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Simultaneous detection of the biological agents responsible for wheat rust diseases: *Puccinia triticina* and *Puccinia striiformis* f. sp. *tritici*

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The species *Puccinia triticina* (Pt) *and Puccinia striiformis* f. sp. *tritici* (Pst) are devastating cereal pathogens that cause brown/leaf and yellow/stripe rust diseases, respectively. Both fungi are an obligate parasites capable of producing infectious urediniospores as long as infected leaf tissue remains alive. They are responsible for significant yield losses of common wheat (*Triticum aestivum* L.) that may have ranged from 10% to 70% depending on susceptibility of the cultivar, initial infection rate, development and duration of disease. The early detection of fungal pathogens can lead to preventive measures and minimize economic losses through i.e. fungicidal control. The molecular methods are the most reliable for monitoring of disease development and early pathogens detection. Multiplex PCR has the potential to target and differentiate more than one species at the same time. In the present study, we develop conventional PCR assays for the simultaneous species-specific detection of Pt and Pst. The Multiplex PCR assay targets the second largest subunits of the RNA polymerase II (*rpb2*) for Pt and beta-tubulin 1 (*tub1*) genes for Pst. The specificities of the PCR primers were verified using naturally infected plant materials with visual symptoms of rust diseases and diseases caused by other wheat pathogens (*Blumeria graminis, Drechslera tritici-repentis* and *Septoria tritici*). The primer sets LidPs9/10 and LidPr1/2 produced single DNA fragments of lengths 240 and 144 bp, respectively. No cross-reactions were observed with tested fungal pathogens and healthy plant tissues. The detection limit of singular primer sets was reached at 1 pg for Pt and 50 pg for Pts. The assay shows 100% effectiveness in rust fungi detection that make them promising tools for determining the proper schedule for plant protection.

Biography

Anna Kot has her expertise in Environmental Microbiology. Primarily, she has focused her study on waste management, especially organic waste from food industry and its impact on soil microbial activity, functional and genetic diversity. Her study proving that utilization of that kind of waste can be safe for the environment and beneficial for agriculture and land reclamation. Recently, she has expanded her interest to plant pathology. As a member of research team supervised by Dr. Adam Kuzdraliński, she takes part in designing assay based on molecular biology for detection of the most common wheat pathogens. Results can let to a better diagnosis of fungal diseases and optimal fungicides application.

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