Euphresco

Success story

May 2016

Assessment and testing of strawberry pathogens

Strawberry (*Fragaria* × *ananassa*) is an important food crop that is susceptible to a range of pests, including fungi, bacteria, viruses and nematodes. Literature on strawberry diseases at national level is relatively poor, with the exception of Russia.

The objectives of the project were to map the occurrence of strawberry diseases in partner countries and to collect information on diagnostic tests for *Xanthomonas fragariae* and *Phytophtora fragariae*, respectively two of the major bacterial and fungal pathogens in Europe.

During the duration of the project, a questionnaire was circulated amongst strawberry growers and producers and field samples were collected and tested; these provided information on the occurrence of strawberry diseases in various countries. Peer review records suggest that *P. fragariae* is of major commercial concern in Ireland. *X. fragariae* only occurred in Austrian fields; however there are records of its occurrence also in Ireland and Spain. More field inspections would be necessary to gain a representative picture of the occurrence and relevance of strawberry diseases.

A systematic review of PCR-based methods used for detection or quantification of the most important strawberry pathogens was put together. The systematic review concentrated on *Fusarium* spp., *P. fragaria*, *Colletotrichum acutatum*, *Verticillium dahliae*, *Botrytis cinerea*, *Macrophomina phaseolina* and *X. fragariae*. A total of 259 titles and abstracts were reviewed. 23 scientific publications met all the inclusion criteria. The accuracy and sensitivity of PCR diagnostic methods was the focus of most studies included in this review. The systematic review revealed that real-time PCR (qPCR) is a particularly promising technique for the diagnosis and quantification of pathogen populations in strawberry. This technique allows accurate, reliable and high throughput detection of target DNA in symptomless strawberry leaves and various environmental samples.

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A number of different diagnostic protocols to detect and/or quantify the most important quarantine and emerging pathogens of strawberry in Europe were tested in test performance studies involving the laboratories of the participating countries; a pronounced variation in the percentage of correctly detected samples (56-96%) among the participating labs and between the tests was observed. False negative results could be attributed to a reduced sensitivity due to processes of lyophilisation or vacuum concentration of primers and/or extracted DNA from samples, which were performed to simplify transportation of the material tested. Contamination during the rehydration of samples and/or primers or handling with the PCR mix may have led to false positive results. However, these assumptions would have to be examined in more detail. Under optimal conditions, using freshly extracted DNA and primers, all tests should be suitable to detect the selected diseases directly from diseased strawberry plants.

However, the test performance study pointed out that for implementation of these molecular methods in different laboratory conditions, some optimization is necessary in order to obtain robust diagnostic tests capable to provide reproducible results using different equipment, reagents and laboratory set up.
Further research is needed to get the adequate overview of the pathogens, especially the soil-borne (ie. nematodes) occurrence. RT-PCR is the best suitable detection method to date, but there is a need for a more universal diagnostic approach as several diseases and conditions often form a complex.

Project ID: Assessment and testing of strawberry pathogens (SPAT).