

# **NURSERY STOCK PRODUCTION (CALIFORNIA) - MATERIAL METHYL BROMIDE (ACTUAL CH<sub>3</sub>BR) - SCHEDULE B - DUAL APPLICATION UNTARPED - APPLICATION #2 - CLAY LOAM SOILS**

## General Information

### GENERAL INFORMATION

Telone II soil fumigant is a multi-purpose liquid fumigant for preplant treatment of cropland soil. Telone II can be used as part of a nematode management program involving crop rotation, planting of resistant varieties, sanitation, and other cultural practices designed to reduce nematode infestations.

Telone II may be applied as a preplant soil treatment as part of a management program to aid in reducing the damaging effects of certain soil pests; plant parasitic nematodes [citrus, burrowing, cyst formers (golden, sugarbeet, soybean, carrot and wheat), dagger, lance, pin, needle, reniform, ring, root knot, root lesion, spiral, sting and stubby root; symphylans (garden centipedes); and wireworms.

Telone II can also be used to suppress sugar beet Rhizomania disease, Fusarium wilt of cotton and Verticillium wilt of mint, and aid in the control of bacterial canker of peaches.

Soil sampling for the type and number of pests present is recommended before fumigation. In fields where pre-treatment soil samples indicate the presence of high population levels of nematodes, a successful fumigation cannot be expected to eradicate entire populations. Therefore, post-treatment (mid-season and/or preharvest) sampling is recommended to determine the need for additional pest management practices.

Supplemental labels are available for certain crops in selected geographies. Refer to these supplemental labels for specific use directions. Consult a Dow AgroSciences representative or visit the Dow AgroSciences website at [www.dowagro.com](http://www.dowagro.com) for additional information.

Consult State Agricultural Experiment Station or Extension Service specialists for information on other practices such as post-harvest destruction of crop residues,

weed control or other cultural practices, and use of nematode resistant crop varieties that may aid in reducing crop losses from soil borne pests.

### General Use Precautions

Soil fumigation using Telone II should be conducted only according to directions and conditions of use described in the labeling.

Recontamination Prevention: Telone II will help manage certain soil borne pests that are present in the soil treatment zone at time of fumigation. It will not control pests that are introduced into soil after fumigation. To avoid reinfestation of treated soil do not use irrigation water, transplants, seed pieces, or equipment that could carry soil borne pests from infested land. Avoid contamination from moving infested soil onto treated beds through cultivation, movement of soil from below the treated zone, dumping contaminated soil in treated fields and soil contamination from equipment or crop remains. Clean equipment carefully before entering treated fields. Cultural practices, which provide post-harvest destruction of crop residues and weeds prior to fumigation and practices which prevent weed infestation following fumigation and prior to planting, will help prevent recontamination.

Do not use containers, pumps or other transfer equipment made of aluminum, magnesium or their alloys, as under certain conditions Telone II may be severely corrosive to such metals.

Fertility Interactions: Fumigation may temporarily raise the level of ammonia nitrogen and soluble salts in the soil. This is most likely to occur when heavy rates of fertilizer and fumigant are applied to soils that are either cold, wet, acidic, or high in organic matter. To avoid injury to certain crops including red beets, carrots, corn, radishes, cole crops, legumes (beans), lettuce, onions, and sugarbeets, fertilize as indicated by soil tests made after fumigation. To avoid ammonia injury or nitrate starvation (or both) to crops grown on high organic soils, fertilizers containing ammonium salts are not recommended.

When using high rates of Telone II as required by certain state nursery regulations, liming of highly acid soils before fumigation may stimulate nitrification and reduce the possibility of ammonia toxicity. Certain nursery crops such as citrus seedlings, *Cornus* sp., *Crataegus* sp., spruce, and vegetable crops such as cauliflower have shown evidence of phosphorus deficiency following fumigation. To avoid this possible effect, additional phosphate fertilizer (foliar applied) is recommended

where experience indicates a deficiency may occur.

**Use Restrictions for Certain Florida Counties:** For application of this product in Brevard, Broward, Charlotte, Citrus, Collier, Dade, DeSoto, Glades, Hardee, Hendry, Hernando, Highlands, Hillsborough, Indian River, Lake, Lee, Manatee, Martin, Monroe, Okeechobee, Orange, Osceola, Palm Beach, Pasco, Pinellas, Polk, Sarasota, Seminole, St. Lucie, Sumter, and Volusia counties, applicators must have labeling for FIFRA Section 24(c) Special Local Need (SLN) FL990003 in their possession and comply with stated requirements.

**Use Restrictions for Certain New York Counties:** This product is prohibited from sale, use or distribution in Nassau and Suffolk counties.

## Application Directions

### Application Timing

Telone II soil fumigant can be applied at any time of the year when soil conditions permit. Conditions that allow rapid diffusion of the fumigant as a gas through the soil normally give best results. Because Telone II does not provide residual control of soil pests, it should be used as a preplant application before planting each crop. The following soil temperature and moisture conditions should exist at time of treatment. Failure to meet these conditions may result in unsatisfactory product performance:

### Soil Conditions

Soil temperature at the depth of application must be between 40°F and 80°F. In areas where the soil temperature in the spring may not reach 40°F in time to allow application of Telone II prior to planting, late summer or early fall treatment is recommended.

### Soil Moisture

It is critical to manage soil moisture properly before fumigation. Plan fumigation for seasons, crop rotations, or irrigation schedules which leave moisture in the soil. For application depths greater than 18 inches, the soil should be moist within a 16-inch radius upwards from the point of injection as determined by the feel method. For all other applications, the soil must be moist from 2 inches below the soil surface to at least 12 inches deep as determined by the feel method. The amount of moisture

needed in this zone will vary according to soil type. The surface soil generally dries very rapidly and should not be considered in this determination. If there is insufficient moisture at the 2 to 6 inch depth, the soil moisture must be adjusted. If irrigation is not available and there is adequate soil moisture below 6 inches, it may be brought to the surface by disking or plowing before or during the injection. To conserve existing soil moisture, pretreatment or treatment tillage practices should be done as close to the time of application as possible. For fields with more than one soil texture, soil moisture content in the lightest textured (most sandy) areas must comply with this soil moisture requirement. Whenever possible, the field should be divided into areas of similar soil texture and the soil moisture of each area should be adjusted as needed. Coarser textured soils can be fumigated under conditions of higher soil moisture than finer textured soils; however, if the soil moisture is too high, fumigant movement will be retarded and effectiveness of the treatment will be reduced. Previous and/or local experience with the soil to be treated or the crop to be planted can often serve as a guide to conditions that will be acceptable. If you do not know how to determine the soil moisture content of the area to be treated, consult your local extension service or soil conservation service specialist or pest control advisor (ag consultant) for assistance.

In general, no irrigation should immediately precede subsoiling or fumigation; however, when irrigation is available and surface soil moisture conditions are not likely to provide an adequate seal against fumigant loss, a very light sprinkler irrigation to wet the top 1 to 2 inches of soil is recommended before and/or immediately after fumigation.

The following descriptions will aid in determining acceptable soil moisture conditions by the "feel method." For coarse soils (sand and loamy sand), there must be enough moisture to allow formation of a weak ball when compressed in the hand. Due to soil texture, this ball is easily broken with little disturbance. In loamy, moderately coarse, or medium textured soils (coarse sandy loam, sandy loam, and fine sandy loam), a soil sample with the proper moisture content can be formed into a ball which holds together with moderate disturbance, but does not stick between the thumb and forefinger. Fine textured soils (clay loam, silty clay loam, sandy clay, silty clay, sandy clay loam and clay), should be pliable and not crumbly, but should not form a ribbon when compressed between the thumb and forefinger.

Soil Preparation

The soil should be free of clods. Large clods can prevent effective soil sealing and reduce effectiveness of Telone II. Plant residues should be thoroughly incorporated into the soil prior to treatment to avoid interfering with application. Non-decomposed plant material may harbor pests that will not be controlled by fumigation. Little or no crop residue should be present on the soil surface. Crop residue that is present should lie flat to permit the soil to be sealed effectively. Compacted soil layers within the desired treatment zone should be fractured before or during application of the fumigant. Deviation from the above conditions may result in unsatisfactory results.

### Placement of Fumigant

Telone II may be applied as either a broadcast (overall) or row treatment. It must be placed at least 12 inches below the final soil surface. When soil conditions allow, placement at a minimum of 14 inches below the final soil surface is recommended. Deeper placement is required when fumigating soil to be planted to deep-rooted plants, such as perennial fruit and nut crops, or to control deeply distributed pests. For row application, the fumigant must be placed at least 12 inches from the nearest soil/air interface (e.g., furrow or bed top).

### Application Methods and Equipment

Broadcast Application: Use chisel (shank) or coulter (e.g., Yetter 30-inch Avenger), offset wing shank, Nobel (sweep) plow, or plow-sole application equipment. For best results when using chisel equipment, use ripper-type, forward-swept shanks. Nobel plow equipment is particularly useful for fall fumigation when the soil still contains some non-decomposed standing plant material. Subsoiling may be necessary before application as described under Soil Preparation. Choose application equipment that allows the deepest application and best soil seal under existing conditions.

The fumigant outlet spacing varies with the type of application equipment used.

With chisel and coulter equipment, a fumigant shank spacing of 12 to 24 inches is recommended. Do not exceed the maximum shank and outlet spacing of 24 inches. The outlet spacing for this equipment may be up to 1 1/2 times the application depth but generally should be equal to the application depth and should not exceed the soil-shattering capability of the chisels.

With plow-sole equipment, a 12-inch outlet spacing is recommended.

Do not exceed an outlet spacing of 18 inches.

With Nobel (sweep) plow equipment, use an outlet spacing of 9 to 12 inches along the sweeps. Application should be made to a depth of at least 15 inches.

Broadcast application can be made in the same direction or at an angle to the direction of row planting. Refer to Table 1 for broadcast treatment rates for various crops.

Row Application (for row spacing greater than 24 inches): Use chisel equipment to treat a band of soil where the crop is to be planted, i.e., the plant row. When multiple chisels per plant row are used, space the chisels (fumigant outlets) no more than 12 inches apart. Regardless of the number or spacing of chisels used, the fumigant must be placed at least 12 inches from the nearest soil/air interface (e.g., furrow or bed top).

With certain deeper rooted crops such as potatoes and sugarbeets, higher rates may be necessary to ensure adequate treatment of the zone of soil where primary root growth occurs.

To prevent seed germination problems caused by improper seed-to-soil contact or improper planting depth regardless of application method, do not place the seed directly over the furrow left by the applicator chisel(s)/ coulter(s). When 1 chisel is used per plant row, place the seed about 4 inches to one side of the chisel furrow. When 2 chisels are used per plant row, plant the seed offset from the chisel trace.

### Sealing the Soil After Application

For broadcast treatment (flat fumigation), immediately after chisel application of Telone II, the soil must be "sealed" to prevent fumigant loss and ensure that an effective concentration of fumigant is maintained within the soil for a period of several days. To create an effective seal it is important that the shank traces be disrupted and the soil surface compacted. Disruption of shank traces can be accomplished with equipment that will uniformly mix the soil to a depth of 3 to 4 inches to eliminate chisel or plow traces which can allow direct escape of the fumigant. A tandem disc or similar equipment may be used for this purpose. To maximize soil sealing, steps should also be taken to compact the soil surface to

further retard the rate of fumigant loss by following with a ring roller or cultipacker in combination with the aforementioned tillage equipment. Compaction of the soil surface alone does not effectively disrupt chisel or plow traces. When using coulter (e.g., Yetter 30-inch Avenger) applications, additional sealing may not be necessary when soil moisture conditions are optimal and a beaver tail is used.

For row treatment, forming the beds at the time of application should be accomplished in a manner that places the fumigant at least 12 inches from the nearest soil/air interface (e.g., furrow or bed top). The closest soil/air interface could be the furrow for multiple knife applications or the top of the bed for single knife applications. It is recommended that additional soil sealing be accomplished by going over the bed with a bed shaper, press sealer, rolling cultivator, ring roller, or rolling basket.

Sealing can also be improved by applying non-perforated plastic film, such as polyethylene, over the entire area or in strips. Use of a film to seal the soil surface does not eliminate the need to eliminate chisel traces prior to application of the plastic film. When using coulter (e.g., Yetter prebedder) applications, a beaver tail may be used for sealing. Proper soil conditions at the time of application (see Soil Preparation section) are important to ensure proper placement of fumigant (see Placement of Fumigant section) and obtaining adequate sealing. Prior tillage should be adequate to eliminate clods and thoroughly mix crop residues into the soil.

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Note: Schedule D treatments (Charts I-VII) may be used instead of schedules A, B, or C at lower dosages where appropriate soil moistures, soil textures and soil temperatures allow. If soil conditions are such that Schedule D cannot be used, the appropriate schedule A, B or C must be used.

See the label for more information on Simultaneous Application of Telone plus K-PAM HL or Sectagon-K-54 or Sectagon 42 or Vapam HL for Suppression of Verticillium Dahliae and Suppression of Root Knot, Lesion Nematodes and Stubby Root Nematode Vector of Corky Ringspots in Soils to be Planted to Potatoes, Onions and Carrots.

See the label for more information on Sequential Application of Telone plus K-PAM HL or Sectagon-K-54 or Sectagon 42 or Vapam HL for Suppression of Verticillium Dahliae and Suppression of Root Knot, Lesion Nematodes and Stubby Root Nematode Vector of Corky Ringspots in Soils to be Planted to Potatoes, Onions and Carrots

### Limitations, Restrictions, and Exceptions

Apply Telone II to control nematodes in soils to be planted to nursery crops. When used according to state nursery regulations, Telone II may be used in the production of certified nursery stock. In California refer to Sections 3055 to 3055.6 and 3640 of Title 3 of the California Code of Regulations. Telone II may be applied as a dual application at the rates defined in Schedules B, C, or D of the Nursery Inspections Procedures Manual (NIPM) #7 in order to meet the nematode cleanliness requirements defined in the regulations. Users shall follow the use directions in this SLN and the attached NIPM #7 document.

A Dual Application Method is defined as one in which the first treatment is applied at a minimum depth and chisel spacing. After a minimum 14-day waiting period, the top 12 inches of soil is inverted prior to the application of a second treatment made in the same manner as the first application. Immediately seal the soil surface with a disk and ring roller after each application. Following the second application, the soil is to be undisturbed for at least 14 days. Refer to NIPM #7 for further details on rate, depth, and chisel spacing. The pounds of Telone II applied per acre per treatment must not exceed the maximum allowed in the Permit Conditions.

Restriction: In the state of California, the maximum single application rate is 332 lb ai per acre.

### APPROVED TREATMENT AND HANDLING PROCEDURES TO ENSURE AGAINST NEMATODE PEST INFESTATION OF NURSERY STOCK

In accordance with the Regulations for the Nursery Stock Nematode Control Program, California Code of Regulations (CCR) Sections 3055 to 3055.6 and Section



3640, the California Department of Food and Agriculture (CDFA) hereby specifies soil treatment and handling procedures which, when verified and documented, are approved to ensure nematode cleanliness of both field and container grown nursery stock. These procedures are not aimed at control of soil pathogens, weeds, or other soil-borne pests. The "Report of Supervision of Nursery Fumigation and Other Approvals" (form 64-054) is to be used to document compliance with these approved procedures. This report must be submitted monthly along with the "Nursery Stock Nematode Certification Report Form" (form 64-086).

Section 3640, CCR, makes it mandatory that nursery stock for field planting be commercially clean with respect to economically important nematodes. Exempted from this requirement are garlic mint, onion, and seed potato nursery stock and any nursery stock grown only in non-soil media.

#### FIELD GROWN STOCK

Soil preparation is the most important factor affecting the success of fumigation. The County Agricultural Commissioner or the CDFA shall verify to ensure that all of the following requirements for pre-treatment preparation, treatment, and post-treatment handling of soils have been met.

1. Trash Removal. Trash (crowns, steins, roots) from the previous crop must be removed as completely as possible, to eliminate or minimize plant residues that may harbor nematodes during the waiting period. After trash removal, the land should be disked thoroughly to reduce the size of the remaining plant tissues and to hasten its decomposition. The waiting period may not begin until trash removal has been completed. Soil treatment cannot be approved if trash removal has not been completed.

2. Waiting Period. After trash removal and before soil treatment, a crop-free, clean-fallow waiting period shall be observed as follows:

a. Not less than 24 months following removal of an orchard or vineyard that has been in place for more than one year;

b. Not less than 9 months following removal of a woody nursery crop which has been in place for more than one year;

c. Not less than 6 months following removal of a nematode host crop (including seedling or June-budded fruit trees, grapevine or strawberry nursery stock, cotton, or alfalfa) which has been in place for less than one year.

d. No waiting period is required after the removal of an annual vegetable crop, provided that the vegetable crop residue is removed prior to soil treatment

3. Pre-Treatment Soil Preparation. The following pre-treatment soil preparations may be verified up to three days {72 hours) prior to soil treatment:

a. Deep tillage - The soil should be plowed or subsoiled 2 to 3 feet by plow or chisels to break up hardpan or plowsole.

b. Soil moisture - Soil moisture should be adequate to prepare soil to seed bed tilth. Large fluctuations in temperature or rainfall may require re-verification.

c. Cultivation - The top 6 to 8 inches of soil should be cultivated to break up clods and render the soil in seed bed condition.

4. Treatment. The treatment shall be verified and documented by the County Agricultural Commissioner or the CDFA to ensure compliance with the required treatment and handling procedures

a. Application - All applications of pesticides must be made in strict compliance with all applicable laws and regulations.

b. Material and Schedule of Dosages - The rate per acre for the fumigant used shall not be less than the minimum prescribed by the CDFA

c. Soil temperature - May be verified up to three days (72 hours) prior to start of soil treatment. Soil temperature measured at the depth of injection shall be between

40°F and SOT. If the soil temperature is between 81°F and 85°F, the dosage of methyl bromide should be increased by 5 percent over the minimum specified by the CDFA (provided this will not exceed maximum allowable application rates).

d. Clay soils - There are no recommended treatments for soils which contain more than 30% clay. Clay soil treatments cannot be approved e. Approval duration - Treatments made and approved in accordance with these procedures shall be good for 18 months from the date of treatment to the date of planting provided that the treated area is clean-fallowed and otherwise not exposed to nematode re infestation.

## 5. Application Methods.

a. Dual Application (applies to methyl bromide and Telone II). Apply the first treatment by injecting the chemical at a minimum depth of 20 inches (51 cm) at a chisel spacing of 30 inches (76 cm) or less; wait at least 7 days (methyl bromide) or at least 14 days (Telone II), then turn under the top 12 inches (31 cm) of soil with a plow. (Alternatively, soil may be flipped just prior to the second treatment provided the appropriate waiting period has passed.) Apply the second treatment in the same manner as the first application. Seal the surface with a ring roller immediately after each application. Wait at least 14 days following the second treatment before disturbing the soil. (Methyl bromide fumigations must abide by and made in accordance with CCR, Section 6450.3)

b. Tarping {applies to methyl bromide and Telone II) Tarping refers to the postapplication covering of soil with plastic tarpaulins. For methyl bromide applications, tarpaulins must be approved by the California Department of Pesticide Regulations (see CCR, Section 6450 (e) for details}. Two methods may be used to accomplish a complete coverage of the production area. "Solid tarping" accomplishes coverage in one step using equipment which glues together the overlapping edges of the plastic strips. The outside edges are buried at least 6 inches (15 cm) deep. "Strip tarping" is used in a two-step soil treatment. Soil strips approximately 12 feet (3.7 meters) wide are fumigated and mechanically covered with a plastic tarpaulin, all edges of which should be buried at least 6 inches (15 cm) These strips are alternated with untreated, untarped strips about 10 feet (2.8 meters) wide. After 48 hours the tarps are removed from the treated soil strips and treatment and tarping are applied to the alternate and previously untreated strips. Methyl bromide and methyl bromide/methyl isothiocyanate formulations (mixtures) should be injected at a depth of 10 to 15 inches (25 to 38 cm) on a 12 inch {31 cm) spacing, with the total dosage applied at one time. Tarps should be applied simultaneously

with treatment or immediately following. The outside edges of the tarp should be buried at least 6 inches deep. The tarp shall not be cut until a minimum of 5 days (120 hours) following application and tarp removal shall not begin sooner than 24 hours after tarp cutting (see CCR, Section 6450.3 (3) for details).

#### CONTAINER. FLAT. AND FRAME GROWN NURSERY STOCK

1. Used containers (flats, frames, pots) not cleaned to the satisfaction of the CDFA or the County Agricultural Commissioner, recycled potting mixes or planting materials, and soil, shall be treated prior to planting.

2. Approved Treatments.

a. Aerated steam in a closed chamber until temperature of all soil reaches at least 140° F that is maintained for a minimum of 30 minutes.

b. Steam in a closed chamber or under a tarpaulin until temperature of all soil reaches 180° F.

c. Fumigation with methyl bromide at the rate of 2 pounds per 100 cubic feet under a plastic tarpaulin or in a gas-tight chamber for 24 hours. Soil temperature should not be below 50° F when treated. CHECK WITH COUNTY PESTICIDE USE ENFORCEMENT OFFICIALS PRIOR TO TREATMENT TO ENSURE COMPLIANCE WITH CURRENT STATE I COUNTY PESTICIDE USE RESTRICTIONS.

d. Solarization of soil using a “double-tent” setup until temperature of all soil reaches a minimum of ISST (70°C) that is maintained for at least 30 continuous minutes, or a minimum of 14QT (60°C) that is maintained for at least 60 continuous minutes. Soil must be either in polyethylene planting bags or in piles not more than 12 inches high Soil in piles must be placed on a layer of polyethylene film, concrete pad, or other material, which will not allow reinfestation of soil, and covered by a sheet of clear polyethylene film.

An additional layer of clear polyethylene film must be suspended over the first layer to create a still air chamber over the soil to be treated. Soil moisture content must be near field capacity. Soil temperature at the bottom center of the pile or bag must be monitored

1 Pesticide regulations may require a longer period If so, pesticide regulations or permit conditions will govern the time the tarp must remain in place. Coordination with county pesticide use enforcement officials is necessary

#### PLANTING STOCK AND POST-HARVEST HANDLING

1. Planting Stock. Any rooted nursery stock for planting in approved treated soil must meet the Nursery Stock Nematode Certification regulations. If not, it must be

sampled and found free of economically important plant-parasitic nematodes of the approved soil treatment will be nullified. (CCR 3055.1)

2. Post-Harvest. Nursery stock produced in accordance with approved procedures shall be stored, healed-in, or calloused in media, beds or storage areas approved by the Department or County Agricultural Commissioner. Treatment as necessary to protect against nematode infestation may be required.

#### NON-SOIL MEDIA

Non-Soil Media. These growing media include bark, cinders, gravel, peat moss, perlite, rock wool and vermiculate. Other media may be considered non-soil but will be identified on a case-by-case basis.

Schedule B. Protection for a 26-month crop and June-budded trees. Treatments in schedule B are approved only for properties on which at least two field-grown crops have been produced, for each of which:

[a) An approved soil treatment to ensure against nematode infestation has been applied, or no nematode infestation has been detected using laboratory methods; and

(b) The property has not been exposed to nematode infestation during the interval between crops.

This dosage schedule is for nematode control only. It is not recommended for control of soil-borne pathogens such as *Phytophthora* spp.

Treatment recommendations for the latter should be obtained from local Farm Advisor(s). CHECK WITH COUNTY PESTICIDE USE ENFORCEMENT OFFICIALS PRIOR TO TREATMENT TO ENSURE COMPLIANCE WITH CURRENT STATE AND COUNTY PESTICIDE USE RESTRICTIONS.

Schedule D. Schedule D treatments (Charts I - VII) may be used instead of schedules A, B, or C at lower dosages where appropriate soil moistures, soil textures, and soil temperatures allow. If soil conditions are such that Schedule D cannot be used, the appropriate schedule A, B or G must be used.

Procedure for Schedule D

A = Tare Weight

B = Fresh Soil Weight (including Tare Weight)

C = Dried Soil Weight (including Tare Weight)

D = Difference Between Fresh and Dried Soil Weights

E = Dried Soil Weight Minus Tare Weight

F = % Soil Moisture

## Procedure for Selection of Treatment Rates and Methods

1. Use local experience or a soils map to locate the site where the highest soil moisture is expected. The wettest site is usually of finer texture or has a hard pan layer within the soil profile.
2. Take soil samples at each 12-inch increment down to 5 feet. Su b-samples are not necessary. Determine, by the feel method, the soil texture at each depth and record on the data sheet. Place each soil sample (pint each) into a moisture-light container. Seal and label according to site and depth.
3. Record the soil temperature at the 12 inch depth only. Allow 5 minutes for equilibration before recording on the data sheet.
4. Now select an area of the field which you estimate is representative of the nursery site relative to field moisture. Repeat steps 2 and 3 above and record data.
5. At the location of the scales and microwave oven, mix each soil sample and place 100 to 150 grams of soil into each weighing dish. Weigh immediately, record weights and place into oven with lids off. About 10 soil samples can be dried simultaneously. An open vessel of water should not be placed in the oven when using a modern microwave oven. The oven should be run at high range (650 watts) for 15 minutes.
6. Oven-dried samples will absorb moisture from the atmosphere if they are allowed to sit in the open. Therefore, weigh each dish quietly and record the dry weights of the samples.
7. Calculate the difference in weight between the fresh and dried soil ( $B - C = D$ ).
8. Subtract the tare weight from the dried soil weight [ $C - A = E$ ].  
Divide the difference in weight by the dried soil weight to compute the % of soil moisture ( $D/E \times 100 = F$ )
10. You now have a record of soil texture, temperature, and moisture within the 5-foot soil profile. A fumigation is limited by highest soil moisture. For example if a soil profile has a silt layer at the 3 ft. depth, which exceeds the fumigation range on the fumigation charts, do not expect to kill nematodes below the 3 ft. depth. In every case except one: the treatment must be delivered to the 5 ft. depth. The one possible exception is a soil which has a hardpan layer which does not contain old roots. In such a case, control to the hardpan layer is all that is necessary. However, many hardpan layers have fracture points which may contain old roots.
11. Additional soil samples may be helpful if there is disparity across the field due to high moisture areas or if the field is quite large (more than 20 acres). Additional

sampling is at the discretion of the inspector.

## SOIL TEXTURAL CLASS CHARACTERISTICS

### Notes:

(1) The Natural Resources Conservation Service (NRCS) of the USDA has characterized the soil textures of almost all nursery sites in California. Their soil texture analyses provide a definitive guide to prevailing soil textures. However, the NRCS surveys could not evaluate and characterize the small localized textural differences that may be present in every field. Therefore, soil textural descriptions are provided below to serve as an in-Held aid for confirming NRCS determinations or for modifying them as appropriate.

(2) The following soil type characteristics may not all occur with any particular soil type because at differences in clay and organic matter content, exchangeable cation ratios, or amount of soluble salts present.

### SAND OR LOAMY SAND

Dry: Loose, single grained: gritty; no or very weak clods.

Moist: Gritty; forms easily crumbled ball; does not ribbon.

Wet: Lacks stickiness, but may show faint clay staining (loamy sand especially).

Individual grains can be both seen and felt under all moisture conditions.

### SANDY LOAM

Individual grains can be seen and felt under nearly all conditions.

Dry: Clods break easily.

Moist: Moderately gritty to gritty; forms ball that stands careful handling; ribbons very poorly.

Wet: Definitely stains fingers; may have faint smoothness or stickiness, but grittiness dominates.

### LOAM

This is the most difficult texture to place since characteristics of sand, silt, and clay are all present but none predominates. Suggests other textures.

Dry: Clods slightly difficult to break; somewhat gritty.

Moist: Forms firm ball; ribbons poorly; may show poor fingerprint.

Wet: Gritty; smooth, and sticky all at same time. Stains fingers.

### SILT OR SILT LOAM

Grittiness of sand is well masked by other separates. (Texture most likely SILT LOAM, there are a few SILT soils.)

Dry: Clods moderately difficult to break and rupture suddenly to a floury powder that clings to fingers; shows fingerprint.

Moist: Has smooth, slick, velvety, or buttery feel; forms firm ball; may ribbon slightly before breaking; shows good fingerprint.

Wet: Smooth with some stickiness from clay; stains fingers.

#### SANDY CLAY LOAM

Dry: Clods break with some difficulty.

Moist: Forms firm ball that dries moderately hard; forms J f ribbons that hardly sustain own weight; may show poor to good fingerprint.

Wet: Grittiness of sand and stickiness of clay about equal, masking smoothness of silt; stains fingers.

#### CLAY LOAM

Dry: Clods break with difficulty.

Moist: Forms firm ball that dries moderately hard; ribbons fairly well, but ribbons barely support own weight; shows fair to good fingerprint.

Wet: Moderately sticky with stickiness dominating over grittiness and smoothness; stains fingers.

#### SILTY CLAY LOAM

Resembles SILT LOAM but with more stickiness of clay.

Dry: Clods break with difficulty.

Moist: Shows a good fingerprint; forms a firm ball; drying moderately hard; ribbons Vs'-1" that can be fairly thin.

Wet: Stains fingers; has sticky-smooth feel with little grittiness of sand.

#### SANDY CLAY

Dry: Often cloddy, clods broken only with extreme pressure.

Moist: Forms very firm ball, drying quite hard; shows fingerprint; squeezes to thin, long, somewhat gritty ribbon.

Wet: Stains fingers; clouds water; usually quite sticky and plastic, but has some grittiness present.

#### SILTY CLAY

Dry: Same as SANDY CLAY.

Moist: Forms very firm ball; becoming quite hard on drying; shows fingerprint; squeezes out to a thin, long, smooth ribbon.

Wet: Stains fingers, clouds water, stickiness dominates over smoothness, grittiness is virtually absent.

#### CLAY

Dry: Cloddy, clods often cannot be broken even with extreme pressure.

Moist: Forms firm, easily molded ball; drying very hard; squeezes out to a very thin ribbon 2-3" long.



Wet: Stains fingers, clouds water; usually very sticky with stickiness masking both smoothness and grittiness; wets slowly.

- One pound per acre equals 1.12 kg per hectare; one gallon per acre equals 9.35 liters per hectare.

- Two treatments are required. Applications must be made in accordance with label and permit requirements.

Method

[Soil Injection](#)

Rates

[field\\_rates 0](#)

[field\\_rates 1](#)

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Soils

[Clay Loam](#)

Timings

[N.A.](#)