Development of a rapid immuno-based method for simultaneous detection of potato viruses with SPR (Surface Plasmon Resonance)

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Phytopathogenic viruses cause substantial losses in yield and may reduce the quality of potatoes in all potato-growing areas. Aside from the control of insect pests as vectors, the use of healthy, virus-free propagated material is the only way to face this problem. In the European Union, ELISA (Enzyme-linked immunosorbent assay) tests for several viruses are required for certified seed potatoes. Because ELISA can detect just one single pathogen per assay, it is relatively time consuming. Additionally, viruses cannot be detected in the potato tuber itself, but in seedlings derived from the germinated tuber. The production of seedlings only for virus test purposes is time consuming and expensive. SPR (Surface Plasmon Resonance) technology is a spectroscopic method to measure the layer thickness on a surface on the nanometer scale. Mostly the SPR-systems are based on SPR-chips coated with a thin metal surface, mainly gold. The binding of virus particles to a specific antibody, which is immobilized on a gold surface, causes a detectable increase in layer thickness. This change can be monitored in real-time, without any modifications of the antibody, which enables a label-free serological detection method. The goal of this project is to establish a Lab-on-a-chip immunoassay, at least as sensitive as conventional ELISA assays, allowing the simultaneous detection of the six most important potato viruses PVA, PVM, PVS, PVX, PVY and PLRV by means of SPR.