

## Potato Bacterial Disease Surveillance in Kenya - Explanatory note #1

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 provides a summary of the survey report. 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](https://www.wur.nl/en/Research-Results/Research-Institutes/centre-for-development-innovation/show-cdi/seed_potato_phase3.htm)

### Why this survey?

Blackleg is a very common disease in all potato production regions in the World, and is regarded in nearly all countries as quality organism and has therefore **not** a quarantine status. Kenya is a notable exception to this rule. The "Erwinia" bacteria cause the stems and tubers to rot, either in the field or under (poor) storage conditions. This results in lower quality and yields. When infected seed potatoes are distributed, the disease will spread. Therefore, it is important to know if and to what extent the *Erwinia complex* is present in Kenya in order to control it and prevent it from further spreading.

Is there a problem with potato yield levels in Kenya? Yes, there is! FAO figures show that potato yields in Kenya have consistently declined from 21.2 tons/hectare in 2008 to 8.6 tons/hectare in 2018. A disastrous decline for a country that wants to be food secure. Part of these low yields are caused by diseases such as bacterial wilt (bacterium *Ralstonia solanacearum*), late blight (fungus *Phytophthora infestans*) and blackleg, as well as by poor agricultural methods (e.g. lack of crop rotation) and poor storage facilities.

The purpose of the survey was to assist KEPHIS in detection and identification of the different "Erwinia" bacteria present and mapping the occurrence of blackleg in the country to ensure that seed regulations are aligned with determined risks. This will lead to increased awareness of the country's disease status, better disease prioritization and increased investments in appropriate disease prevention and control. This will potentially improve disease management practices of authorities and market actors, drive increased availability of quality seed, hence improving potato productivity, incomes and therefore food security.

### The survey was very extensive!

The survey was conducted in six main potato producing counties: Elgeyo Marakwet, Meru, Nakuru, Narok, Nyandarua and Trans Nzoia. These counties were selected because they are potato-growing counties and there was suspicion of high blackleg disease pressure, increasing the chance of finding this target disease. 1002 farmers were selected by the counties to participate in the survey and nearly 3000 samples of tubers, plant material and soil were collected, and sent to the KEPHIS laboratory for analysis. In addition to collection of samples, a structured questionnaire was distributed among farmers to better understand the farming systems potentially affected by blackleg. The farms were visited for sampling in November/December 2019; laboratory analysis took the whole of 2020.

## What were the results?

*Pectobacterium* spp. were identified in 290 samples, which is equivalent to one in every ten samples! More specifically the survey found the following species: *P. brasiliense*, *P. carotovorum*, and *P. wasabiae*. These blackleg and soft rot causing species were found earlier in Kenya, and described in previous studies. Their presence is again confirmed. During this survey a *Pectobacterium* species was found for the first time: *P. atrocepticum*. Also newly found in Kenya was *Dickeya solani*. causing blackleg as well. The latter was found on two farms, in Elgeyo Marakwet and in Narok. When CABI and KEPHIS returned to those farms to check their findings with new samples it turned out that 50% of those samples tested positive on *Dickeya solani*. Disturbing note: one of these farms produces "clean seed". Conclusion: one in every ten samples taken from six counties tested positive on Blackleg. This clearly shows that this bacterial disease is widely present in Kenya, as it is in other countries.

## Is the problem of Blackleg going to increase?

The report does not state where the various blackleg species are coming from, and when they arrived in Kenya. There has been trading in potato and related crops in Kenya for decades and the bacteria could have entered from anywhere at any time. The report **does** indicate the main suspected reason for the distribution of the bacteria and the increased incidence: the informal seed trade! More than 80% of the seed planted in the 6 counties was farm-saved, from fellow farmers, or acquired otherwise and definitely not certified. This is a good explanation why seed-borne diseases such as blackleg are increasing in Kenya, hereby threatening potato production. The over-reliance on the use of non-certified seed has been reported before in Kenya and is also responsible for the spread of the much more dangerous (and much more prevalent) disease brownrot, caused by the bacterium *Ralstonia solanacearum*.

Especially the use of locally produced variety Shangi plays an important role in the distribution of the disease: 89.7% of the farmers sampled across the six counties grew this variety. With infested seed moving from farm to farm the problem of blackleg will likely dramatically increase.

Another reason why the problem of blackleg will increase is inadequate knowledge of disease management and weed control, inadequate capacity to undertake potato diseases diagnosis, poor knowledge of the availability of disease-free lands for seed multiplication, and lack of crop rotation. Farmers find it hard to identify the disease and lack the knowledge of possible hosts of the bacteria (weeds as well as rotation crops). Very few of the farmers participating in the survey could identify blackleg. Potato is a key crop in the traditional production areas, hence the land is continuously cultivated to grow the crop and this leads to a build-up of diseases. Lastly, low usage of agro-inputs (such as pesticides, both organic, inorganic and biologicals), poor agricultural practices (such as abuse of crop rotation regimes), and poor storage facilities also contribute to the observed high disease incidences.

Conclusion: blackleg, caused by a complex of "Erwinia" bacteria, including *Pectobacterium ssp* and *Dickeya ssp* is very likely to increase in Kenya both in terms of distribution (informal seed trade) and incidence (poor management practices). When left uncontrolled this trend will negatively affect the quality of potatoes and yield levels that are already amongst the lowest in the world. This trend is seriously threatening food security in the country. What is the Kenya potato sector going to do about it?

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