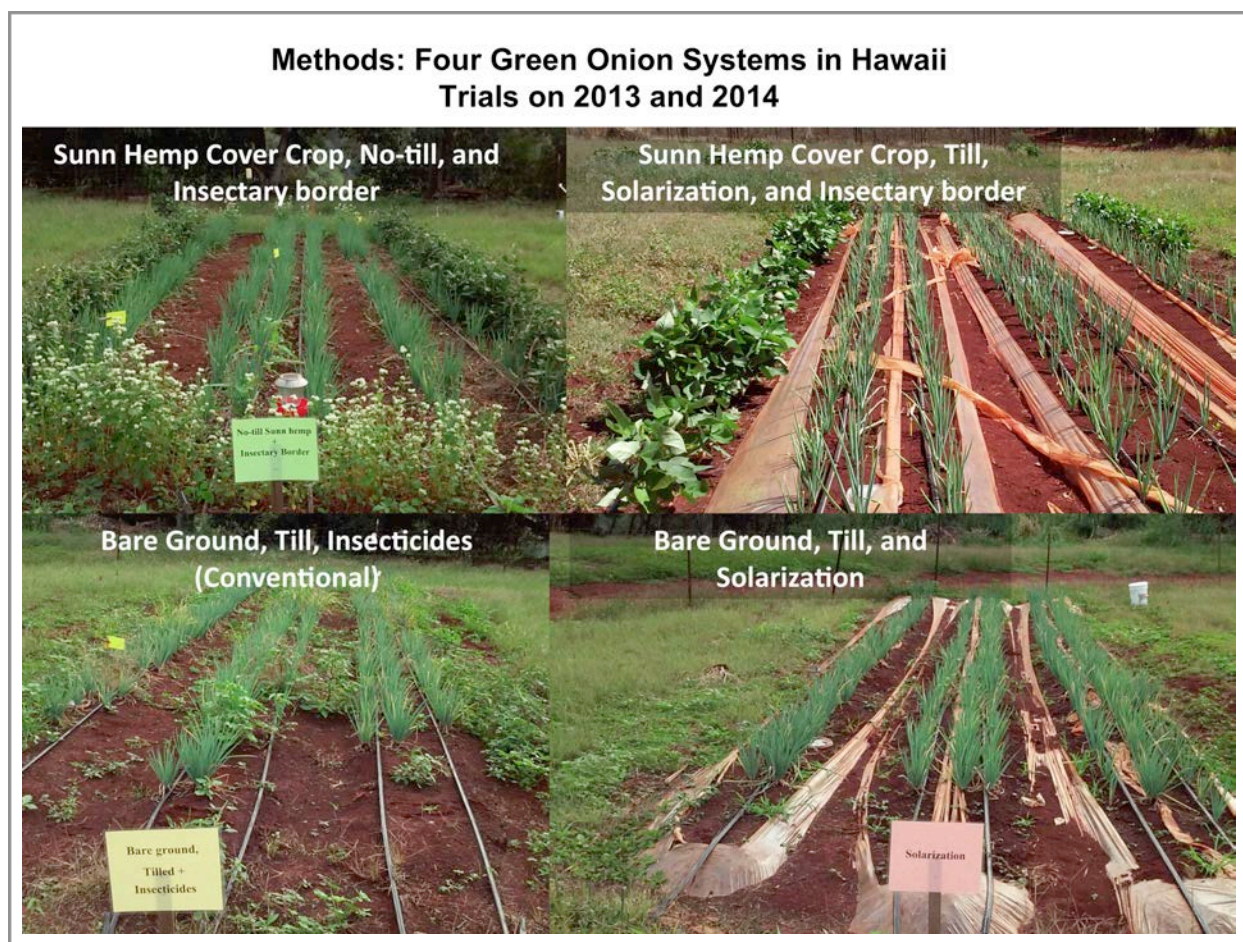




## Mulches for Pest Control and Soil Health

by Marisol Quintanilla-Tornel

Mulches can play a surprising role in pest control and soil health. Organic mulch, such as wood chips, cover crop residues, or straw, can reduce thrips and leaf miner numbers significantly (Larentzaki et al., 2008). Additionally, organic mulch (e.g. wood mulch) can reduce foliar fungal pathogens by mitigating soil splashing and, therefore, preventing spores from reaching the leaves. For example, purple blotch (*Alternaria porri*), an important fungal disease of green onions, can be significantly reduced by using mulch. Organic mulches also help to conserve soil moisture and increase beneficial soil organisms that play a role in nutrient cycling and biocontrol, which results in a significantly greater yield (Quintanilla-Tornel et al., 2016).



Synthetic mulches can play an important role in pest control. Reflective plastic mulch, or silver colored plastic mulch, significantly reduces arthropod pests such as thrips, spider mites, and whiteflies. The light reflection repels and confuses these pests, with often controlling pest more effectively than insecticides (Summers et al., 2004). Additionally, reflective mulch increases plant growth by increasing photosynthesis, and it reduces heat and water stress by keeping the plant and soil cooler. These combined benefits resulted in greater than a 50% increase in marketable yield in a University of Hawai'i tomato field trial (Kaufman et al., 2015).

Solarization mulch, or clear synthetic mulch that cover the soil, traps solar heat to kill off the weed seed bank in the top soil layer (Stapleton, 2000). Additionally the high temperatures generated reduce the numbers of nematodes and many pathogens. Solarization mulch is a very effective weed control strategy (Quintanilla-Tornel et al., 2016). In order for solarization to be effective, sunny days are necessary. Solarization mulch can be covering the soil for two weeks and needs to be performed before planting.

So when to use each mulch? Both the wood and synthetic reflective mulches are useful in most situations. Organic mulches, such as wood mulch, might not be the best strategy in very cool conditions where we want the soil to warm up (this is rare in Hawai'i). It is important to keep in mind that having organic mulches (e.g. wood mulch) near a house can increase certain pests such as roaches and centipedes. In order for the synthetic reflective mulch to be effective, sunlight needs to reflect from it, so weeds needs to be kept from shadowing the mulch, and plants need to not totally cover the mulch. For example, tomatoes should be staked or caged in order to keep them growing upright and not covering the reflective mulch. Solarization mulch needs to be performed in sunny conditions and after it is completed, the clear plastic needs to be removed. After the clear plastic is removed, organic or reflective mulches can be used around your plants in order to obtain additional benefits.

In conclusion, mulches can be an effective and sustainable pest control strategy that can reduce chemical inputs, improve yield, and increase soil and plant health. Use mulch in your garden or farm to obtain these multiple benefits.



Tomatoes with black plastic mulch, contrast this with the next picture, reflective mulch. Reflective mulch (silver colored), in-



Reflective mulch, the plants are so much bigger than on the black mulch (previous picture). The pictures were taken on the same day and the plants were planted at the same time and were the same size at planting time. Reflective mulch increased growth, yield, and reduced pests.



Master Gardeners visiting on a garden tour.