

EFFICACY OF PHOSPHINE FUMIGATIONS OF BAGGED MILLED RICE UNDER POLYETHYLENE SHEETING IN INDONESIA

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Phosphine fumigation is the major means of pest control in milled rice in government godowns in Indonesia. In the tropical climate, insect infestation is severe and phosphine fumigation is required each 3 months. The predominant pest species are *Tribolium castaneum* (Herbst) and psocids, chiefly *Liposcelis entomophilus* (Enderlein). The fumigation enclosure comprised a single polyethylene sheet 0.125mm thick covering two adjoining stacks each around 300t and thus totaling around 600t of grain. The polyethylene sheeting was sealed to the concrete floor by weighting with fumigation chains around the perimeter of the enclosure. The nominal dosage of phosphine was 2g per t plus an allowance of 5% of dosage for walkway space and was applied as tablets containing aluminium phosphide. Phosphine concentrations were monitored throughout the fumigation using portable electronic meters with the capacity to separately determine carbon monoxide. In a 5 day fumigation, the concentration by time products exceeded 150 mg L⁻¹ h⁻¹. Fumigations involving sheeting in poor condition, fumigation enclosures with 2 sheets joined only by overlap, or fumigations without chains all produced much lower concentration by time products. The phosphine concentrations are discussed in relation to the rate of release of phosphine from the aluminium phosphide, the rate of sorption/desorption on milled rice and the rate of permeation of phosphine through the polyethylene sheet and the woven polypropylene bags. Complete kill of both species is possible in this type of fumigation but reports of strains from Indonesia of *L. entomophilus* with enhanced tolerance to phosphine suggest that complete kill is not always achieved in practice. Meters capable of monitoring phosphine concentrations in the field have now been issued to operational staff and should reduce the frequency of fumigation failure.