



Treatment of Plant Bed Soils with Methyl Bromide Fumigant

By J. F. Freeman and Russell A. Hunt

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University of Kentucky • College of Agriculture and Home Economics, Extension Division • FRANK J. WELCH, Dean and Director



Untreated (left) and Methyl Bromide treated portions of plant bed. Wild grass has crowded out tobacco plants on the untreated soil.

(Figure 1)

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Gas treatment of plant bed soils has been used since 1949 by some Kentucky growers as a substitute for burning or steaming. A liquefied gas, methyl bromide containing 2 percent chloropicrin (tear gas), is released under a gas-proof cover fitted over the prepared soil of the seedbed, and confined for 24 to 48 hours. During treatment the gas penetrates the loose soil of the seedbed and kills most of the weed seeds and any living plants and insects which are present. Expense of treatment by this method is less than that for steaming if the cost of the gas-proof cover and of the special applicator is spread over 10 or more uses. Methyl bromide fumigation is not effective if the soil temperature is below 50°F. Best results are obtained when the soil is 60°F, in which case 24 hours exposure time is enough. If it is necessary to gas plant beds when the soil temperature is between 50°F and 60°F the exposure time should be 48 hours.

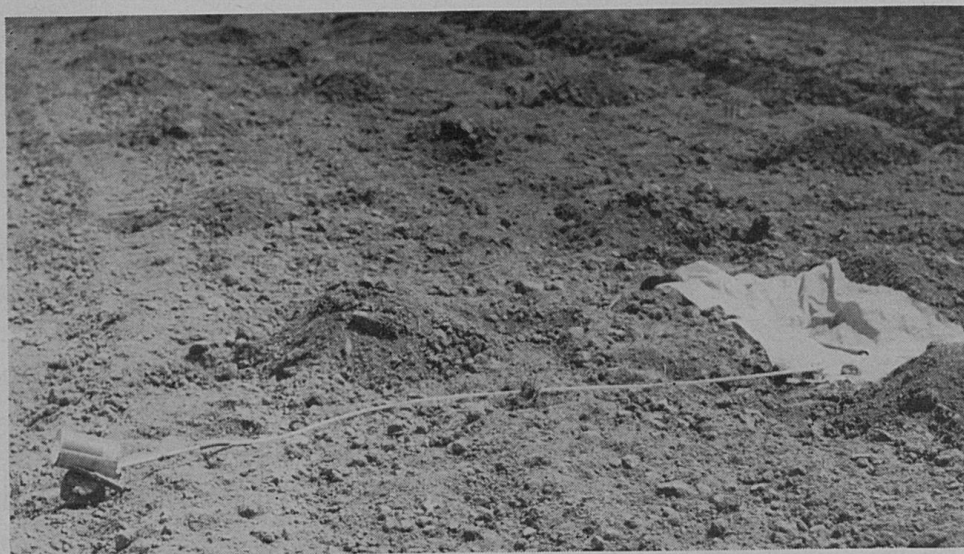
Soil preparation

Plow the area and smooth it down in advance. The soil of each bed should be worked into a fine loose condition just ahead of treatment. It should be free of clods and unpulverized pieces of sod. The fumigant penetrates only as deep as the soil is properly worked. Soil should be moist enough to work well because the weed seeds must be moist for the most effective kill.

The prepared area should be at least 4 feet wider and longer than the bed is to be, so that loose soil will be available for placing on the edges of the cover to seal it to the ground. Because the gas tends to concentrate in low areas, long beds on steep ground should be located on the contour rather than up and down the slope.

Gas-proof covers

Suitable covers made either of plastic sheeting or of asphalt laminated paper are available for gas treatment of beds. They may be had in either of the two sizes, 10½ ft x 100 ft for beds 9



Bed Area, ready for gas-proof cover. Note the soil mounds for supporting the cover, and the plastic-lined trench, plastic tubing and applicator for methyl bromide cans. (Figure 2)

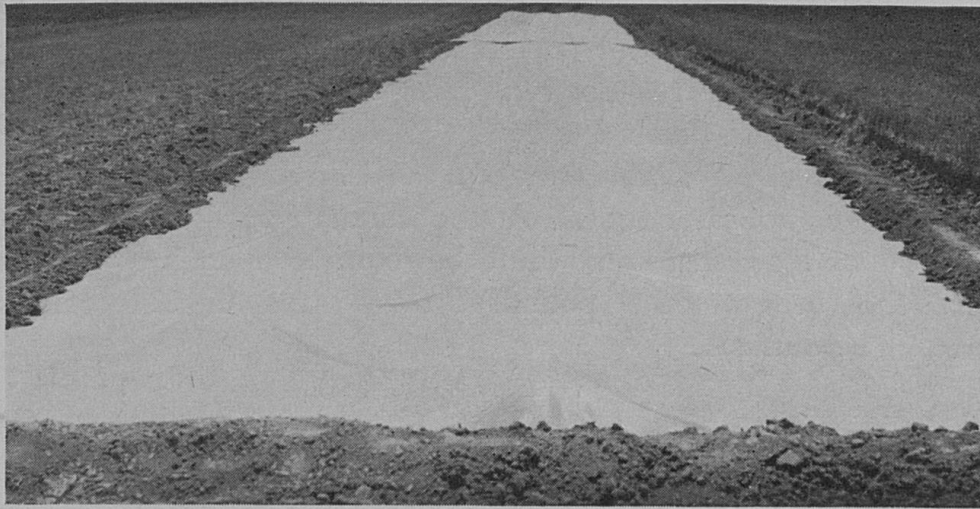
feet wide or $13\frac{1}{2}$ ft x 100 ft for beds 12 feet wide. The extra width of cover allows 9 inches on each side for weighting down with soil in making the seal. The plastic cover is being used more generally because of its durability, light weight, and greater ease in handling.

Cover supports

The cover should be supported a few inches above the soil so that the gas may move over the bed from the three points of application. Low mounds made by heaping 4 or 5 shovelfuls of bed soil together, spaced over the bed, provide a simple and effective means of support. A satisfactory arrangement is to have three rows of mounds running lengthwise of the bed, spaced about 5 feet apart in the rows and the rows about 3 feet apart on centers. Following treatment the mound soil should be raked back into place.

Evaporating troughs and tubing

Since the liquid methyl bromide does not vaporize immediately upon application, the liquid should be delivered into shallow metal pans or troughs to prevent the fumigant from running directly into the ground. If plastic gas-proof covers are used, a suitable trough can be made by opening a shallow trench



Same bed with plastic gas-proof cover in place and the edges properly sealed with soil. (Figure 3)

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24 inches long in the soil and lining it with a strip of the plastic. A strip 15 inches wide cut from the end of the cover will provide enough plastic for 3 or 4 trough linings. Three troughs are recommended for each 100 foot bed, one placed near the middle and the others about 16 feet from each end of the bed.

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Three lengths of plastic tubing are provided with the applicator, one for each trough. A piece of plastic tubing, through which the methyl bromide flows from the applicator, should be placed with one end anchored in the evaporating trough with a rock or short length of metal pipe and the other end extending out from under the cover so that the applicator may be attached readily before the cans are punctured.

Placing the cover

The cover should be unfolded, or unrolled if paper is used, on top of the bed supports beginning at the end toward the wind. Seal down the end of the cover completely with soil and as the cover is unfolded place dirt along the outer edges to anchor the cover firmly and to prevent sudden gusts of wind from catching under it.

Seal cover thoroughly

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A gas-tight seal around the entire edge of the cover should be made after the cover is in place, as shown in Figs. 3 and 5. Enough dirt should be used for sealing that the weight of it when packed down will prevent the firmly stretched cover from

sagging to the ground. A poorly sealed cover may permit gas to escape and result in poor control of weeds. When completing the seal make sure that one end of each of the applicator tubes extends out from under the cover. Before treatment place the proper number of 1-pound cans of methyl bromide fumigant near each of the applicator tubes. At the standard dosage of 1 pound per 100 square feet, 3 cans would be required at each of 3 tubes for 9-foot beds (total 9 pounds), and 4 cans for 12-foot beds (total 12 pounds).

Applying the gas

The special applicator is easily attached to the plastic tubes



Suitable applicator for 1-pound cans of the fumigant.

(Figure 4)

by means of a rubber tube connector. One applicator is all that is required. With it the can containing the liquid gas is punctured and the hole automatically gasketed so that the liquid flows through the tubing into the evaporating trough underneath the cover. During application, hold the can so that the hole is in the lowest position. The can will be emptied in less than one minute. When through applying methyl bromide to one trough, disconnect the applicator, move to the next tubing inlet, and repeat the procedure. After the gas application is completed, the plastic tubes may be pulled out and placed for use on another bed.



Releasing Methyl Bromide beneath gas-proof paper cover, using special application equipment.

(Figure 5)

Removing the cover

After the proper exposure time has elapsed the cover may be removed. This is done readily by removing the soil seal with a stiff broom or by flipping the dirt off the edge by lifting the edge of the cover. A plastic cover is removed most easily by folding, with a man on each side. One end is carried forward to the other to double the sheet, then the folded part is carried forward even with the loose ends, and this is repeated until it can be folded crosswise for easy handling, as is done in folding a wagon sheet. For unfolding, the reverse procedure is used. If two beds side by side, or end to end, are to be treated with the one cover, it is not necessary to fold the cover. Instead the soil seal on the side or end toward the second bed is left undisturbed to serve again as the seal on that side. After removing the seal from the other sides and end, the cover is turned over onto the supports of the new bed—bottom side up. The free edges of the cover are then sealed down as previously described. Paper covers

should be rolled up for removal, or if the adjacent bed is ready for treatment the paper may be turned over on it as described for the plastic cover, or may be dragged into place if it is not windy. The cover should be inspected for small holes or tears as it is being moved and any needed repairs should be made. Masking tape is a satisfactory material for repairing small holes and tears from which gas might escape during the next bed treatment.

Care of treated beds

Ditch around beds to prevent rainwater from washing weed seed and untreated soil over the bed after treatment. This is essential in the case of fall-treated beds. Spring-treated beds may be boxed and seeded at once; then ditched.

A light working of the soil is necessary before seeding fall-treated beds, but the soil should be moved as little as possible, to avoid dragging untreated soil which contains live weed seeds onto the bed.

Handling precautions

Methyl bromide fumigant is a poisonous gas. It is quite volatile and may cause burns. Its vapors are extremely hazardous. Follow instructions carefully.

Use only for fumigation of soil, manure, or compost.

Store in outbuildings away from dwellings.

Do not breathe the vapor.

Do not spill. If the liquid gets on shoes or clothing remove them at once and do not wear them again until they are thoroughly aired outdoors for several days. Do not use gloves when applying the fumigant.

Keep children and animals away from beds being treated and for at least 30 minutes after the cover is removed. The fumigant contains tear gas as a warning agent which causes pain and closing of the eyes when the gas concentration becomes too high. This will warn against leakage or spillage during storage or handling, but the warning agent disappears within a few hours after the gas has been discharged and will not keep children and animals from crawling under the cover.

Read instructions on the can before applying.

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