1. Content of the ‘Topic Description’ document

1.1. Topic area
A: Diagnostics, field detection, surveillance

1.2. Links to the Euphresco Strategic Research Agenda
The topic addresses the following objective(s) of the 2017-2022 Euphresco Strategic Research Agenda:
- Objective 2017-R-2.2: to expand knowledge on transmission of disease and pathogens for healthy planting material
- Objective 2017-R-4.1: to validate risk-based sampling methodologies for phytosanitary inspections
- Objective 2017-R-5.1: to understand the biological significance of a positive molecular diagnosis
- Objective 2017-R-6.1: to test and validate methods for in situ detection and identification of pests

1.3. Topic title
Validation of molecular diagnostic methods for the detection of Tomato brown rugose fruit virus (ToBRFV) in seeds of tomatoes, chilies and eggplants.

1.4. Description of the problem the research should solve
Tomato (Solanum lycopersicum L.) is considered one of the most important vegetables worldwide (Gómez et al., 2000), such as China, India, Turkey, United States of America, Egypt, Iran, Italy, Spain and Mexico. Trellised tomato plants grown in protected structures, greenhouses, net-houses are highly exposed to infections by mechanically transmitted viruses or viroids primarily by the prevalent genera of the Tobamoviruses, Potexviruses and Pospiviroids. Commercial tomato varieties resistant to several Tobamoviruses are available, but recently Tomato brown rugose fruit virus (ToBRFV) was shown to overcome Tm2.2 resistance gene (Luria et al., 2017). Tomato brown rugose fruit virus has been reported to be present in Jordan¹, Germany², Israel³, Italy⁴, Mexico⁵, Palestine⁶, Turkey⁷ and the United States⁸.

Several molecular tests for the diagnosis of Tomato brown rugose fruit virus have been developed but harmonized protocols are missing. The Euphresco project shall aim at validating a number of PCR and real-time PCR tests for the detection and identification of the virus on seeds or propagative material of chili pepper and pepper (Capsicum annum), tomato (Solanum lycopersicum) and eggplant (Solanum melongena). The tests that may be considered for the Test Performance Study are described in the following publications:

² https://gd.eppo.int/reporting/article-6442
³ https://doi.org/10.1371/journal.pone.0170429
⁵ https://www.pestalerts.org/oprDetail.cfm?oprID=765
⁶ https://doi.org/10.1007/s42161-019-00240-7
⁷ https://gd.eppo.int/reporting/article-6553
• Davino S et al., (submitted). Developing of real time reverse transcription polymerase chain reaction for rapid detection of Tomato brown rugose fruit virus and its comparison with other techniques
• Rodríguez-Mendoza J, García-Ávila CJ, López-Buenfil JA, Arauíjo-Ruiz K, Quezada-Salinas A, Cambrón-Crisantos JM and Ochoa-Martínez DL (2019). Identification from Tomato brown rugose fruit virus by RT-PCR from a coding region of replicase (RdRP) (Identificación de Tomato brown rugose fruit virus por RT-PCR de una región codificante de la replicasa (RdRP)). DOI: 10.18781/R.MEX.FIT.1902-6
• Detection of infectious Tomato brown rugose fruit virus (ToBRFV) in tomato and pepper seed (ISHI-Veg) https://www.worldseed.org/wp-content/uploads/2019/05/Pepper-ToBRFV_2019_1.2.pdf
• First report of Tomato brown rugose fruit virus infecting greenhouse tomato in the United States. https://doi.org/10.1094/PDIS-11-18-1959-PDN
• Occurrence of Tomato brown rugose fruit virus Infecting Tomato Crops in Mexico. https://doi.org/10.1094/PDIS-11-18-1974-PDN

1.5. Description of the expected results
The proposal aims to compare and validate detection/identification molecular tests. Results will support the development of a validated Diagnostic Protocol that could facilitate the trade of seeds.

1.6. Beneficiaries of this research product
The beneficiaries of this protocol are the tomato, chili (pepper) and eggplant growers, the seed industry, the national plant protection organizations and policy makers.

1.7. Research funders and research contribution/ distribution

<table>
<thead>
<tr>
<th>Funding organisation</th>
<th>Research activity and researchers involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Centro Nacional de Referencia Fitosanitaria del SENASICA, México</td>
<td>-Project coordination with partner 2 NVWA -The group will be focus on the next crops: Solanum lycopersicum, Solanum melongena and Capcicum annum, that are affected by Tomato brown rugose fruit virus. -Provision of material for the TPS Contact person: Clemente de Jesus García Ávila E-mail address: <a href="mailto:clemente.garcia@senasica.gob.mx">clemente.garcia@senasica.gob.mx</a></td>
</tr>
<tr>
<td>Clemente de Jesus García Ávila <a href="mailto:clemente.garcia@senasica.gob.mx">clemente.garcia@senasica.gob.mx</a></td>
<td></td>
</tr>
<tr>
<td>2. National Plant Protection Organization, the Netherlands</td>
<td>-Project coordination with partner 1 Senasica -Participation in the TPS Contact person: Annelien Roenhorst E-mail address: <a href="mailto:j.w.roenhorst@nvwa.nl">j.w.roenhorst@nvwa.nl</a></td>
</tr>
<tr>
<td>Martijn Schenk <a href="mailto:M.Schenk1@nvwa.nl">M.Schenk1@nvwa.nl</a></td>
<td></td>
</tr>
</tbody>
</table>
3. Federal Ministry for Sustainability and Tourism, Austria  
Sylvia Blümel  
sylvia.bluemel@ages.at

- Participation in the TPS  
Contact person: Sabine Grausgruber Groeger  
E-mail address: sabine.grausgruber-groeger@ages.at

4. Flanders Research Institute for Agriculture, Fisheries and food, Belgium  
Kris de Jonghe  
Kris.DeJonghe@ilvo.vlaanderen.be

- Participation in the TPS  
-National survey in host crops  
-If available, reference material will be shared  
Contact person: Kris de Jonghe  
E-mail address: Kris.DeJonghe@ilvo.vlaanderen.be

5. Bulgarian Food Safety Agency, Bulgaria  
Ani Becheva  
a.besheva@bfsa.bg

- Participation in the TPS  
Contact person: Dora Panavotona  
E-mail address: d.panavotona@bfsa.bg

6. French Agency for Food, Environmental and Occupational Health and Safety, France  
Geraldine Anthoine  
geraldine.anthoine@anses.fr

- Participation in the TPS  
Contact person: Pascal GENTIT  
E-mail address: pascal.gentit@anses.fr

7. Federal Ministry of Food and Agriculture, Germany  
Bettina Beerbaum  
Bettina.Beerbaum@bmel.bund.de

- Participation in the TPS  
-Provision of material for the TPS  
Contact person: Heiko Ziebell  
E-mail address: heiko.ziebell@julius-kuehn.de

Silke Steinmöller  
silke.steinmoeller@julius-kuehn.de

8. Ministry of Agriculture, Plant Biosecurity Plant Protection and Inspection  
Yael Meller Harel  
YaelM@moag.gov.il

- Participation in the TPS  
-Provision of material for the TPS  
Contact person: Mouhammad Zeidan  
E-mail address: mouhammad.zeidan7@gmail.com

9. Council for Agronomic Research and the analysis of Bioeconomy, Italy  
Luca Riccioni  
luca.riccioni@crea.gov.it

- Participation in the TPS  
-Provision of material for the TPS  
Contact person: Laura Tomassoli  
E-mail: laura.tomassoli@crea.gov.it

10. All Russian Plant Quarantine center, Russian Federation  
Natalia Sherokolava  
natalia_sh@mail.ru

- Participation in the TPS  
-Provision of material for the TPS  
-Testing of different seeds and plants by PCR and ELISA  
Contact person: Yury Shneyder  
E-mail address: yury.shneyder@mail.ru
| 11. Ministry of Agriculture Forestry and Food, Slovenia          | Participation in the TPS | Erika Oresek  
erika.oresek@gov.si |
|---------------------------------------------------------------|--------------------------|---------------------------|
| 12. Eurofins Plant Pathology Laboratory, France               | Participation in the TPS | Abdelnasser El Ghazouani  
AbdelnasserElGhazouani@eurofins.com |
|                                                              |                          | Contact person: Natasa Mehle  
E-mail address: natasa.mehle@nib.si |
| 13. The French Variety and Seed Study and Control Group, France | Participation in the TPS | Valérie Grimault  
valerie.grimault@geves.fr |
|                                                              |                          | Contact person: Valérie Grimault  
E-mail address: valerie.grimault@geves.fr |
| 14. Hazera, Israel                                            | Participation in the TPS | Hila Danino  
Hila.Danino@hazera.com |
|                                                              |                          | Contact person: Hila Danino  
E-mail address: Hila.Danino@hazera.com |
| 15. University of Palermo, Italy                             | Participation in the TPS | Salvatore Davino  
salvatore.davino@unipa.it |
|                                                              | Participation in the TPS | Contact person: Salvatore Davino  
E-mail address: salvatore.davino@unipa.it |
| 16. Enza Zaden, the Netherlands                               | Participation in the TPS | Gerbert Hiddink  
G.Hiddink@enzazaden.nl |
|                                                              | Provision of material for the TPS | Contact person: Gerbert Hiddink  
E-mail address: G.Hiddink@enzazaden.nl |
| 17. Naktuinbouw, the Netherlands                              | Participation in the TPS | Marcel Toonen  
m.toonen@naktuinbouw.nl |
|                                                              | Validation according to EPPO PM 7/98 (2)  
of a detection protocol for ToBRFV based on the ISHI-Veg protocol (2) | Contact person: Maaike Bruinsma  
E-mail address: m.bruinsma@naktuinbouw.nl |

1.8. Research project partnership outside Euphresco

Euphresco funding ensures a certain level of transnational collaboration among Euphresco member countries. It is possible, if the funding consortium is interested, to contact funding organisations or research groups outside the geographical area covered by Euphresco members. The Euphresco coordinator could advertise the research topic in order to have an enlarged collaboration. If funders are interested in this possibility, please check the case below:

☑️ The funding consortium of the topic mentioned in section 1.2 requires that the topic is advertised outside the Euphresco network

Information to define the profile of sought partners could be useful (but not mandatory): country/region (if there are preferences), skills/expertise required, etc.
1.9. Any other relevant information on content
The EU funded project VALITEST will organize a TPS in the spring 2020. Synergies shall be pursued between the two projects. Contact person: Géraldine Anthoine
geraldine.anthoine@anses.fr
2. Euphresco management aspects of the project

2.1. Indication of the topic budget

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<th>Funding organisation a</th>
<th>Mechanism b</th>
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2.2. Expected duration of the project (only for non-competitive topics)
18 months. An early start of the project is suitable, i.e. by October 2019.

2.3. Identification of project coordinator
Has the research project coordinator been identified?

☑ Yes
☐ No

2.4. Any other relevant information on topic organisation and management

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a First member is project coordinator. A minimum of two partners are necessary for each proposal. Add lines as needed.

b Please indicate the preferred mechanism (e.g. real pot RP; virtual pot VP; non-competitive NC), or several mechanisms if there is flexibility.

c Optional, as this amount can still change in the next phase. In-kind contribution should also be indicated in this column.