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DETECTION OF FUSARIUM FUNGI AND *Erwinia amylovora* IN APLLES OF FOUR DIFFERENT CULTIVARS AT DIFFERENT STAGES OF VEGETATION PLANTED IN ORCHARDS AND LISIMETER

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In recent years, due to changing environmental conditions, a decline in the overall immunity of apple trees has been observed in apple orchards. Due to weather stress, a new disease has emerged in the apple tree community: core rot, which is caused, among other things, by the fungal pathogen Fusarium avenaceum. The fungus Fusarium equiseti causes fusarium wilt of apple trees, which causes fruit rot during ripening and storage. Fire blight, caused by the quarantine bacterium Erwinia amylovora, is one of the most dangerous diseases of fruit crops. It can infect numerous trees in a short period of time, causing significant damage to fruit production.

Early detection and identification of pathogens will improve the effectiveness of measures to mitigate the impact of pathogens on fruit yields and prevent the spread of pathogens.DNA-based diagnostic methods enable rapid and accurate detection of pathogens affecting apple trees. DNA samples from four apple varieties grown in an orchard—Golden Delicious and Renet Simirenco—and in a lysimeter—Golden Spur and Granny Smith—were used to identify the studied pathogens at different stages of the growing season. DNA was extracted from leaf primordia, developed leaves, ovaries, and mature fruits using a 2% SDS buffer, and DNA was purified using the CTAB protocol. Nested PCR with species-specific primers was used to detect the pathogens, and PCR results were visualized on a 1.5% agarose gel under UV light.

Fusarium spp. and *Fusarium avenaceum* were detected in DNA samples from young leaves of apple trees from the orchard. Fusarium spp. were also detected in DNA samples extracted from leaves and young ovaries of Granny Smith apple trees growing in a lysimeter. In Golden Spur apple trees growing in a lysimeter, when tested for the presence of the four studied pathogens, only Fusarium spp. were detected in leaf DNA, and the bacterial pathogen Erwinia amylovora was detected in

ovary DNA. The pathogen *Erwinia amylovora* was also identified in leaf and ovary DNA of Granny Smith apple trees, and the fungal pathogen Fusarium avenaceum was detected only in ovary DNA samples of this variety.

At the fruit formation stage in the orchard, Fusarium spp. was detected in both leaves and fruits of the Golden Delicious variety; in addition, F. equiseti was identified in the fruits of this variety. In DNA samples of the Renet Simirenco variety, Fusarium spp. was detected only in leaves. Fusarium spp. was identified in the DNA of leaves and developing fruits of the Golden Spur apple variety and in the fruits of Granny Smith. In DNA samples extracted from mature apple fruits before storage, Fusarium spp. was detected in the Granny Smith and Renet Simirenco varieties. In addition, F. avenaceum was additionally detected in the Granny Smith variety. Molecular DNA testing of fruits after 2 months of storage at a temperature of 1 °C and 90% humidity showed that the pathogen Fusarium spp. was determined in 3 varieties, and F. avenaceum was also detected in 3 varieties. The other studied pathogens were not detected.

Keywords: apple, Erwinia, Fusarium, PCR.

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