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Treatment Manual

Chemical Treatments

Fumigants • Methyl Bromide

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Properties and Use

Methyl bromide (MB) (CH_3Br) is a colorless, odorless, nonflammable fumigant. MB boils at 38.5 °F and has a very low solubility in water. As a gas, MB is three times heavier than air. As a liquid at 32 °F, 1 pound of MB is equivalent to 262 ml. For ease in transportation and handling, MB is compressed and stored in metal cylinders as a liquid.

MB is an effective fumigant for treating a wide variety of plant pests associated with a wide variety of commodities. MB is the most frequently used fumigant in quarantine fumigations. MB may also be used to devitalize plant material. MB is effective in treating the following pests:

- ◆ Insects (all life stages)
- ◆ Mites and ticks (all life stages)
- ◆ Nematodes (including cysts)
- ◆ Snails and slugs
- ◆ Fungi (such as oak wilt fungus)

MB is effective over a wide range of temperatures (40 °F and above). In general, living plant material tolerates the dosage rate specified, although the degree of tolerance varies with species, variety, stage of growth, and condition of the plant material. MB accelerates the decomposition of plants in poor condition.

Since MB is three times heavier than air, it diffuses outward and downward readily, but requires fans to ensure upward movement and equal gas distribution. Fan circulation also enhances penetration of

MB into the commodity. A volatilizer is used to heat the liquid MB in order to speed up its conversion to a gas. Once the gas is evenly distributed, it maintains that condition for the duration of the treatment unless an outside event such as excessive leakage occurs.

“Q Labels” and Section 18 Exemption Treatment Schedules

Methyl bromide fumigants, except those with “Q” labels, may be subject to requirements of the FIFRA Section 18 Quarantine Exemption. When commodities intended for food or feed are fumigated with methyl bromide under the FIFRA Section 18 Quarantine Exemption, one additional EPA *requirement* must be met: PPQ must monitor aeration by sampling the gas concentration to determine when a commodity may be released.

In this manual, fumigation schedules under the FIFRA Section 18 Quarantine Exemption are followed by an “Important” note to help you determine the current exemption status. For example:



Important

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).



Always use the label of the fumigant to determine if the commodity can be treated. Fumigation schedules in this publication are intended to clarify and expand commercial labels for methyl bromide. The EPA only authorizes fumigation for commodities that are listed on the label of the gas being used for the fumigation. Also, to comply with State requirements, a fumigant must be registered in the State where it is being used. If you are uncertain that a fumigant is registered in a state where the fumigation is being performed, contact a major port in that state or the Center for Plant Health Science Technology (CPHST).

The following Table is a list of commodities covered by the FIFRA Section 18 exemption. This list will expire on March 03, 2009.

Commodity	Minimum Temperature (F)	Maximum Dosage Range (lb/1000 ft ³)	Exposure Period (hours)
Avocado	70	4	4
Banana and Plantain	40	4	2
Blackberry and raspberry	40	4	2
Cucurbit seeds, edible, shelled/unshelled	40	9	12
Cucurbit vegetables not on the Q-label (except gherkins)	40	4	2
Dasheen (root and tuber)	40	4	4
Gherkin (cucurbit)	50	3	2
Herbs and spices, fresh	40	4	2
Ivy gourd	40	4	2
Kiwi	40	4	4
Leafy Vegetables not on the Q-label (including Brassica)	40	4	2
Longan	60	4	2
Lychee fruit	40	4	2
Mint, dried	40	3	24
Mint, fresh	40	4	2
Opuntia	40	4	3.5
Pointed gourd	40	4	2
Rambutan	60	4	2
Root and tubers not on the Q-label (except Dasheen)	60	3	3.5
Dasheen (root and tuber)	40	4	4
Edible Podded Legume Vegetables	40	4	2

FIGURE 2-3-1: Section 18 Exemptions

To better accommodate the requirements of quarantine and regulatory fumigations with methyl bromide, the Animal and Plant Health Inspection Service (APHIS) and the Great Lakes Chemical Corporation have developed a premium 100 percent methyl bromide fumigant that is only intended for quarantine and regulatory use. This methyl bromide fumigant is provided by several companies and generally referred to as a “Q label”. It is labeled for many uses which were previously covered by FIFRA Section 18 Exemptions. Additional features of the “Q label” include the following:

- ◆ Use of additional fumigant to maintain the required concentration is allowed.

- ◆ The commodity must be allowed to aerate for at least one hour before completely removing the tarp. However, the aeration procedures described in this manual require a longer period than required on the label, and must be followed. Be sure that the fumigator is placed under a compliance agreement, and that he follows the aeration procedures outlined in this manual.

Although there is some overlap in the “Q label” and other methyl bromide labels, substitution of the products may result in non-compliance. Use the Treatment Manual to determine when a “Q” labeled fumigant must be used:

- ◆ When the treatment schedule is marked MB, any methyl bromide fumigant may be used for the fumigation if the commodity is on the fumigant label.



When the treatment schedule is marked MB (“Q” label only), the fumigation is restricted to methyl bromide “Q” labels. This restriction is based on the “Q” label replacement of FIFRA Section 18 exemptions.

- ◆ A few schedules restrict the use of a label based on temperature range. In this case, the specific temperature range is marked and noted (“Q” label only).

Always read and follow the “Q label” label and use directions. The “Q-label” allows fumigation of certain commodities and pests at sites and rates that are not allowed under other labels. The label is purposely flexible to handle unforeseen emergencies and other special situations formerly covered by FIFRA Section 18 label exemptions.

Although the use of “Q label” fumigants eliminates the requirements for residue and aeration monitoring, the “Q label” requires fumigations using the product be conducted under the monitoring of a state or federal agency. Monitoring does not necessarily require the actual presence of a regulatory agent during the entire fumigation, but does mean that the monitoring agent be able to certify that the fumigant was done in compliance with the label and other requirements.

To show that the fumigation using the “Q” label was monitored by a regulatory agent, the fumigator should record the name, title, telephone number and mailing address of the monitoring regulatory agent(s) in his restricted use pesticide application records, even if the same information is recorded on other documents (e.g., phytosanitary certificate).

Leak Detection and Gas Analysis

Use an APHIS-approved gas detection device to measure gas concentration levels in tarpaulins and chambers. Use an APHIS-approved leak detection device primarily to check for leaks around tarpaulins, chambers, application equipment, and as a safety device around the fumigation site. Colorimetric tubes, which are supplied by the fumigator, are used to measure gas concentration levels during aeration.

Effects of Temperature and Humidity

MB is effective at the same temperatures plants are generally handled (usually 40 °F and above). In general, increases in temperature give a corresponding increase in the effectiveness of MB. All treatment schedule temperatures are listed with the corresponding dosage rate. Follow the dosage rates listed. A Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 3 registration (the labeled rate of MB provided), or a Section 18 Exemption must be in effect at the time of treatment.

For live plant material which is actively growing or with leaves, maintain a high percentage of humidity (above 75 percent) in the chamber by placing wet sphagnum or excelsior in the chamber or by wetting the chamber walls and floor. Protect actively growing or delicate plants from the direct air flow of fans. Do not add any moisture to the chamber when fumigating seeds. Too much moisture on the material to be fumigated may prevent the fumigant from reaching some of the pests.

Penetration and Aeration of Boxes and Packages

Plastic Wrappings and Impermeable Papers

Plastic wrappings such as cellophane, films, and shrink wrap, and papers that are waxed, laminated, or waterproofed are not readily permeable and must be perforated, removed, or opened before fumigation. If wrappings are perforated to facilitate fumigation, holes should be at least 3/16-inch in diameter every 3 square inches or 1/4-inch in diameter every 4 square inches over the entire surface of the wrapping. Also acceptable are plastic wraps containing numerous pinholes (at least 49 per square inch). These holes enhance permeability through the plastic fruit trays, which are frequently used for transport of fruit.



Inform prospective importers that the wrappings on their shipments may have to be perforated to PPQ specifications, removed, or opened if PPQ requires fumigation. If wrappings on shipments are designed to satisfy PPQ requirements for fumigation readily, importers could save time and money. Shippers should send a complete bag/wrap sample to CPHST for inspection and approval.

USDA-APHIS-PPQ-CPHST
Treatment Quality Assurance Unit
1730 Varsity Drive, Suite 400
Raleigh, NC 27606
919-855-7450

Kraft Paper and Corrugated Cartons

Kraft paper is permeable to MB and does not need to be removed prior to fumigation. Corrugated cartons are also permeable to MB and unless impermeable liners are present, aeration will be satisfactory, although it will be slower in closed boxes.

Wooden Boxes

Although MB penetrates wooden boxes, aeration of tight boxes may be slow, particularly if sorptive packing materials are present. To aid in aeration, have the lids removed and boxes placed on their sides prior to fumigation. If removing lids is not practical, then increase the aeration time.

Sorption

Sorption is the process of chemically or physically binding free MB on or within the fumigated commodity. Sorption makes the fumigant unavailable to kill the plant pest. There are three types of sorption—absorption, adsorption, and chemisorption. Sorption rate is high at first, then gradually reduces to a slow rate. Sorption increases the time required for aeration.

Commodities known or believed to be highly sorptive should not be fumigated in chambers unless concentration readings can be taken to ensure the required minimum concentration is met. Additional readings may be necessary in order to properly monitor gas concentration sorptive commodities in chambers.

For tarpaulin fumigation, additional gas readings are necessary to monitor concentration of gas to determine the rate of sorption. The following is a partial list of commodities known to be highly sorptive:

- ◆ Burlap bales
- ◆ Carpet backing
- ◆ Cinnamon quills

- ◆ Cocoa mats
- ◆ Cotton
- ◆ Flour and finely milled products
- ◆ Gall nuts
- ◆ Hardboard (Masonite™)
- ◆ Incense
- ◆ Myrobalan
- ◆ Pistachio nuts
- ◆ Polyamide waste
- ◆ Polystyrene foam (Styrofoam)
- ◆ Potato starch
- ◆ Rubber (crepe or crude)
- ◆ Vermiculite
- ◆ Wood products (unfinished)
- ◆ Wool (raw, except pulled)

Call CPHST if you are concerned about the sorptive properties of other commodities.

Residual Effect

MB may adversely affect the shelf life of fresh fruits and vegetables, the viability of dormant and actively growing plants, and the germination of seed. Although MB may adversely affect some commodities, it is a necessary risk in order to control pests. Some dosage rates are near the maximum tolerance of the commodity, so care must be exercised in choosing the proper treatment schedule and applying the treatment.

MB may also adversely affect nonplant products. In general, articles with a high sulfur content may develop "off-odors" on contact with MB. In some commodities the odors are difficult or impossible to remove by aeration. If possible or practical, remove from the area to be fumigated any items that are likely to develop an undesirable odor.

Ordinarily, the following items should *not* be fumigated:

- ◆ Any commodity not listed on the label or lacking a FIFRA Section 18 Exemption
- ◆ Any commodity lacking a treatment schedule
- ◆ Automobiles

- ◆ Baking powder
- ◆ Blueprints
- ◆ Bone meal
- ◆ Butter, lard, or fats, unless in airtight containers
- ◆ Charcoal (highly sorptive)
- ◆ Cinder blocks or mixed concrete and cinder blocks
- ◆ Electronic equipment
- ◆ Feather pillows
- ◆ Felt
- ◆ Furs
- ◆ High protein flours (soybean, whole wheat, peanut)
- ◆ Horsehair articles
- ◆ Leather goods
- ◆ Machinery with milled surfaces
- ◆ Magazines and newspapers (made of wood pulp)
- ◆ Magnesium articles (subject to corrosion)
- ◆ Paper with high rag or sulfur content
- ◆ Photographic chemicals and prints (not camera film or X-rays)
- ◆ Natural rubber goods, particularly sponge rubber, foam rubber, and reclaimed rubber including pillows, mattresses, rubber stamps, and upholstered furniture
- ◆ Rug pads
- ◆ Silver polishing papers
- ◆ Woolens (especially angora), soft yarns, and sweaters; viscose rayon fabrics
- ◆ Yak rugs