CHEMICAL SOIL TREATMENTS FOR DISEASE-WEED CONTROL IN TOBACCO BEdS

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Annual treatment of tobacco bed soils with specified chemicals makes it possible to control root knot and weeds, and to use the same bed site many years. It is practical to use two chemicals at the same time, one for control of nematode diseases and one for weeds. Two practical combinations for light Georgia soils are (1) EDB-40* or D-D mixture* for nematodes plus granular calcium cyanamid for weed control, and (2) urea (Nu-Green) plus cyanamid. A third method consists of gassing with methyl bromide which controls both weeds and soil-borne diseases. Each method has some particular advantage over the others, depending on soil type and location, weed species prevalent, severity of disease, and over-all costs. *EDB-40 is 40 percent ethylene dibromide; D-D is dichloropropene-dichloropropane mixture.

Preparation of Soil for Chemical Treatment

To prevent excessive weed increase, keep the site free from objectionable plants during the summer and do not let them go to seed. Cut down weeds in the surrounding area to prevent seeds from blowing in after treatment. In September or at least two weeks before treating, harrow or disk the soil several inches deep. Do not use a turnplow. If compost is to be used this is the time to apply it. Remove clods, roots and litter. The soil should be well loosened and pulverized before treating. Drag harrows and weeder are good tools for leveling before and after treating. Dig ditches on the upper side to control drainage water.

1. Soil Fumigation plus Cyanamid

Approximately 3 pints of EDB-40 or D-D mixture plus 100 to 150 pounds of cyanamid are required for each 100-square yard area. Apply both materials 60 to 90 days before seeding, preferably in cool weather and after a shower when the soil is moist, but not too wet to plow. The same type of gravity flow rig for applying fumigants in the field will be satisfactory. First adjust the applicator to deliver 1/2 pint of fumigant to each 140 feet of furrow. Apply the liquid 7 to 10 inches deep in small scottie furrow 12 inches apart, and smooth the surface with a weeder. The cyanamid may be applied immediately afterward or, if preferred, several days later. Broadcast 100 pounds of cyanamid uniformly on the surface and harrow this thoroughly into the top 2 or 3 inches of soil. The more mixing the better, provided this is not done deeper than 3 inches. If weeds are expected to be severe, apply an additional 50 pounds of cyanamid per 100 yards and scratch this in with a weeder only 1 inch deep. Do not disturb the soil again until time for applying fertilizer. At seeding time apply only 1 pound of fertilizer per square yard. CAUTION: To avoid plant stunting, apply the fumigant BEFORE using cyanamid. If nematode diseases are known to be absent, cyanamid may be used alone at the above rates for weed control.

1/ In cooperation with Bureau of Plant Industry, Soils & Agricultural Engineering, U. S. Department of Agriculture, and the University System of Georgia.
2/ Plant Pathologist, U. S. Department of Agriculture, Georgia Coastal Plain Experiment Station, Tifton, Georgia.
Fumigation plus cyanamid insures a uniform rate of growth, the maximum number of plants at the first pulling, and excellent root knot control. The combination is the least expensive of the three methods described, and no special equipment other than a fumigation applicator is necessary. The cyanamid may not give good results in light sands, and it does not give consistent good control of lambsquarters, spiny Amaranth, goosegrass, and nutgrass. Excessive amounts of fumigant with cyanamid sometimes cause stunted growth of plants, especially when applied late in the season and in low wet soils.

2. Combination Urea-Cyanamid Treatment

The combination of 100 pounds of urea (Nu-Green) plus 50 pounds of cyanamid per 100 square yards is the oldest over-all treatment used commercially in Georgia. The urea first used was designated as Uramon instead of Nu-Green. Urea used alone gives good weed control and prevents severe root knot, but the combination with cyanamid often improves final stands and invariably produces more early plants. Apply both materials 60 to 90 days before seeding, preferably after a rain or when the soil is neither too wet to plow nor dusty dry. If the soil is too dry apply 200-300 gallons of water per 100 yards the day before treating.

Two important steps are necessary for insuring best results against root knot as well as weeds. First broadcast the urea and work this thoroughly into the soil at least 6 inches deep. The more mixing the better. Then re-level with a weeder and immediately broadcast the cyanamid. Harrow this in only 2 inches deep and, again, thorough mixing is essential. Leave undisturbed until time for applying fertilizer. Use only 1 pound of fertilizer per square yard, raking it in no deeper than 2 inches a few days before seeding. Heavy rates of fertilizer following this treatment may cause poor stands, irregular growth and low plant yield. CAUTION: If urea-cyanamid or cyanamid plus fumigation treatments are used, locate the beds on well drained soil where there is no seepage water. The treatments are less satisfactory in very light sands and also in wet places. In unusually dry seasons it is necessary to water the treated beds every day or two when the seeds are sprouting and during the week following. Urea-cyanamid is less effective against root knot than fumigation-cyanamid but both methods are about equally effective against weeds.

3. Disease-Weed Control with Methyl Bromide Gas

Methyl bromide (MC-2) gas controls most weed species prevalent in Georgia beds as well as soil-borne diseases. Six pounds of gas usually are adequate for treating a 100-square yard area. It may be purchased in 1-pound cans. Since the gas is poisonous and under pressure in the cans, it must be handled with due caution and released only through special applicators. Carefully follow the manufacturer warnings on the label. In addition the gas must be confined in the soil by placing a good plastic or other suitable gastight cover over the area to be treated. Unless this cover is impervious to the gas, the treatment will not be effective. Most ordinary fabrics and papers are of no value. Dealers should be consulted for further information. A convenient size plastic cover commonly used is 13-1/2 feet wide and 90 to 100 feet long, which is ample for treating a 100-square yard area after allowing for necessary overlapping. The special applicators have been used repeatedly, while the better plastic covers have been used successfully as many as ten times. However, if holes are torn in the cover or there is excessive abrasion, it may be ineffective after the first treatment. After being used several times, even the best covers permit an increasing amount of gas to escape. Thin plastics and accepted paper covers are less durable and often can be used only once.
Several important steps are required for effective use of methyl bromide in treating 100 to 130-square yard areas.

1. Provide some convenient and simple supports to hold the cover several inches above the ground. From 15 to 20 burlap bags partly filled with hay may be placed in two parallel rows and equidistant in an area that has been marked off slightly smaller than the cover. Cornstalks, large bottles or cans, and other materials having a smooth surface, with no sharp edges or points, can be substituted.

2. Place two flexible applicator tubes on top of the soil, each about 12 feet from either end of the marked area, with the delivery end midway between the sides and ending in a shallow container covered with cloth or paper to prevent the liquid from being forced against the cover.

3. Put the cover in place by rolling it over the bed so that it is held above ground by the supports, and bury the sides and ends vertically in a slit trench 3 inches deep all around the area. Carefully fill the trenches with soil and press firmly along the sides and ends to make a continuous airtight connection. The applicator tube can be buried conveniently under the edge.

4. Insert a 1-pound can of methyl bromide in the applicator, according to directions on the label, and apply one can after another until 3 pounds have been injected under each end of the cover. Pull out the flexible applicator tube and re-pack the soil at the point where the tube was buried under the edge. Do not lift up any portion of the edges of the cover during or following treatment. Apply gas just before night; never in the morning of warm sunny days.

5. Leave the cover in place 48 hours before removal. There is no harm in keeping it on several days; and by increasing the dosage to 10 pounds per 100 yards, similar good control can be obtained by leaving the cover on only 24 hours.

6. Carefully remove the cover and in a similar manner gas the adjoining area, continuing at 48-hour intervals as long as the cover remains in good condition or until the entire bed site has been treated. If the covers are such that they can be used only once or twice, it is practical to treat all or half of the total bed space at one time.

It is not necessary to use methyl bromide well in advance of seeding as is the case with cyanamide and urea. It is safe to sow methyl bromide beds the day after removing the covers, or seeding may be delayed as preferred. Fertilizer may be applied before treating if the bed is to be sown within a week. Since the gas has no nitrogen fertilizer value, use 2 pounds of fertilizer per square yard of bed, and side dress with nitrogen during the plant growing season as occasion demands. Side dressing seldom is required where cyanamide is used.

Methyl bromide effectively controls lambsquarters, spiny Amaranth (careless weed), goosegrass, and nutgrass, and these are the weeds not well controlled by cyanamide and urea. However, double rates of gas may be required to completely eliminate nutgrass. The gas may be used on heavy clay soils and on sand. Disadvantages of the method are (1) it is cumbersome and sometimes expensive; (2) it does not effectively control such hardseeded weeds as cranesbill, nor hardseeded leguminous weeds; and (3) when used at high rates it sometimes causes poor stands and low plant yields. It is safer and more successful against disease if applied at the lower rate in slightly dry sandy soils, but when the surface is not dusty dry.