



GCSA Convention SPEECHES

Three Methods of Soil Fumigation

*Here is how to handle tarps after
Methyl Bromide — Chloropicrin mix
is injected into the treated area*

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Most weeds, soil fungi, nematodes and soil-borne insects can be controlled in the soil before planting. Seed will germinate, grow and spread faster if these pests



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are eliminated because there will be little, if any, competition for soil nutrients and space. Similarly, healthy turf will resist re-infestation due to use of cultural practices. That is, it is far easier to start with clean soil than to try to eliminate a pest after it is established.

Methyl bromide, and menthyl bromide-chloropicrin mixtures are the most common pre-plant soil fumigants. Methyl bromide is a colorless, odorless liquid which is three and a half times heavier than air and boils at approximately 40 degs. F. It is noted for its extremely fine penetrative qualities. It will penetrate a 6 x 6 timber in 24 hours and kill all stages of insect life therein. When released, methyl bromide boils and expands to a gas rapidly and must therefore be contained with gas-proof tarps.

Used in Mixture

Chloropicrin, or tear gas, is extremely toxic to soil fungi. It is used in a mixture

with methyl bromide to enhance the kill of soil pathogens. A synergistic action occurs in these mixtures which gives each a boost in toxicity allowing lower dosages to be applied with improved results.

The effectiveness of most soil fumigants is closely related to soil conditions. To obtain maximum results the following preparations should be made with regard to moisture and tilth:

The soil should be chiseled or plowed to the depth the fumigant should penetrate. Then it should be well disced and rototilled to eliminate large clods. Finally, it should be smoothed to seeding condition prior to fumigation.

Moisture Maintained

The soil should have sufficient moisture to support seed germination for at least 10 days prior to the application of the fumigant. At the time of application of the fumigant, the surface of the soil should be moist and, if necessary to assure this condition, water should be applied two days before fumigating.

There are basically three different ways to apply fumigants to the soil, and to seal or contain them within a given area:

(1) The raised tarp method: After all the requirements for tilth and moisture have been met, a six inch trench is dug around the area to be treated. Bags full of straw, cardboard boxes, wire hoops or boards held up by blocks are placed within the area to be treated in such a way as to hold the tarp six inches off the ground when stretched over the area. The edges of the tarp are placed in the trench vertically and covered with soil so as to make the area under the tarp a sealed atmospheric fumigation chamber.

Methyl bromide should be metered out of the cylinder through a dispenser or weighed out on an accurate scale. It is common practice to vaporize the liquid by means of a heat exchanger or forced recirculation fan to insure an equal distribution of fumigant to air in all areas under the tarp. The proper dosage for this method of application is 1½ to 2 pounds

of Methyl bromide per 100 sq. ft. of soil. Exposure should be for 24 to 48 hours. Aeration for methyl bromide is 48 to 72 hours; after that time it is usually safe to complete grading and plant. Most fumigation of golf greens is done in this manner.

Manual Tarping Method

(2) Chisel injection manual tarping method: Due to the volatile nature of these fumigants, chisel injection can create some unique problems. Rapid expansion to the gaseous state causes icing of injection tools. This is overcome by dilutions and mixtures with other chemicals which slow down the diffusion of the gases. In order to accurately calibrate dosage, it is essential that three factors be held constant. These are: speed of the delivering carrier, spacing on the injection chisels, and weight or viscosity of the mixture. With these factors held constant, various orifice plates can be used at given pressures to maintain very accurate calibration.

When these chemicals are injected into the soil at a depth of 6 to 8 inches they are found to create semi-oval, linear plane diffusion patterns which overlap at 10 to 14 inch chisel spacings. Penetration of the chemical is enhanced and results are achieved at lower dosages.

Application Method

Application equipment which embraces all the above features is in daily commercial use and greatly increases the speed and economy of application in comparison with the so-called raised tarp method, already described. The fumigant is injected into the soil through nine chisels spaced 12 inches apart. Mounted on the same tool bar is a disc which opens a trench on the outside of the area to be treated. By making a second pass in the opposite direction an 18-foot area is thus treated with a trench opened on each side.

Immediately after application a 2 mil polyethylene tarp, 20 feet wide is rolled over the treated area. The edges of the tarp are placed in the trench in a vertical manner and the trench is filled in. A complete seal is effected. No appreciable fumigant is lost as the area is covered and sealed within 30 minutes.

An experienced crew can apply and cover three to four tarps, 800 feet long, in one hour. The following day the area adjacent to the tarp is treated in the same manner, the only exception being that only

one trench is opened at the outer edge of the newly treated area. The tarp that was layed the previous day is flopped over this area and sealed. If treatment is desired in two days, tarps should be spaced at 36 foot intervals so that the first tarp when flopped meets the area covered with the second tarp, and so on. The tarp can then be moved to the next area to be treated. In general, a 2 mil tarp will hold up through six to ten flops before it must be replaced.

Automatic Tarping

(3) Chisel injection automatic tarping: The theory of application is the same here as in the previous method except that a rather recently perfected machine attached to the tool bar is used to lay the tarp automatically as the chemical is injected. With this machine we treat a 9 foot, 6 inch swath, covering with 11 foot wide 1 mil poly film. The fumigant is injected, the trenches opened, the tarp laid and the edges buried in one operation. This is the ultimate for a large scale operation.

The factors governing which method should be used are time, available labor and area to be treated. In the preparation of a golf course, if only greens are to be treated and weeds are to be controlled, we recommend the "raised tarp method". Polyethylene film can be obtained in widths up to 40 feet and 100 feet long, permitting covering of a large area at one time. In this way, the soil can be prepared for seeding before fumigation and requires a minimum of work to smooth out footprints and other irregularities when the tarp is removed. Use of tractor equipment on greens presents a problem of compaction.

If fungus diseases are known or suspected to exist, chloropicrin can be very easily and effectively applied in areas such as golf greens with a hand operated applicator known as the Fumigun. Experience has shown that no golf green should be established without the use of fumigants in the soil preparation.

Michigan State Field Day

Michigan State U's turf field day is scheduled for June 25 at the University farm in East Lansing. James B. Beard, assistant professor in the farm corps dept., is in charge of arrangements.

Golf Guide is a 92 page booklet to be published this month by Snibbe, Mott & Assoc., New York 1.