

## Annual Ryegrass

### Forage Management in the Mid-Atlantic



Annual ryegrass (*Lolium multiflorum* Lam.) is a cool-season annual bunchgrass native to southern Europe. It is closely related to perennial ryegrass (*Lolium perenne* L.), and both species share a wide distribution throughout the world, including North and South America, Europe, New Zealand, and Australia. Annual ryegrass is not to be confused with cereal rye (*Secale cereale* L.). For the

purpose of this publication, the term “ryegrass” will refer to the multiflorum specie or annual ryegrass only, unless stated otherwise.

Annual ryegrass is a highly adaptable short duration grass. It can be established without seedbed preparation, grows in a wide range of soil types, persists across a range of environmental conditions, and tolerates abuse by both livestock and the producer. While it is



widely utilized in many situations where a quick grass cover is required, its high palatability and digestibility make annual ryegrass highly valued as forage in livestock production systems.

The primary region that grows annual ryegrass for forage is from central Texas east to the Atlantic Coast in hardiness or temperature zones 8 and 9 where average minimum temperatures are above 10°F. Additional acreage extends northward into zone 7. In these areas, annual ryegrasses are generally seeded into warm season grass near the fall dormant period. The ryegrass germinates and grows throughout the winter months into the spring until hot weather brings on ryegrass senescence and initiates warm-season grass growth. The forage production curve of the winter ryegrass growth peaks from mid-winter into the spring months, traveling from south to north in this southern ryegrass range.

Although annual ryegrass has been grown in the Maryland area as a quick cover for lawns and construction sites for decades, its forage use is new. A dairyman in West Virginia seeded an annual ryegrass variety in the late summer of 1995. It acted like a winter annual, growing through the fall months, going dormant over winter, and resuming growth in the spring. Its successful forage production into July of 1996 prompted a Washington County, Maryland, dairy farmer to seed several fields in early October 1996. The grazing and haylage harvest of this crop was well documented in 1997 (2). In 1998 grazing and haylage harvests were documented on six Washington County farms (3). In addition, annual ryegrass varieties have been tested under intensive grazing and mechanical harvest systems at the Western Maryland Research and Education Center (WMREC) in 1998 and 1999 (4,5). It should be noted that annual ryegrass plot-

work has not yet been subjected to severe winter conditions and its cold hardiness is still in question.

## Seeding Methods and Situations

Annual ryegrass' ability to produce a vigorous seedling lends it to a variety of seeding methods into a number of forage cropping systems.

Following southern recommendations, a seeding rate of 30 pounds per acre has provided satisfactory results in numerous on-farm and research farm situations. It should be noted that annual ryegrass varieties will differ in seed size and density. This fact will require producers to adjust seeding rates and drill calibrations slightly from variety to variety.

Some producers, particularly on dairy farms utilize higher seeding rates of 40 pounds (1) or even 50 pounds. These increased seeding rates will produce more dense stands which can be used for either grazing or haylage harvest.

Due to its small seed size, annual ryegrass seedings are either broadcast on the surface or no-tilled at a  $\frac{1}{4}$ -inch depth. Under favorable conditions, germination can be expected in five to seven days.

Most annual ryegrass seedings in the south are made into perennial warm-season grass sod. In this area, annual ryegrass should not be seeded into live cool-season grass stands. Ryegrass will not compete effectively with an established cool-season perennial grass. However, in thin or poor perennial grass stands, annual ryegrass may be broadcast or no-tilled after the perennial grass is suppressed or destroyed with Gramoxone or Roundup.

Annual ryegrass can be seeded into established alfalfa by broadcasting seed or no-tilling. Seedings should be made immediately after the alfalfa cutting in late August or early September.

If the field to be seeded is cultivated by plowing or disking, the seed bed should be firmed. The seeding may then be made by

broadcasting the seed alone or blended with dry fertilizer. The field should then be cultipacked. A conventional drill cannot be used to seed annual ryegrass in a cultivated field in a normal manner due to placing the seed too deep in the drill disk furrows. However, if the conventional drill is used in the raised position or if the boots are removed from the disc opening, the seed will be effectively broadcast. The field should then be cultipacked.

In this area, many annual ryegrass seedings follow corn silage harvest. Ryegrass is an effective cover crop. If no manure is to be applied, simply broadcast or no-till the seed. If applying manure with no incorporation, broadcast seed prior to manure application to improve soil contact. If manure is to be incorporated, follow recommendations for a cultivated field.

Several seedings have been made into standing corn in early summer both on-farm and at the WMREC. In summers with adequate rainfall, grass survival is good, with accelerated fall growth. In dry weather, grass stands are less than optimal but still survive as a cover crop. Research work using annual ryegrass as a relay crop in corn silage will continue at WMREC.

Annual ryegrass growth is strongly governed by temperature. Ryegrass will germinate at day/night temperatures from 59/36°F to 95/72°F. However, germination drops to 30% at the higher temperatures. Optimum germination temperatures may be correlated with optimal ryegrass growth temperatures. Annual ryegrass growth ceased when average daily temperatures decrease to less than 44°F. As average daily temperatures increased above that level, growth rate increased until reaching a peak at an average daily temperature of 65°F (1).

Timing of late summer to early fall annual ryegrass seedings must be made with its temperature requirements for growth in mind. The month of September seems to provide the best window for late summer seedings. Seedings made prior to mid-August risk delayed or depressed germination from heat. Additionally, early seedings run the risk of germinating under satisfactory conditions in



early August, then being stressed or killed by extended hot, dry conditions in late summer. Successful seedings have been made as late as mid-October in Washington County, Maryland. Seedlings need to attain 3-4 inches of growth prior to the soil freezing. Later seedings may be possible east of the Piedmont and south of Maryland.

There is limited experience with spring seeding of annual ryegrass in this area. A March seeding will provide grass growth in May and June, but dry-matter yield will be considerably less than a fall seeding. There may be potential for some annual ryegrass varieties to be spring seeded, grow through the summer without producing a seed head, overwinter, then produce a seed head the following spring similar to a biennial. More work is required to determine if this practice is possible and profitable in this area.

Due to the prolific seed production of some ryegrass varieties, it should be noted that a number of producers have managed successful volunteer seedings in alfalfa fields and annual ryegrass hay fields, in grazing situations.

## Fertilization and Harvest Management

Annual ryegrass responds vigorously to nitrogen (N) fertilization. Southern studies report maximum dry matter yields at N rates up to 250 pounds per acre (1). In this region, very satisfactory yields are obtained under intensive grazing or haylage harvest regimens using a total of 200 lbs. N. In very general terms, apply 50 lbs. N at the early September seeding. Then in the spring, apply 50 lbs. N at April 1, May 1, and June 1 for maximum growth. Manure can provide a portion of this N requirement.

Apply 50 lbs. N in a quickly available form (urea) in late March to jump-start growth. Initiate grazing when the grass is six inches tall. Under an intensive grazing system, apply another 50 lbs. N in 20-30 days or two grazing rotations. This roughly equates to the second N application by May 1 and a third application by June 1, if harvest is to be extended into early summer.

Fall seedings made before October can utilize up to 50 lbs. N to produce a fall crop to be grazed or cut for haylage by mid- to late November. Later seedings will utilize proportionately less N.

Excessive fall growth should be harvested or clipped to a 3- to 4-inch height to prevent matting under snow. Due to the continuous growth habit of annual ryegrass leaves and lack of true dormancy, matting or excessive freeze damage to grass leaves will delay or inhibit spring growth.

Under a haylage system, the best forage quality is achieved when the first cutting is harvested when the plants are in the late vegetative to early boot stage of maturity. This corresponds to an average height of 15-20 inches. Immediately apply 50 lbs. N and plan to harvest the next cutting in 20 days. Each producer will then need to decide how long to graze or cut haylage from the ryegrass before replanting the field to the next crop in a double-crop system.

Farm managers need to take some care in controlling ryegrass regrowth prior to planting the next crop. Annual ryegrass regrowth is more difficult to control than that of cereal rye. Producers have obtained good results by allowing several inches of regrowth and using Roundup at a 1½-quart rate. Post-applied grass herbicides provide effective control, also.

*NOTE!! Do not use annual ryegrass in grain production systems! It is a prolific seed producer and is a serious weed in small grains!*

## Forage Quality and Harvest Management

Annual ryegrass is an aggressive and versatile forage grass, but its real value is in its ability to produce significant yields of high quality forage. This ryegrass can be harvested as pasture, greenchop, chopped haylage, baleage or dry hay. Only top forage management will obtain optimum forage quality.

Ryegrass needs to be grazed before the grass begins the jointing phase of development. Ryegrass is best managed under a

management intensive grazing system. Initiate grazing when the grass is six inches tall and move animals quickly. Expect to maintain a 10- to 12-day rotation to achieve top forage quality. The key is to keep the grass in a vegetative growth state as long as possible. Following are examples of pasture forage samples (3).

Date	CP <sup>a</sup>	ADF <sup>b</sup>	NDF <sup>c</sup>	NEL <sup>d</sup>	RFV <sup>e</sup>
4-3	20.5	23.5	46.9	.76	140
5-14	13.6	29.0	47.8	.73	129
6-2	16.3	31.8	59.5	.69	100

<sup>a</sup>crude protein; <sup>b</sup>% acid detergent fiber; <sup>c</sup>% neutral detergent fiber; <sup>d</sup>net energy for lactation (Meal/lb.); <sup>e</sup>relative feed value

Protein analysis is very sensitive to plant maturity. Delayed grazing can reduce protein content by as much as a percentage point every day or two, especially under less than optimum N fertilization. This is noted in the following example where the first spring N application was delayed until after the first grazing rotation (3).

Date	CP <sup>a</sup>	ADF <sup>b</sup>	NDF <sup>c</sup>	NEL <sup>d</sup>	RFV <sup>e</sup>
4-8	11.6	21.1	35.6	.82	189
4-20	26.4	21.8	42.8	.81	156

<sup>a</sup>crude protein; <sup>b</sup>% acid detergent fiber; <sup>c</sup>% neutral detergent fiber; <sup>d</sup>net energy for lactation (Meal/lb.); <sup>e</sup>relative feed value

This example also clearly shows that although protein content is important, it is the energy (the digestibility of the plant's sugars, pectins, and fiber fractions) that makes this grass such a valuable forage. Livestock producers, dairymen in particular, need to be reminded that animal performance is determined by the forage energy content.

Annual ryegrass can be grazed through July under good management and adequate moisture. However, expect the forage quality needed to support 60-70 pounds of milk production to be lacking by sometime in June depending upon weather conditions. June and July pasture forage will adequately support dairy dry cow and heifer growth, and beef cow and stocker growth.

Haylage harvest should be initiated when the ryegrass is in the early boot stage of maturity. Ryegrass is approximately 15-20 inches tall at this stage. With proper N fertilization expect a cutting every 20-25 days. As an example, if the first cutting is taken April 15, the second cutting is May 5 and the third by May 25 or so. Following are the analyses of haylage cuttings two, three, and four from a farm in 1998 (3).

Date	CP <sup>a</sup>	ADF <sup>b</sup>	NDF <sup>c</sup>	NEL <sup>d</sup>	RFV <sup>e</sup>
4-23	19.7	24.7	42.1	.81	154
5-14	21.	31.5	51.1	.69	117
6-3	23.5	29.4	51.4	.72	120

<sup>a</sup>crude protein; <sup>b</sup>% acid detergent fiber; <sup>c</sup>% neutral detergent fiber; <sup>d</sup>net energy for lactation (Meal/lb.); <sup>e</sup>relative feed value

This grass makes highly palatable hay under good drying conditions in late May or into June. This is the only grass that can be seeded in this region in the fall and make two cuttings of hay by July. Following are two dry hay forage analyses (3).

Date	CP <sup>a</sup>	ADF <sup>b</sup>	NDF <sup>c</sup>	NEL <sup>d</sup>	RFV <sup>e</sup>
5-28	10.0	38.2	62.7	.62	92
6-24	11.0	33.1	57.7	.68	102

<sup>a</sup>crude protein; <sup>b</sup>% acid detergent fiber; <sup>c</sup>% neutral detergent fiber; <sup>d</sup>net energy for lactation (Meal/lb.); <sup>e</sup>relative feed value

## Summary

Annual ryegrass is a new forage crop in the mid-Atlantic region. Its usage has grown quickly due first to forage shortages and secondly due to its forage quality and adaptability to a variety of forage production systems. It has been utilized successfully as a cover crop and double crop after corn silage and other summer annual forages. Mediocre bluegrass pastures and older alfalfa fields have had their yields and forage quality boosted by the addition of annual ryegrass. It is a winter annual crop. A late summer seeding will actively grow through September and October with the growth curve slowing and stopping in November. An early September seeding can be harvested in November for pasture or haylage. Spring growth is rapid in April and May, declining through June into July. Intensive management will produce total dry matter yields of three tons or more.

Information on variety selection is very limited at this time. Ryegrass responds to N fertilization. Fifty pounds of N at the September seeding and an additional 50 lbs. N prior to April 1 then by May 1 and again by June 1 will provide maximum response. This maximum N application rate is adjusted downward based on manure application and management requirements.

Producing a high quality forage is the real value of annual ryegrass. In a pasture system, initiate grazing early when grass growth is 6 inches and plan a 10- to 12-day rotation. For haylage, take the first cut at 15-20 inches and plan a 20- to 25-day harvest schedule. Top forage yield and quality requires intensive management.

Annual ryegrass should not be used in grain production systems. It is an aggressive grass that reseeds readily and can be a serious weed in small grains.

Further research is being conducted at WMREC with annual ryegrass. This includes variety plots, winter hardiness, and the use of annual ryegrass as a cover crop following corn silage.

For further information on the use of annual ryegrass for forage production in the mid-Atlantic, please contact the authors.

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