

# STUDIES ON THE SENSITIVITY OF *PHAKOPSORA PACHYRHIZI* TO FUNGICIDES

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Soybean rust, caused by *Phakopsora pachyrhizi*, is mainly controlled with applications of fungicides, including demethylation inhibitors (DMI), quinone outside inhibitors (QoI) and succinate dehydrogenase inhibitors (SDHI). The intensive use of fungicides can select fungicide-resistant isolates and *P. pachyrhizi* isolates from Brazil less sensitive to DMIs and QoIs have been previously reported and characterized regarding resistance mechanisms and competitive fitness. Different mutations in the target gene of DMIs, the *cyp51*, and overexpression of mutated *cyp51* have been identified to cause DMI sensitivity reduction<sup>1</sup> and it could be shown that fitness of isolates with mutations in the *cyp51* was reduced<sup>2</sup>. Reduced QoI sensitivity is caused by the mutation F129L in the cytochrome *b* gene<sup>3</sup> and fitness studies and the high frequency of F129L in soy bean rust populations in Brazil indicate no or low fitness costs accompanied with this mutation in this pathogen<sup>2</sup>. Recently, isolates with lower SDHI sensitivity have been identified which carried a mutation in the subunit C leading to the amino acid exchange from isoleucine to phenylalanine at position 86 (C-I86F), which are currently under further investigation<sup>4</sup>. Besides integrated agronomic measures such as variety selection, seeding time or crop management, practices that reduce selection pressure such as limited numbers of fungicide applications and the alternation and mixing of fungicides with different modes of action should be implemented in disease control strategies for a sustainable use of fungicides.

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2. Klosowski, A.C., Brahm, L., Stammler, G. and May de Mio, L.L. 2016. Competitive fitness of *Phakopsora pachyrhizi* isolates with mutations in the CYP51 and CYTB genes. *Phytopathology* **106**, 1278-1284

3. Klosowski, A.C., May de Mio L.L., Miessner, S., Rodrigues, R. and Stammler, G. 2016. Detection of the F129L mutation in the cytochrome *b* gene in *Phakopsora pachyrhizi*. *Pest Management Science* **72**, 1211-1215

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