What About Those Perennial Ryegrasses?

by VICTOR A. GIBEAULT, EDWARD JOHNSON, JOHN VAN DAM, KEN GOWANS AND DEAN DONALDSON*

Perennial ryegrass *(Lolium perenne L.)* is a cool season species that in the past has been established in regions characterized by mild winters and cool moist summers. In these areas ryegrass was used where quick establishment was needed and/or a fairly coarse texture could be tolerated. Recently, plant selection and breeding within the species has resulted in several improved plant types for turf use. These varieties, or cultivars, have resulted in an increased adaptation range and usage potential for the species.

Before getting into a discussion of California trials on varietal performance, it is important to understand the species in the context of growth responses. It is from this understanding that decisions on grass selection and management can be made.

Growth Response

Optimum germination will be achieved at moderate temperatures, however perennial ryegrass is characterized by a fairly wide temperature range under which the seed will germinate. Under ideal conditions, seedling emergence can be expected in three to five days. The rapid emergence and stand maturation may account for the often observed suppression of annual bluegrass *(Poa annua)* and other weeds common to newly established turfgrass swards. This will be discussed in some detail later.

The optimum temperature for top growth of perennial ryegrass is between 68 and 77 degrees Fahrenheit. Significant top growth can occur at relatively low temperatures, however growth slow down and potential injury usually occur above 90 degrees. The growth rate responses, based on the temperatures given, will determine the mowing frequency required. Mowing of the older ryegrass varieties in general is difficult because of extensive fibers in the leaves. High temperatures increase the amount of these fibrous tissues, thereby increasing the toughness and mowing difficulty.

The top growth of perennial ryegrass, like all other turfgrass species, is greatest in full sunlight. Ryegrass is comparable to Kentucky bluegrass in both light requirement and shade tolerance. The shade tolerance of turfgrass species is as follows:

SHADE TOLERANCE

Shade ↓ Sun

- Red fescue
- Zoysia
- St. Augustine
- Dichondra
- Colonial bentgrass
- Tall fescue
- Creeping bentgrass
- Meadow fescue
- Kentucky bluegrass
- Perennial ryegrass
- Improved bermudas
- Common bermuda

Tiller production of perennial ryegrass is similar to other cool season species. Maximum tillering occurs when moderate day lengths and cool temperatures of spring and fall prevail. Negligible tillering occurs in the summer months. Tillering is increased following nitrogen applications in the fall and spring. However, this management practice will not improve tillering during the summer.

Optimum soil temperature for root growth is 50 to 60 degrees Fahrenheit. Rate of root growth decreases rapidly as temperatures increase above the optimum.

Perennial ryegrass is moderately tolerant to soil salinity, showing little reduction of growth at salt levels below 8 mmhos. The accompanying list shows the relative position of perennial ryegrass in comparison with other commonly used turfgrass species regarding salinity tolerance.

SALINITY TOLERANCE

High ↓ Low

- Improved bermudas
- Common bermuda
- Creeping bentgrass
- Zoysia
- St. Augustine
- Tall fescue
- Perennial ryegrass
- Meadow fescue
- Red fescue
- Kentucky bluegrass
- Colonial bentgrass
- Dichondra

*Environmental Horticulturist, University of California Agricultural Extension, Riverside; Farm Advisor, San Mateo County; Farm Advisor, Los Angeles County; Ken Gowans (formerly area Farm Advisor, East San Francisco Bay); and County Director, Napa County, respectively.

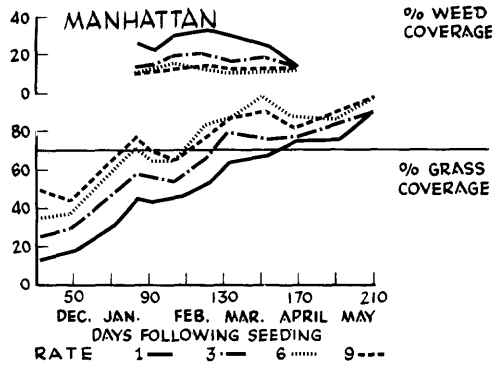


Figure 1.

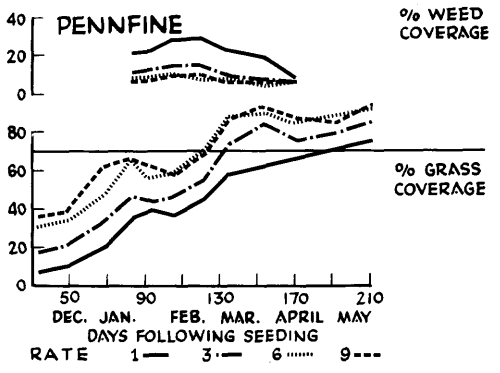
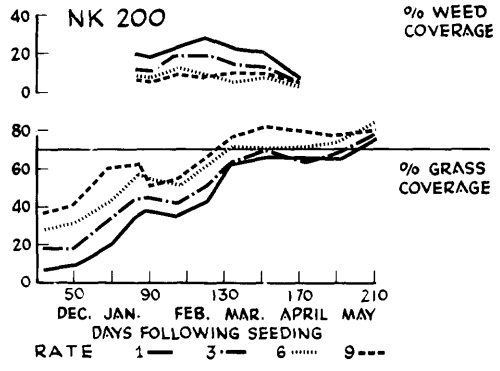


Figure 2.



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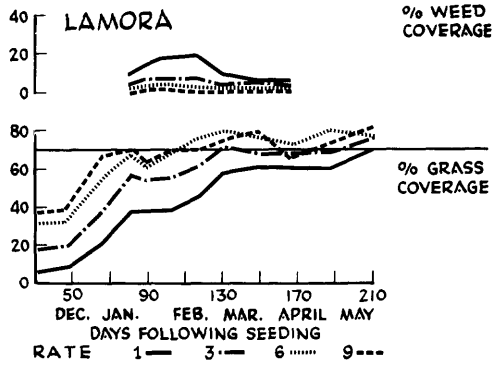


Figure 4.

It has been the objective of a series of California trials to evaluate the performance characteristics of the turf-type perennial ryegrass cultivars. For purposes of this discussion, the results obtained relative to seeding rate, cutting quality, and overseeding will be presented.

Seeding Rate Study

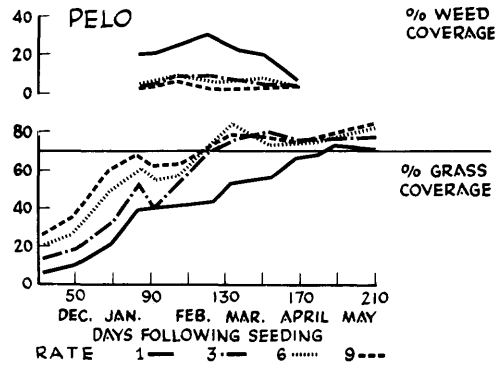
Currently, the seeding rate for all varieties of perennial ryegrass is suggested in the 6 to 12 pounds per 1,000 square foot range. Observation of stands of the newer varieties indicate that a lesser seeding rate, with considerable economic implications, may be in order. Unfortunately, observations in this regard are the only information available at present. Therefore, a trial was established at the University of California Deciduous Fruit Field Station, San Jose, in the fall of 1972. It was the objective of this study to evaluate seeding rates of 1, 3, 6 and 9 pounds per 1,000 square feet of the varieties Manhattan, Pennfine, Pelo, NK-100, NK-200, Lamora and Common.

The site at the field station was prepared in the normal manner for turf establishment. The soil was a loam with pH 7.3 and had a low electrical conductivity reading. Phosphorus and potassium levels were adequate. Each variety at each seeding rate was hand sown to 5 by 20 foot plots and the plots were replicated four times. Maintenance following establishment consisted of mowing (at 1½ inches), irrigation (to maintain an adequate water balance), and monthly fertilization with ammonium sulfate.

The most important measurements taken to realize the objectives of this trial included per cent turfgrass cover and per cent weed invasions at regular intervals. The results obtained are presented in Figures 1-7. Each graph illustrates the per cent grass and weed coverage over time. The horizontal line at 70 per cent grass coverage indicates a mature, fully useable turf sward.

Regarding time to 70 per cent grass coverage, it can be noted that at the higher seeding rates, NK-100, Lamora and Common were the fastest varieties to establish. With all varieties, there was little difference between the 6 and 9 pound rate. With most varieties, the 3 pound rate established slower than the 6 and 9 pounds treatment and the 1 pound rate was slower than the 3 pound seeding rate.

The results of the 1 pound seeding rate are best noted in the per cent weed readings. As is shown, there was a considerably greater weed stand in all varieties seeded at the 1 pound rate. The weed amount decreased significantly with the 3, 6 and 9 pound rates (note exception NK-200 at 3 pounds).



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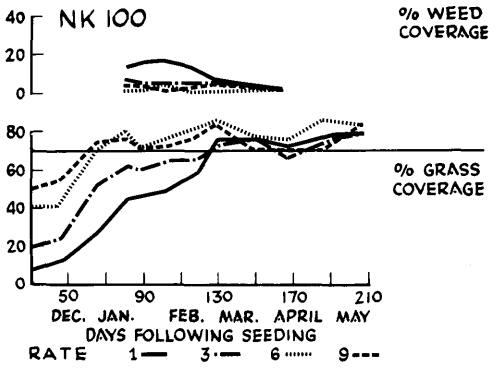

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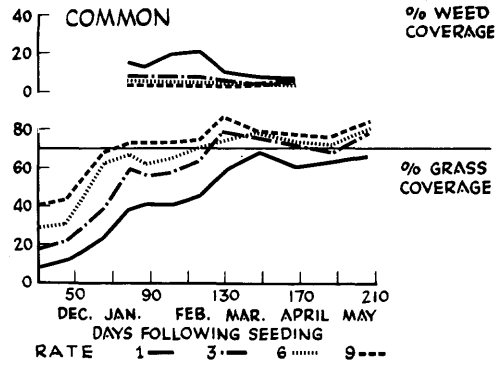

Figure 7.

Following maturation of the above described seeding rate study, visual observations were made during early summer, 1973, on the cutting quality of the seven varieties at the four seeding rates. The results of a June reading are given in Table 1. The rating is based on a 0 to 10 scale with 0 representing poor cutting quality (severe shredding of leaf blades) and 10 representing a clean leaf cut.

It should be noted that environmental conditions (high temperature) and management practices (rotary mower, relatively low nitrogen rates), accentuated the cutting quality observations that are reported.

As Table 1 indicates, the seeding rate had no effect on the cutting quality of the varieties Manhattan, Pennfine, NK-200 and Common. Common perennial ryegrass consistently showed poor cutting quality. The cutting quality of Lamora, NK-100 and Pelo improved as seeding rate increased.

To summarize these results, it was found that: 1) There is little reason to seed the perennial ryegrass varieties at a rate greater than 6 pounds per 1,000 square feet for optimum establishment; 2) A 3 pound seeding rate will result in a good sward with adequate weed competition, however, the turf will take longer to mature (note exception of NK-200 which would require 6 pounds per 1,000); 3) The 1 pound seeding rate appears inadequate unless a slow maturing, weedy, possibly "bunchy" turf can be tolerated; 4) The cutting quality of Manhattan, Pennfine, Lamora and Common is not influenced by seeding rate whereas the seeding rate does influence the appearance following mowing with Lamora, NK-100 and Pelo.

Overseeding Study

In areas of California where common bermuda grass is used, an overseeding with a cool season species (usually annual ryegrass) is a common practice to enchance winter appearance. Recently, an increased use of perennial ryegrass has occurred, mainly because of the availability of the newer varieties. Unfortunately, little quantitative information is available for the new varieties, especially regarding their persistance past the first overseeding season as influenced by high summer temperatures.

Table 1. Cutting Quality of Seven Perennial Ryegrass Varieties at Four Seeding Rates (0 = Very Poor; 10 = Excellent)

Seeding Rate	Varieties						
lbs./1000 sq. ft.	Manhattan	Pennfine	Lamora	NK-100	NK-200	Pelo	Common
1	6.25 N.S.**	7.00 N.S.	3.75 Z*	1.25 Z	6.00 N.S.	3.00 Z	1.75 N.S.
3	7.00	8.25	4.75 YZ	3.00 Y	7.00	4.25 YZ	1.00
6	6.50	8.50	6.25 X	4.00 XY	6.50	4.25 YX	2.00
9	6.50	8.50	6.00 XY	5.25 X	6.25	5.25 Y	1.75

* Values followed by the same letter are not significantly different at the 5% level.

** Not significant.

Therefore, a trial was conducted on a lawn area at Cal-Tech, Pasadena; summer temperatures in this area frequently exceed 95 degrees for extended periods.

Six commercially available and two experimental perennial ryegrass varieties (as given in Table 2) were overseeded to a common bermudagrass sward that had been moderately scalped, verticut and swept clean of debris. Seeding was performed on October 30, 1970. Except for the checks which were not seeded, each 5 feet by 10 feet plot was seeded at the rate equivalent to 10 pounds per 1,000 square feet. Each variety treatment was replicated four times and the plots were arranged in a completely randomized design. The experimental area was irrigated frequently until initial establishment of the ryegrasses was complete; thereafter the normal irrigation schedule for the campus turf areas was followed. A month following establishment the plot area was fertilized with a 16-8-8 fertilizer (1 pound N/1,000 square feet) and then fertilized on a three-times-a-year schedule. The area was mowed at regular intervals at a cutting height of approximately 1¾ inches. No other primary or secondary management practice was given for the duration of the test.

The plots were observed periodically for general turf appearance and per cent ryegrass. The turf score rating is a visual score based on appearance of the sward. A 0 represents a completely dead turf while 10 represents an ideal turf stand of uniform density, texture, color, etc., of the desired species mixture. Those plots considered dormant because of little or no ryegrass present are so indicated.

As is shown in Table 2, all varieties gave good cover the first overseeding season and there was little difference in appearance. Following the first summer, the per cent stand in the winter of '71-'72, of K9-123, K9-124, NK-100, NK-200, Pelo and Common decreased as did the turf scores. Manhattan and Pennfine continued as desirable overseeded grasses. The same trend was observed in the winter of '72-'73. By the winter of '73-'74, all varieties, with the exception of Manhattan and Pennfine, had decreased to the level that they had no aesthetic value. Manhattan and Pennfine continued to give good cover as is shown in Table 2. It was concluded from this study that the varieties Manhattan and Pennfine were better able to uniformly survive high temperature stress and bermudagrass competition for an extended period of time.

Conclusions

The release of new turf type perennial ryegrass varieties offers a greater use potential for this species both as a primary turf and for overseeding purposes. The improved texture, density, color and cutting quality assures a desirable turfgrass sward in areas where the species/variety is adapted and where it is managed correctly. The trial results presented herein indicate that a 6 pound per 1,000 square feet seeding rate is adequate for all varieties; that a 3 pound rate can be used with good weed competition (except NK-200) but the turf will take longer to mature; that the cutting quality of Manhattan, Pennfine, Lamora, and Common is not influenced by seeding rate whereas the seeding rate does influence the appearance following mowing with Lamora, NK-100 and Pelo; and the varieties Manhattan and Pennfine seem better able to tolerate high summer temperatures and bermudagrass competition to give a more permanent cool season-warm season species mixture.

Appreciation

Appreciation is extended to Northrum King and Company, Berger and Plate Company, and Germains Incorporated for the seed donated for these trials. The cooperation of the personnel at Cal Tech, Pasadena, and the San Jose Field Station is also appreciated.

Table 2. The per cent perennial ryegrass and turf scores of eight varieties at three observation dates following an October, 1970, overseeding.

		Per cent Ryegrass			Turf Scores	
Cultivar	3-17-71	2-16-72	12-12-73	3-17-71	2-16-72	12-12-73
K9-123	↑	38 a*	22 b	7.1 bc	3.5 ab	3.9
K9-124		48 abc	2 a	7.1 bc	5.0 bc	Dormant
NK-100		50 abc	18 ab	7.6 bc	5.7 c	4.0
NK-200		60 bc	6 ab	7.2 bc	6.2 c	Dormant
Pelo		44 ab	16 ab	6.8 bc	4.5 abc	3.9
Manhattan	90% cover	88 c	79 c	7.7 c	9.0 d	7.1
Pennfine		82 d	83 c	7.2 bc	8.0 d	6.5
Common		64 c	20 a	6.7 b	5.0 bc	4.2
Check	↓	-	-	Dormant	Dormant	Dormant

* Values followed by the same letter are not statistically different at the 5 per cent level.