional or personal reasons.

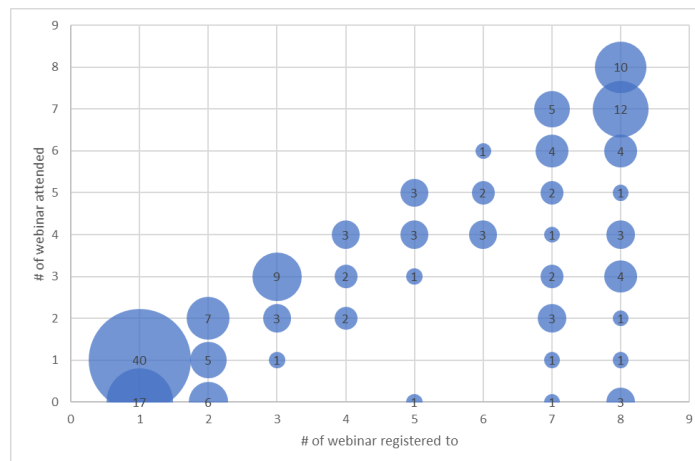


Fig. 4: Number of people that registered or attended to 1 to 8 of the webinars.

Regarding the practical training activities, all the people that registered to the activities (34 and 35 respectively) could participate. The attendance rate was 79% for the first training activity and only 57% of the people did attend despite the reminders sent.

Overall, the number of registrants and attendants was lower than for the webinar series on the concept of test validation in Plant Health which can be explained by the fact that TPS organisation is a more specialized topic.

Registration and attendance details for each webinar and training activity are indicated in Table 6.

Table 6: Participation to the webinar series on TPS organisation.

	<i>Webinar 1</i>	<i>Webinar 2</i>	<i>Webinar 3</i>	<i>Webinar 4</i>	<i>Webinar 5</i>	<i>Webinar 6</i>	<i>Webinar 7</i>	<i>Webinar 8</i>	<i>Training activity 1</i>	<i>Training activity 2</i>
Registered	85	82	71	77	109	88	82	91	34	35
Attending	65	61	54	45	86	59	50	59	27	20
Attendance rate	76%	74%	76%	58%	79%	67%	61%	65%	79%	57%
Poll	4	2	2	2	4	4	0	0		
Survey participation	58%	38%	52%	49%	48%	58%	46%	54%	56%	65%

4.2.2.3 *Satisfaction of the participants*

About 45 to 55 % of the attendees responded to the satisfaction survey.

In general, attendees that responded to the satisfaction survey were satisfied by the activities with 94% answering that the session was good or excellent compared to their expectations and 92 % answering that they were very likely or likely to recommend the session to a colleague.

Most of the attendees that responded to the satisfaction survey (40%) considered that 50-75% of the information presented was new to them. The percentage of information that was new for attendees varies from one webinar to the next. For example, for the webinars on the selection of participants and for the Q&A session on the statistical analysis of TPS results, people learnt more new information than for other webinars.

Finally, 72% of the attendees that responded to the satisfaction survey will use the information they learnt immediately or in the next year meaning that the information provided during the webinars is very useful.

Results of the satisfactory surveys for each webinar and training activity are indicated in Table 7.

Details on the numbers of views (on 2021-07-30) of the recordings per Webinar of this series are given in Annex 2.

Table 7: Results of the satisfaction surveys of the activities of the webinar series on the organisation of TPS.

	Webinar 1	Webinar 2	Webinar 3	Webinar 4	Webinar 5	Webinar 6	Webinar 7	Webinar 8	Training activity 1	Training activity 2	All activities
How did the session compare to your expectations?											
Excellent	32%	30%	29%	36%	59%	44%	26%	48%	64%	38%	41%
Good	63%	57%	71%	64%	34%	53%	65%	49%	29%	46%	53%
Fair	5%	13%	0%	0%	7%	3%	9%	3%	0%	15%	5%
Poor	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%	1%
How likely are you to recommend this session to a colleague?											
Very likely	53%	39%	44%	59%	59%	53%	48%	63%			53%
Likely	39%	48%	52%	32%	34%	38%	39%	31%			39%
Possibly	8%	13%	4%	9%	7%	9%	13%	6%			8%
Unlikely	0%	0%	0%	0%	0%	0%	0%	0%			0%
What percentage of information was new to you?											
More than 75%	21%	17%	33%	18%	23%	21%	39%	22%	20%	38%	25%
50-75%	34%	43%	41%	37%	35%	41%	35%	44%	47%	39%	40%
25-50%	37%	36%	15%	36%	37%	35%	26%	25%	20%	15%	28%
0-25%	8%	4%	11%	9%	5%	3%	0%	9%	13%	8%	7%
When will the information you learnt be useful to you?											
Immediately	37%	27%	44%	45%	61%	38%	39%	56%	53%	31%	43%
In the next year	37%	37%	15%	28%	20%	38%	35%	19%	14%	46%	29%
In the next 5 years	26%	36%	37%	27%	17%	24%	26%	25%	33%	15%	27%
Never	0%	0%	4%	0%	2%	0%	0%	0%	0%	8%	1%

4.3 The use and validation of High Throughput sequencing (HTS) tests for diagnostics of plant pests.

4.3.1 Objective of the series and description of the activities

High-throughput sequencing (HTS) is a powerful tool that enables the simultaneous sequencing of potentially all organisms present in a sample. Because of the growing interest in applying HTS for routine diagnostics in plant health laboratories, the objective of this webinar series and activities was to present the recommendations developed by WP2 on the process of selection, development, validation, and verification of high-throughput sequencing (HTS) tests and the quality assurance for their routine use as diagnostic tests in plant health laboratories. These recommendations are general to enable a broad application in all plant health fields with appropriate flexibility to account for the changes of technologies.

The activities consisted of 3 webinars (1 to 1.5h) and 1 practical training activity (2 sessions) (see below the duration of each session). Each of these activities are further described in Table 8.

Table 8: Agenda of the series on the use and validation of HTS (timings are CEST time zone)

	Title of the webinar	Date and time	Information	Links
Webinar 1	What is High Throughput Sequencing (HTS)?	Friday 30 th April, 2 pm-3:30 pm	<u>Content of the webinar:</u> During this webinar, an overview of the HTS process including the different steps in the laboratory and for the bioinformatics analysis was presented. This webinar was targeting diagnosticians and scientists that are not familiar with HTS. <u>Presenter:</u> Sébastien Massart (ULG)	Presentation Recording
Webinar 2	How to prepare your laboratory to conduct HTS tests?	Monday 3 rd May, 2 pm-3 pm	<u>Content of the webinar:</u> During this webinar, the general and technical requirements that need to be considered by laboratories that intend to routinely use HTS tests in their laboratories were presented. The general requirements cover facilities, personnel, quality management, outsourcing and data management. Special technical considerations during the laboratory work and bioinformatic analyses related to the use of HTS tests were also presented in this webinar. <u>Presenter:</u> Sébastien Massart (ULG)	Presentation Recording
Webinar 3	How to develop, validate and routinely use HTS for diagnostic purpose?	Tuesday 4 th May, 2 pm-3:30 pm	<u>Content of the webinar:</u> This webinar will present a methodology and its key points in order to adopt a HTS test in a diagnostic laboratory. A focus will be made on the selection, development, verification or validation of an HTS test. The routine application of HTS test in diagnostics including the controls to be used will be discussed as well as how to deal with the continuous update of kits and databases. <u>Presenter:</u> Sébastien Massart (ULG)	Presentation Recording
Practical training activity	How to apply the guidelines to your laboratory?	Wednesday 5 th May, 2 pm to 4:30 pm and Friday 7 th May, 2 pm to 4:30 pm.	Objective of the activities: The activity will be divided into 2 sessions. In the first session (2.5 hours), small group activities will be organised to get the participants to think about how they would apply the guidelines to their laboratory in order to validate or verify a HTS test. The questions that the group will tackle are: what would be the minimal requirements for evaluating the performance criteria and for validating a HTS test based on shotgun sequencing or on amplicon sequencing? How many samples? How many targets/pests in the reference samples? How many replicates?... Preliminary document will be sent to the participant beforehand. In the second session, the work and reflections of each small group will be shared and discussed altogether. Prerequisite: This practical training activity target diagnosticians that are implementing HTS tests in their laboratory or intend to do so in the future. Participants should attend the webinars 2 and 3 (or watch the recordings once released) to participate in this practical training activity and have already an experience with HTS analysis. <u>Presenters/facilitators:</u> Sébastien Massart (ULG)	Training completed

4.3.2 Participation to the series

4.3.2.1 Targeted participants

These VALITEST training activities are mainly targeting technical staff of public and private diagnostic laboratories that intend to routinely use HTS technologies for the detection and identification of any plant pest regardless of the type of HTS technology. Scientists that are using HTS in their laboratories for research purpose may also be interested to join the webinars and training activities and their expertise will be welcome during the practical training activity.

4.3.2.2 Registrations and attendance

In total, 161 different people (from 41 countries) registered to the webinars and 122 (from 32 countries) attended at least one webinar which corresponds to an attendance rate of 76%. The highest numbers of attendees were recorded Belgium, France, Germany, Ireland, Italy, Portugal, Slovenia, Spain, The Netherlands and United Kingdom and 69% of the attendees were from EU countries (see Fig. 5).

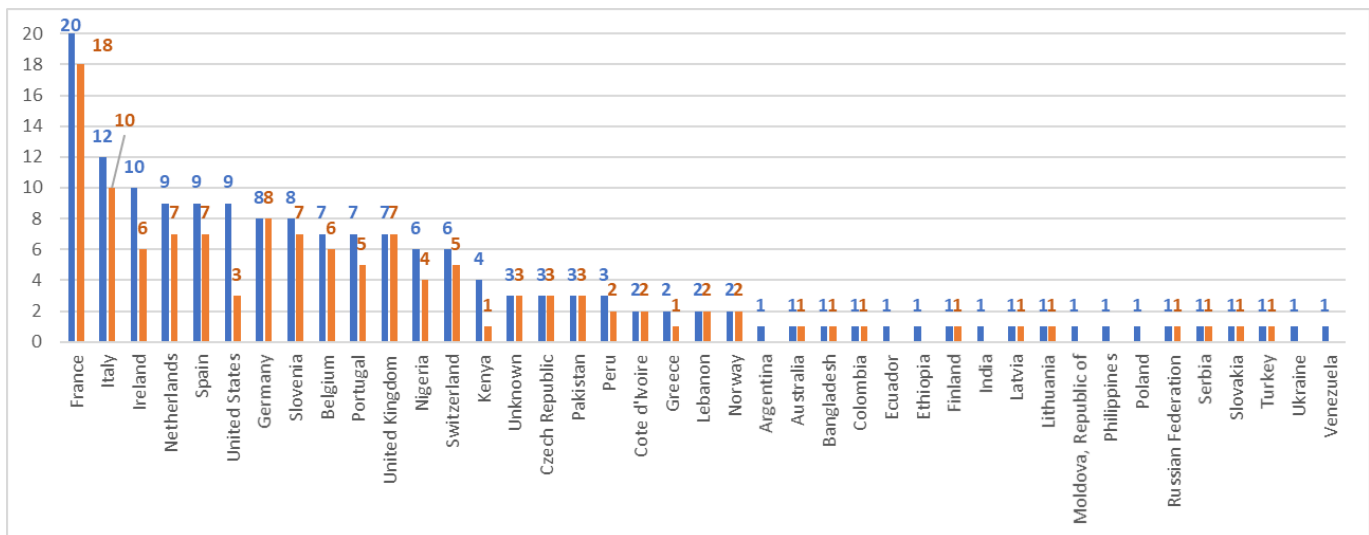


Fig. 5: Number of people that registered (blue) or attended (red) at least one webinar of the series per country.

108 people registered to the 3 webinars of the series. Most of the people registered attended the three webinars (31%), about a quarter attended 1 or 2 webinars and the rest did not attend any webinar (Fig. 6). 70% of the attendees followed at least 2 webinars. Overall, the participation data suggest that the whole series was of interest for many people, but some could not always attend webinars for professional or personal reasons.



Fig. 6: Number of people that registered or attended to 1 to 5 of the webinars.

Regarding the practical training activities, 49 people registered including 73% from EPPO countries but only 20 applicants could attend the training to ensure sufficient interactions between the participants. The applicants were selected based on the criteria defined in 3.2.2.2. Experience was evaluated based on two questions asked during registration (Are you using HTS tests in your laboratory or do you intend to do so in the near future? and, do you have an experience on validation of HTS test or on its comparison with other tests (indexing, PCR...)?). In total, 21 participants were selected and confirmed their participation and only 1 person did not attend.

Registration and attendance details for each webinar and training activity are indicated in Table 9.

Table 9: Participation to the webinar series on the concept of test validation in Plant Health.

	Webinar 1	Webinar 2	Webinar 3	Training activity 1
Registered	135	127	139	47
Attending	88	80	90	20
Attendance rate	65%	63%	65%	95%*
Poll				NA
Survey participation	53%	56%	47%	70%

* of the 21 applicants selected to participate

4.3.2.3 *Satisfaction of the participants*

About 47 to 56 % of the attendees responded to the satisfaction survey.

In general, attendees that responded to the satisfaction survey were very satisfied by the activities with 99% answering that the session was good (39%) or excellent (60%) compared to their expectations and 89 % answering that they were very likely or likely to recommend the session to a colleague.

Most of the attendees that responded to the satisfaction survey (35%) considered that 50-75% of the information presented was new to them. The percentage of information that was new for attendees was similar for the 3 webinars (although a bit smaller for the introductory webinar which is expected).

Finally, 82% of the attendees that responded to the satisfaction survey will use the information they learnt immediately or in the next year meaning that the information provided during the webinars is very useful.

Results of the satisfactory surveys for each webinar and training activity are indicated in Table 10.

Details on the numbers of views (on 2021-07-30) of the recordings per Webinar of this series are given in Annex 2.

Table 10: Results of the satisfaction surveys of the activities of the webinar series on HTS.

	Webinar 1	Webinar 2	Webinar 3	Training activity 1	Total (all activities)
How did the session compare to your expectations?					
Excellent	55%	64%	60%	64%	60%
Good	45%	36%	38%	36%	39%
Fair	0%	0%	2%	0%	1%
Poor	0%	0%	0%	0%	0%
How likely are you to recommend this session to a colleague?					
Very likely	66%	40%	64%		57%
Likely	30%	42%	24%		32%
Possibly	4%	18%	12%		11%
Unlikely	0%	0%	0%		0%
What percentage of information was new to you?					
More than 75%	21%	27%	31%	7%	22%
50-75%	30%	42%	41%	29%	35%
25-50%	34%	20%	21%	35%	28%
0-25%	15%	11%	7%	29%	15%
When will the information you learnt be useful to you?					
Immediately	36%	71%	43%	64%	53%
In the next year	41%	27%	24%	22%	29%
In the next 5 years	23%	2%	33%	14%	18%
Never	0%	0%	0%	0%	0%

5 Conclusion

Three webinar and training activities series were organised in the framework of VALITEST. Even though training activities had to be organised online due to the Covid-19 pandemic, limiting the possibilities to interact with the participants, the trainings were successful in terms of participation and satisfaction of the participants. They also succeeded in the training of the participants as most of them indicated that more than 50% of the information was new to them and in the dissemination of the project results. Finally, with those online activities, the consortium managed to target more participants than they would have with the physical workshops. The recordings of the webinars are accessible on the VALITEST website (and will also be available on the EPPO YouTube channel at the end of the project) and can be further used by laboratories to train people on the concept of validation, on the organisation of TPS and on the use of HTS diagnostic tests ensuring long term dissemination of the experience gained in the project.

ANNEX I: Announcements of the VALITEST training activities

1. *Announcement of physical workshops*



1st Announcement and call for interest

3 regional training workshops

on the concept of validation in Plant Health diagnostics

1st quarter 2021 in

Rome (IT) (event organized by CREA and NIB)

Wageningen (NL) (event organized by WUR and FERA)

Warsaw (PL) (event organized by PIORIN)

Objectives of the workshops

- To introduce the concept of validation and present the state of the art in terms of choice of a test and analysis of the results
- To train experts on the use of kits (including on-site and field tests)
- To present the state of the art in term of organization and analysis of interlaboratory comparisons (with a focus on test performance studies).

Format

The workshops will include presentations, small group activities and practical sessions and will be based on the experience and results gained by the partners of VALITEST during the project. The concepts presented at the different regional training workshops will be similar, but they will be illustrated with different pests that are of interest for each region.

More information & expression of interest

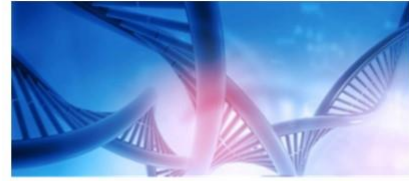
<https://www.surveymonkey.com/r/JVDG9MV>



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°773139.



2. Announcement of online trainings



Announcement

VALITEST training activities

on the concept of validation in Plant Health diagnostics

1st semester 2021

Note that due to the Covid-19 pandemic, the regional training workshops that were announced in July are cancelled. Online activities will be organized to replace those workshops.

Webinar series and online practical training sessions on the following topics:

- The concept of test validation in Plant Health
(January to February 2021)
- The organization of Test Performance Studies (TPS)
(February to April 2021)

Further information and registrations :

https://www.valitest.eu/training/activities_and_webinars

A webinar series and training activities on the use and validation of High Throughput Sequencing (HTS) tests for diagnostics of plant pests will be announced later.



**More information soon on <https://www.valitest.eu>
and <https://twitter.com/ValitestProject>**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°773139.



ANNEX 2: Details on the number of views for videos and webinars

A - Webinars

The concept of test validation in Plant Health

	Webinar name	date	Nb of views on 2021-07/30
Webinar 1	What is test validation and why it matters for reliable diagnostics?	Monday 11 th January, 2 pm	229 views
Webinar 2	How to adopt a new test in your laboratory?	Friday 15 th January, 2 pm	159 views
Webinar 3	The use and validation of on-site tests	Wednesday 20 th January, 2 pm	82 views
Webinar 4	How do companies handle quality control and validation of products and how will the EPDIA charter help in improving this task?	Monday 1 st of February, 2 pm	59 views
Webinar 5	Why is communication on test selection between risk managers and diagnostic laboratories important?	Monday 15 th of February, 2 pm	79 views

Test Performance Studies organisation

	Webinar name	date	Nb of views on 2021-07/30
Webinar 1	Preparing the TPS plan	Friday 19 th February, 11 am	43 views
Webinar 2	Selection of the tests and associated documents	Wednesday 24 th February, 2 pm	42 views
Webinar 3	Selection of participants and contract	Monday 1 st March, 2 pm	43 views
Webinar 4	Preparation and dispatch of samples	Friday 5 th of March, 11 am	41 views
Webinar 5	Production of reference material for TPS	Wednesday 10 th of March, 2 pm	41 views
Webinar 6	How to tackle the analysis of TPS results?	Monday 22 nd of March, 2 pm	33 views
Webinar 7	Q&A session: the statistical analysis of TPS results	Monday 29 th of March, 2 pm	21 views
Webinar 8	From TPS organisation to analysis of the results: example of the TPS on ToBRFV	Wednesday 7 th of April, 2 pm	14 views

The use and validation of High Throughput sequencing (HTS) tests for diagnostics of plant pests

	Webinar name	date	Nb of views on 2021-07/30
Webinar 1	What is High Throughput Sequencing (HTS)?	Friday 30 th April, 2 pm-3:30 pm	78 views
Webinar 2	How to prepare your laboratory to conduct HTS tests?	Monday 3 rd May, 2 pm-3 pm	38 views
Webinar 3	How to develop, validate and routinely use HTS for diagnostic purpose?	Tuesday 4 th May, 2 pm-3:30 pm	32 views

B - Videos

Video name	Partners involved in the preparation of the video*	Nb of views on 2021-07/30
Presentation of the VALITEST project	EPPO	19
What is a Test Performance Study?	EPPO, NVWA	120
Selection of pests and TPS organisers	EPPO (NIB / FERA)	75
Interviews on the preparation of the TPS plan	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)	70
Interviews on the selection of tests	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)	37
Interviews regarding the selection of participants	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)	22
Interviews on the preparation & dispatch of samples	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)	22
Interviews on the guidelines developed by WP3 on the production of reference material	EPPO (ANSES, UNITO, CREA)	13
Interviews on the analysis of TPS results	EPPO (FERA, NIB, ANSES, NVWA, UNITO, CREA)	25
The analysis of TPS results – video 1 – Introduction and sample panel	ULG	146
The analysis of TPS results – video 2 – Confidence intervals	ULG	98
The analysis of TPS results – video 3 – Analytical sensitivity	ULG	118
The analysis of TPS results – video 4 – Repeatability and reproducibility	ULG	108
The analysis of TPS results – video 5 – Introduction and sample panel	ULG	83

* Partners in parenthesis were interviewed.