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## Rearing *Eiphosoma laphygmae*, a Potential Biocontrol Agent of the Fall Armyworm

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### Abstract

Fall armyworm (FAW), *Spodoptera frugiperda*, is an invasive pest, native to the Americas. Since detection in Nigeria in 2016, it has established in most of Africa, Asia and has reached Australia, jeopardising the food security of millions in its wake. The parasitoid wasp, *Eiphosoma laphygmae*, is a potential candidate for classical biocontrol. A detailed risk assessment in quarantine is necessary before any candidate can be recommended. Both testing biocontrol agents and ultimately releasing them relies on rearing and this can be problematic and a bottleneck given their specificity.

Our objective was to improve rearing of *E. laphygmae* by assessing how the diet of the host FAW and their age at exposure impacted parasitoid sex-ratio, emergence rate and FAW mortality. We exposed FAW larvae reared on a modified McMorran-Grisdale diet versus those reared on maize plants. We also exposed one-, two-, three- and four-day old FAW larvae. Work was conducted in a quarantine facility at 23°C, 60% relative humidity and a photoperiod of 16h light and 8h dark.

*E. laphygmae* did develop successfully in one-, two-, three and four-day old FAW larvae, with female progeny in all tested host ages. On average, parasitism rate was 18% and mortality of FAW larvae was 12%. Of those parasitised FAW, the parasitoid emergence rate was 82% of which 77% were male. Parasitism rates were numerically lower for four-day old FAW larvae than for the younger larvae. Parasitism rates were numerically lower on FAW reared on the modified McMorran-Grisdale diet than on those reared on maize plants. We did not detect any other effects of either FAW larval age or diet on parasitoid sex ratio, mortality of host-larvae or emergence rate of the parasitoid. We recommend using maize plants to rear FAW and then exposing them at one- to three-days old. Future work should verify these results in larger-scale studies and consider whether manipulating other nutritional or environmental variables can increase parasitism rates and reduce the male progeny bias.

**Keywords:** Biocontrol, maize, parasitoid wasps, rearing, *Spodoptera frugiperda*