ENTOMOLOGY BULLETINS:

NO. 1 FUMIGATION OF STORED PRODUCTS USING METHYL BROMIDE

Every year vast amounts of food are lost to insect pests which attack stored crops (commodities). One way in which these pests can be killed is by fumigation. This is a method in which stacked commodities are treated with a poisonous gas. The stacks are covered with a plastic sheet to prevent the gas from escaping. One of the chemicals used in this way is the fumigant methyl bromide

The amount of methyl bromide to be used, the dosage, can be calculated from the formula:-

$$D = (SxV) + (MxW)$$

Where:

D = dosage in g

S = space dosage in g/m^2

V = volume to be fumigated in m^3

M = commodity dosage in g/t

W = weight of commodity in t

The space dosage (S) and the commodity dosage (M) can be found from Table 1 below, while the volume to be fumigated (V) and the weight of the commodity (W) can be measured directly.

The lowest value for (V) used in the calculation is 30, and this is used even if the actual volume to be fumigated is less than 30 m^3. If the volume to be fumigated is greater than 30 m^3, then the actual figure is used.

If the commodity is at higher temperatures than 30°C, then the dosage (D) which has been calculated from the formula should be multiplied by 0.75.. This is because less methyl bromide is needed at higher temperatures.

If Trogoderma *spp. are present, then the calculated dosage must be multiplied by 1.5. This is because* Trogoderma *spp. are very difficult to kill and will survive normal dosages.*

The dosage calculated from the formula only applies if the fumigant is applied properly and if the amount of fumigant leaking out of the plastic sheeting is very small. Some fumigant is also lost due to being taken up (sorbed) by the commodity. The amount sorbed depends on the type of goods being treated and this is why the dosage applied is different for different types of commodity.

TABLE 1. EXPOSURE PERIOD. SPACE DOSAGE AND COMMODITY DOSAGE FOR METHYL BROMIDE FUMIGATION OF STORED COMMODITIES

Commodity	Exposure period (hrs)	Space dosage g/m³=S		Commodity dosage g/t=M	
		10-20°C	20°C	10-20°C	20°C
1) Rice, barley peas, beans, cocoa beans, dried fruit, chillies	24	15	10	0	0
2) Wheat, maize oats, lentils	24	15	10	30	20
3) Sorghum, nuts dates, figs	24	15	10	60	40
4) Flour, rice, bran, oil seeds, copra, groundnuts, empty sack	48	15	10	60	40
5) Oil seed cakes and meals, fish meal	48	15	10	120	80

The important thing in fumigation is that the concentration of fumigant stays high enough for a long enough time to give a good kill of insects. This is measured as the concentration x time product (CT product). The concentration of fumigant will vary from place to place within the stack but it is important that the lowest CT product achieved within the stack is high enough to give a good kill.

The space and commodity dosages given in the table have been worked out from laboratory tests so that the CT product will be high enough to kill at least 99.9% of a wide range of storage insect pests. The operator should keep a check on the CT product by measuring the concentration of fumigant in the stacks at least once during the fumigation and again before removing the plastic sheets at the end.

Special care must be taken when fumigating wheat flour with methyl bromide because it may give loaves baked with the flour a strange smell. Usually the smell is not strong and can only be noticed as the loaves are being taken out of the oven. Flour should only be treated once and the values for space and commodity dosages at 10-20°C only should be used. The fumigant must be fully vapourised when fumigating flour so that it does not contact the flour as a liquid.

It is important to note that methyl bromide fumigation is a dangerous process and should only be carried out by specially trained operators.

Reference: Pest Infestation Control Laboratory, Tolworth (1970). Methyl bromide dosage schedules. *Tropical Stored Products Information* (20):27-30.