

THE EFFECT OF TEMPERATURE ON THE RESPONSE OF
SUSCEPTIBLE AND RESISTANT STRAINS OF STORED PRODUCT
BEETLES TO PHOSPHINE

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Around the world phosphine fumigations are performed across a wide range of stored commodity temperatures. Generally it is held that insects are tolerant of phosphine at lower temperatures and this tolerance decreases with increasing temperature. This is usually explained by an increase in the insect's metabolic rate. However, when resistant insects are examined the model does not always hold. This paper examines the effect of temperature on the toxicology of phosphine.

Mixed-age cultures of susceptible strains of *Sitophilus oryzae*, *S. granarius*, *S. zeamais* and *Rhyzopertha dominica* and resistant strains of *S. oryzae* and *R. dominica* were exposed to constant phosphine concentrations of 0.03, 0.05 and 0.1mg L⁻¹ at temperatures ranging from 15°C to 35°C. All beetles were more tolerant of phosphine at 15°C. Higher temperatures reduced the required exposure time for complete mortality at all concentrations for susceptible strains of *Sitophilus* spp. and *R. dominica* and resistant strains of *S. oryzae*. In contrast, the exposure time to achieve complete mortality of resistant *R. dominica* was longer at 35°C than at 25°C for all concentrations except 0.1mg L⁻¹. At this concentration complete mortality at 35°C was achieved in the same or slightly less time than at 25°C.