INTEGRATED MANAGEMENT OF PERENNIAL CROPS IN CALIFORNIA USING MULCH AND DRIP IRRIGATION: A SYSTEMS APPROACH

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Management of many high value annual crops using plastic mulch is commonly practiced in several regions of the U.S.A., as well as other areas of the world. Plastic mulch has been tested experimentally on numerous tree crops, usually with favorable results. When unfavorable results occurred, they were usually attributed to "souring" the soil and subsequent root damage. In this paper, a holistic management system is described using black plastic mulch and drip irrigation which integrates soil disinfestation, irrigation conservation, elimination of herbicide use in tree rows, and sometimes increased flowering and yield responses. The system is compatible with pre-plant soil fumigation and post-plant chemigation. It has been tested successfully in the San Joaquin Valley of California on perennial crops including apple, almond, apricot, peach, pecan and orange. Experimentation began as an offshoot of solarization, a method of disinfecting soil using solar energy. The system was found to be effective in controlling Verticillium wilt, certain nematodes, and virtually all weed species.

Reductions in seasonal irrigation water requirements of up to 90% have been documented in first-, second-, and third-leaf trees. Water management is critical with this system, as excessive irrigation can trigger root injury and "soil souring" referred to earlier.

Weed growth along tree rows is virtually prevented with this system, eliminating the necessity of repeated herbicide applications. In soil highly infested with nutsedge (*Cyperus* spp.), shoots occasionally poke through the mulch, but are readily controlled manually or with topical glyphosate applications.

It has been apparent that the mulch/drip system applies varying amounts of stress, as measured by tree performance and leaf moisture potential, to treated trees. Clear film, commonly used with solarization, can allow excessive buildup of heat in San Joaquin Valley soils, injuring or killing young trees. Therefore, black film, which heats soil to a lesser degree, has been used in more recent field trials. Nevertheless, slight heat stress is postulated to trigger the increased flowering and yield responses commonly

observed in the young trees under the mulch regime. These phenomena usually disappear in experimental trees when the mulch is removed.

Although results of these field trials have been favorable, continued testing of additional parameters, such as effects of, and compatibility with the range of pesticides and fertilizers employed by producers using this technique, and varietal responses of treated plants, must be done.

References

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