

PHOTOPROTECTIVE EFFECT OF MINERAL OIL AND TITANIUM DIOXIDE TO *Metarhizium* spp. CONIDIA ASSESSED ON CULTURE MEDIUM OR ON *Rhipicephalus microplus* CUTICLE

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This study aimed at evaluating photoprotectants for increasing conidial tolerance of *Metarhizium* spp. to ultraviolet (UV) radiation. Three isolates were tested: *M. anisopliae* s. s. IP 119, *M. robertsii* IP 146, and *M. robertsii* ARSEF 2575. Conidia produced on potato dextrose agar plus yeast extract (PDAY) were suspended in aqueous solution (0.01% Tween 80), mineral oil-in-water emulsion (5% or 10%), or titanium dioxide (TiO₂) solution (2.5% or 5%). The oil emulsions were inoculated on glass slides and exposed to UV-B radiation (5.46 kJ m⁻²); the slides were then washed off with a detergent to remove the mineral oil, and conidia were inoculated onto PDAY with chloramphenicol 0.05 % in Petri plates. The TiO₂ suspensions were directly inoculated and spread onto PDAY and exposed to the same UV-B dose mentioned above. After seven days of incubation, the relative percent of colony forming units (CFU) was calculated. The photoprotection of formulated conidia of IP 119 was also evaluated on cuticle of *R. microplus* engorged females. Ticks were topically treated with 2 µL of the following conidial suspensions: 1) aqueous, 2) 10% oil-in-water emulsion, or 3) 5% TiO₂, and exposed (3.9 or 5.46 kJ m⁻²) or not (control) to UV-B. After 72 h incubation, ticks were fixed and conidial germination on their cuticle was examined by scanning electron microscopy. On culture medium, conidia of all isolates were more tolerant to UV-B radiation when prepared in oil emulsion than conidia suspended in Tween solution. Conidia of IP 119 or ARSEF 2575 suspended in TiO₂ were also more tolerant to UV-B than their conidia formulated in Tween solution; an increased UV-B tolerance of IP 146 conidia was reported only with 5% TiO₂. On the tick cuticle, conidia suspended in Tween solution had visually lower germination than conidia formulated in oil emulsion, and presented smaller germ tubes. Conidia formulated with TiO₂, although not quantified on the tick cuticle, visually exhibited lower adherence in comparison to conidia suspended in Tween or oil emulsion. However, 5% TiO₂ afforded significant protection to conidia against UV-B that also presented large germ tubes even when exposed to 5.46 kJ m⁻². In conclusion, formulations with mineral oil protected conidia against UV-B radiation. Despite the conidial protection of TiO₂ against UV-B, it apparently impaired the adhesion of conidia to the cuticle. Mineral oil seems to be a promising additive to develop more effective formulations of *Metarhizium* sp. conidia against *R. microplus* in biological control programs.

Keywords: Entomopathogenic fungi, conidial formulation, cattle tick, UV-B radiation.
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