# Seed Covers and Germination Blankets Influence the Establishment of Seeded Warm-Season Grasses

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## Abstract

Covers and blankets are often used to reduce erosion, retain soil moisture, and increase soil temperature, plant germination, and establishment rates. There are reports of various effects of seed cover technology on the germination and establishment of warm-season grasses. The objective of this study was to determine how seed covers constructed out of various materials influence the establishment of seeded bermudagrass (*Cynodon dactylon* L pers.), buffalograss (*Buchloe dactyloides* (Nutt.) Engelm.), centipedegrass (*Eremochloa ophiuroides* (Munro.) Hack.), seashore paspalum (*Paspalum vaginatum* Swartz), and zoysiagrass (*Zoysia japonica* Steud.). Plots were seeded 9 June with various species and covered with seed cover technologies including excelsior wood fiber mat, jute multifilament yarn, polypropylene jute netting, polypropylene, Futerra, polyethylene, straw, straw and polypropylene netting, paper-based, polyester, and an uncovered control. Light transmission, soil temperature, soil moisture, and turf coverage were monitored throughout the study. Effects of these cover technologies on each species and soil properties will be discussed.

## Introduction

Covers and blankets are often used to protect plants during winter and spring, to warm the soil and increase germination rates and also to reduce erosion. Seed germination blankets can allow light penetration and gas exchange, facilitate soil warming, and increase soil moisture holding capacity, all of which increase germination rates without the risk of excessive temperature build-up. It is known that bermudagrass and zoysiagrass germination increases as temperatures rise, with maximum germination rate occurring between 30 to 35 °C (Portz et al., 1981; Zuk et al., 2005). The first report of using covers to establish zoysiagrass was in 1967. Yu and Yeam (1967) doubled the germination rate of zoysiagrass seed by using a polyethylene film, while Portz et al. (1993) found that clear polyethylene covers placed over the seedbed for 7 or 14 days after seeding increased germination and zoysiagrass coverage in Illinois and Maryland. Other materials tested such as straw (80 lb/1000 ft$^2$), did not enhance germination because they excluded light and reduced soil temperatures (Portz et al., 1993). Organic fiber mats increased establishment when used in non-irrigated areas likely due to increased soil moisture but did not increase establishment when used in irrigated plots (Hensler et al., 2001). Overall the data shows different effects from different cover technologies, but no comparison has been made between the different technologies. This study proposes to compare different seed cover technologies among seeded bermudagrass, buffalograss, centipedegrass, zoysiagrass, and seashore paspalum.

## Materials and Methods

- Experiments were established in the June of 2007.
- Selected areas were fumigated with methyl bromide and then lightly tilled to prepare the soil prior to seeding.
- Experimental design was a randomized complete block with three replications and an individual plot size of 24 ft$^2$ (1.2 x 1.8 m).
- Plots were treated with various species and cover technologies in a 3 x 13 factorial.
- Bermudagrass was seeded at a rate of 48 kg PLS/ha, zoysiagrass at a rate of 96 kg PLS/ha, seashore paspalum at a rate of 48 kg PLS/ha, centipedegrass at a rate of 24 kg PLS/ha, and buffalograss at a rate of 384 kg PLS/ha
- Covers were applied immediately after seeding and plots were irrigated for one week after seeding and then irrigation was applied only to prevent drought.

## Materials and Methods *cont.*

- Temporary covers (such as polyethylene and AgroFabric) were removed 14 days after seeding.

Species
1. 'Zenith' zoysiagrass
2. 'Riviera' bermudagrass
3. 'Sea spray' seashore paspalum
4. 'TifBlair' centipedegrass
5. 'Bowie' buffalograss

Cover technology treatments and manufacturer
1. Curlex, natural color (curled excelsior aspen wood fiber mat)
2. Poly Jute erosion control blanket (polypropylene multifilament yarn) DeWitt
3. Jute mesh erosion control mat (mesh fabric)
4. Deluxe (0.5 oz crop protection fabric) Dewitt
5. Thermal blanket (3 oz. white polypropylene) Dewitt
6. Futerra F4 Netless, natural color, Profile Products LLC (6.5' × 90')
7. Futerra, natural color, Profile Products LLC (82" × 135')
8. BlueYellow (bleached kraft southern pine fiber), BlueYellow, LLC
9. Clear polyethylene cover 4 mil (0.1 mm, 4/1000"), various manufacturers
10. Straw blanket with polypropylene netting (S1000) Enviroscape ECM
11. Straw (80 lbs/1000ft2, 0.39 kg m2) (Portz et al., 1993)
12. uncovered control

## Results and Discussion

- Futerra products, Poly Jute, Jute and Curlex were among the products with the greatest coverage across all species 6 weeks after planting (Table 1). The untreated check and BlueYellow had the least coverage.
- Coverage 6 weeks after planting (Table 2) was as follows; bermudagrass > seashore paspalum > buffalograss > centipedegrass = zoysiagrass.
- There was a significant cover by species interaction. Most notable were with seashore paspalum and zoysiagrass. Seashore paspalum coverage was greatest when using Futerra products, Poly Jute, Jute, polyethylene, Deluxe, and Thermal Blanket. Zoysiagrass coverage was greatest when using Futerra products or Curlex (data not shown).
- Above average rainfall frequency and amounts occurred for 40 days after planting. Therefore, soil moisture was not likely a contributing factor to establishment. Data is still being analyzed. Soil temperature data is also currently being analyzed.
- The amount of photosynthetically active radiation (PAR) passing through each of these materials was determined (Figure 1). However, this data provides little insight into why cover technology influenced establishment.

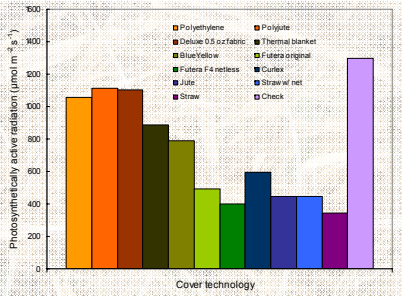


Figure 1. Research plots 12 days after planting (A) under various blankets and covers. Bermudagrass was the first species to germinate and emerge (B, photo taken 19 days after planting).

Table 1. Summary of the turfgrass coverage across species for various seeding blankets.

| Blanket | % coverage |
|---|---|
| Futerra F4 Netless | 58.9 a |
| Poly Jute | 56.8 ab |
| Futerra | 55.0 ab |
| Jute | 50.5 abc |
| Curlex | 48.9 abc |
| Polyethylene | 44.9 bcd |
| Deluxe | 44.3 bcd |
| Straw | 38.8 cd |
| Thermalblanket | 35.7 d |
| Strawblanket | 34.7 de |
| Blueyellow | 22.7 ef |
| Uncovered check | 18.0 f |

Data collected 07/24/07, planted 6/9/07
Means within a column followed by the same letter are not significantly different.

Table 2. Summary of the turfgrass coverage across seeding blankets for various species.

| Species | % coverage |
|---|---|
| Bermudagrass | 88.9 a |
| Seashore | 61.7 b |
| Buffalograss | 35.0 c |
| Zoysiagrass | 11.7 d |
| Centipedegrass | 10.3 d |

Data collected 07/24/07, planted 6/9/07
Means within a column followed by the same letter are not significantly different.

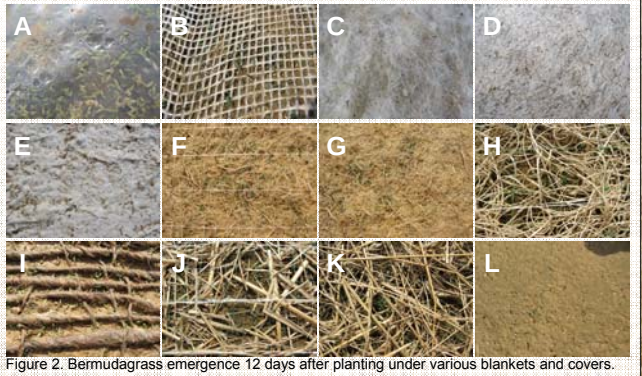


Figure 2. Bermudagrass emergence 12 days after planting under various blankets and covers. Clear polyethylene (A), Poly Jute (B), Deluxe (C), Thermal blanket (D), BlueYellow (E), Futerra F4 Netless (F), Futerra (G), curlex (H), jute mesh (I), straw blanket with polypropylene netting (J), straw (K), uncovered control (L).

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