



Soil Solarization: As an effective method for nematode management

Rohit Kumar, Shweta, Vinod Kumar and SS Mann

Department of Nematology,
CCS Haryana Agricultural University, Hisar (125004)

Introduction

The usage of chemical pesticides for the control of diseases and pests including plant parasitic nematodes (PPNs) is increasing from last many decades at an alarming rate. Its drawbacks include not only the huge cost and labour involved but also its adverse effect on the crop, soil, water and human health. Chemical methods are curative controls of pest but our approach must be preventive. The aim should be to prevent the pests and diseases that too with a technique that is suitable for a wide area, is cost-effective and ecologically sound. Soil solarization is one of those cultural practices that aims towards safe and long-lasting manner, and thus the production of crops.

What is soil solarization?

Soil solarization is one of the components of integrated methods of disease and pest control. It is an accurate example of optimum utilization of renewable resources; here the solar energy for agricultural purposes, especially in hottest period or summer season of the year. Soil solarization as the name indicates is a soil disinfestation method of heating moist soil by covering it with transparent plastic sheets (polythene mulching) to trap solar radiation during warm months resulting in increased mortality of soil borne pathogens including PPNs due to higher temperature. It merely works on the principle of passive solar heating of soil by creating the greenhouse effect. It is also called as soil pasteurization.

Principle of soil solarization

- There is accumulation of heat in polyethylene mulched soil by transmission of short-wave solar radiation.
- Due to elimination of evaporation and greenhouse effect of polyethylene mulching there is rise in temperature which help in reducing nematode population.

- Soil moisture assists the solarisation process by conducting heat energy to target pests (PPNs).
- There is increase in nematode microbial and physico-chemical reactions in soil which resulting in accumulation of gasses, some of which are toxic and also release of soil volatiles, many of which are biocidal to pathogens, while other serve a nutrient or induce resistance in the subsequent crop.
- Exposure of nematode to prolonged high temperature results in increased mortality of the pathogens.
- Soil solarization not only help in controlling nematode but also effective in control of wide range of pathogens, weeds and arthropod pests.
- Soil solarization involve exposure of soil heat during hottest period or summer season of the year to achieve desiccation and killing significant percentages of weeds, soil-borne pest and pathogens population.



Figure: soil solarization

Advantages of soil solarization

- Soil solarization an eco- friendly technique of Integrated Nematode Management.
- It is preventive in nature.
- It is a cost-effective method, which requires no heavy installations.
- It is a labour extensive practice.
- It can be used for small-scale kitchen gardens to large-scale field/farm areas.
- It improves soil health and thus, enhance crop productivity.
- It has no residue.
- No toxic fumes/gaseous particles are released into the air.

- It is effective against a variety of soil-borne pathogens.
- It can be easily integrated with other management practices.

Conclusion:

Soil solarization is a soil disinfestation method that works on the principle of passive solar heating of soil by creating the greenhouse effect. The solar heat is trapped by transparent or black polyethylene sheets which are spread over the partially moist and friable soil. Due to an increase in temperature and the presence of soil moisture, the steam formed leathels the soil-borne pathogens and weed seeds in the treated area. It is a cost-effective and eco-friendly approach which restricts the use of harmful chemical pesticides.