Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION

Cool-season Annual Grasses: Seed Cost, Productivity, and Return

Volume 12, Issue 8

Rocky Lemus
Mississippi State University

August 2019

Visit us at: **http://mississippiforages.com**

There is a diverse number of cool-season annual grasses that can be utilized for grazing in the southern USA when bahiagrass and bermudagrass pastures reach dormancy and become unproductive. These forages include annual ryegrass and small grains such as cereal rye, oat, triticale, and wheat. They can have high nutritive value and extend the grazing season while decreasing dependency on stored hay and the use of commodity feeds. Small grains tend to have a bimodal forage growth that allows having forage production in the fall (depending on planting date, seeding method, fertilization, and species selection) and during the early winter months. On the other hand, annual ryegrass' forage growth is from mid-winter to late spring. Due to the earlier maturity of small grains, they can be grown in combination with annual ryegrass and/or legumes to extend the grazing season.

Establishment – These forages can be established in the fall using different methods such drilling in a prepared seedbed, direct sod-seeding with a no-till drill in warm-season perennial grass pastures or broadcasting (overseeding) the seed. It is important to note that planting with a drill will require lower seeding rates per acre than broadcasting. Seed establishment should be based on your forage needs and existing forage species in the farm. A study conducted at Mississippi State indicated that over four-years, planting annual ryegrass into prepared seedbed can provide earlier grazing and more grazing days per acre (Fig. 1). A two-year study also indicated a delay of 4 to 6 weeks in grazing potential when annual ryegrass was drilled into a bermudagrass sod. Planting into a prepared seedbed from mid-September to early October could provide the best opportunity to achieve early grazing. A three-year study conducted at LSU also indicated that planting winter forage into a prepared seedbed could provide higher seasonal forage production relative to other seeding methods. The study indicated a 55% higher forage production for annual ryegrass when planted in a prepared seedbed compared to a bermudagrass sod (Cuomo and Blouin, 1997; Eichhorn, 1997). Despite of these findings, it is important to keep in mind that planting annual ryegrass too early can make it more susceptible to armyworm damage and gray leaf spot disease (blast). This approach might be more feasible for planting small grains.

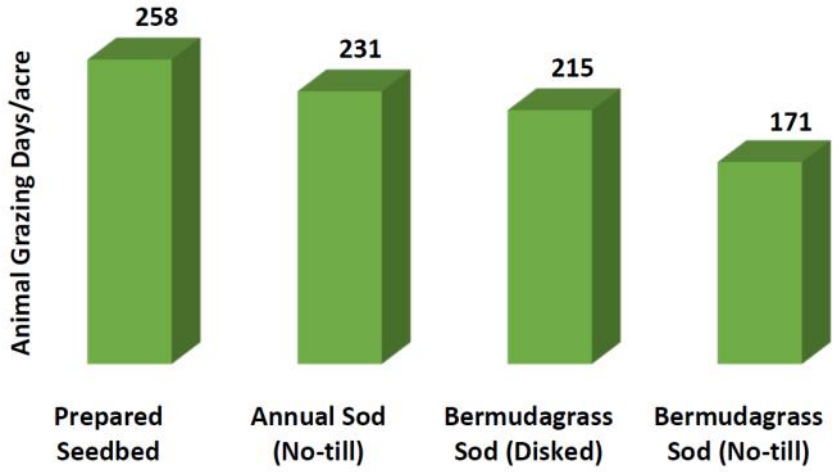

Figure 1. Four-year average animal grazing days per acre in annual ryegrass when comparing different seeding methods (Ingram et al., 1993).

Species Selection – There are several species and varieties available to producers to develop a winter grazing program. Annual ryegrass is the most popular in the southeast for the stocker cattle industry. Other small grain species and clovers can also be incorporated as part of the program. These cool-season annual grasses are high in crude protein, energy and low in fiber from late fall to mid-spring with a small decrease in nutritive value during the early winter. One of the advantages of planting cereal rye, oat or triticale is that they can provide earlier forage biomass for grazing from late November to early April depending on weather conditions and establishment method.

Annual ryegrass – It can provide a long period of forage production and high nutritive value from late December to mid-May depending on location, fertilization, and establishment method. It reaches peak production in late March to mid-April. Annual ryegrass average yields tend to be higher that small grains and tend to mature much later that small grains. It tolerates high moisture soils than wheat or oat. The seed cost per acre is usually cheaper than small grains.

Producers tend to use both tetraploid and diploid varieties across the state. However, data collected over the last eight years at Mississippi State University have shown very little yield advantage of tretraploids over diploids (Table 1).

Table 1. Annual Ryegrass Performance in Mississippi: Seasonal Yield Summary.

Variety	Years	Ploidy Level	Holly Springs	Starkville	Newton	Poplarville	State Avg.	RY (%)
Bulldog Grazer	3	Diploid	4305	5041	5032	5799	**5044**	**-10.3**
Ed	2	Diploid	3309	4611	6237	5897	**5014**	**-10.9**
Flying A	8	Diploid	5371	5504	5911	6346	**5783**	**2.8**
Fria	8	Diploid	5365	5318	5862	6346	**5723**	**1.7**
Jackson	8	Diploid	5066	5839	5913	5725	**5636**	**0.2**
Lonestar	8	Diploid	5088	5741	5835	6370	**5759**	**2.4**
Marshall	8	Diploid	4692	6513	6505	6119	**5957**	**5.9**
Passarel Plus	4	Diploid	5654	6719	6990	5676	**6260**	**11.3**
Winterhawk	7	Diploid	4981	6007	5771	6350	**5777**	**2.7**
Attain	7	Tetraploid	4881	5933	6321	6549	**5921**	**5.2**
Big Boss	6	Tetraploid	4878	5975	5910	6059	**5706**	**1.4**
Diamond T	7	Tetraploid	4522	6613	6529	6867	**6133**	**9.0**
Earlyploid	3	Tetraploid	3462	5847	7635	5600	**5636**	**0.2**
Jumbo	6	Tetraploid	4991	5080	5464	6002	**5384**	**-4.3**
Maximus	6	Tetraploid	4618	5601	5686	6693	**5650**	**0.4**
Meroa	2	Tetraploid	5578	4944	5343	6552	**5604**	**-0.4**
Nelson	8	Tetraploid	4271	5820	5645	6772	**5627**	**0.0**
Prine	4	Tetraploid	3927	4774	6073	6418	**5298**	**-5.8**
TAMTBO	8	Tetraploid	4619	5165	5551	6329	**5416**	**-3.7**
Tetrastar	8	Tetraploid	4562	4650	5739	5810	**5190**	**-7.7**
Location Avg.			**4707**	**5585**	**5998**	**6214**	**5626**	**--**
Relative Yield (%)			**-16.3**	**-0.7**	**6.6**	**10.5**	**--**	**--**

Note: This summary contains commercial varieties that have been tested in the performance trials for a minimum of two years across all locations from fall of 2011 to spring of 2019.

Ploidy level refers to the number of chromosome sets in a biological cell and is often used in characterizing ryegrass varieties as either diploid (2x) or tetraploid (4x). Whether ploidy level is advantageous to a specific variety in regards to performance is more dependent on location.

Relative Yield (RY) is the potential of annual ryegrass to perform well at a specific location when compared to the overall state average biomass production.
Relative yield (RY) was calculated as the percent increase in yield when comparing the average state performance of a variety to the overall state average, RY = ((Agv. Var - Avg. State)/Avg. State)*100

Citation: White et al.. 2011-2019. Cool-season Annual Forage Variety Trials. Mississippi State University Agricultural and Forestry Experiment Station.

Cereal rye - It is the most cold- and drought-tolerant of the cool-season annual species and allows planting in early September. It can have higher forage production in the fall compared to other small grains (Fig. 2). One disadvantage is that can mature earlier than other small grains. Cost of seed per acre tend to be higher than wheat or oat.

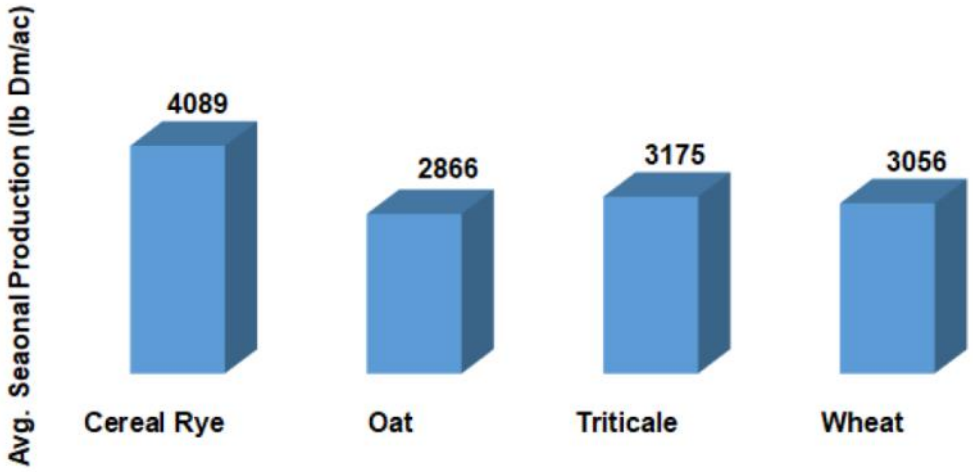

Figure 2. Average seasonal forage biomass production for small grains in Mississippi. Yields in pounds of dry matter per acre are based on average yields from MSU forage variety trials across multiple locations and years (White et al., 2011-2019).

Oat – It is the most cold-sensitive of the cool-season annual species which can pose a risk for stand loss. It has a high palatability and high higher fall forage production than wheat. The seed cost per acre is usually intermediate between cereal rye and wheat and end to mature later in the spring. Under heavy rain, high humidity and cool-temperatures, oats can also be more susceptible to leaf rust than cereal rye or wheat.

Triticale – It is a cross between cereal rye and wheat. It is palatable as wheat and vigorous as cereal rye. In Mississippi, it produces similar yields to cereal rye and wheat. Seed cost per acre tend to me more expensive than other small grains.

Wheat – It is adapted to a range of soils and tolerant to grazing. Most wheat production in southeast is in early winter (January to April), similar to annual ryegrass due to late planting in most cases. The seed cost per acre for wheat is the lowest among the cool-season annual grasses.

Fertility – Optimum forage production depends on a sound soil fertility program. It is recommended to get a soil sample and obtain fertility recommendation for the target monoculture or mixed species. Most cool-season grasses will have optimal growth at a soil pH of above 6.0, especially if annual clovers are incorporated in the grazing program. Phosphorus (P) and (K) potassium can be applied at planting per soil testing recommendations. In a prepared seedbed, the first nitrogen (N) application should occur when the grass has germinated and it is about two inches tall. In a sod-seeded pasture, nitrogen application should be delated until the summer perennial grass (bermudagrass or bahiagrass) is dormant to avoid new growth and competition. The second application in annual ryegrass should occur after the first grazing period and a third application should occur in late March or early April if necessary. For small grains, the second N application should occur before they begin to joint. Do not exceed more than 40 to 50 units of N per acre per fertilization cycle.

Table 2. Cost of seed per pound, per acre and per ton of forage produced in Mississippi.

Cool-season Annual Grass	Estimated Price ($/50 lb/bag)[1]	Unit Price ($/lb)	Seeding Rate (lb/ac)[2]	Seed Cost ($Acre)[3]	Yield Potential (ton DM/acre)[4]	Seed Cost of Ton of Forage ($/DM ton)
A. Ryegrass	$34	$0.68	25	$17.00	2.8	$6.04
Cereal Rye	$17	$0.34	90	$30.60	1.5	$20.40
Oat	$15	$0.30	90	$27.00	2.0	$13.21
Triticale	$24	$0.48	90	$43.20	1.6	$27.22
Wheat	$11	$0.22	90	$19.80	1.5	$12.96

[1]Seed cost will vary depending on location and availability. Estimated prices are from 2018 across different establishments within 50 miles radius of Mississippi State University and include average prices across different varieties within forage species.
[2]It assumes 90% germination and 99% purity.
[3]There are other costs to consider such as land preparation, fertilizer, and other variable costs. This calculation assumes similar costs for each species.
[4]Yields in tons of dry matter per acre are based on average yields from MSU forage variety trials across multiple locations and years (White et al., 2011-2019).

What is the cost of selecting a cool-season annual grass? – Annual ryegrass is the most common cool-season annual grass planted in Mississippi. In the last three years, we have seen a significant increase in annual ryegrass seed cost compared to small grains. The dilemma that producers face is: can I buy small grain (wheat or oat) instead of annual ryegrass because it is cheaper? The answer is usually think about when you need most of your grazing and seasonal forage productivy. They should not make a purchase decision based on the cost of a 50-pound bag of seed. They need to think about the overall benefit that can provide to the livestock based on several principles: seed purity and germination, seeding rate, cost of seed per acre, and cost of seed per ton of forage produced. Although small grains seed might be cheaper, keep in mind that they will require higher seeding rates than annual ryegrass. Table 2 provides an economic analysis, which indicates that even at higher cost per pound of seed, annual ryegrass can provide a cheaper cost per ton of dry matter produced. In some cases, looking at mixes of annual ryegrass, small grain (cereal rye, oat or triticale), and a late maturing clover with good reseeding potential could be the best option to extend the grazing season and improve animal performance and return. When doing a cost analysis, it is important to keep in mind that seed cost vary among species and varieties based on location and seed availability. It is the time to start making decisions for your winter grazing program and start inquiring about seed prices and seed availability. Do not wait until last minute when you might experience a high a demand and short supply that could influence seed cost.

Upcoming Events

For upcoming forage related events visit: ***http://forages.pss.msstate.edu/events.html***