



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

TECHNIQUES IN PLANT PROTECTION MSH-304

LECTURE 02

Soil sterilization

Soil steam sterilization (soil steaming) is a [farming](#) technique that [sterilizes soil](#) with [steam](#) in open fields or greenhouses. Pests of plant cultures such as weeds, bacteria, fungi and viruses are killed through induced hot steam which causes vital cellular proteins to [unfold](#). Biologically, the method is considered a partial disinfection. Important heat-resistant, spore-forming bacteria can survive and revitalize the soil after cooling down. Soil fatigue can be cured through the release of nutritive substances blocked within the soil. Steaming leads to a better starting position, quicker growth and strengthened resistance against plant disease and pests. Today, the application of hot steam is considered the best and most effective way to disinfect sick soil, potting soil and compost.

Soil sterilization provides secure and quick relief of soils from substances and organisms harmful to plants such as:

- Bacteria
- Viruses
- Fungi
- [Nematodes](#) and
- Other Pests
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Soil Solarization

Soil solarization is an environmentally friendly method of using the sun's power to control pests such as bacteria, insects, and weeds in the soil. The process involves covering the ground with a tarp, usually a transparent polyethylene cover, to trap solar energy. The sun heats the soil to temperatures that kill bacteria, fungi, insects, nematodes, mites, weeds, and weed seeds.

To solarize your soil:

1. Clear the area of plants and debris.
2. Water the soil deeply until it is wet.
3. Cover the area with clear plastic (such as 1 to 4 mil painter's plastic). Don't use white or black plastic; they don't allow enough heat to get to the soil.
4. Bury the plastic edges in the soil to trap the heat.
5. Leave the plastic in place for at least 4 weeks in the hottest part of the summer.
6. Remove the plastic.

Soil solarization works best on heavy soils—those containing clay, loam, or mixtures of them. They can hold more water than can light soils, long enough to produce steam every day. Steam is needed to kill nematodes, weed seeds, and insect eggs in the soil.

Deep Ploughing

The prime purpose of ploughing is to turn over the uppermost soil, so bringing fresh nutrients to the surface, while burying weeds and crop remains to [decay](#). Trenches cut by the plough are called furrows. In modern use, a ploughed field is normally left to dry and then [harrowed](#) before planting. Ploughing and cultivating soil evens the content of the upper 12 to 25 centimetres (5 to 10 in) layer of soil, where most plant-feeder roots grow.

Flooding

A **flood** is an overflow of water that submerges land that is usually dry. **Floods** are an area of study in the discipline of hydrology. They are the most common and widespread natural severe weather event. **Floods** can look very different because **flooding** covers anything from a few inches of water to several feet.

Techniques to check the pest spread

- A **pest** is any animal or plant which has a harmful effect on humans, their food or their living conditions. Pests include animals which:
 - carry disease-causing micro-organisms and parasites, for example, mosquitoes which carry Ross River virus and Murray Valley encephalitis.
 - attack and eat vegetable and cereal crops, for example, caterpillars and grasshoppers.
 - damage stored food. For example, rats and mice may eat grain in silos, rice or biscuits in shops and homes and contaminate this food with their faeces (droppings) and urine.
 - attack and eat farm and station animals. For example, feral dogs (dingoes) kill or maim many sheep and goats each year; foxes will kill poultry, lambs and many species of native wildlife; and feral cats also prey on native wildlife.
 - damage clothing. Silverfish, for example, eat holes in clothes.
 - damage buildings. For example, termites can cause considerable damage to timber in buildings.
 - bite people. For example, bed bugs (so called because they often bite people in their beds) are very difficult and expensive to control. Their bites can cause great irritation to those bitten and, like mosquito bites, can become infected if scratched

Advantages of using pesticides

- Applying pesticides is not difficult, provided users are properly trained
- Modern pesticides are very effective. This means that nearly all the target pests which come in contact with these pesticides are killed
- Results are quick. This means the pests are killed within a very short time.
- Using pesticides can be an economical (cheap) way of controlling pests. Pesticides can be applied quickly and there is not the high labour cost which might apply to other methods of control, such as removing weeds by hand.

Disadvantages of using pesticides

- If pesticides are not used correctly, they can affect human health or cause serious injury or death to the pesticide operator, other people or household pets.
- Pesticides can also directly affect other non-target animals. For example, a gardener spraying his garden to kill caterpillars will probably also kill harmless ladybird beetles and praying mantises.
- If pesticides are used incorrectly or applied wrongly, they may find their way into places where they are not wanted, for example, they might be washed into rivers or into the soil.

- Pesticides can enter the food chain.
- Biosecurity refers to a set of precautions that aim to prevent the introduction and spread of harmful organisms. These include non-native tree pests, such as insects, and disease-causing organisms, called pathogens, such as some bacteria and fungi.
- Tree pests and diseases can be transported between or within countries via a number of pathways, including:
 - [live plant and tree products](#), such as potted plants
 - timber and wood packaging materials (WPM), such as shipping crates and pallet .
 - dirty tools, kit, machinery and vehicles, such as chainsaws, boots and all-terrain vehicles
 - soil and organic material, such as leaf litter
 - natural methods, such as wind and water
- There has been a significant increase in the number of non-native tree pests and diseases being introduced to the United Kingdom since the early 2000s. This demonstrates the need for us all to take action to provide our trees, woods and forests with greater protection. By implementing appropriate biosecurity measures, we can significantly reduce the risk of introducing and spreading tree pests and diseases.