Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE

Average Annual Ryegrass Biomass

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There are over 60 varieties of annual ryegrass commercially available that are grouped in two different types based on their number of chromosomes (ploidy level). These two types include diploid and tetraploid varieties. Diploid varieties have to set of chromosomes (2n = 14) in each cell, their cells are smaller in size with lower water (moisture) content, plant structures (leaves and seed size) are smaller, and the plant tend to produce more tillers. Higher tiller density can provide a denser stand and be more competitive with weeds, sustain production in lower fertility and wetter soils. Diploids also tend to have more a prostrate growth (horizontal) which allows the stand to be more persistent in heavy grazing scenarios. On the other hand, tetraploid varieties have four set of chromosomes (4n = 28) in each cell with larger cell size, larger (wider) leaves, larger seed size, greater content of soluble carbohydrates (sugar and starch) and less fiber content. Tetraploid varieties are developed by treating germinating seed with specific compounds that cause a mutation in the chromosome number. Tetraploids tend to have higher water content in their cells and therefore animals can fill up faster and reduce dry matter intake. Tetraploids have a slower recovery after grazing than diploids because they do not tiller as aggressively and they can also be susceptible to overgrazing because of higher palatability which can lead to overgrazing. Since tetraploids do not tiller vigorously as diploids, they could be good candidates for mixtures with clovers and reduce species competition. In general, tetraploids tend to mature later than some diploids. Although these differences between annual ryegrass types may not be obvious early in the season, they can become more apparent as the season progresses and grazing pressure is implemented.

Table 1. Annual ryegrass performance in Mississippi: Seven-year yield summary. Yields are expressed in pounds of dry matter per acre.

Variety	Years	Ploidy Level	Holly Springs	Starkville	Newton	Poplarville	State Avg.	RY (%)
Bulldog Grazer	3	Diploid	4305	5041	5032	5799	**5044**	**-10.4**
Ed	2	Diploid	3309	4611	6237	5897	**5014**	**-10.9**
Flying A	7	Diploid	5587	5336	5732	6750	**5851**	**4.0**
Fria	7	Diploid	5620	5211	5620	6723	**5794**	**2.9**
Jackson	7	Diploid	5391	5522	5763	5949	**5656**	**0.5**
Lonestar	7	Diploid	5330	5573	5610	6825	**5835**	**3.7**
Marshall	7	Diploid	4769	6313	6459	6397	**5985**	**6.3**
Passarel Plus	3	Diploid	6637	6524	6606	6088	**6464**	**14.8**
Winterhawk	7	Diploid	5267	5920	5574	6712	**5868**	**4.3**
Attain	6	Tetraploid	5493	5655	6115	6676	**5985**	**6.3**
Big Boss	5	Tetraploid	5430	5792	5314	6584	**5780**	**2.7**
Diamond T	7	Tetraploid	4071	5634	5366	6377	**5362**	**-4.7**
Earlyploid	3	Tetraploid	3462	5847	7635	5600	**5636**	**0.1**
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	7	Tetraploid	4671	5521	5380	7149	**5680**	**0.9**
Prine	4	Tetraploid	3927	4774	6073	6418	**5298**	**-5.9**
TAMTBO	7	Tetraploid	5052	4984	5175	6730	**5485**	**-2.5**
Tetrastar	7	Tetraploid	4914	4208	5511	6162	**5199**	**-7.6**
Location Avg.			**4921**	**5405**	**5785**	**6404**	5629	--
Relative Yield (%)			**-12.6**	**-4.0**	**2.8**	**13.8**	--	--

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 2018.

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.. 2011-2018. Cool-season Annual Forage Variety Trials. Mississippi State University Agricultural and Forestry Experiment Station.

A six-year summary of annual ryegrass types across locations in Mississippi has indicated that diploids may provide a

slightly higher seasonal yield than tetraploids, but the differences are very small from location to location (**Figure 1**). Each annual ryegrass type and variety has its strengths and weakness, make sure that you select one that could provide the greatest advantage for your unique grazing situation. Your management and utilization along with the environment and fertilization will play big roles in which variety you decide to plant for grazing purposes.

Yield measurements from the variety trial are extremely important in determining the number of acres to plant, the amount of fertilization needed and the number of animals that grazing system can sustain. Knowing average yields will allow forage/ livestock producers to better match nutrient applications to minimize costs, maximize fertilizer efficiency and reduce potential environmental problems. Yields are also critical as a measuring tool to evaluate new varieties, improve management techniques and allow producers to make more informed decisions concerning feeding practices for their livestock.

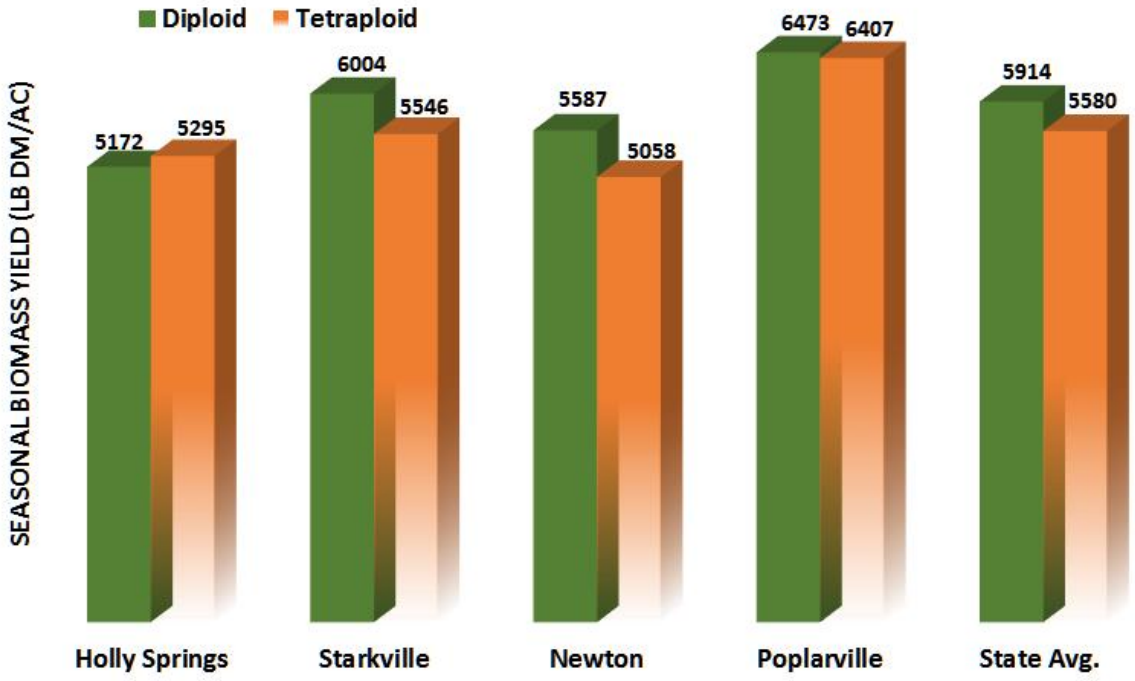

Figure 1. Biomass production of driploid and tetraploid annual ryegrass in Mississippi across different locations. Data summarized over a six-year period (2011-2018). Source: White eat al., 2012-2018.

Knowing the estimated forage for winter grazing would allow producers to buy or sell forage at the time of the year that would be most financially feasible. When available, using data from multiple years as an average might provide a better assessment on varietal performance than a single year, due to changes in weather conditions, especially temperature and precipitation that could affect production from year to year. Data summarized in **Table 1**, provides a better assessment of annual ryegrass production across the state. A seven-year yield mean of annual ryegrass yield range from 4,921 pounds per acre in Holly Springs to 6,404 pounds per acre in Poplarville. The state average dry matter yield was 5,629 pounds per acre. The overall yield potential of annual ryegrass was below the state average for Holly Springs and Starkville, while the largest increase in yield potential has been observed in Poplarville. This could be related to temperature and rainfall gradients across these locations during the growing season. Across the state, diploid varieties have a slightly higher biomass production than tetraploid varieties, except for Holly Springs (**Fig. 1**). Performance of varieties across the state also indicated that 54 percent of the tetraploids may have relative lower yield (RY) compared to 22 percent of the diploid varieties when compared to the state average production. Data from the variety trial at Mississippi State has not reflected the yield advantage of tetraploids in Mississippi as it has been observed in other locations across the southern USA, but this could be management, fertility and environmental conditions dependent. For more information on Mississippi State Forage Variety Trial visit http://mafes.msstate.edu/variety-trials/forage.asp

Upcoming Events

September 24-25, 2018—GLCI Conference, Natchez, MS
September 27, 2018—Coastal Plain Fall Forage Field Day, Newton, MS
November 12, 2018—MCA Cattlemen's College, West Point, MS
November 13, 2018—MCA Cattlemen's College, Hattiesburg, MS
For upcoming forage related events visit: ***http://forages.pss.msstate.edu/events.html***

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