

STUDY OF THE INSTALLATION RATE OF SOME SPECIES AND MIXTURES FOR LAWNS

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Abstract

The evolution of society has led to an increase in aesthetic and functional requirements, which has transformed lawns into an essential element for enhancing everyday comfort. The considerable expansion of lawn-covered areas in recent decades reflects the reinterpretation of natural lawns in a modernized version, corresponding to current functional and aesthetic requirements. The purpose of this study is to monitor the growth rate of five mixtures and two species in pure lawn culture: a₁-Speedy Green (100% *Lolium perenne*); a₂- SuperSport (50% *Lolium perenne*+50% *Poa pratensis*); a₃-RPR Sport (50% *Lolium perenne* RPR+50% *Lolium perenne*); a₄-Bar Power RPR (30% *Lolium perenne* RPR+25% *Lolium perenne*+ 30% *Festuca rubra commutata*+15% *Festuca rubra*); a₅-Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*); a₆-Resilient Blue Sport (30% *Poa pratensis* with YJWM + 46% *Lolium perenne* + 24% *Lolium perenne* RPR); a₇- Turf Clover (100% *Trifolium repens*), under the conditions of the urban area of Iași. The observations were made visually and expressed with scores, according to the NTEP (National Turfgrass Evaluation Program) rating scale. Observations were made at intervals of 20, 25, 30, and 90 days after sowing, representing the ability of the species in the mixture or pure crops to cover the entire surface in the shortest possible time. According to the observations made to monitor the rate of establishment, the best germination was recorded in variant a₇-Turf Clover (100% *Trifolium repens*), with a score of 8 at 90 days after sowing, and the slowest germination was recorded in variant a₅-Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*) with an average score of 2.33 at 20 days after sowing.

Keywords: ornamental turf, installation rate, germination, NTEP, grass mixtures

The grassland flora of our country includes approximately 226 grass species belonging to 71 genera, reflecting the high diversity and ecological plasticity of these species within natural phytocoenoses. Approximately 50 species are used for lawns, selected based on their adaptability and the aesthetic or functional qualities they provide (Vîntu V. *et al.*, 2004).

Research by Larsen S.U. *et al.*, (2004) showed that when *Festuca rubra* and *Lolium perenne* were sown simultaneously with *Poa pratensis*, the latter accounted for only 3–30% of the total germinated plants, although its seeds represented 50–59% of the sowing mixture. In contrast, when *Festuca rubra* and *Lolium perenne* were sown several days after *Poa pratensis*, the establishment of *Poa pratensis* was significantly improved. The germination rate of this species increased by up to 0.08% for each day of delayed sowing. Therefore, adjusting sowing times according to species-specific germination rates and temperature requirements can substantially

enhance the successful establishment of each component within a turf mixture.

Studies conducted by (Charif K. *et al.* 2019) show that *Lolium perenne* seeds germinate rapidly, reaching 92% germination within just 7 days, reflecting a high germination capacity and very fast establishment. In contrast, *Poa pratensis* exhibits the lowest germination rate, only 61%, with germination occurring over 30 days, indicating slow germination and a longer establishment period. This difference underscores the importance of selecting appropriate species based on lawn requirements and environmental conditions.

For *Lolium perenne*, emergence and tillering occur within 7 days, whereas *Poa pratensis* and *Festuca rubra* show slower growth, taking up to 20 days during the first year after sowing. *Lolium perenne* stands out for its superior aesthetic appearance, high turf density, and vigorous root development. *Festuca rubra* is notable for its fine leaves, disease resistance, and uniform coloration. At the end of the vegetative growth period, the

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highest turf and root density was recorded in *Lolium perenne* (Mastalerczuk, G. *et al.*, 2012).

Studies on *Lolium perenne* and *Festuca arundinacea* showed that germination rates were faster at 21°C than at 5°C. At 5°C, seeds required up to 20 additional days to reach maximum germination compared to seeds tested at 21°C (Braun R. *et al.*, 2023).

Buru T. *et al.* (2021) investigated eight grass seed mixtures sown under controlled temperature and light conditions for 14 days to identify the mixture with the highest germination rate. The Landscaper Pro Rapid mixture, consisting of *Festuca rubra* 'Cathrine' (15%), *Lolium perenne* 'Vermino' (40%), *Lolium perenne* 'Groundforce' (35%), and *Poa pratensis* 'Heatmaster' (10%), achieved the highest germination rate of 28% after 7 days, indicating superior adaptation and viability compared to the other mixtures tested.

The objective of the present study is to evaluate the establishment rate under field conditions of five mixtures and two pure species of turfgrass.

MATERIAL AND METHOD

The experiment was established on May 14, 2025, in three replicates, with seven randomly arranged variants—two with pure species and five with different mixtures for ornamental turf—on cambic chernozem soil in the Agronomy Student Campus area of the "Ion Ionescu de la Brad" University of Life Sciences in Iași (coordinates: 47°11'34.2"N, 27°33'35.6"E). Each experimental variant covered 8 m² (4 m × 2 m), with the total experimental area totaling 210 m².

The site was prepared by removing existing vegetation with a systemic glyphosate-based herbicide, followed by soil loosening using a Maschio Gaspardo vertical drum cutter. The surface was then cleared of remaining debris, leveled, and covered with a layer of manure and sand to optimize drainage and soil texture. BioStart fertilizer, containing both mineral and organic nutrients and designed to stimulate rapid and uniform germination, was applied at sowing. The site was irrigated three times daily, adjusted according to rainfall, to maintain adequate soil moisture for germination and subsequent turf growth. During the 90 days following germination, climatic conditions were favorable, with minimum temperatures of 12°C, maximum temperatures of 25°C, and accumulated rainfall of 75.45 mm.

The research aims to identify the most effective turfgrass mixtures or species that ensure rapid and uniform establishment, a process closely related to germination speed and subsequent plant growth and development.

In this study, the establishment rate was evaluated for seven experimental variants, as follows:

a₁-Speedy Green (100% *Lolium perenne*); a₂- SuperSport (50% *Lolium perenne*+50% *Poa pratensis*); a₃-RPR Sport (50% *Lolium perenne* RPR+50% *Lolium perenne*); a₄-Bar Power RPR (30% *Lolium perenne* RPR+25% *Lolium perenne*+30% *Festuca rubra commutata*+15% *Festuca rubra*); a₅- Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*); a₆- Resilient Blue Sport (30% *Poa pratensis* cu YJWM + 46% *Lolium perenne* + 24% *Lolium perenne* RPR); a₇- Turf Clover (100% *Trifolium repens*).

The turfgrass varieties used in the experiment are available on the Romanian market, being imported from the Dutch company Barenbrug, and are well adapted to local soil and climatic conditions. The turf establishment rate was assessed visually in the field using the NTEP (National Turfgrass Evaluation Program) rating scale, which ranges from 1 to 9. This scale, developed in the United States and widely used internationally, provides a standardized method for evaluating turfgrass performance. Each score reflects the degree of germination as follows: score 1 - almost no sprouting; score 2 - very poor germination; score 3 - low germination; score 4 - partial germination; score 5 - acceptable germination; score 6 - relatively uniform germination; score 7 - very good germination; score 8 - excellent germination; score 9 - exceptional germination and total coverage.

Statistical analysis of the data was performed using the ANOVA method, with significance determined by the Least Significant Difference (LSD) test.

RESULTS AND DISCUSSIONS

The establishment rate was determined immediately after sprouting began, at 20, 25, 30, and 90 days after sowing, based on visual assessments using the NTEP (National Turfgrass Evaluation Program) rating scale.

Twenty days after sowing, the fastest emergence was observed in the control variant, a₁ – Speedy Green (100% *Lolium perenne*), with an average score of 6.67, serving as the reference standard for the other variants. a₇ – Turf Clover (100% *Trifolium repens*) established nearly as quickly as the control, scoring 6.33. In contrast, a₅ – Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*) exhibited the slowest establishment rate, with a score of 2.33, which was significantly lower but ultimately resulted in a dense and resilient lawn. The other mixtures showed slower establishment compared to the control (table 1).

Twenty-five days after sowing, the fastest establishment was again observed in the control

variant, a_1 – Speedy Green (100% *Lolium perenne*), with an average score of 7.00, followed by a_7 – Turf Clover (100% *Trifolium repens*), which scored 6.67, the difference being statistically insignificant. At the opposite end, the slowest establishment was recorded in a_5 – Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*), which achieved a score of 2.67, representing a highly significant reduction (table 2).

Thirty days after sowing, the best establishment was observed in the control variant, a_1 – Speedy Green (100% *Lolium perenne*), with a score of 7.33. This was followed by a_7 – Turf Clover (100% *Trifolium repens*), which scored 6.67. The establishment rate of a_7 was close to that

of the control, with no statistically significant difference a_5 – Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*) achieved a score of 3.33, representing a difference of -3.67 compared to the control, which is highly significant (table 3).

Ninety days after sowing, the highest establishment rate was observed in a_7 – Turf Clover (100% *Trifolium repens*), which scored 8.00. The lowest establishment rate at this stage was recorded for a_5 – Resilient Blue Lawn (25% *Lolium perenne* + 45% *Festuca trichophylla*, *Festuca rubra rubra*, *Festuca rubra commutata* + 30% *Poa pratensis*), which achieved a score of 6.67, representing a highly significant reduction of -1.00 compared to the control (table 4).

Table 1

The rate of turf establishment 20 days after sowing

* Lp- *Lolium perenne*; Pp- *Poa pratensis*; Fr- *Festuca rubra*; Ft- *Festuca trichophylla*; Frr- *Festuca rubra rubra*;

Variant*	Installation rate	Difference		Significance
	note	note	%	
	Control: a ₁ - Speedy Green (100% Lp)			
a ₁ - Speedy Green (100% Lp)	6.67	Control	100	Control
a ₂ - SuperSport (50% Lp+50% Pp)	4.00	60.0	-2.67	ooo
a ₃ - RPR Sport (50% Lp RPR+50% Lp)	5.33	80.0	-1.33	oo
a ₄ - Bar Power RPR (30% Lp RPR+25% Lp+ 30% Frc+15% Fr)	3.67	55.0	-3.00	ooo
a ₅ - Resilient Blue Lawn (25% Lp + 45% Ft,Frr, Frc + 30% Pp)	2.33	35.0	-4.33	ooo
a ₆ - Resilient Blue Sport (30% Pp cu YJWM + 46% Lp+ 24% Lp RPR)	5.00	75.0	-1.67	ooo
a ₇ - Turf Clover (100% Tr)	6.33	95.0	-0.33	-
	LSD 5%	0.84		
	LSD 1%	1.18		
	LSD 0.1%	1.66		

Frc-Festuca rubra commutate; Tr-Trifolium repens

Table 2

The rate of turf establishment 25 days after sowing

Variant*	Installation rate	Difference		Significance
	note	note	%	
	Control: a ₁ - Speedy Green (100% Lp)			
a ₁ - Speedy Green (100% Lp)	7.00	Control	100	Control
a ₂ - SuperSport (50% Lp+50% Pp)	5.00	71.4	-2.00	ooo
a ₃ - RPR Sport (50% Lp RPR+50% Lp)	5.67	81.0	-1.33	oo
a ₄ - Bar Power RPR (30% Lp RPR+25% Lp+ 30% Frc+15% Fr)	3.67	52.4	-3.33	ooo
a ₅ - Resilient Blue Lawn (25% Lp + 45% Ft,Frr, Frc + 30% Pp)	2.67	38.1	-4.33	ooo
a ₆ - Resilient Blue Sport (30% Pp cu YJWM + 46% Lp+ 24% Lp RPR)	5.33	76.2	-1.67	oo
a ₇ - Turf Clover (100% Tr)	6.67	95.2	-0.33	-
	LSD 5%	0.90		
	LSD 1%	1.26		
	LSD 0.1%	1.78		

Table 3

The rate of turf establishment 30 days after sowing

Variant*	Installation rate	Difference		Significance
	note	note	%	
	Control: a ₁ - Speedy Green (100% Lp)			
a ₁ - Speedy Green (100% Lp)	7.00	Control	100	Control
a ₂ - SuperSport (50% Lp+50% Pp)	5.67	81.0	-1.33	oo
a ₃ - RPR Sport (50% Lp RPR+50% Lp)	6.33	91.5	-0.67	-
a ₄ - Bar Power RPR (30% Lp RPR+25% Lp+ 30% Frc+15% Fr)	4.00	57.1	-3.00	ooo
a ₅ - Resilient Blue Lawn (25% Lp + 45% Ft.Frr. Frc + 30% Pp)	3.33	47.6	-3.67	ooo
a ₆ - Resilient Blue Sport (30% Pp cu YJWM + 46% Lp+ 24% Lp RPR)	6.00	85.7	-1.00	o

a7- Turf Clover (100% Tr)	7.33	104.8	0.33	-
	LSD 5%	0.91		
	LSD 1%	1.28		
	LSD 0.1%	1.81		

Table 4

The rate of turf establishment 90 days after sowing

Variant*	Installation rate	Difference		Significance
	note	note	%	
	Control: a ₁ - Speedy Green (100% Lp)			
a ₁ - Speedy Green (100% Lp)	7.67	Control	100	Control
a ₂ - SuperSport (50%Lp+50%Pp)	7.00	91.3	-0.67	o
a ₃ - RPR Sport (50% Lp RPR+50% Lp)	7.33	95.7	-0.33	-
a ₄ - Bar Power RPR (30% Lp RPR+25% Lp+ 30% Frc+15% Fr)	7.00	91.3	-0.67	o
a ₅ - Resilient Blue Lawn (25% Lp + 45% Ft .Frr. Frc + 30% Pp)	6.67	87.0	-1.00	oo
a ₆ - Resilient Blue Sport (30% Pp cu YJWM + 46% Lp+ 24% Lp RPR)	7.33	95.7	-0.33	-
a ₇ - Turf Clover (100% Tr)	8.00	104.3	0.33	-
	LSD 5%	0.63		
	LSD 1%	0.89		
	LSD 0.1%	1.26		

CONCLUSIONS

Observing the germination dynamics, it is evident that a₁ and a₇, represented by *Lolium perenne* and *Trifolium repens*, respectively, are characterized by a rapid and uniform establishment rate. Even within the first 20 days after sowing, they achieved scores above 6, ensuring optimal turf density due to their favorable biological traits. Over the entire 90 day observation period, these variants maintained the highest performance, with final scores of 7.67 for a₁ and 8.00 for a₇.

The study data indicated that mixtures with a high proportion of *Festuca spp.* and *Poa pratensis* exhibited noticeably slower establishment, which reduced the rate of ground coverage, promoted weed emergence, and increased water losses through evapotranspiration. The most pronounced effects were observed in a₅, which showed a consistently slowed establishment process throughout the observation period, with scores of 2.33 at 20 days and 3.33 at 30 days.

In the long term, mixtures with slower establishment, resulting from the biological characteristics of their component species, provide good turf density and resistance (scores of 6.67 for a₅ and 7.0 for a₄ at 90 days after sowing). These

mixtures are therefore suitable for areas subject to moderate or heavy traffic and for more challenging environmental conditions.

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