



Soil solarization to control garden pests

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Introduction

Even during extreme summers when temperatures above 100° are scorching tender leaves, horticultural pests such as diseases, nematodes, insects and weeds can continue to cause gardening problems. At these times, many commercial pesticides cannot be used, because their labels specify they must not be applied when temperatures are above a certain limit (or under windy conditions).

There may be no convenient chemical control available for certain problems or a gardener may be hesitant to use chemical methods. Pest management can be particularly difficult with certain organisms, such as nematodes, microscopic worms also known as eelworms, which cause a wide range of plant problems. When the weather is too extreme for healthy plant growth, it can be a good time to use a pest control method that is both effective and acceptable in organic practice.

The process

The process, called *soil solarization*, uses natural heat and light to kill soil dwelling organisms. Depending on the season, the soil type and moisture level, along with the intensity of the sunlight and the outdoor temperature, the depth of the heating effect can vary from a few inches to nearly a foot. The exposure of the plot will also affect heat transmission, for instance the soil in a north-facing plot will probably not become as hot as soil in a south or west facing one.

Solarization is especially useful in small areas where there has been an infestation or disease. We recommend rotating planting beds, i.e. planting different crops in an area during subsequent years, to deter the

development of pest populations. This is especially recommended for vegetables. In small areas it is not always feasible. In such cases, however, solarization can be an important tool.

The method

In its simplest description, solarization means covering moist soil with transparent plastic sheeting to create a hothouse effect within the soil. The process is relatively uncomplicated, requiring only clear plastic, sunlight, heat, and time.



Photo courtesy of Scott Edwards, Dept. of Nematology, Univ. of Calif. Riverside

Note on materials to use – black plastic does **not** work for solarization. It does not cause heat to be transmitted deep into soil under it. Clear plastic must be used. Rolls of plastic sheeting in varying weights, widths and lengths can be obtained at home centers or hardware stores. The thinner the plastic film, the more heat can permeate but the more fragile it will be.

In areas where temperatures are moderate and sunlight not too intense, a

thinner plastic (~ 1 – 2 mil) can be used. A “mil” is 1/1000 of an inch. In desert conditions, where summer temperatures easily exceed 100° F and sunlight is intense, a heavier construction grade (~ 6 mil) should be used. Some references recommend using bubble wrap, which might be more resistant to tearing.

First, make sure the area to solarize is level and clear of anything that might puncture the plastic. Remove any plant debris or surface stones, and break up any large soil clods. Rake the surface smooth.



Photo: Angela O'Callaghan, UNCE

Once the bed is level and free of clumps, water it thoroughly. Let it drain so the soil is moist, but not sopping wet. In other words, it should look like an area that is about to be planted. Before applying the plastic, place a soil or compost thermometer in the soil, with the probe extending at least four inches deep. Temperatures in the covered bed may exceed 140° F, depending on the cloud cover, ambient heat, and length of days. The temperature under the plastic should not be less than that of the air. Do not puncture the plastic with the thermometer.

Cover the prepared area with clear plastic, and **bury the edges securely to ensure a snug fit**. This will keep the hot air and moisture from escaping. If attempting to control Bermuda grass (*Cynodon dactylon*), cut a trench (about one foot deep) around the bed and line the trench with the plastic to stop the roots and runners. Sadly, there is no method, even solarization, guaranteed to be successful against Bermuda grass.

Keep the plastic cover in place for a minimum of four to six weeks. The underside of the plastic will show condensation soon after it has been applied, indicating moisture is present.

This system is most effective during warm periods with long days, allowing more heat to enter the soil. Any weed seeds present will probably germinate, producing a flush of new growth at first, but the high heat should kill them before they have a chance to become established.

Using the solarized bed

After the treatment is complete (a minimum of six weeks), remove the plastic. The soil should be virtually sterile. One effective way to replace beneficial microorganisms and improve the nutritional status is to add compost. This can be obtained commercially or from the gardener's own compost bin. **Do not** add unsolarized soil from the area of the solarized bed. This will avoid re-introducing the original problem to the solarized one. After solarizing and replenishing with compost, the bed will be ready for planting.

References

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