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Soil Solarization as a Method for Prairie Restoration Site Preparation

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Soil Solarization as a Method for Prairie Restoration Site Preparation

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When restorationists begin a prairie restoration program, the first question is often: “Should I kill existing vegetation and start with bare soil conditions, or should I begin by interseeding within existing vegetation?” For those projects in which a bare soil scenario is more appropriate (e.g., there is an insufficient amount of native species to warrant saving), two conventional methods exist for creating bare soil: plowing and nonselective herbicide treatment. Recently, however, soil solarization has received recognition as an environmentally friendly alternative.

Soil solarization uses clear polyethylene sheeting to heat the soil and associated biota. This technique has its roots in winter protection of agricultural crops. Later, it was used as a pre-planting soil treatment to control soil borne pathogens and weeds in vegetable farming. Generalized observed effects of soil solarization include a reduction in fungi, bacteria, nematodes, insects, and weed seeds, and an increase in plant growth. Although the mechanism is not fully understood, most researchers attribute the increased plant growth to the concentration of plant nutrients and lack of soil pathogens. The low cost and non-chemical nature of solarization warrants its evaluation as a potential method for restoration when objectives include eliminating unwanted vegetation.

Our pilot study was designed to determine the duration of solarization treatment needed to kill existing vegetation on a degraded prairie site dominated by Johnsongrass. The study took place at the Lewisville Lake Environmental Learning Area (LLELA). We compared treatments with durations of 3, 5, and 7 weeks starting in the spring (March 28). Only the three-week treatment exhibited significantly higher temperatures than the control. Shoot counts were reduced in the 3, 5, and 7-week treatments by 41%, 51%, and 20%, respectively, compared with the controls. Thermal vegetative kill was not observed in any of the treatments. This study suggests that early season solarization will not kill existing vegetation, but it can increase the amount of bare soil available for seeding by reducing the emergence of new vegetation.