

Cover Crops and Solarization for Nematode Control

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Nematodes are microscopic round worms that are very abundant and diverse in soil ecosystems. Plant parasitic nematodes are considered pests when they feed on our crops. There are also many types of nematodes that are beneficial and are predators of other nematodes, feed on fungi, bacteria, or are omnivores. Plant parasitic nematodes are a serious pest in Hawaii. Some of the most common and damaging are root knot nematodes and reniform nematodes. There are several strategies that help to control these serious pests. One of the most important strategies is to prevent introducing them into your soil. You can do this by making sure you do not move soil nor infested plants. Unfortunately, these nematodes have moved around in Hawaii, and many agricultural fields and gardens are already infested. There are organisms that control nematodes, such as nematode trapping fungi, some bacteria, and predator nematodes, and by making sure that you increase soil health by using compost, cover crops, manures, and/or keeping the soil covered with mulch, these beneficials can increase and help to control plant parasitic nematodes and increase plant health.

Sunn hemp (*Crotalaria juncea* L.) is a leguminous cover crop that grows well in the tropics. It provides the soil with organic matter and nutrients, its residues act as a mulch, and it has been used for its plant parasitic nematode reducing properties when incorporated into the soil (Quintanilla-Tornel et al. 2016, Wang and McSorley, 2004; Rotar and Joy, 1983). Sunn hemp has been reported to increase numbers of beneficial organisms, such as ground arthropods and soil dwelling nematodes (Quintanilla-Tornel et al., 2016). Cover crops have been shown to increase the abundance of bacterivore and fungivore nematodes, and they often have a greater effect on the soil food web than compost additions. Additionally, cover cropping is commonly used to reduce soil erosion, increase yield, and reduce pest damage (Hartwig and Ammon 2002).

Another effective nematode control method is soil solarization. In order to achieve this, soil is covered with a transparent polyethylene film which causes the temperature of the soil to rise under sunny conditions, killing plant parasitic nematodes and weed seeds. The addition of an organic source, such as cover crops, has been shown to increase the effectiveness of solarization (Stapleton, 2000). Soil solarization mulch temporarily reduces beneficial nematodes. Sunn hemp cover crop incorporated before solarization reduces the negative effect of solarization on beneficial communities. Addition of compost, vermicompost, and mulch, can also increase number of beneficial organisms.

There are other methods of controlling nematodes – one of the most important is using plant varieties that have resistance to nematodes. However, this resistance is often against root knot nematodes, and may not cover other nematode types. Additionally, often, these varieties do not have some desired characteristics of taste or appearance. To remedy this, grafting can be done in order to have resistant roots, while the top of the plant produces the crop with the desired characteristics.

In conclusion: there are pest and beneficial nematodes, sunn hemp cover crop and solarization can reduce plant parasitic nematodes, increasing soil health can increase nematode biocontrol and plant health, and plant resistance is an excellent strategy to combat these problems.