

University of Missouri Extension

G4511, Reviewed October 1993

Orchardgrass

Jimmy Henning and Norman Risner
Department of Agronomy

Orchardgrass (*Dactylis glomerata* L.) is a bunch-type, tall-growing, cool-season perennial grass. It is one of the most productive cool-season grasses, tolerant to shade, fairly drought resistant with moderate winter hardiness. Orchardgrass does not exhibit as much tolerance to drought or winter hardiness as tall fescue and brome grass. It has been reported growing in the United States since before 1760.

Adaptation

Orchardgrass is well adapted throughout Missouri, but its persistence may be a problem on south slopes in the droughty shallow soils of the Ozark Mountains. However, new disease-resistant varieties and good management techniques should help maintain high-producing stands for several years, even in the more shallow soils in south Missouri.

Orchardgrass is well adapted to grow with legumes such as alfalfa, red clover, lespedeza and white clover. It establishes more easily than brome grass or timothy when seeded with other species. Stands will be more productive and last longer than brome grass or timothy when grown with alfalfa that is cut frequently and heavily fertilized.

Orchardgrass will persist and make reasonable yields on soils that have moderately poor drainage. However, it will not tolerate wet areas as well as reed canarygrass or tall fescue.

Growth characteristics

Orchardgrass is fast-growing and matures very early in the spring. There are some varietal variations but, in general, orchardgrass matures about one week earlier than tall fescue and about two weeks before smooth brome grass. It also regrows quickly after harvest, making it well suited for seeding with frequently harvested alfalfa. It produces less fall growth than tall fescue under similar growing conditions. The bunch-type growth characteristic and shade tolerance combine to make orchardgrass well adapted to grow with competitive tall growing legumes such as alfalfa and red clover. In a three-year shade tolerance study, yield and stand were not affected by reducing light by 33 percent.

Orchardgrass is easy to establish and has a more dense root system than smooth brome grass, timothy or bluegrass. It grows on a wide range of soil types, doing well in low-fertility soils, but also responding well to high-fertility soils. One undesirable trait is that forage quality of spring growth declines rapidly as maturity increases. However, orchardgrass re-growth, which is mostly leaves, is very high in quality. Temperatures above 80 to 85 degrees Fahrenheit will greatly reduce the growth and tillering of orchardgrass. That means that summer productivity is less than in spring and fall.

Establishing a stand

Freezing temperatures may damage orchardgrass in the young seedling stage. Thus, fall seedings should be made about 45 days before the first killing frost (usually about 27 to 28 degrees Fahrenheit) so seedlings can develop well enough to survive the winter. For this reason, fall seedings are not recommended in the northern one-third of the state. Late August to early September are considered best fall seeding dates in most of the state, with mid-September seedings satisfactory in the extreme southern areas. Spring seedings should be successful if made in late March to early April in the southern part of the state, and most of April is considered satisfactory in north Missouri.

A clean, firm seedbed is important to help plants make a more vigorous early growth and resist winter heaving. Orchardgrass may be seeded with fly-resistant wheat in south Missouri, seeded with spring oats in north Missouri or interseeded with winter wheat in early spring. Competition from small grains should be reduced by using them for pasture, hay or haylage.

Buying a certified variety gives the best assurance of obtaining quality seed. The minimum specifications for certified orchardgrass seed are 85 percent purity and 80 percent germination. Eight pounds of clean, high germination seed is usually adequate to obtain good stands of orchardgrass. A pound of orchardgrass seed will contain about 645,000 seeds, roughly 2-1/2 times the number of seeds in one pound of tall fescue.

Most Missouri orchardgrass is seeded with a companion legume as shown in the accompanying table. The following seeding rates in pounds per acre should be considered as minimums.

Table 1

Minimum seeding rates in pounds per acre

	Bulk	Pure Live Seed
Alfalfa	10	8
Orchardgrass	6	4
Or		
Red clover	8	7
Orchardgrass	6	4
Ladino clover	1	1
Orchardgrass	6	4
Or		
Lespedeza	15	12
Orchardgrass	6	4

The percent Pure Live Seed (PLS) is determined by multiplying percent purity times percent germination divided by 100. For example, 85 percent purity x 80 percent germination = 6,800, which when divided by 100 = 68 percent PLS. In this example, 10 pounds of bulk seed would deliver 6.8 pounds of Pure Live Seed.

Seeding methods

Drilling orchardgrass and the companion legume seed is preferred. The use of drills, such as the Brillion type or grain drills, will usually result in better stands at the same seeding rate, more controlled seeding depth and better seed distribution than broadcasting. Good results are obtained with grain drills when orchardgrass is put through the grain box and the companion legume is seeded from the small legume box. The legume seed

should be allowed to drop straight to the ground to prevent covering too deep. Drag chains on the drill will cover the seed adequately. Pull a cultipacker or light roller over the field to give good seed-to-soil contact and promote more vigorous seedling growth.

Seedings of orchardgrass can also be made with broadcast equipment such as fertilizer trucks, buggies or tractor-mounted distribution. Broadcast equipment will not throw orchardgrass seed as far as it will throw fertilizer or heavier seeds such as fescue. To help avoid uneven stands, drive the equipment close enough to overlap the previous spread pattern to ensure even seed distribution. Orchardgrass seed should be covered with about 1/4 to 1/2 inch of soil. Spike tooth harrows or "brush type" drags make good tools for covering broadcast seed. The use of a cultipacker or lightweight roller is very important for the same reasons cited above.

Fertilizer and lime

Establishment

Take a good soil sample and follow soil test recommendations for lime and fertilizer when seeding orchardgrass or grass-legume mixtures. Best results occur after incorporating recommended limestone in advance of final seedbed preparation. Companion legumes will require lime applications to be worked into the soil at least six months preceding planting. This is especially true when preparing soils with high lime requirements or when alfalfa will be in the forage mixture. Orchardgrass is more tolerant of acid soils than timothy or brome grass but will respond to limestone that is applied for a companion legume.

Phosphorus is very important for good root development. When soils are extremely low in phosphorus (10 pounds P or less), it is a good practice to apply and incorporate the major portion of recommended phosphorus, then apply some as a starter. Band seeding with some phosphorus-starter fertilizer markedly improves seedling vigor of grasses or grass-legume mixtures. Soil test recommendations for establishment of orchardgrass or orchardgrass-legume mixtures will normally require 20 to 30 pounds N, 50 to 120 pounds P₂O₅ and 40 to 60 pounds K₂O per acre.

Production

Orchardgrass and orchardgrass-legume mixtures have high yield potentials. Various studies have shown that orchardgrass will respond to high levels of fertility.

The following fertility practices should be applied to realize the top potential of pure stands of orchardgrass. Soil test reports should be used as a guide in determining rates of N, P₂O₅ and K₂O to apply for desired yield goals. In the absence of a soil test, 80 to 120 pounds N plus 40 to 60 pounds P₂O₅ plus 100 to 140 pounds K₂O should be used. When using the heavier rates of N, apply 65 to 70 percent of the N with the winter application. The remainder of the N should be applied immediately after the first cutting in August to encourage late summer growth. Make the winter application of fertilizer from early February to about mid-March in south Missouri and about two weeks later in the northern part of the state.

Normally, the top annual yields in south Missouri will range from 2-1/2 to 3 tons per acre. North Missouri yields may reach 3 to 4 tons per acre due to better moisture-holding ability of soils and slightly lower temperatures. Yields of orchardgrass can be seriously reduced by high temperatures, low moisture supplies and the presence of plant diseases.

Nitrogen fertilizer should not be applied when the stand contains 30 percent or more of alfalfa, red clover or ladino clover. Mixtures of orchardgrass alfalfa will remove about 10 to 12 pounds of P₂O₅ and 35 to 45 pounds of K₂O for each ton of forage. Potassium fertility is especially important when orchardgrass is grown with alfalfa and should not be allowed to become limiting. Orchardgrass competes vigorously with alfalfa for potassium, potentially reducing the yield and persistence of alfalfa.

Management

Orchardgrass produces heavy growth during April and May. This growth can be used for pasture, hay, greenchop or silage. Graze it heavily or mechanically harvest it early to promote high yields of high quality forage.

Pasture management

When managed properly, orchardgrass will produce excellent results in pasture programs for dairy and beef. Properly managed orchardgrass plants will have a higher leaf-to-stem ratio than tall fescue. Several research studies have demonstrated higher animal intake and better animal performance from orchardgrass pasture as compared with tall fescue pasture, especially during spring and early summer. During a three-year study in Missouri, yearling steers gained 1.75 pounds per day on orchardgrass pasture, 1.16 pounds on tall fescue and 1.84 pounds on bromegrass. In the study, the carrying capacity of orchardgrass was well above bromegrass and slightly less than fescue. In a similar study involving cow/calf pairs, calves gained 1.80 pounds per day on orchardgrass and 1.51 pounds per day on fescue.

Mixtures of orchardgrass and clover (red or ladino) are very popular for pasture in Missouri. Rotational grazing with heavy stocking rates of cattle will give better animal performance and reduce spot grazing. If plants are continually grazed short, they will be weakened and stands may be depleted. Close grazing can be especially detrimental during hot weather. Heavy grazing of orchardgrass during October can decrease carbohydrate storage and lead to some winter kill of plants. Stands of orchardgrass will often be more persistent when grown with a companion legume.

Management for hay

Orchardgrass will produce excellent yields when grown in pure stands or with legumes. When using pure stands for hay, it is imperative that nitrogen be applied in combination with adequate phosphorous and potassium.

Harvesting the spring growth of orchardgrass at late-boot to early-head stage will produce higher quality forage than allowing the plant to mature further. This early harvest will also help increase yield of high quality re-growth. Forage researchers and several Missouri farmers have observed less damage to plants from summer heat and drought when the first harvest is made early and plants have time to re-grow before the stress. Some south Missouri farmers have reported almost 100 percent loss of stands when harvest was delayed to the late bloom stage. This can be more of a concern when late harvest is followed by high temperatures and low moisture supply.

As with close grazing, close cutting can lead to stand reduction. Harvesting at a height of four inches will help maintain strong root reserves, leading to fast recovery of re-growth and better stand persistence. Mixtures of orchardgrass with alfalfa or red clover should be managed to favor the legume. This is especially true with reference to fertilizer application and stage of maturity to harvest. Alfalfa orchardgrass mixtures should normally be harvested when alfalfa is at early bloom to one tenth bloom. This harvest state will produce good dry-matter yields, quality forage and favor stand persistence of the alfalfa.

Diseases

Many diseases attack orchardgrass. Stem rust, leaf spots, brown stripe and scald are among the most prevalent in Missouri and surrounding states. Recent evidence from MU's orchardgrass breeding program showed that the presence of rust on leaves lowered animal digestibility of the forage. Three years of grazing studies have documented that rust-infected orchardgrass varieties gave 0.2 to 0.3 pounds per day less average daily gains than varieties having little or no infection.

Diseases of orchardgrass are also partly responsible for stand depletions. Data from MU showed that when the stem rust pathogen is present, orchardgrass stands are severely depleted during late July and throughout the month of August. The best and most practical means of controlling diseases, hence improving animal performance and stand persistence, is to plant varieties that are resistant or highly tolerant to foliar diseases.

Varieties

At the present time, Hallmark is the most commonly grown orchardgrass variety in the state of Missouri. Hallmark produces forage yields equal to or slightly above most other adapted varieties and persists fairly well in most areas of the state (Table 2). Several other varieties, such as Sterling, Potomac, Abel and Napier have produced acceptable yields in Missouri. Other developments by private companies are also being offered for sale in the state. Some of these varieties may be very well adapted to Missouri. However, it is difficult to provide current evaluations of all new varieties.

Table 2
Orchardgrass variety trials

	Missouri ¹	Illinois ²	Wisconsin ³	Iowa ⁴	Yield	Digestibility
	Hay graze, tons per acre					
Hallmark	3.08	2.54	3.27	5.54		
Justus	3.04	2.65	3.39	6.20	3.63	57.5 percent
Potomac	2.94	2.67	3.04	5.57		
Sterling	2.94	2.51			3.82	55.2 percent
Abel	2.75	2.56				
Napier					3.73	55.7 percent

¹MU, Southwest Center, 1982-84. Clipping was used to simulate grazing.

²Three locations, 1986.

³Three-year average, 1984-86.

⁴1985 data.

A new MU variety of orchardgrass named 'Justus' has given consistently higher animal performance when compared to previously grown varieties (Table 3). Justus was selected for high tolerance to the stem rust pathogen and has produced better animal performance than other varieties in grazing trials.

Table 3
Average daily gains (pounds) of steers grazing orchardgrass, Mo

Year	Justus	Hallmark	Potomac	Sterling
1982	2.18	1.88	1.85	1.51
1983	2.07	1.92	1.96	1.58
1984	1.63	1.55	1.29	1.52

Seed production

The production of orchardgrass seed has not been a big business in Missouri. This is probably due to less demand than for tall fescue seed and because very few acres of orchardgrass are grown alone, making them suitable for seed harvest. Some producers have experienced difficulty in producing well-filled, high-quality seed. With the release of a more persistent, better performing variety, some Missouri farmers may be interested in seed production.

Good seed yields should be expected when farmers apply fertilizer according to soil test recommendations. This will usually include 60 to 80 pounds N applied in December or January. Higher rates of N will tend to encourage lodging. Nitrogen needs to be applied earlier than for hay production, as early applications form reproductive growth over leafy growth.

Seed yields also can be increased by clipping and removing the stubble shortly after each year's seed harvest. The summer re-growth may be used for grazing, but avoid heavy grazing during September and October. Forage can be grazed later in the fall when plants have become more winter hardy. However, this late fall growth will be less acceptable to cattle than tall fescue.

Summary

Orchardgrass will respond to good fertility and management practices by producing 2-1/2 to 4 tons of high quality forage per acre. Early stand depletion has been one of the major complaints from farmers. With the development of more disease-resistant varieties to help maintain longer-lived stands, orchardgrass can take its place as one of the important cool-season grasses in Missouri.

The authors wish to thank Jim Brown, Daryl Buchholz, Dave Sleper and Jerry Nelson for assisting in the preparation of this guide.

G4511, reviewed October 1993

Related MU Extension publications

- G3150, Forages for Cattle: New Methods of Determining Energy Content and Evaluating Heat Damage
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G3150>
- G4650, Establishing Forages
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G4650>
- G4670, Seed Production of Tall Fescue and Other Cool Season Grasses
<http://extension.missouri.edu/publications/DisplayPub.aspx?P=G4670>

Order publications online at <http://extension.missouri.edu/explore/shop/> or call toll-free 800-292-0969.



■ Issued in furtherance of the Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Director, Cooperative Extension, University of Missouri, Columbia, MO 65211
■ an equal opportunity/ADA institution ■ 573-882-7216 ■ extension.missouri.edu