



Late and early blights, caused by *Phytophthora infestans* and *Alternaria* spp. respectively, severely threaten both the foliage and harvested products (tubers/fruits) of potato and tomato crops in Europe and worldwide. In Europe, the cost of late blight alone, including control and losses, is estimated at about 900 M€ a year. This annual cost exceeds 5 B€ globally.

Despite continuous breakthroughs, further research and extension efforts are needed to fully achieve integrated pest management (IPM) strategies, as required by EU Directive 2009/128/EC and by the priorities of the new Green Deal and Farm to Fork initiatives launched by the EU as part of the Horizon Europe strategic framework programme. This context imposes a set of expectations that can be grouped under three major themes:

- **understand the composition of pathogen population, their genetic evolutions and the biological, climatic and anthropic drivers behind their invasive success;**
- **develop new innovative, effective and sustainable Integrated Pest Management strategies,** consolidating and exploiting population information, improved climate prediction, available control means (conventional pesticides, resistant cultivars, biocontrol options, early detection and warning) and cutting-edge information technologies;
- **provide optimal husbandry of efficient control means** to maximize their benefits whilst mitigating the risk of reduced efficacy of these important control measures due to pathogen change.

### What is EuroBlight?

These themes remain the rationale for 'EuroBlight', a very active multi-disciplinary, multi-actor consortium launched with initial funding from the EU and which has met regularly since 1996 with a clear overall objective: to identify, evaluate and combine the best possible tools to predict, manage and control late and early blights. EuroBlight has developed into a unique collaborative platform from which the challenges that early and late blights pose in Europe and worldwide can be identified and tackled. Its biennial workshops allow key research and extension priorities to be identified and formulated into collective Statements that underpin joint actions and international collaborations for improved IPM strategies. The 18<sup>th</sup> EuroBlight Workshop, held online in May 2021 due to the CoVid19 pandemic, brought together 120 participants from Europe, South America, USA, Africa, and India to share research and identify current challenges and opportunities.

### Major achievements and breakthroughs on past EuroBlight statements

Since the EuroBlight workshop in York (May 2019), research and development on late and early blights have remained strong in Europe, and generated both new findings and new initiatives.

Among the **new findings**, let us cite:

- the detection, typing and mapping of new emerging clones, both within as yet clonal populations (EU\_36\_A2 and EU\_37\_A2 being the most notable) but also within as yet sexual populations (EU\_41\_A2, EU\_43\_A2). The latter emergences are driven by a change in early inoculum sources, with volunteers and dump piles playing a strong role;
- The confirmation of the expanding occurrence of resistance or multi-resistance to some key fungicides in both *P. infestans* (EU\_37\_A2/fluazinam) and *Alternaria* spp (multiple mutations responsible for resistance to e.g. QoIs) ;
- an increasing interest for resistant cultivars, both in Europe and elsewhere in the world. Most of these resistant cultivars rely on major genes, alone or as pyramids, which raise the question of resistance durability;
- many on-going trials with new and/or integrated control solutions.

Regarding **new initiatives**, EuroBlight members have started several new projects dealing with biocontrol (ECOSOL, SC, DK, FI, ES, DE), management of primary inoculum and dissemination of early infections (SYNAPTIC, F), integrated management of early and late blights (H2020 Organic +), and new technologies for scouting and monitoring infections with drones and sensors. EuroBlight also maintained its efforts for population surveillance, fungicide assessment against tuber and foliage blight, and launched similar trials and protocols for early blight control and for biocontrol solutions.

**Recommendation 1:**  
*Continue and renew efforts to monitor populations of blight pathogens, their evolution and their epidemiology*

**EuroBlight strongly believes a pan-European surveillance of populations of blight pathogens is essential for fast reaction to new emergences and optimization of control strategies. EuroBlight will maintain its efforts to serve as a pilot network for the production and use of population information in IPM, and would welcome national and EU support to fully implement it.**

The Europe-wide epidemiovigilance led by EuroBlight demonstrated the value of monitoring, mapping and typing pathogen populations. It allowed the rapid detection and early characterisation of new, emerging clones, such as EU\_36\_A2 and EU\_37\_A2 in western Europe and EU\_41\_A2 in Nordic countries, which today threaten fungicide and host resistance husbandry.

*EuroBlight will continue its long-term involvement in population monitoring and typing. However, this coordinated and long-term effort would be best supported through National Action Plans for IPM implemented in EU member states. EuroBlight stresses that such a coordinated scheme, that can be easily transposed to other major crop pathogens, should: 1) consolidate an EU (global) network of reference laboratories for pathogen characterization (Recommendation 3); 2) improve and distribute protocols for sampling, storing and phenotyping isolates, including the development of 'fast phenotyping' methods (Recommendation 4); and 3) manage and exploit a comprehensive database infrastructure, such as the one included in the EuroBlight toolbox, to track emergence and match geo-referenced data on pathogen composition, host resistance and fungicide performance (Recommendation 2).*

**Recommendation 2:**  
*Assess, develop and integrate control methods into efficient, tailor-made local strategies through collaborative and participatory research*

**As a long-time actor in IPM, EuroBlight supported the search for as diverse an array of control options as possible, including biocontrol technologies, host resistance, crop/farm management alongside a set of high-performance fungicides. A strong focus must now be put on combining these components into efficient, robust, local and sustainable control strategies; this can only be achieved through multi-actor actions involving key stakeholders along the value chain.**

The core of IPM strategies is optimal combinations of best local practices. The flow of new components is still high (new biocontrol products, better resistant cultivars, more efficient monitoring and scouting methods), but their integration into validated strategies remains a difficult challenge. Furthermore, the durability and acceptability by users of both individual solutions and complex strategies are still not fully ascertained. Multi-actor research and demonstration projects are therefore needed to design and validate IPM schemes.

*EuroBlight will continue its involvement in the evaluation of management options for the control of late and early blights, and in making available updated information on the current best practices for IPM. As a multi-disciplinary, multi-actor network, EuroBlight is ideal to test innovative ideas and strategies through participatory actions. EuroBlight is also willing to play an active role in the assessment of more complex, integrated blight control strategies in both conventional and organic production systems.*

**Recommendation 3:**  
*Developing a transnational, distributed European infrastructure*

**Since its inception, EuroBlight acted as a pan-European network, developing initiatives for a coordinated response to the challenges of sustainable control of early and late blights. EuroBlight therefore strongly supports any initiative to establish a permanent infrastructure able to sustain and expand the collection, integration, use and dissemination of data relevant to IPM design and validation, as well as the capacity building in these fields.**

Previous EuroBlight statements (Brasov 2015; Aarhus 2017, York 2019) insisted upon the necessary coordination and harmonization of resources, protocols and competences to achieve maximum success in the development and implementation of IPM against early and late blights. EuroBlight, through specific research projects developed according to these statements (notably IPMBlight2.0, 2016-2019) and through its long-term operations (population monitoring, IT infrastructure, databases etc...) developed a strong basis for this cooperation, which would be considerably strengthened by a permanent infrastructure with long-term funding.

*EuroBlight offers to contribute its assets to a European infrastructure dedicated to IPM in arable crops, and to actively work to develop it on a wider scale. It also offers to use some of its generic tools for the lasting control of other major diseases of agricultural crops via this European, shared infrastructure.*

**Recommendation 4:**  
*Fostering global outreach, cooperation and harmonisation*

Dealing with major diseases distributed worldwide, EuroBlight recognizes both the challenges and opportunities for a global approach of sustainable crop health management. It is also well aware of the need for increased visibility and accessibility of the data and knowledge gathered during its 25 years of existence. EuroBlight recommends that the long-term efforts to share and develop a global view of the blights issue, but also of the new questions it raises (local versus global management issues, rapid development of information technologies, impact of global warming on pathogen distribution and spread etc...) be fully exploited for the identification of research, development and priority setting, and for the set-up of transcontinental activities improving the lasting control of such major plant diseases.

EuroBlight was and remains a pioneer network in IPM management of major plant diseases, and served as the basis for the development of sister networks sharing the same goals in other regions (North America – USAblight -, Latin America - Tizón Latino - and Asia - AsiaBlight). Given the intensive intercontinental trade in potato and tomato, and the possibility for worldwide dissemination of invasive genotypes, it is essential that these networks continue to cooperate.

In recent years, EuroBlight also dedicated efforts to make its actions (and the high stakes they address) more visible for a wider stakeholder audience, including scientists, decision makers, practitioners and industry actors.

*As part of its international strategy, EuroBlight will further strengthen its connections to sister networks worldwide, and commits to help strengthen the budding AfricaBlight network. EuroBlight will continue to contribute its tools and platforms to sister networks, and to propose or get involved in the development of shared initiatives and projects.*

*EuroBlight commits to reinforce its dissemination efforts towards the academic and scientific community and, but also to breeders, extension specialists, teachers, decision makers and end-users. EuroBlight will also enforce a policy regarding data management and use, to make its data and results available to a wider audience and directly usable in participatory, open science projects.*

**Contact**

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