

CONTROL OF MAJOR PESTS OF COPRA WITH PHOSPHINE FUMIGATION

Copra, a valuable produce of Kerala, is infested with insect pests like *Necrobia rufipes* De Geer, *Oryzaephilus surinamensis* Linn. and *Araecerus fasciculatus* De Geer. The infestation is very severe during June to October as the breeding season commences June onwards (Nalinakumari *et al.*, 1993). During this period, majority of the godowns are extensively fumigated during storage of the commodity. However, a precise and comprehensive information on the effect of various fumigants and their residue problems are not available. This investigation was, therefore, undertaken with a view to determine the exposure period and dose of the commonly used fumigant phosphine and the residues of the toxicant in the produce.

Gunny bags with pest damaged copra were exposed to aluminium phosphide tablets at 1.5g (0.85g a.i. m^{-3}), 3.0g (1.7g a.i. m^{-3}) and 4.5g m^{-3} (2.55g a.i. m^{-3}) for 1, 2 and 3 days inside the fumigatoriums. Three lots of such copra in closed glass jars served as control. The fumigated samples were aerated for 24 h and stored in glass jars for 60 days. The adult emergence was recorded periodically. Phosphine residue was estimated by the colorimetric method developed by Bruce *et al.* (1962).

The results revealed that the mean percentage reduction in the emergence of the adults of *N. rufipes* from copra fumigated with 1.5 g m^{-3} of aluminium phosphide was 42.0, 55.2 and 77.5 when exposed to 1, 2 and 3 days respectively (Table 1). However, produce fumigated with aluminium phosphide @ 3 g m^{-3} resulted in 87.1 per cent suppression when exposed for 1 day and an exposure period of 2 days resulted in 100 % suppression of adult emergence.

The mean percentage reduction in the emergence of *O. surinamensis* adults from copra

fumigated with 1.5 g m^{-3} of the toxicant was 84.0, 89.6 and 94.4 when exposed to 1, 2 and 3 days respectively. Aluminium phosphide application @ 3 g m^{-3} with an exposure period of one day suppressed the pests completely.

In the case of *A. fasciculatus*, the mean percentage reduction in the adult emergence varied from 61.1 to 97.6 from copra samples fumigated with 1.5 g m^{-3} and 3.0 g m^{-3} aluminium phosphide with exposure periods of 1, 2 and 3 days. Adults emergence was completely suppressed when the produce was exposed to the toxicant at 4.5 g m^{-3} with an exposure period of 1 day.

The residues of phosphine in copra exposed to 1.5 and 3.0 g m^{-3} aluminium phosphide for three exposure periods were below detectable limits.

The residues at a dosage of 4.5 g m^{-3} were 0.0003, 0.0024 and 0.0038 ppm for the exposure periods of 1, 2 and 3 days respectively and were below the MRL of 0.01 ppm.

For curative treatment of copra infested by *N. rufipes*, fumigation with aluminium phosphide at 3 g m^{-3} for 2 days was required. According to Rai and Singh (1977) application of phostoxin @ 8.1 g m^{-3} for 2 days controlled the pests infesting stored copra. It was also reported that application of aluminium phosphide @ 0.8 g m^{-3} controlled *N. rufipes* and *O. mercator* in stored cacao beans (Mejule and Onyuike, 1980). However, in the present investigation a dose of 0.85g a.i. m^{-3} dose was found ineffective against the pests attacking copra. It was also found that for an effective control of *A. fasciculatus* application of the toxicant @ 4.5 g m^{-3} with 1 day exposure was effective. Since mixed population of these insects is usually prevalent under godown

conditions, a dose of 4.5 g m^{-3} of aluminium phosphide and an exposure period of one day could be recommended for the effective control of the pests of copra.

Table 1. Control of the insect pests infesting copra with phosphine (aluminium phosphide) fumigation at varying doses and exposure periods

| Dose of aluminium phosphide g m^{-3} | Exposure period days | Mean per cent reduction in the number of adults emerging in treatments over that of control | | | Residue ppm |
|---|----------------------|---|------------------------|------------------------|-------------|
| | | <i>N. rufipes</i> | <i>O. surinamensis</i> | <i>A. fasciculatus</i> | |
| 1.5 | 1 | 41.98 | 84.04 | 61.07 | BDL |
| 1.5 | 2 | 55.24 | 89.63 | 71.18 | BDL |
| 1.5 | 3 | 77.48 | 94.38 | 78.67 | BDL |
| 3.0 | 1 | 87.10 | 100.00 | 83.57 | BDL |
| 3.0 | 2 | 100.00 | 100.00 | 91.43 | BDL |
| 3.0 | 3 | 100.00 | 100.00 | 97.61 | BDL |
| 4.5 | 1 | 100.00 | 100.00 | 100.00 | 0.003 |
| 4.5 | 2 | 100.00 | 100.00 | 100.00 | 0.0024 |
| 4.5 | 3 | 100.00 | 100.00 | 100.00 | 0.0038 |

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