CARBONYL SULFIDE FOR DISINFESTATION OF EXPORT HAY: AN UPDATE

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Fumigant alternatives to methyl bromide currently available (carbon dioxide and phosphine) for use on export hay require long exposure times and are recommended only if the ambient temperature exceeds 15°C, two factors that make them unacceptable to the industry. Carbonyl sulphide (COS), a potential new fumigant, may offer an alternative to these treatments that can be undertaken within 48 hours at temperatures at or above 15°C . The proposed Australian label dosage rates for application of COS to control all stages of most stored product insects are provided in Table 1.

To determine the suitability of COS as a fumigant for export hay, i) laboratory studies were undertaken to assess penetration of COS into hay bales, sorption and desorption behaviour and residues remaining in the hay; and ii) the feasibility of using COS in the field was assessed in two field trials.

Under laboratory conditions, COS was found to penetrate into the centre of the bales within 6 hours, and following appropriate airing, the level of carbonyl sulfide in the hay was indistinguishable from natural, pre-fumigation levels. However, diffusion of gas out of the highly compressed bales was slow and required at least 48 hours of aeration to reduce the level of COS inside the bale to or below the operational Threshold Limit Value – Time Weighted Average (TLV-TWA) based on the Australian TLV-TWA for hydrogen sulfide of 10 ppm. These properties are similar to those displayed by methyl bromide.

In parallel, comparative laboratory studies, the concentration of methyl bromide in the hay bales peaked approximately 6 hours after application and required 48 hours of airing to reduce in-bale concentrations to the 5 ppm TLV-TWA for this fumigant.

In the field, COS was applied using a technique similar to that currently used for methyl bromide. Treatments were found to be successful in terms of ease of application, gas penetration and retention (Figure 1), and control of bio-assay insects (100%).

However, a sulphurous odour was evident on hay fumigated with COS, several weeks post fumigation (Table 2) and the acceptability of this to exporters and importers will need to be evaluated.

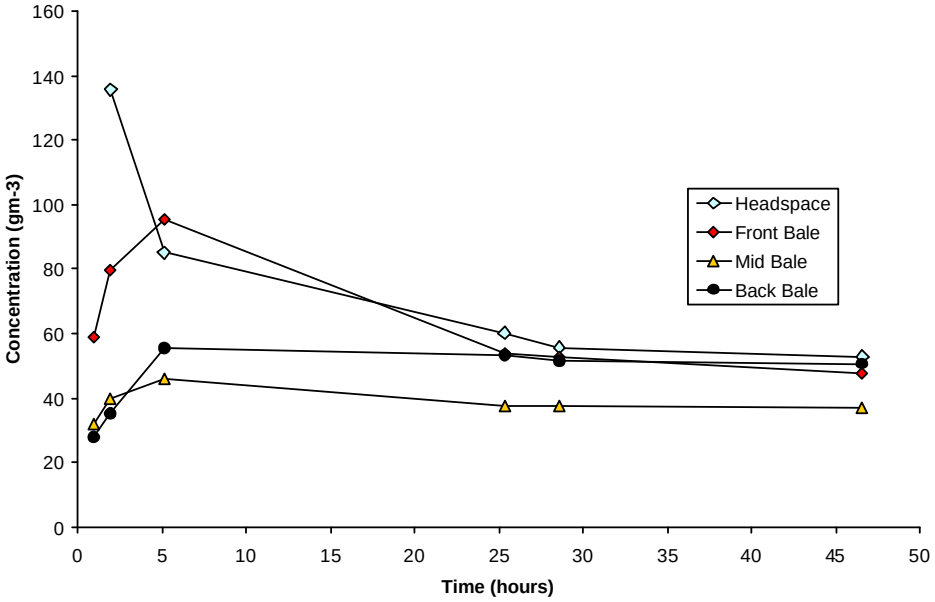

Figure 1. COS concentrations at various locations in a 40 ft shipping container during a 48 hour fumigation. The 'front bale' was located nearest the doors, and the back bale at the 'closed' end.

Table 1. Draft Australian label rates for application of COS to control all stages of most pest stored products insects.

Exposure	Temp (°C)	Rate g/m^3
10 days	>15	10
7 days	>15	20
	20	15
4 days	>15	55
	20	25
	25	20
2 days	20	60
	25	40

Table 2. Assessment of odour in hay fumigated during field trials, assessed by exporters. Ratings on a scale of 1 -5 where 1 was a strong odour and 5 was no apparent odour. Bales on the outside and inside of the stack were assessed.

Days post fumigation	Methyl bromide	COS (external bales)	COS (internal bales)
7	5*	2***	
14	5*	3**	
21	5*	5*	3**
28	5*	5*	3**

* No malodour detected. ** Moderate malodour detected. *** Malodour detected.