Hoop And Shade Cloth System for Protecting Nursery Seed Beds

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Abstract

Since 2002, Towner State Nursery in North Dakota has used a hoop and shade cloth system to protect seed beds from unpredictable weather events that occur during the growing season, such as torrential rains, severe windstorms, and hail. This system is inexpensive to build and can be customized to a seed bed's width. For other nurseries that may be experiencing (or anticipate) unpredictable weather patterns, a hoop and shade cloth system is an inexpensive solution.

Introduction

The Towner State Nursery is a conservation nursery owned and operated by the North Dakota Forest Service since 1951. The nursery produces both bareroot and container stock for conservation tree-planting practices within the region. Bareroot species produced include Colorado blue spruce (*Picea pungens*), Black Hills spruce (*Picea glauca*), Rocky Mountain juniper (*Juniperus scopulorum*), eastern redcedar (*Juniperus virginiana*), Scotch pine (*Pinus sylvestris*), ponderosa pine (*Pinus ponderosa*), and a few hardwood species.

The nursery is in north-central North Dakota, which is approximately the geographical center of the North American continent. As such, the nursery is subject to a continental climate characterized by extreme variations in temperature throughout the year, with hot summers and cold winters. During the growing season unpredictable weather events are common, such as torrential rains, severe windstorms, and hail. Such events present challenges to production of conservation seedlings—especially to recently established seed beds with vulnerable germinants.

To mitigate these weather challenges, Towner State Nursery developed a hoop and shade cloth system to protect seed beds, which has been in use since 2002.

System Description

The system is relatively straightforward and consists of hoops of curved 0.5-in (1.3-cm) aluminum conduit pushed into the ground every 10 ft (3.0 m) along the length of the 500-ft-long (152.4 m), 4-ft-wide (1.2 m) seed beds. A 6-ft-wide (1.8 m), 40-percent shade cloth (heavy-duty knitted polyethylene and polypropylene) is laid over the top of the hoops and secured into place with landscaping staples along the sides. Installation of this system over the nursery's 30 seed beds takes 6 employees approximately 16 hours (figure 1).

The hoop and shade cloth system is used on shallow-seeded species, including Colorado blue spruce, Black Hills spruce, Rocky Mountain juniper, eastern redcedar, and Scotch pine. The system is not used on ponderosa pine because this species is seeded deeper, and the nursery has not observed a benefit using the system on this species. The system has not been tested on hardwood species.

In North Dakota, seeding occurs in late June once soil temperatures warm to 65–70 °F (18.3–21.1 °C); Towner State Nursery uses a Bartschi Fobro Accord DA air seeder. The hoop and shade system is installed immediately after seeding. Once installed, the system remains over the seed beds throughout the summer. The shade cloth allows for sprinkler irrigation to be used, however, it does hamper the effectiveness of aerial applications of postemergent herbicides. To remedy this, a good chemigation prior to installation is essential. Towner Nursery fumigates fields designated for seed beds with Basamid in September the year before and a preemergent herbicide directly after seeding to suppress weeds. Staff remove the hoops and shade cloth in early October prior to frost development in the soil.

Advantages and Disadvantages

The hoop and shade cloth system used by Towner Nursery offers several benefits, including (1) creating a microclimate that moderates temperature extremes and helps retain soil moisture; (2) providing protection against severe wind events, torrential rains, and hail; and (3) deterring seed depredation from avian and rodent species

Drawbacks to the system include (1) installation being contingent on available labor, (2) the need to fabricate specialized hoops, (3) the upfront cost associated with the materials, and (4) the ongoing cost of replacing materials (shade cloths must be replaced every 20 years). Lastly, once a grower installs the system they are unable able to till or treat weeds; good chemigation prior to seeding is essential.

Summary

Towner Nursery has seen great success over the years using this hoop and shade cloth system. Once the initial investments are made to incorporate the practice, the benefits are clearly realized with greater consistency in seed bed establishment. This system has provided an essential assurance to meet production goals despite the persistent weather challenges associated with an outdoor nursery.

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Figure 1—Nursery employees installing the hoop and shade cloth system. Photo by Jeff Smette, 2024.

To watch the hoop and shade cloth system be installed, visit:

https://app.screencast.com/