

Weed Management with Solarization

Sonja K. Birthisel, PhD
Postdoctoral Research Associate
University of Maine
<https://skbirthisel.weebly.com/>

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Stale seedbeds are commonly used by organic vegetable farmers to reduce in-season weed density. The primary purpose of this study was to evaluate the efficacy of soil solarization (clear plastic) with subsequent flaming for stale seedbed preparation. A secondary objective was to compare the efficacy of solarization with tarping (black plastic). Solarization is an established weed management practice in warmer climates, but its efficacy in the humid continental Northeast USA was unknown. We hypothesized that solarization during May-June in Maine, USA would increase weed emergence, and could thereby contribute to depletion of the germinable weed seedbank and, with subsequent flaming, creation of an improved stale seedbed. We expected that firming soil with a roller prior to solarization would further increase weed emergence. Across four site-years of replicated field experiments and two on-farm trials we found that, contrary to expectations, 2 weeks of solarization reduced apparent weed emergence (density) in comparison to nonsolarized controls by 83% during treatment, and 78% after 2 weeks of observation following plastic removal and flaming. Rolling did not significantly affect weed density. Soil temperatures were elevated in solarized plots, reaching a maximum of 47 °C at 5 cm soil depth, compared to 38 °C in controls. Weed community analyses suggested that solarization might act as an ecological filter limiting some species. Addressing our secondary objective, two replicated field experiments compared the efficacy of solarization with tarping applied for periods of 2, 4, and 6 weeks beginning in July. Across treatment durations, solarization was more effective than tarping in one site-year, but tarping outperformed solarization in the other; this discrepancy may be explained by differences in weed species and soil temperatures between experiments. Overall, solarization and tarping are promising stale seedbed preparation methods for humid continental climates, but more work is needed to compare their relative efficacy.