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## **Phosphine fumigation strategies for effective control of bruchid pests**

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### **ABSTRACT**

The Australian pulse industry, especially mung bean and chickpeas, has been growing rapidly in recent years. Due to heavy focus on cereal industries, however, knowledge in post-harvest pest management in stored pulses is very limited. Bruchid pests, particularly the cosmopolitan cowpea weevil, *Callosobruchus maculatus* (F.) threatens industry's ability to maximise profits from this commodity. Although phosphine is being used predominantly to disinfest stored commodities in Australia, and fumigation protocols are available for major cereal pests, comprehensive research-based information on effectiveness of this key fumigant against bruchids is not available. The present study addressed this knowledge gap and attempted to establish detailed phosphine fumigation efficacy data particularly on the effect of concentration and exposure time against *C. maculatus*. Mixed-age populations (including all life stages) of a previously established laboratory population and a recently collected field population of *C. maculatus*, were raised in mung bean and chickpeas and fumigated at 25°C. Concentrations of 0.5 and 1.0 mg/L (360 and 720 ppm) were evaluated over multiple exposure periods up to 7 d. Apart from an adult mortality assessment at 7 d post-fumigation, the impact of the fumigation on immature stages (F1 progeny) was determined after 6 wk post-fumigation. Results suggest that irrespective of the concentrations used, a 7-d fumigation at 1 mg/L (720 ppm) was required to achieve complete control of bruchid populations. The field population of *C. maculatus* seemed to be more tolerant than the older laboratory population. These results were consistent across both mung bean and chickpeas. Our laboratory data were well supported by a silo-scale fumigation trial with mung beans. We concluded that the current Australian label for fumigation using aluminum phosphide formulations was adequate for controlling *C. maculatus* in stored pulses.

**Keywords:** Phosphine, Fumigation, Bruchids, Mung bean, Chickpea, Storage