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# Establishing Seeded Tall Fescue with Covers and Drip Irrigation Methods

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# Establishing Seeded Tall Fescue with Covers and Drip Irrigation Methods[1]

*Alex P. Bach, Dale J. Bremer, Cathie C. Lavis, Steven J. Keeley, and Mu Hong*

## Summary

The use of covers may improve establishment of seeded turfgrass but their use in combination with drip irrigation techniques has not been evaluated. We investigated the effects of two cover types and three irrigation methods on establishment of seeded tall fescue turfgrass. For spring seeding of tall fescue [*Schedonorus arundinaceus* (Schreb.) Dumort.], turf establishment was successful with subsurface drip irrigation (SDI) and aboveground drip irrigation (AGD) in fine textured soil in the transition zone. With SDI, AGD, or sprinkler irrigation, both polyester mesh (Poly) and straw blanket (Straw) covers improved turf establishment in the order of Poly > Straw > No Cover, but turf establishment in Poly and Straw became similar over time. Soil surface temperature averaged higher in Poly (14°C [57°F]) than Straw (9.5°C [49°F]) and No Cover (8.6°C [47.5°F]) during the first 12 days after seeding when covers were installed. Results indicate that covers improved spring establishment of seeded, cool-season turfgrass in a fine-textured soil and in a US transition zone climate by mitigating low temperature extremes and reducing erosion during rainfall. Establishment was similar between drip (SDI and AGD) and sprinkler irrigation, but the use of protective covers is recommended when establishing turfgrass from seed.

## Rationale

Few studies have investigated the use of SDI for turfgrass irrigation. Of those studies, most have been conducted in sandy loam soils in the arid southwestern United States (Leinauer et al., 2010; Schiavon et al., 2015; Serena et al., 2014; Suarez-Rey et al.,

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2000). Even fewer studies have evaluated the establishment of turfgrass using SDI. Aboveground drip irrigation, which is similar to SDI except that it rests on the soil surface (Figure 1), has been suggested as a portable system to enhance the establishment of turfgrass along roadsides. However, little research has been conducted to evaluate the use of AGD in the establishment of turfgrass (Friell and Watkins, 2021).

Covers are frequently used to improve germination and establishment of seeded turfgrass by reducing erosion, retaining soil moisture at the surface via reduced drying rates, and modifying the surface temperature. For example, during spring turf establishment, covers may mitigate low soil temperature extremes that could damage emerging seedlings. Results from a study related to this one suggested that covers may improve turfgrass establishment, including when using SDI and AGD, but the effects of covers were not directly evaluated (Bach et al., 2022). To our knowledge, the effects of covers in combination with drip irrigation technologies on the establishment of turfgrass from seed has not been investigated.

## Objective

To investigate establishment of tall fescue from seed using:

1. Two types of turf protective covers and an uncovered control; and
2. SDI, AGD, and overhead sprinkler irrigation (control).

## Study Description

We investigated the effects of two cover types and three irrigation methods on establishment of seeded tall fescue turfgrass, which is a popular turfgrass for lawns in the transition zone (Bremer et al., 2012). This study was repeated twice in the spring of 2020 at Rocky Ford Turfgrass Research Center, Manhattan, KS. Glyphosate (Glyphomate 41, PBI/Gordon Corporation) was applied to existing tall fescue three weeks before seeding the first trial; and after the turf turned brown all dead biomass was removed. Immediately before seeding, the plot area was cultivated with a verticutter. Tall fescue was seeded at 390 kg $ha^{1}$ [8 lb/1000 $ft^{2}$] on April 9 (Trial 1) and May 2 (Trial 2) and lightly raked to ensure good seed-to-soil contact. The tall fescue seed blend included the cultivars 'Copious' (38.67%), 'Reunion' (38.56%), and 'Starfire II' (22.27%) (Lesco Inc., All Pro Transition Blend). Urea fertilizer (44-0-0, Humic Coated Urea, The Andersons) was applied at a rate of 49 kg N $ha^{1}$ [1 lb/1000 $ft^{2}$] approximately three weeks after each trial began. Plots were not mown and weeds were removed by hand throughout the trials.

Turfgrass cover treatments included: (1) polyester mesh (Poly) (0.5 oz. Deluxe Seed and Plant Guard Frost Blanket, DeWitt); (2) straw blanket (Straw) (Single Net Blanket, SiteOne Landscape Supply); and 3) uncovered (No Cover), serving as the control (Figure 2). Covers were installed immediately after seeding. Irrigation treatments were: (1) SDI; (2) AGD; and (3) overhead sprinkler irrigation (control), 3× per day each at 150% $ET_o$.

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The experiment was arranged in a split-plot design with three irrigation treatments applied to whole plots and three cover treatments applied to split-plots within each whole plot. The three irrigation treatments were each represented by a single irrigation zone (37 × 6.10 m [121 × 20 ft]), with each zone divided into three whole plots (5.49 × 9.14 m [18 × 30 ft]); all irrigation zones in the study were adjacent to each other. Within each whole plot, the three cover treatments were randomly applied to split plots (1.83 × 3.05 m [6 × 10 ft]), for a total of 27 subplots in the study. Covers were removed when seedling shoots began to appear through the Poly covers to avoid damage to seedlings when covers were removed. Covers were removed 13 days after seeding in Trial 1 and 12 days after seeding in Trial 2.

Establishment was evaluated with percentage green cover measured with digital images (Nikon D5000, Nikon Inc.) using a lighted camera box, visual turfgrass quality ratings, and ground and drone-based remote sensing measurements (normalized difference vegetation index [NDVI]). Day and nighttime seedbed temperatures were measured with soil encapsulated thermocouples (Ham and Senock, 1992) and averaged across both trials from 1000 to 1800 (daytime) and 2200 to 0600 CST (nighttime) during the study. Soil surface temperatures were measured only in SDI because of limitations in sensor and data acquisition availability.

## Results

Seeded tall fescue established faster in all irrigation treatments when plots were covered with either Poly or Straw during the first 12-13 d after seeding, as indicated by higher green cover, turf quality, and ground and drone-based NDVI in Poly and Straw than No Cover plots (Figure 3; see Bach et al., 2021 for TQ and NDVI). Establishment was also initially faster in Poly than Straw, probably because the soil surface was warmer in Poly than in Straw (and No Cover) during the period when covers were installed (Figure 4). For example, the soil temperature was 14°C (57°F) in Poly compared with 9.5°C (49°F) in Straw and 8.6°C (47.5°F) in No Cover; air temperature was 8.5°C (47°F) during the same period (24-h average). However, by the end of both trials, establishment was generally similar between Poly and Straw (Figure 3). Establishment was better in covered (Poly and Straw) than No Cover plots because Poly and Straw covers also prevented erosion of the seedbed during rainfall early in both trials (Figure 5). Specifically, during the period when covers were installed in Poly and Straw plots, the seedbeds in No Cover were eroded after 18.0 mm (0.71 inches) and 39.6 mm (1.6 inches) of rainfall in Trial 1 and Trial 2, respectively.

Leaf burn from nitrogen fertilization was observed in drip irrigation (SGI and AGD) during Trial 2, which was conducted later in the spring when temperatures were higher than in Trial 1; leaf burn was significantly less in sprinkler-irrigated plots. This indicates a possible limitation to using drip technology in turf that requires further investigation into different types, sources, and application rates of N fertilizer to minimize leaf burn.

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No consistent differences in tall fescue establishment were observed between drip (SGI and AGD) and overhead sprinkler-irrigation treatments across the two trials. Although the potential uses for AGD may be more limited than SDI, establishment was acceptable in AGD and more research is needed into this method. The effects of covers on turf establishment were similar among SGI, AGD, and sprinkler-irrigated treatments. Overall, results from this study indicate that Poly or Straw covers benefit the establishment of seeded tall fescue in turf with SDI and AGD, as well as sprinkler-irrigation.

Additional details from this study are available in Bach et al. (2021).

*Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.*

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**Figure 1. Aboveground drip irrigation system. In this study, driplines were spaced at 18 inches and rested on the soil surface. The subsurface drip irrigation driplines were nearly identical but were buried in the soil at 6 inches.**

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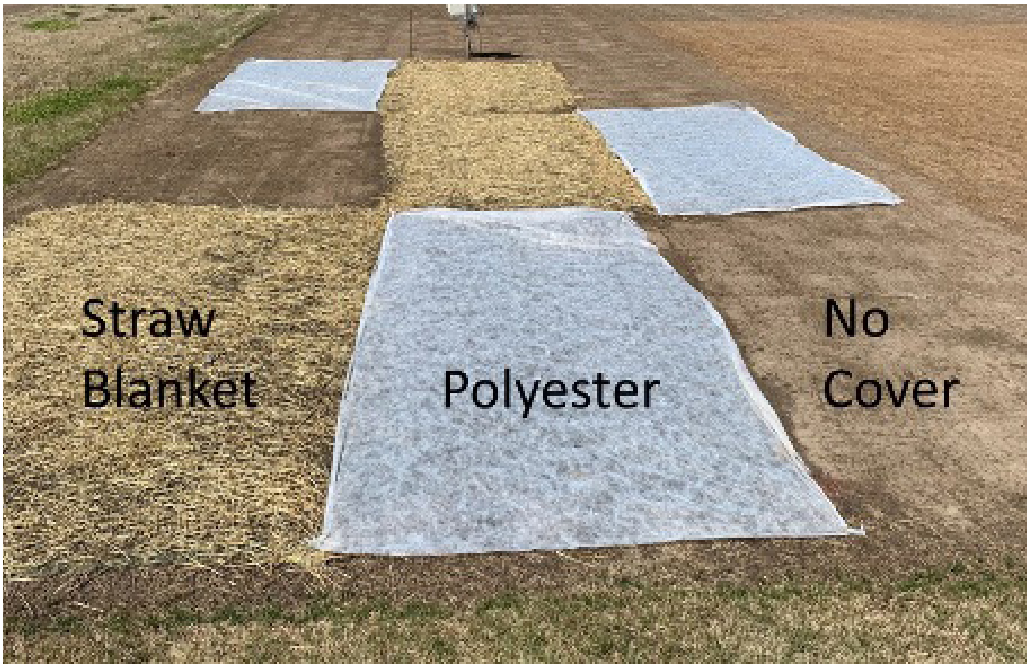


**Figure 2. Protective covers included straw blanket (front left), polyester mesh (front middle), and no cover as a control (front right).**

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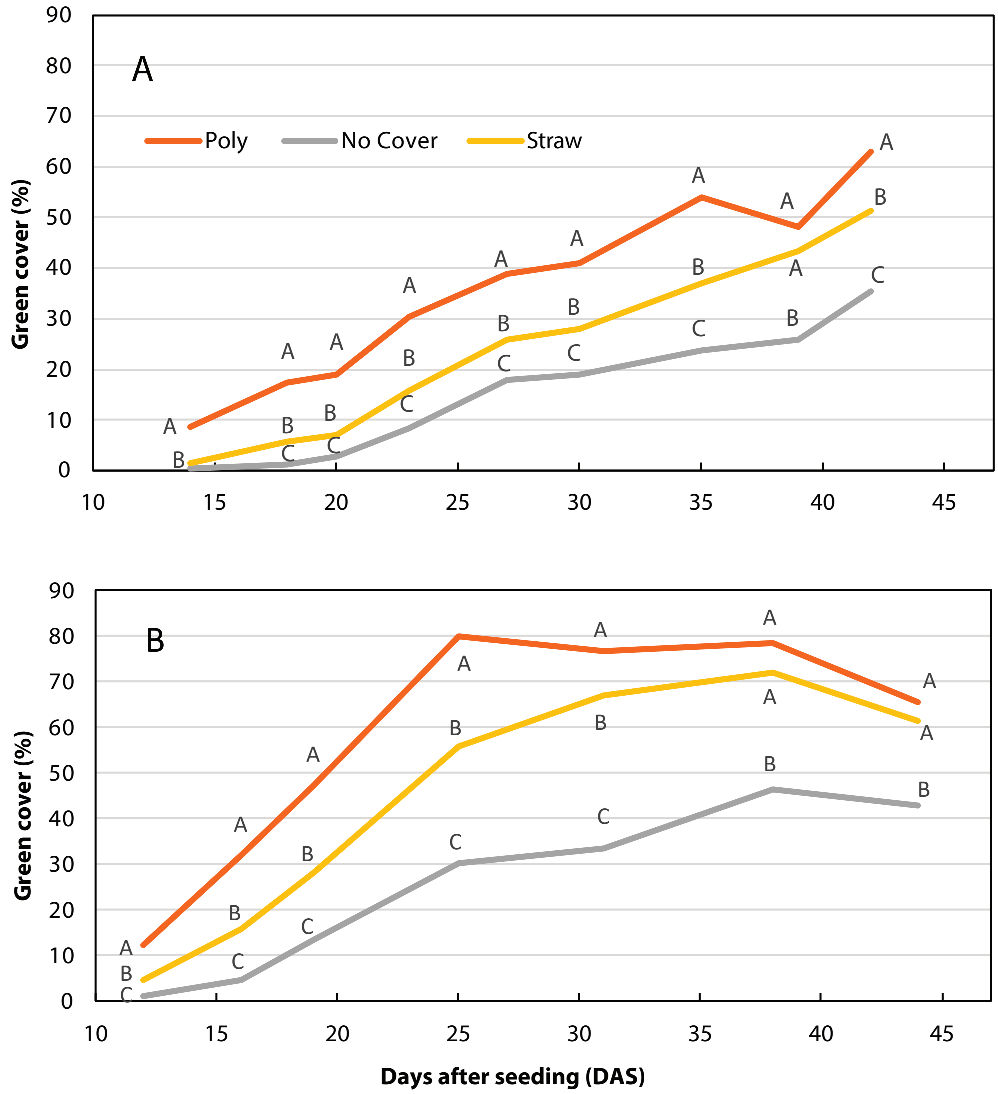


**Figure 3. Percentage green cover during Trial 1 (A) and Trial 2 (B). Covers included polyester mesh (Poly), a straw blanket (Straw), and an uncovered control (No Cover). On each measurement date, means with the same letter were not significantly different at $\alpha = .05$.**

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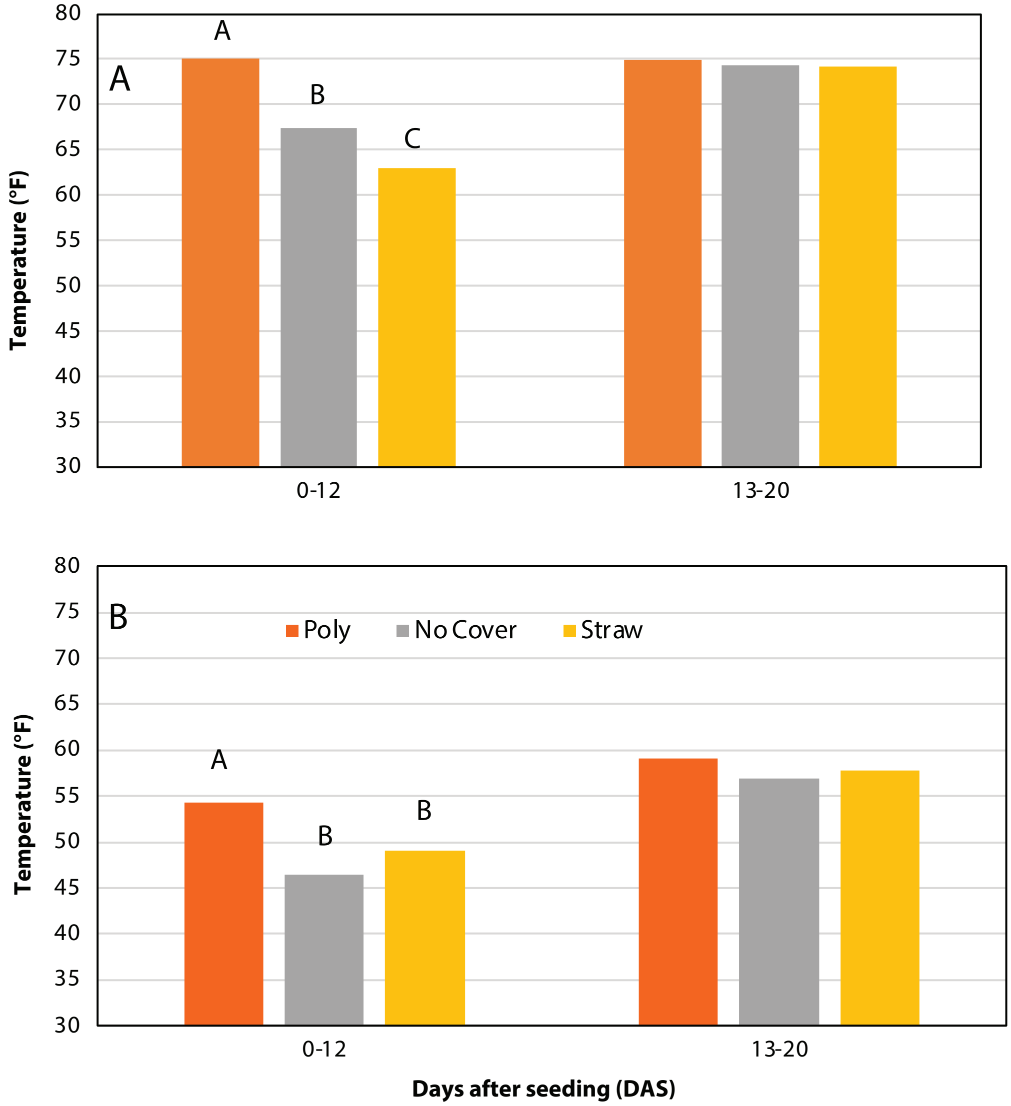


**Figure 4. Soil surface temperatures during day (top; A; 1000-1800 CST) and night (bottom; B; 2200-0600 CST), averaged across both trials. Temperatures were measured during the periods when covers were installed (0 to 12 DAS) and during the first 8 days after covers were removed (13 to 20 DAS). Within each measurement period, means with no letters or the same letter are not significantly different at α = 0.05.**


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**Figure 5. Turfgrass establishment 14 days after seeding in Trial 2, after removal of covers. No Cover plots (3) were clearly eroded by 1.6 inches of rainfall during the first 12 days after seeding, while establishment was better in Poly (1) and Straw (2) because of protection from erosion.**

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