Pest Free Soil for Greenhouse Use: The Alternatives

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Media contaminated with insects, disease organisms or weed seeds will quickly cause problems in the greenhouse. Today, many growers use artificial media exclusively. These materials are generally free of pest organisms, and no additional preventive measures are required on the part of the user. In some instances, as with greenhouse vegetable production, artificial media are recycled and decontamination steps are required.

In other cases, field soil is incorporated into the mix. This practice is commonly used by bedding plant producers in Connecticut. Soil is used to increase bulk density (annuals in pots

don't blow over as easily) and to improve moisture retention (drought tolerance) of annuals in flats. Whenever field soil is added to a mix, it must be decontaminated to eliminate weeds, insects and diseases.

Field soil is usually treated in late summer or early fall for spring use. If growers wait until the weather turns cold to treat their soil, temperatures may be too cool to get effective chemical control or soils may be frozen and difficult to work.

To sterilize contaminated soils, growers can choose between steam and chemical fumigants. The advantages and disadvantages of these options are discussed below.

Steam: Steam is usually the preferred method because it is fast, effective and relatively safe to use. Steamed soil can be used as soon as the pile cools. Steaming can also be done in the greenhouse without harming plants in other parts of the house.

The soil mass should be moistened two to three weeks before steaming to allow weed seeds to germinate. Moist soil will also conduct heat better, resulting in a higher kill of certain microorganisms. Note that seeds will not germinate if the soil temperature is too cool (i.e. below 60°F). Seeds such as oxalis and clover are much easier to kill once germination begins.

Steam the pile until the temperature reaches 180°F and maintain this temperature for 30 minutes. Do not oversteam - i.e. steam at temperatures higher than 180°F or for periods exceeding 30 minutes. Oversteaming can result in ammonium buildup, the formation of toxic manganese compounds or the death of beneficial microorganisms.

If aerated steam is available, a temperature between 140° to160°F maintained for 30 minutes is sufficient. Aerated steam is preferred over nonaerated steam because fewer toxic compounds are formed and fewer beneficial microorganisms are destroyed. Use thermometers, placed at several locations in the pile, to monitor temperature. Make sure the entire pile reaches the desired temperature.

Chemical Fumigants

Several chemical agents can be used to fumigate soil in the greenhouse. In general, chemical fumigants are less effective, more expensive and pose a more serious safety hazard to the applicator than steam. Chemical fumigation can also produce phytotoxic residues which may take several weeks to dissipate

from the soil. Vapam, Vorlex and Brom-O-Gas are three chemicals which can be used to fumigate soils in the greenhouse.

Safety precautions must be followed with all chemical fumigants. Read the label and use as directed. Enclosed areas must be adequately ventilated and proper safety equipment or clothing must be used when chemicals are applied.

Vapam is a liquid carbamate compound which can be used to control most weeds, fungi and nematodes. The soil temperature must be at least 60°F and crop plants must be removed from the greenhouse prior to Vapam application. Growers should allow two to four weeks between soil treatment and use.

Vorlex is a mixture of dichloropropene-dichloro-propane and methyl isothiocyanate. Vorlex will control weeds, fungi and nematodes. As with Vapam, do not apply Vorlex in a greenhouse containing crop plants. Soil temperature should be at least 50°F, and a two to four week waiting period is recommended before planting a crop in treated soil.

Brom-O-Gas is methyl bromide with 2% chloropicrin added as a warning agent. Methyl bromide will control weeds, most fungi (it will not control Verticillium) and nematodes. Soil temperature must be at least 50°F for effective control of soilborne pests, and 70°F is preferred.

Methyl bromide is extremely toxic to humans but can be used in a well ventilated greenhouse if the proper safety precautions are followed. Methyl bromide must be applied under gasproof covers, usually polyethylene, using special applicators.

After treatment, uncover the soil for one to two days and allow the pile to air. Crops can be planted in methyl bromide-treated soils in two days but, under cool conditions, allow one to two weeks before using for crop plants. Plants in the genus Dianthus (i.e. carnations) are sensitive to methyl bromide and should not be planted in methyl bromide-treated soils.