Application of Partially Stabilized Organic Amendments to Inactivate *Brassica nigra* (a Weed) and *Fusarium oxysporum f.sp.lactucae* (a Fungal Pathogen) Using Soil Biosolarization. J.D. Fernández-Bayo[1,2], T.E. Randall*[2], Y. Achmon[1,2], K.V. Hestmark[2], D.R. Harrold[2], J.Su[1], R.M. Dahlquist-Willard[3], T.R. Gordon[4], J.J. Stapleton[5], J.S. VanderGheynst[2], and C.W. Simmons[1]. [1]Department of Food Science and Technology, University of California, Davis, CA, USA (UC Davis), [2]Department of Biological and Agricultural Engineering, UC Davis, [3]University of California Cooperative Extension, Fresno County, CA, USA, [4]Department of Plant Pathology, UC Davis, [5]Statewide Integrated Pest Management Program, University of California, Kearney Agricultural Research and Extension Center, Parlier, CA, USA.

Composting is a widely used conversion practice for organic waste management and compost products are often applied as soil amendments due to their positive impact on soil quality. Anaerobic digestion (AD) is becoming an increasingly popular organic waste conversion process due to the potential to produce renewable biofuel as a value-added product from the waste. The by-products of AD are known as digestates, and their beneficial effects as soil amendments are currently being researched. Soil biosolarization (SBS) is an enhanced soil disinfestation process, achieved by amending soil with organic matter prior to solarization. The efficacy of SBS has been shown to be influenced by the biological stability of the organic amendments. As a result, the application of compost and digestate in SBS may be limited by the high degree of stability of these materials in their mature form. The objective of this study was to assess the impact of partially stabilized organic matter on soil biosolarization. The organic soil amendments selected for this study were derived from green and food wastes that were partially composted (PC) and partially digested. The partially digested feedstock was separated into solid digestate (SD) and liquid digestate (LD). To assess the impact of these amendments on SBS, the inactivation of two target pests was monitored. Mesocosms were loaded with a sandy clay loam soil, either non-amended or amended with the three types of feedstocks. Furthermore, the experimental plot was deliberately infested with *Fusarium oxysporum f.sp.lactucae* (FOL), a fungus causing lettuce disease. Weed seeds of *Brassica nigra* were placed at 12.5 cm depth. The mesocosms were solarized in an experimental plot or incubated at room temperature (RT, 25ºC) for eight days. Solarization of the non-amended soil increased weed seed mortality from 9.07±5.92% at RT to 18.44±7.69%. In the amended samples the mortality increased from 3.35±3.33%, 2.66±3.65% and 5.35±5.04 at room temperature to 34.05±7.94%, 33.18±15.37% and 34.15±18.21% for the soil amended with PC, SD and LD, respectively. At 5 cm, solarization reduced FOL in the non-amended soil from 275±99.25 colony forming units (CFU)/g of soil to 27.78±34.00 CFU/g. In all the amended samples FOL levels were below the detection limit (<20.8 CFU/g) at this depth. At 12.5 cm, the levels of FOL were 100±88.88 CFU/g in the solarized, non-amended soil and 41.66±20.85, 49.98±27.96 and 83.34±60.04 CFU/g for the solarized soils amended with PC, SD and LD, respectively. Although complete inactivation was not achieved after 8 days (current treatment guidelines are 4-6 weeks of heating), results show promising impacts of biosolarization with these amendments for inactivation of both studied pests. Further research is needed to understand the mechanisms

involved in inactivation. Special focus is needed on volatile fatty acid (VFA) accumulation as VFAs have previously been shown to contribute to pest inactivation.