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The Effect of Durability and Pathogen Strains on the Wheat Induced Resistance against Zymoseptoria tritici as a Response to Paenibacillus sp. Strain B2

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Abstract : Plant growth promoting rhizobacteria are known as potential biofertilizers and plant resistance inducers. The present work aims to study the durability of the resistance induced as a response to wheat seeds inoculation with PB2 and its influence by Z. tritici strains. The internal and external roots colonization have been determined in vitro, seven days post inoculation, by measuring the colony forming unit (CFU). In planta experimentations were done under controlled conditions included four wheat cultivars with different levels of resistance against Septoria Leaf Blotch (SLB) and four Z. tritici strains with high aggressiveness and resistance levels to fungicides. Plantlets were inoculated with PB2 at sowing and infected with Z. tritici at 3 leaves or tillering growth stages. The infection level with SLB was evaluated at 17 days post inoculation using real-time quantitative polymerase chain reaction (PCR). Results showed that PB2 has a high potential of wheat root external colonization (> 10^6 CFU/g of root). However, the internal colonization seems to be cultivar dependent. Indeed, PB2 has not been observed as endophytic for one cultivar but has a high level of internal colonization with more than 104 CFU/g of root concerning the three others. Two wheat cultivars (susceptible and moderated resistant) were used to investigate PB2-induced resistance (PB2-IR). After the first infection with Z. tritici, results showed that PB2-IR has conferred a high protection efficiency (40-90%) against SLB in the two tested cultivars. Whereas the PB2-IR was effective against all tested strains with the moderate resistant cultivar, it was higher with the susceptible cultivar (> 64%) but against three of the four tested strains. Concerning the durability of the PB2-IR, after the second infection timing, it has been observed a significant decrease (10-59%) depending strains in the moderate resistant cultivar. Contrarily, the susceptible cultivar showed a stable and high protection level (76-84%) but against three of the four tested strains and interestingly, the strain that overcame PB2-IR was not the same as that of the first infection timing. To conclude, PB2 induces a high and durable resistance against Z. tritici. The PB2-IR is pathogen strain, plant growth stage and genotype dependent. These results may explain the loss of the induced resistance effectiveness under field conditions.

Keywords : induced resistance, Paenibacillus sp. strain B2, wheat genotypes, Zymoseptoria tritici
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