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### Perspectives to the use of entomopathogenic fungi for biological control of *Diaphorina citri* in Mexico

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Entomopathogenic fungi are natural enemies of *D. citri* adults in Mexico. Natural prevalence (%) of fungi on live adults in central Veracruz (summer) and southern Tamaulipas (fall) were: *Hirsutella citriformis* (7-35); *Isaria fumosorosea* (5-15); *Lecanicillium* (2 in Tamaulipas), and *Beauveria* (<1). *Torrubiella* (= *Sporothrix*) is a hyperparasite of *Hirsutella*. In inland Tamaulipas only *Isaria* was found. *Entomophthora* (<2%), a new report for *Diaphorina*, was found at Veracruz in October 2012.

On April 2011, spores (conidia) were applied either as water suspension or emulsion in PureSpray® oil at 0.5% in water; at  $1 \times 10^8$  (*Beauveria*, *Metarhizium*) or  $5.6 \times 10^7$  conidia/ml (*I. fumosorosea*), on lime trees against *D. citri* nymphs at Martinez de la Torre, Veracruz (MTV) (dry season). *Isaria* concentration was ca. 5X lower. Average infection (as sporulation) 72 h after application (AP) by *Beauveria*, *Isaria* and *Metarhizium* was near 70, 50 and 50% respectively. The fungus-formulation interaction was significant.

In 2012, spraying of conidia ( $1 \times 10^8$ /ml in water) at MTV (rainy season) and General Teran, Nuevo Leon (GTNL) (dry summer) showed that infection (dense development of fungal hyphae inside nymphs) occurred in the field 48 h AP at MTV (% infection: *Metarhizium*= 31; *Beauveria*= 27; *Isaria*= 0); and 72h AP at GTNL (only *Metarhizium* applied; 42-76% infection). No sampling before at either place. Dead nymphs were collected and immediately examined or tissue-fixed. At GTNL, 30-65% of recovered conidia from foliage germinated 72h AP, and 30% after seven days. There, weather was >40°C with rain. Since conidia remained viable for long periods on foliage, nymphs were examined immediately upon collection (2012), to avoid infecting insects stored in bags before examination. Other noise sources are: infection underestimates from falling off trees of infected (dead and sick) nymphs; and detection of fungal DNA on insects, from simple adhesion of conidia to insects without infection.