# Development of Fumigation Protocol for Liquid Phosphine for the Control of Rice Weevil *(Sitophilusoryzue)* in Stored Milled Rice

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An experiment was designed to develop a fumigation protocol for liquid phosphine (2% phosphine and 98% liquid carbon dioxide) to control rice weevil *(Sitophiltisolyzae)* in stored milled rice and thereby to increase the food safety at the quarantine service in Sri Lanka. The experiment was laid out in a Complete Randomized Design with eight concentration levels of liquid phosphine;10, 20, 35, 50, 100, 150, 200, and 250 g (equivalent to 140, 280, 490, 700, 1400, 2100,2800, and 3500 ppm, respectively) with a control treatment. All treatments were replicated three times. Each concentration level was tested under two time regimes (24 and 36 hrs.) and 50 same-aged adults were introduced to glass vials with 50 g of milled rice in each. Similarly, other life stages *viz.* pupae, larvae and egg infested rice, each weighing 50 g, were introduced separately to vials for fumigation. Mortality of *S. oryzae* was recorded soon after the fumigation as well as 1, 4, 7, 14, 21, 28 and 35 d after fumigation. In the eight treatments, except for the control treatment, 100% mortality was recorded inthe adult stage, in both time regimes. After 14 d of treatment, all tested concentration levels against pupae of *S.oryzaesh❑wed* mean newly emerged adult numbers of 0.67, 0.67 and 0.33 ($P < 0.0001$) at 140, 280 and 490 ppm, respectively, forthe 24 hrs.time regime and 0.33, 0.33 and 0.67 (P 0.053) at 140, 280 and 490 ppm, respectively,for the 36 hrs. time regime. After 28 d, 24 hrs.treatment of liquid phosphine concentrations against the eggs of *S. oryzae* recorded a mean newly emerged adult number of 0.67 ($P = 0.003$) at 280 ppm whereasthe 36 hrs.treatment of liquid phosphine yielded adult numbers of 0.33 and 0.33 ($P = 0.322$) at 140 and 280 ppm, respectively. The lowest concentration and the lowest fumigation time to achieve 100% mortality of all stages of *S. oryzae* was 700 ppm with24 hrs.of fumigation time. Therefore, the concentration level of 700 ppm with 24 hrs. of fumigation time can be declared suitable for achieving 100% mortality of *S. oryzae*, as per the present findings.

*Keywords:* Fumigation, Liquid Phosphine, *Sitophilusotyzae*, Rice