Potato Bacterial Disease Surveillance in Kenya - Explanatory note #4

In 2019/20 CABI and KEPHIS conducted an extensive survey on potato diseases most notably on blackleg, a "wilting disease" caused by a complex of bacteria, including Pectobacterium and Dickeya spp. This group of bacteria is sometimes referred to as the "Erwinia complex", and can be transferred by tubers but also by water, insects, wind and rain. The full report of 157 pages is available as PDF. In addition a series of what we call the "Explanatory notes" is published and disseminated to stakeholders in the Kenya potato sector, to make the often very technical details in the report more accessible.

This paper compares international practice on Erwinia tolerances. The "Explanatory notes" and the full CABI/KEPHIS potato disease surveillance report can be found on the following web page: https://www.wur.nl/en/Research-Results/Research-Institutes/centre-for-development-innovation/show-cdi/seed_potato_phase3.htm

Erwinia bacteria: international practice

The CABI /KEPHIS "Potato Disease Surveillance in Kenya" has confirmed the presence of various species of Erwinia in Kenya. This is not surprising. In all countries where potatoes are grown on a serious scale, research has found Erwinia. In this paper we will briefly discuss how other countries cope with this disease.

One common denominator in major potato growing countries is the acceptance that the disease cannot be eradicated. It is therefore not qualified as a quarantine organism (Q) but in most cases as a quality disease. Some specific Erwinia species may be assigned as a Q but there are very few countries that consider the entire Erwinia complex as a Q. Kenya is one of these rare exceptions to the rule. The exceptions are rare because it would imply that the local seed certification system has a zero tolerance for Erwinia, making it virtually impossible to produce certified seed.

The objective of Erwina control measures is to regulate the disease in a way that the development of the potato sector is not unnecessarily negatively affected. The most effective instrument in minimizing the impact of Erwinia is the abundant use of certified seed. Moreover, such use of quality seed also stops the spread of other important diseases. Use of certified seed also increases yields. It is a major factor in achieving profitable potato cultivation. In general countries want to have seed potatoes of high quality and therefore impose strict standards. On the other hand, if standards are too strict, this will hamper the production of sufficient quality seed. The challenge is to find the right balance.

What is the right level of Erwinia tolerance standards in certification systems?

Each country has to define its own standard, based on local circumstances. If the level of agricultural development is high like in North-West Europe, the certification standard for Erwinia can be strict. In countries where yield levels are low and availability of quality seed is low, it may be wise to choose for more modest certification standards. Priority should then be given to the production of sufficient volumes of certified seed.

The United Nations Economic Commission for Europe (UNECE) https://unece.org/trade/wp7/SeedPotatoes-Standards provides an international reference for all aspects of seed potato certification. This also includes standards for pest and diseases, including Erwinia. The internationally accepted way of measuring the level of Erwinia is by counting diseased plants in seed potato fields. Such plants should subsequently be removed. As Erwinia can cause Soft Rot of tubers, usually also tolerances for Soft Rot are set.

Potato seed production starts from pathogen-free genetic material and mini-tubers. This is followed by a limited number of field generations. Control is based on visual inspection of field crops and tubers. The higher the seed class, the stricter the standard for Erwinia affected plants and tubers.

PCR testing is a method that is NOT suitable for testing Erwinia. It can only determine the presence of Erwinia but cannot give any indication of the severity and cannot predict whether the infection will produce diseased plants. This has been explained earlier in Explanatory Paper #3.

The table below shows the tolerances expressed as percentage of Erwinia infested plants during field inspection in the certification schemes of several countries:

Seed class	**Seed class Kenya**	**EU %**	**UNECE %**	**South Africa %**	**Tanzania %**	**Kenya**
Pre Basic seed (TC)	Pre Basic (G1)	0	0	0	0	0
Basic seed (grade S)	G2	0.1	0.5	1.5	0.5	0
Basic seed (grade E)	C1	1.0	0.5	1.5	1	0
Certified seed (grade A)	C2	2	1.5	5	1.5	0

These figures clearly show that in nearly all cases only the first generation of seed has a zero tolerance during field inspection. For later generations tolerance levels increase. Apart from Kenya it is hard to find a country in the world that applies a zero tolerance for C2 seed, let alone C3 seed. As Erwinia is present everywhere and spreads easily, all countries accept a certain tolerance level.

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