Innovative plastic films enhance solarization efficacy and pest control

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Soil solarization is a common approach to control broad spectrum soilborne pests and. The commonly used films for solarization, e.g. low-density polyethylene (LDPE) or high-density polyethylene (HDPE), elevate soil temp by 7-12 degrees compared with non-treated soil. Increasing soil temperatures during solarization can minimize the time needed for effective control of a given pathogen.

The benefits arising from improving solarization are:

- control of heat tolerant organisms (including fungi, nematodes and weeds)
- Effective solarization in cooler seasons
- shorter solarization period

The objectives of the current study were the select new films with better heating performance during solarization, and evaluate there potential under field conditions.

A wide screening of plastic films was initially done including films with different additives to capture and block the infra red irradiation. Additionally, combination of two layers of mulches was also tested, including sprayable black mulch and clear plastic film. The selection yielded two types of mulches which were found suitable for improved solarization. The first film is based on the same LDPE film with the addition of anti-drip components. This modification prevents condensation of water drops on the under side of the plastic surface and thus increased irradiation transmittance by 30%, compared with the regular LDPE film. Soil temperatures under the new films during June-August were higher by 5-7 degrees compared with regular LDPE. Combination of two layer of black mulch and LDPE mulch resulted in further increase in soil temperature. Mortality of resting structure of *Fusarium oxysporum, Sclerotium rolfsii*, and *Rhizoctonia solani*, was higher in the plots which were solarized by the improved films.

Field experiments were established to asses the effect of solarization with the new films in controlling crown rot of tomatoes and sudden wilt of tomatoes. Solarization with anti-drip films controlled crown rot of tomatoes similar to that achieved by chemical fumigation. Solarization using LDPE yielded only partial control. Double mulch of a black polymer and an anti-drip film effectively controlled sudden wilt of melons while solarization with LDPE alone had no effect on disease level.
The use of the new films can offer solution for better pest control using solarization. Further studies to improve film performance are underway.