Science Diplomacy for Plant Health: Moving towards Global Phytosanitary Research Coordination

1. The fight between human and plant pests and pathogens is as old as agriculture, but movement of pests and pathogens as a consequence of human activities is a recent problem. If trade contributes to the movement of pests and pathogens, it has also been suggested to provide part of the solution to meet future global food demand. These kinds of issues cannot be handled through national activities only. There is a need for a global alliance that will facilitate collaboration between scientists, governments and other end-users at both the national and international level to address common plant health challenges that cannot be solved by any single country.
2. A global network for phytosanitary research coordination to shape research agendas across countries and accelerate the development of science to support regulatory phytosanitary activities will benefit all players. It will provide a mean for national organizations and funding systems to adapt to and take advantage of the internationalization of research. A global network will decrease the divide between countries and allow them to optimize the use of resources while risks to plant health increase. The proximity of various players will break the siloes that have traditionally structured the plant health sector and favor the division of labor in a true transdisciplinary approach that allow for the codesign and coproduction of solution-oriented knowledge, policy and practice while building capacity and harmonizing approaches.
3. Global phytosanitary research coordination is one of the priorities that the Commission on Phytosanitary Measures and its main constituents, the NPPOs of IPPC contracting parties and RPPOs, will have to address over the next decade, and the issue is addressed in the draft IPPC Strategic Framework for 2020-2030. In this context, the IPPC Secretariat and Euphresco have drafted a manuscript describing the benefits of research coordination and collaboration in plant health and providing a vision for a global network. The aim of the publication is to raise awareness on the IPPC Strategic Framework objective and to launch discussions with relevant players worldwide. An email was sent by the IPPC Secretariat on 2019-07-04 to all RPPOs asking for inputs on the manuscript. So far, inputs have been received from EPPO and NAPPO. It is very important that regional plant protection organizations working closely with national plant protection organizations and plant health regulators show a unite front on this topic that is gaining international interest. This will allow to raise awareness on the importance of statutory plant health vs other less applied activities and will ensure that our community can benefit from funding for plant health research activities and stand in front of other competitive initiatives. There is here a good opportunity to make the plant health community stronger and more influential.
4. The TC-RPPO is requested to provide its feedback on the publication, such as:

* provide additional examples on initiatives to consider
* provide a vision for the global network
* provide suggestions on near-future actions
* provide ideas for the final messages to ‘sell’
* provide their formal support to the publication accepting to be co-author

Appendix 1: Draft article

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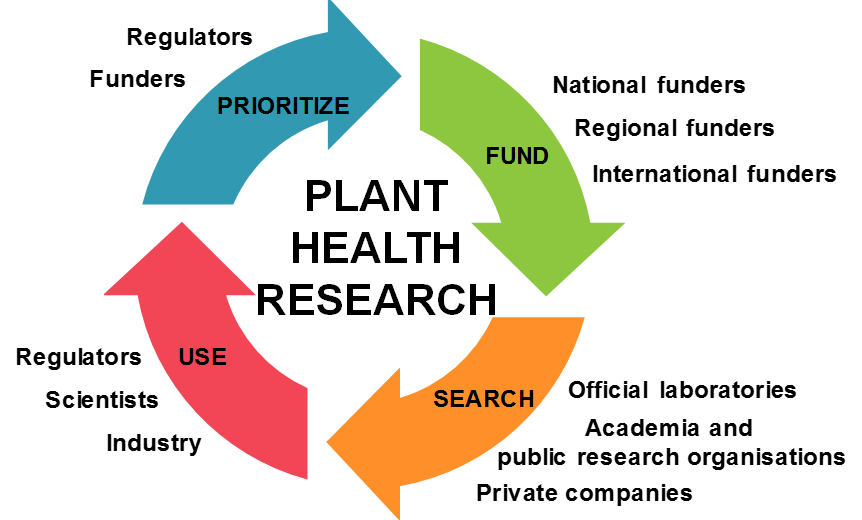
Baldissera Giovani1, Jingyuan Xia2, Mirko Montuori2, Craig Fedchock2, to be completed

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1. Ensuring food security is one of the main societal challenges of the 21st century that can only be addressed if we consider its complexity: an increased human population with changing diet habits (Lindgren et al., 2018) will have to produce more on soils that suffer erosion (Hatfield et al., 2017), with plant varieties whose yield can barely be increased (Ahmad et al., 2019), under changing climatic conditions (Saxena et al., 2018) while facing threats posed by crop pests (Savary et al., 2019). The fight between human and plant pests and pathogens is as old as agriculture, but movement of pests and pathogens as a consequence of human activities is a recent problem (Santini et al., 2018; Bebber et al., 2014). If trade contributes to the movement of pests and pathogens, it has also been suggested to provide part of the solution to meet future global food demand (FAO, 2003). These kinds of issues cannot be handled through national activities only.
2. The entry into force of the International Plant Protection Convention in 1952 represented a historical milestone towards the optimisation of strategies to address plant health threats through cooperation between countries (Griffin, 2018). Despite attempts to rationalise efforts, the activities of national, regional and international plant health authorities have suffered from limited resources, in particular to support research activities meant to provide the scientific evidence to guide policy-making decisions. The inefficient and often neglected communication between the various players (research funders, policy makers, scientists) has shifted research efforts away from relevant problems and has limited the use or re-use of scientific knowledge.
3. Sharing of knowledge and expertise has been at the foundation of modern scientific practice. Undertaking joint research activities, participating in knowledge dissemination events and using common infrastructures have contributed to make research an endeavor with no boundaries. But the phytosanitary field (statutory plant health) had been an exception and scientists working on regulated pests have worked in isolation. As an example, the diagnosticians in official national laboratories had not been challenged to collaborate with colleagues outside their country, because of the scarce funding opportunities to support international plant health research activities but also because plant health research has classically been seen through national prisms. But examples of international collaborations that aim to identify and address common plant health research challenges exist, such as the International Forestry Quarantine Research Working Group (IFQRG) and the International Pest Risk Research Group (IPRRG). The IFQRG is an independent and international group of scientists that supports the IPPC community (e.g. the Commission on Phytosanitary Measures, the Standard Committee and the Technical Panel on Forest Quarantine) by providing scientific information and advice on critical forestry quarantine issue. Similarly, the IPRRG is a dedicated group of scientists that meet regularly and informally to discuss and provide training on innovative research that support pest risk modelling and mapping. Collaborations have also been established between governments, such as the Plant Health Quadrilaterals (Quads), an informal coalition of the national plant protection organizations (NPPOs) of Australia, Canada, New Zealand and the United States of America or the European Joint Programming Initiatives (JPI) that involve national research programme owners and managers. Nevertheless, these initiatives are ‘specialised’, either in terms of the themes they cover and in terms of the professionals (scientists, policy makers or research funders) they involve. This creates fragmentation, may limit the visibility of the decisions and actions undertaken and results in the inefficient uptake of the knowledge produced. Also, it reduces the influence on (inter)national decision-making processes and finally their impact on today’s plant health challenges (Hackmann and Boulton, 2016). As a singularity, the Euphresco network was developed to play the role of a regional platform for phytosanitary research coordination and funding, reducing the fragmentation and duplication of national and regional research activities and favouring international communication between research and policy.
4. There is a need for a global alliance that will facilitate collaboration between scientists, governments and other end-users at both the national and international level in order to address common plant health challenges that cannot be solved by any single country.
5. Such a global network shall bring together national and regional research programme owners and managers interested in agriculture and food safety challenges, authorities such as NPPOs and ministries as well as representatives from academic, public and private research institutes. For such a network to be successful, trust must be built between organizations that have different missions, mandates and that operate in different countries. This takes time and resources, but successful examples exist; rather than duplicating, we should aim at building on their experience. The Euphresco network has operated since 2006 and has been structured as phytosanitary forum, a place where the most recent information on plant health research can be found, where plant health research topics can be discussed, and where ‘business’ can be done. The differences of the organizations participating in the forum have been seen as strengths, their views as knowledge to use to nurture discussions and the network’s main aim was to identify complementarities and coordinating activities.
6. The various actors of the global network will: prioritize the plant health challenges to address (the policy makers and the funders); secure investments and allocate funds for ad-hoc research activities to tackle the challenges (the funders); carry-on the work and deliver results (the scientists); raise awareness and use research evidence to implement national and international actions (all) (fig. 1). The proximity and continuous interaction between policy makers, funders and scientists will improve the dialogue at national and international level and ensure that the research community delivers solutions for the plant health challenges that countries have to face. Such a broad composition may complicate the decision-making process but at the same time it is the only way to grasp and address the complexity of today’s challenges; a high level of representation, in particular from policy makers and research funders, will ensure the credibility of network decisions.
7. Benefits of collaboration only occur where there is mutual interest and alignment of goals. But prioritization is not an easy task when it comes to plant health, a field where problems are addressed locally, regulations are set at national or regional level (ref) and no one really notice the importance of keeping plants healthy until the problem has already manifested itself, and by then it is too late. This results in an overwhelming number of regulated pests whose incursions and outbreaks are under scrutiny by official authorities; as an example, more than 1000 pests are listed in the UK Plant Health Register. Combination of national efforts will benefit those countries that focus on the same problem at a given time; sharing of knowledge will benefit those countries that face the emergence of a pest that has become a routine problem in another region. Global coordination processes should not neglect the regional approach to plant health and should not aim at prioritizing, but rather at identifying commonalities to frame the dialogue. The funding strategy should adapt to this diversity, and rather than allocating the limited funding to few large projects, should rather favour the initiation of small-medium size projects that over a short period of time (i.e. 12-24 months) are able to produce scientific evidence ready to use to support the activities of plant health stakeholders. This is the approach followed by Euphresco, which has allowed to fund in the last 10 years (2008-2018) ca. 100 research projects on regulated arthropods, bacteria, fungi, nematodes, viruses, and invasive alien plants. Limiting the funding operations to small-medium size projects also allows to secure the participation in research projects of organizations with limited resources that would be otherwise excluded from international collaboration. Plant health research should not be an elitist endeavor, if knowledge sharing, optimization of the use of resources, and harmonization of practices are pursued.
8. Mutualisation of infrastructures will ensure that information is accessible to all members of the global network. This infrastructure would include: a database to share information (such as reports, recommendations, guidelines, data) from national and transnational research projects; a database to share information on the research capacity (scientists and their expertise) available in the various countries; and a database to facilitate discussions over research topics to be addressed through trans-national collaboration.
9. Processes and calendars should be flexible enough to suit the constraints of members and cope with the heterogeneity of the national research systems, in order to maximize the collaboration of communities that use different funding rules and ways to implement national activities (calls, grants, etc.) or lack of national research programmes and adequate research funds. This will allow the involvement of less R&D intense countries that have invested less in research but hold expertise that could be critical to address challenges. Processes should also ensure rapid and regular identification of common priorities, allocation of funds and commissioning of projects, especially when emergencies occur. As an example, following the first report of *Xylella fastidiosa* in Southern Italy in October 2013, the Euphresco network funded in 2014 a research project aiming at building/strengthening the diagnostic capacity of the region, as a first rampart to empower the response of countries against incursions of the bacterium or against outbreaks.
10. International collaboration feeds on the dialogue of national communities. Efforts should also be made to strengthen or establish (sub) national processes, in particular between ministries, galvanize the interest of relevant organizations on plant health issues and consolidate positions to ease the decision-making process.
11. Coordination of the practical operations should be ensured by a neutral structure that will benefit from the mediation by Regional Plant Protection Organizations (RPPOs) and of the International Plant Protection Convention (IPPC) that historically have been in charge of the regional coordination of plant health efforts, even if until now only a few (e.g. the European and Mediterranean Plant Protection Organization, EPPO) have been officially mandated to facilitate cooperation in research and in the exchange of relevant scientific information. The sustainability of structures that enable complex collaborations is a major challenge, in particular with regards to the long-term commitment of members to fund the Secretariat. Successful examples exist: the Euphresco Secretariat activities are supported only by an annual contribution of its members in contrast to other networks which are additionally supported by external funds (e.g. STAR-IDAZ, funded by the European Commission).
12. Recent actions by the Commission on Phytosanitary Measures (CPM) will greatly support IPPC member countries to face plant health challenges. Beyond that IPPC-centered action however, a broad research coordination and collaboration network will almost certainly identify the problems facing global plant health that should in turn form the basis for generating more attention (and hopefully resources) for keeping plants healthy. The sooner the effort the launch of a global research coordination and collaboration network takes place the better, especially if it can occur at the beginning of the International Year of Plant Health in 2020.
13. A global network for phytosanitary research coordination to shape research agendas across countries and accelerate the development of science to support regulatory phytosanitary activities will benefit all players. It will provide a mean for national organizations and funding systems to adapt to and take advantage of the internationalization of research. In the past few years the amount of public investment in research has been decreasing in high income countries while it is increasing in lower income countries (Soete et al., 2016). A global network will decrease the divide between countries and allow them to optimize the use of resources while risks to plant health increase (Giovani et al., 2015). The proximity of various players will break the siloes that have traditionally structured the plant health sector and favor the division of labor in a true transdisciplinary approach that allow for the codesign and coproduction of solution-oriented knowledge, policy and practice (UN, 2016) while building capacity and harmonizing approaches. Global phytosanitary research coordination is one of the priorities that the Commission on Phytosanitary Measures and its main constituents, the NPPOs of IPPC contracting parties and RPPOs, will have to address over the next decade, and the issue is addressed in the draft IPPC Strategic Framework for 2020-2030, which is expected to be presented for adoption at the fifteenth session of the Commission on Phytosanitary Measures in 2020. The challenge is great, but science diplomacy is the smartest approach to engage governments, increase mutual understanding, catalyse harmonization and favor international impactful actions on long term and newly emerging global plant health issues.

Figure 1. Global phytosanitary research coordination network (image developed using an infographic vector created by freepik <https://www.freepik.com/free-photos-vectors/infographic>)



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