Overseeding Cool-Season Grasses on *Zoysia japonica* Steud. in Korea

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Abstract

Research was initiated to investigate several growth characteristics in Korean lawngrass overseeded by cool-season grasses. A total of 8 overseeding treatments were used in the study. Cool-season grasses were applied at seeding rate of 50 to 150 g/m² early October in 2007. Treatments were comprised of Kentucky bluegrass(KB), perennial ryegrass(PR), tall fescue(TF), and their mixtures. Such growth characteristics as turf coverage, visual density, uniformity, visual color, leaf color retention and summer performance etc. were measured in overseeded Korean lawngrass.

Significant differences were observed among the treatments. Turf coverage and density in almost a year after overseeding were highest in KB, followed by Mixture I(KB33+PR33+TF33), and lowest in PR. Greatest uniformity was associated with KB and Mixture II(KB25+PR50+TF25) and poorest with PR. The overseeded Korean lawngrass showed greater color retention of approximately 3.5 to 5 months longer than the non-overseeded control. Visual color ratings and leaf color retention, however, differed depending on cool-season grass composition and their mixing rates. Summer drought injury was variable with cool-season grass species in mixtures. In a overseeding practice here in Korea, the higher the PR, the greater the summer injury. However, the higher the KB or TF, the less the injury.

From this study, a variety of treatments could be widely applied in a overseeding practice, depending on lawn types, cultural intensity, the turf quality expectation, and so on. As for gardens, parks, school playgrounds and golf courses with Korean lawngrass of a medium quality level, but requiring sustainable quality of cool-season grass after the overseeding, it would be the best choice to apply with the equal combination of KB, PR and TF by 1/3 in mixtures.

Key words: ***growth characteristics, leaf color retention, Kentucky bluegrass, perennial ryegrass, summer drought, tall fescue, turf quality, zoysiagrass***

Introduction

Korea can be considered as a transition zone from a climatic point of view. This means that both warm-season (WSG) and cool-season grasses (CSG) can grow well in a given condition. Lawns and sports turfs, however, have been traditionally established with WSG in Korea. It is impossible to maintain leaf color retention over the whole year because of the physiological characteristics which they go dormant in cool weather. That is why the WSG have been restricted for use by shorter leaf color retention resulted form dormancy, discoloration, and losses in turf quality.

The CSG, on the other hand, has superior characteristics such as excellence in leaf color retention, leaf texture, wear tolerance and recovery, and so on. But it has been known to show summer drought injury since it is susceptible from heat and drought tolerances. Thus, it would be better to use the strength and make up for the weakness between WSG and CSG. Overseeding is one of the representative turfgrass management.

Research Objective

In this study we investigated several growth characteristics in overseeded Korean lawngrass as follows:

- **Growth Parameters:** Turfgrass coverage, Turfgrass density, Number of leaves, Clippings weight, Leaf color retention, Spring transition, Summer drought injury, Overall turf performance etc.

Materials and Method

Research was conducted at the Turfgrass Research Field in Seoul, Korea. A total of 8 overseeding treatments were used in the study. Overseeding treatments were applied at seeding rate of 50 to 150 g/m² early October in 2007.

- **Site:** Research Field at Sahmyook University, Seoul, Korea
- **Turfgrass entries:** 8 Overseeding treatments
- **Seeding rate:** 50 to 150 g/m² (See Table 1.)
- **Period:** October 2007 ~ December 2008
- **Management:**
  - ▶ **Irrigation:** 2 times weekly
  - ▶ **Mowing:** MH 30 ~ 35 mm / MF twice weekly / Clippings returned
  - ▶ **Fertilization:** Slow-release fertilizers (23-5-10, 21-2-21, 21-2-20 etc.) Bimonthly application at a rate of 10g/㎡
  - ▶ **Pest control:** Pesticides on a curative basis

Experimental Design

- **Layout:** Randomized complete block design
- **Experimental unit:** 1.0 m x 1.0 m
- **Replication:** 4

Table 1. Turfgrass composition, varieties, and seeding rate in the study.

No	ID	Turfgrass composition (% , v/v)	Varieties	Seeding rate (g/m²)
1	KB	Kentucky bluegrass 100%	'Brilliant'	50
2	TF	Tall fescue 100%	'Tar Heel Ⅱ'	100
3	PR	Perennial ryegrass 100%	'Catalina Ⅱ'	100
4	Mixture Ⅰ	KB 33% + TF 33% + PR 33%	'Brilliant' 'Tar Heel Ⅱ' 'Catalina Ⅱ'	75
5	Mixture Ⅱ	KB 25% + TF 25% + PR 50%	'Brilliant' 'Tar Heel Ⅱ' 'Catalina Ⅱ'	100
6	Mixture Ⅲ	TF 50% + PR 50%	'Tar Heel Ⅱ' 'Catalina Ⅱ'	100
7	Mixture Ⅳ	TF 50% + PR 50%	'Tar Heel Ⅱ' 'Catalina Ⅱ'	150
8	Zoy	Korean lawngrass	'Yaji'	sodded

Results and Discussion

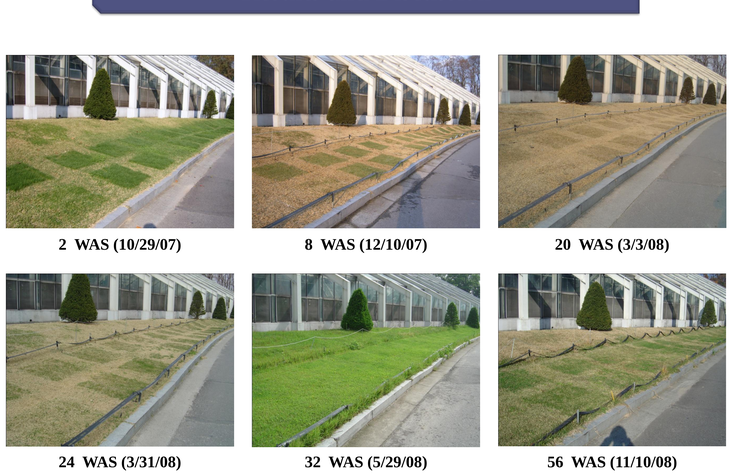

Fig. 1. Seasonal change of turfgrass performance in 8 overseeding treatments grown under field conditions in the study. Visual turf color, turfgrass quality and leaf color retention were different among the CSG composition and their mixing rates. (WAS: weeks after seeding)

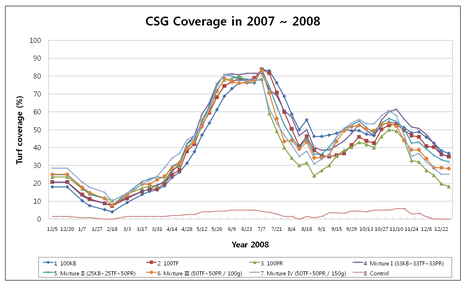

Fig. 2. Seasonal variation of cool-season grass coverage affected by 8 overseeding treatments grown under field conditions during a period of December 2007 to December 2008. Turfgrass species and varieties for treatments are described in Table 1.

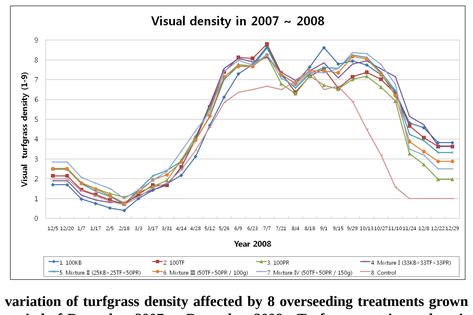

Fig. 3. Seasonal variation of turfgrass density affected by 8 overseeding treatments grown under field conditions during a period of December 2007 to December 2008. Turfgrass species and varieties for treatments are described in Table 1.

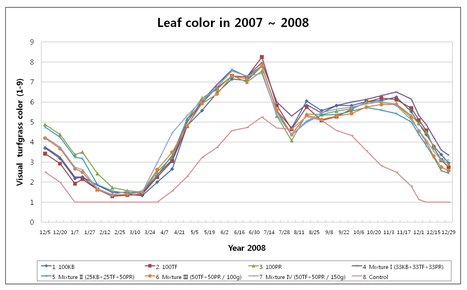

Fig. 4. Seasonal variation of turfgrass color affected by 8 overseeding treatments grown under field conditions during a period of December 2007 to December 2008. Turfgrass species and varieties for treatments are described in Table 1.

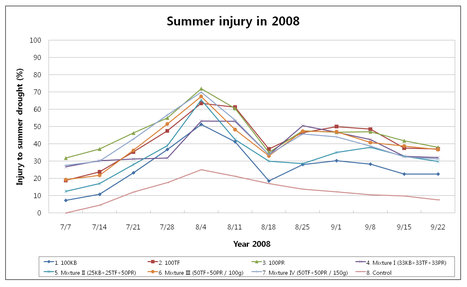

Fig. 5. Seasonal variation of summer injury affected by 8 overseeding treatments grown under field conditions during a period of December 2007 to December 2008. Turfgrass species and varieties for treatments are described in Table 1.

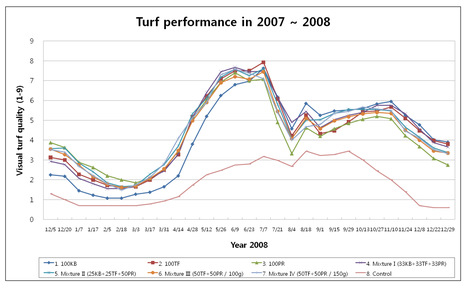

Fig. 6. Seasonal variation of turf performance affected by 8 overseeding treatments grown under field conditions during a period of December 2007 to December 2008. Turfgrass species and varieties for treatments are described in Table 1.

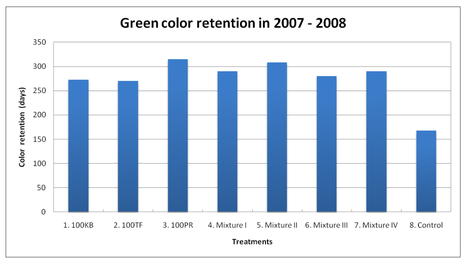

Fig. 7. Number of days of leaf color retention affected by 8 overseeding treatments grown under field conditions in the study. Turfgrass species and varieties for treatments are described in Table 1.

Summary

1. **Significant differences were observed among 8 treatments in turf coverage, visual density, uniformity, visual color, number of leaves, leaf color retention, spring transition, summer drought, overall turf performance etc.**
2. **Turf coverage and density in almost a year after overseeding was highest in KB, followed by Mixture I(KB33+PR33+TF33), and lowest in PR. Greatest uniformity was associated with KB and Mixture II(KB25+PR50+TF25) and poorest with PR.**
3. **The overseeded Korean lawngrass showed greater color retention of approximately 3.5 to 5 months longer than the non-overseeded turf. Visual turfgrass color ratings and leaf color retention, however, differed depending on CSG composition and their mixing rates.**
4. **Summer drought injury was variable with turfgrass species in CSG mixtures. In a overseeding practice here in Korea, the higher the PR, the greater the summer injury. However, the higher the KB or TF, the less the injury.**
5. **Generally, the overseeded Korean lawngrass showed better performance over the control, but there was a wide variation among treatments, depending upon the elapsed time after overseeding, turfgrass composition and mixing rates of CSG. During the first-half year of the overseeding, the more PR and the less KB, the better the turf performance. However, in the second-half year of the overseeding, the less PR and the more KB, the greater the turf performance.**
6. **Three-species combination of KB, PR and TF produced better turf performance than two-species combination of PR and TF.**
7. **It is a necessity to apply a variety of overseeding treatments, depending on lawn types, cultural intensity the turf quality expectation, and so on.**

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