



POLICY BRIEF EVOCA #5

**Collective action against potato
late blight through learning and
monitoring systems**



Late blight as a production constraint

Aforementioned positive developments and promising prospects cannot gloss over the lingering challenges that the potato sector faces. The average yield is around 14.2 t/ha, an amount far below the attainable yield of up to 50 t/ha under improved technologies and management practices in Ethiopia. Disease pressure, particularly bacterial wilt and late blight of potato are the most important production constraint for farmers. Potato late blight is a serious disease that has been wiping out potato fields in a matter of few days due to limited disease surveillance capacity, real-time information exchange on disease incidence and lack of community-based collective disease management strategies.

African case study provides scientific insights

This policy brief shares research findings of an interdisciplinary research programme titled “Responsible life-science innovations for development in the digital age: Environmental Virtual Observatories for Connective Action” (hereafter referred to as EVOCA) that was implemented between 2016 and 2021 by Wageningen University and Research, together with international and local partner organizations. EVOCA developed and researched participatory monitoring systems, virtual platforms, and digital applications geared towards facilitating connective action regarding six different complex problems in four African countries (Rwanda, Kenya,

Ghana, and Ethiopia). This policy brief aims to inform policy and practice about late blight disease management, primarily targeting the public extension system, NGOs providing extension services, and research centers that work with potato producing farmers.

Approaching late blight as a collective action problem

The pathogen that causes late blight (*Phytophthora infestans*) is primarily air-borne and spreads extremely rapidly in the air. This propensity of the pathogen to travel across farm boundaries means that a lack of control of the disease by any farmer stimulates the development of an epidemic and thus imposes costs or losses on other farmers. It also means that control efforts by any farmer confer a benefit to other nearby farmers as a result of decreased disease pressure in the surrounding. Such interdependence among farmers has an important implication for the design and promotion of late blight management strategies by actors in research and extension systems.

BOX 1

A survey conducted with 261 farmers in three Woredas in Oromia and Southern Nations, Nationalities and Peoples regions showed that 97% of the farmers associated the cause of late blight with environmental conditions like rainfall, humidity and cloud. Although most farmers (94%) could recognize the symptom when shown a picture of a plant and a potato field affected by the disease, none of the farmers knew the spreading mechanisms and farmers believed their potato field was safe despite the occurrence of the disease in neighboring fields. A follow-up participatory action research demonstrated how conceptual and practical learning helped farmers appreciate late blight as an infectious disease, with multiple spreading mechanisms and, hence, how the actions of one farmer affect the crop of another farmer. Knowing the multiple spreading mechanisms was instrumental for farmers to see the importance of other cultural management practices (removing volunteers, dehauling, and using disease-free seed) on top of their conventional practice of fungicide spraying.

Managing a collective action problem demands technical and socio-institutional solutions

Helping farmers deal with a collective action problem is about driving and promoting both technical and institutional management solutions.

The less-visible disease development and spreading mechanism make late blight management a knowledge-intensive endeavor for farmers. Relevant technical knowledge on the nature of the disease and on available management options is key for farmers to inform their management practices. Empirical studies (Box 1) conducted in the major potato growing Woredas revealed how farmers’ limited knowledge about the disease is contributing to continued late blight prevalence and

how action-oriented learning improved farmers' knowledge about the disease and its management.

The management of collective action problems such as late blight requires new institutional arrangements

Nevertheless, knowing about the disease and the management practices is not sufficient to effectively deal with a problem that requires collective action. Research and extension efforts that are mainly geared towards addressing the knowledge gap or improving management practices of individual farmers could not help farmers to collectively deal with the problem.

The need for socio-institutional arrangements

The management of collective action problems such as late blight requires new institutional arrangements and social organizations that enable and sustain collective action among farmers. The same studies (Box 2) provided evidence on how conventional extension and advisory approaches may not support communities to collectively and effectively manage late blight and how institutional arrangements in the form of community-based monitoring systems and sanctioning mechanisms can improve farmers' collective action in managing the disease.

Farmers discussing how to jointly monitor late blight incidences.



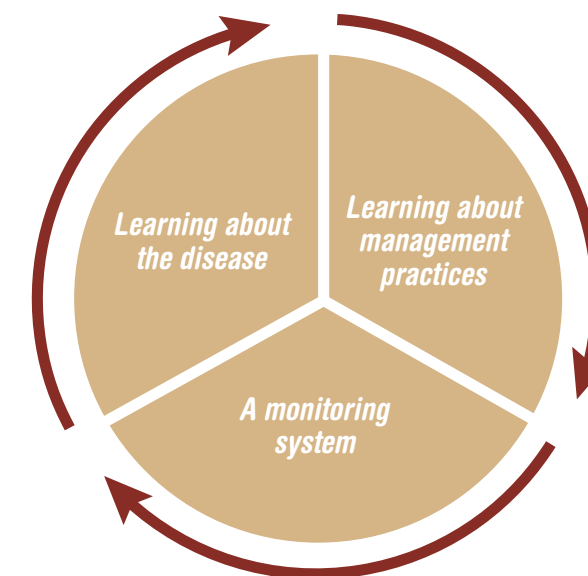
BOX 2

Farmers' realization of the spreading mechanisms of late blight and their interdependence in managing the disease played a key role in initiating discussions on the importance of coordinating their management practices. The discussions led to mutual agreements to jointly scout their fields for detecting late blight incidence and also monitor individual management practices (spraying, removing volunteers, and dehauling) through a farmer selected committee. Non-compliance by some farmers to implement agreed practices eventually made farmers consider sanctions (monitory fines), a practice that farmers rejected at the beginning. Enforcement of the sanctions was proven to improve farmers' compliance. A follow-up game-based experimental study also revealed that only addressing the knowledge gap (providing information to farmers on the spreading mechanisms of late blight and the collective risk and benefits of fungicide spraying) is not enough; such new awareness needs to be complemented with deliberation and negotiation processes that are key for initiating community-based institutional arrangements. The study showed that farmers who were provided with 'extension service' on the spreading mechanisms of the disease and the collective risk and benefits of individual spraying and then given the opportunity to interactively communicate were 65% more effective in managing the disease compared to farmers that only received the 'extension service'.

Recommendations for the research and extension system

To help farmers effectively manage late blight, three complementary and interrelated activities are put forward for key actors in the research and extension system: the public extension under the Ministry of Agriculture and regional agricultural bureaus; potato research and extension departments of the national research system; and NGOs providing farmer advisory services (Figure 2).

Figure 1: A collective management strategy to potato late blight.



Learning about the disease

Extension services should facilitate learning on the cause of late blight and its spreading mechanisms. Knowing the cause of late blight means that farmers would not confuse the cause of the disease with weather condition which only plays a role in the development and spread of the disease. When farmers have this background information, it sets the stage for extension workers to elaborate on the different spreading mechanisms of the pathogen. Farmers might not be expected to know about the life cycle of the pathogen; however, it is important that they discern the characteristics of the pathogen from weather conditions. The main objective here is to help farmers appreciate their interdependence and, hence, see the need for collective action in managing the disease. Different types of learning tools (pictures, videos, animations) can be used to visualize the disease development and different spreading mechanisms.

Integrating different management options minimizes the development of fungicide resistance

Learning about management practices

It is important that farmers learn about additional management options on top of fungicide spraying. Integrating different management options does not only help farmers keep the quality of their seed, including resistant traits of improved varieties, for a longer period, but it also minimizes the development of fungicide resistance by the late blight pathogen. Learning about the following management practices should be the focus of extension services:

- Cutting foliage (the green biomass) two to three weeks before harvesting
- Destroying volunteer potato plants that can be sources of late blight infections
- Planting material (seed tuber) selection and storing techniques
- Alternate use of systemic (e.g. Ridomil) and contact (e.g. Mancozeb) fungicides that help minimize the development of fungicide resistance by the late blight pathogen to systemic fungicides.

Facilitating and backstopping the development of community-based monitoring systems

Once farmers are aware of their interdependence in their management efforts, a monitoring system enables and sustains the implementation of agreed-upon collective management practices. The role of extension services in the development of this type of institutional arrangement is to highlight its importance in managing their collective risk and to facilitate the development of a monitoring system that is primarily championed by the farmers themselves. Once farmers recognize the need to enable the emergence of such monitoring system, the following activities can be suggested as its building blocks:

- Agreed-upon management practices to be implemented by farmers
- Monitoring and gathering information on the implementation or otherwise of agreed-upon management practices by individual farmers

- Sanctions and incentive mechanisms for compliance or non-compliance to agreed-upon management practices
- Locally elected farmer committee that monitors the implementation of agreed-upon management practices and that enforces sanctions or incentive mechanisms
- Regular community meetings to exchange information, evaluate the monitoring work and make adaptive measures as required

Key messages

- **Potato late blight is seriously undermining productivity and farmers' practices are contributing to continued late blight prevalence**
- **Farmers have little knowledge about their interdependence in managing late blight**
- **Research and extension should catalyze farmers' learning on the cause and spreading mechanisms of the disease to initiate a community-based collective late blight management strategy**
- **Fostering a community-managed monitoring system by research and extension system enables and sustains a collective late blight management strategy**

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Colophon

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