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PLANT DISEASES

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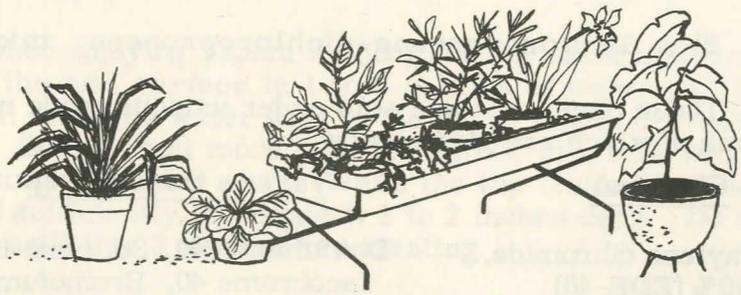
Soil Treatments for Damping-Off



Young seedlings are frequently subject to infection by certain soil-borne fungi, causing them to wilt, fall over and die. This type of disease is called "damping-off". It is particularly common in greenhouse flats, benches, pots, hotbeds and home indoor plantings.

Sometimes the soil in the garden will become infested with microscopic worm-like organisms called nematodes capable of attacking plant roots and causing swellings or roots to die. Such infested plants are inferior in size and vigor and may degenerate until death.

In general, there are three types of compounds employed for damping-off and nematode control: 1) fungicides for damping-off, 2) nematicides for nematodes and 3) soil sterilants which kill both fungi and nematodes.



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FUNGICIDES FOR DAMPING-OFF

Zineb - (Sold as Parzate and Dithane Z-78). The soil should be loose, fine in texture and fairly dry. Apply Zineb dust at a rate of 1/2 oz. per sq. ft. Mix into the upper 2 to 3 inches of soil. The seed can be planted immediately after treatment of the soil.

Thiram - (Sold as Arasan) - Apply same as Zineb.

Captan - (Sold as Orthocide or Captan-50) - Apply same as Zineb.

Semesan - (An organic mercury) - This chemical should be applied as a drench. Use 1 level teaspoon per gallon of water and apply this solution with a sprinkling can at the rate of 3 pints per 10 square feet. The soil should be loose, dry and level. Planting may be done as soon as the soil is sufficiently dry.

NEMATICIDES

The nematicide chemicals, when placed in the soil, will volatalize and fumigate the soil. There are a number of different fumigants but some require special application equipment. There are two kinds which are suited to the needs of the home gardner.

- 1) Ethylene dibromide,
- 2) A dichloropropane-dichloropropene mixture.

These chemicals are sold under various trade names some of which are given below.

<u>Chemical</u>	<u>Various trade names</u>
Ethylene dibromide, 40% (EDB-40)	Dowfume W-40, Soilfume 60-40, Iscobrome 40, Bromofume 40.
Ethylene dibromide, 85% (EDB-85)	EDB-85, Dowfume-85, Nemex-85, Garden Dowfume, Soilfume-85.
Dichloropropane-di- chloropropene (DD)	DD, Nema fume

These chemicals are sold as liquids. Ethylene dibromide also can be obtained in capsules under the trade name "Soilfume caps"-each capsule containing one-half cubic centimeter of pure chemical.

Preparing the land: First, spade (or plow) and rake the soil to seedbed tilth. Be sure to remove any undecayed roots of the preceding season.

Soil temperature: Soil temperature should not be lower than 40° F. and not higher than 80° F. when application is made. Take the temperature of the soil six inches below the surface.

Methods of application: There are two ways that the chemical may be conveniently applied:

1. The furrow method.

a. With a hoe make furrows in the soil 12 inches apart and 6 to 8 inches deep. A fruit jar with two nail holes punched in opposite sides of the metal caps makes a suitable applicator. Fill with chemical and recap the jar. Now walk along the furrow dribbling the chemical in the bottom of the furrow. After application of not more than 100 feet, stop, rake over and cover the furrow. Pack the soil lightly to help seal the gas in the soil.

b. The amounts to apply:

EDB-40 - one pint per 150 to 170 linear feet of row.

DD - " " " " " " " " " "

EDB-85-1/4 " " " " " " " " " "

c. Now wait at least two weeks before planting anything in the ground since these chemicals are toxic to plants and germinating seeds. If the temperature during this two weeks waiting period is low (below 60° F.) or if there has been excessive rain, the time lapse should be increased to three weeks.

2. The spot method.

- a. Prepare ground as outlined above under 1, a.
- b. Punch small holes to a depth of 6 to 8 inches each 12 inches apart over the area to be fumigated.
- c. Place one EDB fumigant capsule in each hole and cover immediately with soil.
- d. Wait at least two to three weeks before planting.

There are some newer nematicides which have given promising nematode control that you may wish to try. They are Telone, Darlane, Nemagon and Fumazone. If used, follow manufacturer's recommendations.



SOIL STERILANTS

Formaldehyde - Where large amounts of soil are to be sterilized, formaldehyde may be used at the rate of one gallon to 50 gallons of water. This solution should be applied at a rate of one-gallon to a square foot of soil surface. After treating, the soil should be covered with a wet tarpaulin or sacks for 24 hours or more. After this the soil should be turned over once or twice to let the gas escape. Do not plant seeds or plants in such soil until it has been aired out for at least 24 hours.

For small amounts of soil use two and one-half tablespoons of commercial formaldehyde for each bushel of soil. This formaldehyde should be mixed with five or six times as much water, sprinkled over the soil, and then mixed in well. Such soil should be put in a covered airtight box or can and allowed to stand for 24 hours. Then air out the soil until all odor of formaldehyde has disappeared before seeding or setting plants in it.

Chloropicrin - Chloropicrin (sold under the trade name Larvacide) is commonly known as tear gas. It is dangerous to use and a gas mask should be worn while working with it.

Success with this type of soil treatment depends especially upon the following four points: 1) good loose friable soil, 2) fairly high soil temperatures (65° F. or higher), 3) moderate soil moisture (when soil will hold its shape when squeezed in the hand), and 4) proper application. An applicator which automatically deposits a measured quantity of the chloropicrin when the tip is inserted in the soil is made by the company selling this chemical. Parallel marks 10 inches apart are made the length of the beds and an injection of 2 cubic milliliters of the liquid is made every 9 inches along these marks. It is necessary to sprinkle the treated area promptly with water to retain the gas. The soil must stand 10 to 15 days before planting or until no odor of the gas can be detected on digging.

Vapam: (Sodium N-methyl dithiocarbamate-anhydrous 30%) - The soil should be fairly fine and of sufficient moisture content to insure maximum gas penetration and weed germination. These conditions should be maintained for at least 5 days prior to treating. The soil temperature should be from 50° to 75° F. or above. For clay soils use a dosage of 1 1/2 to 2 quarts per 100 sq. ft. For light and medium textured soils, the basic dosage is 1 qt. per 100 sq. ft.

When applying Vapam it should be sprinkled uniformly over the soil surface in 1 to 3 gallons of water per 100 sq. ft. Apply a water seal to the upper 1 inch of treated soil. Do not treat more than 100 sq. ft. at a time before applying the water seal. When the top treated soil has dried sufficiently, cultivate it 1 to 2 inches deep. Do not plant until 2 to 3 weeks after treating.

Myllone - (85% dimethyltetrahydro - 1, 3, 5, 2H-thiadiazine-2-thione). A relatively new soil fumigant.

Follow manufacturer's directions and recommendations.

Methyl bromide - This chemical is a superior soil sterilant. It is sold as a liquid in pressure containers but becomes a gas when released in temperatures above 39° F. It must be applied under plastic or other types of gas-proof covers. Follow the manufacturer's directions for application.

Heat - Heat is a good soil sterilant. In the home where only a few pots of soil need to be sterilized, you can do this in an oven or pressure cooker. Heating moist soil in the oven to at least 180° F. for 1/2 to one hour or in a pressure cooker for 2 hours at 15 lbs. pressure is sufficient.

Greenhouses that are heated by steam can adapt systems to utilize the steam heat for soil sterilization.

Observe These Precautions

The fumigant and sterilant chemicals are poisonous. **READ THE DIRECTIONS ON THE LABEL AND FOLLOW THEM AT ALL TIMES.** Avoid breathing their vapors. They cause burns if allowed to stay on the skin. Remove them immediately by washing with lots of soap and water. Clothing and shoes which have been spilled upon should be removed and thoroughly cleaned before being worn again.