

USDA, ARS AREAWIDE PROJECT ON ANAEROBIC SOIL DISINFESTATION

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Anaerobic soil disinfestation (ASD) has potential as an alternative to chemical soil fumigation for the production of many specialty crops. In Florida, the application of ASD is a straightforward process in which organic amendments, such as composted broiler litter (CBL), and a labile carbon source are applied to either pre-formed beds or flat ground, covered with gas-impermeable film, and irrigated to two acre inches of water. The goal of the water application is to fill soil pore space, without flooding, in order to maintain bed integrity and prevent the unnecessary loss of nutrients to the environment. Molasses serves as an effective carbon source for ASD in Florida because it is readily available and results in a high level of anaerobicity. Other sources of carbon can also be used, including rice bran, ethanol, and cover crops may be an effective input.

Initial research allowed for the development of a “standard” ASD consisting of CBL at the rate of 22 Mg ha⁻¹, molasses (Agricultural Carbon Source, Terra Feed, LLC, Plant City, FL) at 13.9 m³ ha⁻¹, applied under Vaporsafe[®] Totally Impermeable Film (TIF[™], Raven Industries, Sioux Falls, SD) with 5-cm of applied irrigation. This approach has been tested for weed, nematode, and disease management in multiple crops in several locations. To address grower-driven research questions, including application of ASD in cooler soil temperatures, and to define the minimum input rates needed in order to reduce costs, an Areawide project was established in which multiple research-scale trials as well as on-farm demonstrations were initiated. The main objectives of the on-going project are to determine if: increasing molasses rate for a spring production cycle would enhance efficacy, reducing inputs in the fall production cycle could potentially reduce cost while maintaining crop productivity, and herbicides could be coupled with ASD without phytotoxicity. In addition, preliminary information on the potential for nutrient loss via leaching during the treatment period or the production of nitrous oxide has been gathered.

Demonstration applications of ASD, field days, and farmer and specialist focus groups have been conducted to determine observer perceptions of the treatments and results and to gain feedback on the research approach moving forward each season. Economic analysis of multiple approaches to ASD is on-going.