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Biocontrol of Crown Rot in Cowpea Using Solid-Formulated *Trichoderma virens* During the Yala Season in the Dry Zone of Sri Lanka

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Objective: The study evaluated the efficacy of solid-based formulation of locally-isolated *Trichoderma virens* strain against *Agroathelia rolfsii*, the causal agent of crown rot in cowpea (*Vigna unguiculata*) under semi *in-vivo* and field conditions during the Yala season in the Dry zone of Sri Lanka.

Methods: The research utilized long-term preserved molecularly confirmed *T. virens* (Accession number: MG386643.1) to prepare its cultures for the study and *Agroathelia rolfsii* was isolated, molecularly confirmed and accession number was derived as, PV216709 during the study. A solid-based formulation of *T. virens* was prepared following a standard protocol and tested under semi *in-vivo* and field conditions. The semi *in-vivo* experiment was conducted under shade house conditions according to CRD design while *in-vivo* experiment was conducted according to four factor split plot design. Weekly CFU/mL of *T. virens* was monitored following serial dilution plate technique, and disease incidence was recorded daily following inoculation using the agar disc method.

Results: *T. virens* remained viable in treated soils throughout the cultivation period, with a decline over time in both conditions which has proven by its CFU/mL in each condition and the disease incidence was observed as zero. Due to the observed decline in colony forming units over time, solid formulation was applied twice at three-week intervals under semi *in-vivo* (T -28°C ± 2°C, 70% RH, and under 50% shade) conditions and three times during the growing season under field conditions (Average T -28.2°C, RF- 5.5 mm/day) at an initial spore concentration of 7×10⁸ spore/mL at seeding, followed by applications at 3×10⁶ spore/mL at three-week intervals against cowpea crown rot disease in dry zone, Sri Lanka.

Conclusion: The effective suppression of *A. rolfsii* by the solid-based *T. virens* formulation highlights its potential as a reliable component in season-specific, sustainable disease management strategies for cowpea cultivation in Sri Lanka's Dry Zone.

Keywords: Crown rot, Sustainable disease management, *Trichoderma virens*