



## Forage Chicory Variety Trial 2004-2010

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<b>Adaptation:</b>	North and central GA north of the Coastal Plain. Best adapted in clay or loam soil. Tolerant of soil acidity, poor drainage, and drought.
<b>Establishment:</b>	Seed drilled into closely grazed or mowed sod at 4 – 5 lb/A in Sept. or Oct.
<b>Recommended Varieties:</b>	Commander, Forage Feast, Puna, Oasis



**Chicory** (*Cichorium intybus*)

## Introduction to Chicory

Forage-type chicory is a perennial forb (neither grass nor legume) that produces forage later into the spring/summer and earlier in the late summer/fall than tall fescue. Chicory has a low growing rosette in winter, much like a giant dandelion. With warmer temperatures in spring it produces large numbers of broad succulent leaves from the crown. In late spring and summer, a few flower stems develop from the crown and will reach 4 or 5 feet if not grazed or cut. Chicory has a thick deep tap root that reaches deep into the soil, even when very acid, allowing it to extract water and making the plant highly tolerant of drought.

The long productive season of chicory and substantial summer growth indicate that it might be useful to extend the grazing season and improve the nutritive quality of mixed tall fescue-bermudagrass pastures. No-till planting of chicory in tall fescue sod is promising, although grass that grows too competitive in spring will reduce the growth of chicory. Water content of chicory is very high, so it would be very difficult to make hay from this crop.



Chicory is a succulent perennial forb that produces substantial yields of high quality forage, even during periods of prolonged drought.

Chicory is a promising perennial forb that can supply high-quality pasture during summer when nutritive quality of perennial grasses is often low. It is highly competitive with grasses and weeds, tolerant of drought and soil acidity, grows over a long period of the year, and is relatively easy to establish. However, chicory is not a low-input pasture crop. It requires several applications of nitrogen each year and some rotational grazing for good productivity. Nonetheless, chicory provides a substantial amount of high quality summer grazing in perennial pastures.

## **Description of the Variety Trials**

Chicory variety entries were solicited from the companies who sell them. These companies were charged an entry fee for each variety they entered and for each location in which the variety was tested. This entry fee helped to cover some of the costs of the variety trial.

The tests were planted at Georgia Agriculture Experiment Station (GAES) facilities and maintained by experienced research technicians and other GAES staff under the supervision of the State Forage Extension Specialist. The chicory yield trials were established and managed using standard practices as recommended by UGA Specialists. The trials were established by drilling the chicory seed into a well-prepared seedbed at the rate of 5 lbs of pure live seed (PLS) per acre. Specific planting dates for individual locations are described in the Yield by Harvest Date sections. Soil fertility was maintained in accordance with soil fertility recommendations.

Yield-type variety trials simulate forage productivity under a hay production regimen or a well-managed rotational grazing regimen. The tests generally continued for at least three years. Tests are only ended before three years when the stands of the majority of the entries deteriorate below 60% basal area coverage (60% stand). Trials that were cut for yield after 2006 also were assessed annually for stand persistence using a quantitative measure of the plot area that is covered by living chicory plants after harvest (basal area coverage).

Harvests were made at recommended intervals, and all plots in the variety trial were harvested on the same day. Statistical analyses were performed on all data to determine if the numerical differences were truly the result of varietal differences or just random differences. To determine if two varieties are truly different, compare the difference between them and the LSD (Least Significant Difference) at the bottom of the column. If the difference is equal to or greater than the LSD, the varieties are truly different when grown under the conditions at the given locations. The comparison is aided by the fact that the value for the best variety within a column is bolded. In addition, values sharing the same letter are not different. NS indicates no differences were observed. The Coefficient of Variation (CV) is a measure of the variability of the data and is included for each column of means when differences exist. Low variability is desirable (generally, a CV less than 15%).

## Chicory Yield Trial Summary

**Table 1.** Forage yield of chicory varieties averaged over the 2004 – 2005 growing seasons in Blairsville or 2004 – 2006 and 2007 – 2010 growing seasons in Athens, GA.<sup>†</sup>

Variety	2-yr Average (2004-2005)	3-yr Average (2004-06)	3-yr Average (2007-10)
	Blairsville	Athens	Athens
	----- dry lbs/acre) -----		
Commander	-	-	5404
Forage Feast	-	-	6130
Oasis	9619	6900	5269
Puna	9472	7538	5361
AGR CI 102 <sup>§</sup>	8979	7142	-
CV %	-	-	-
LSD	NS	NS	NS

<sup>†</sup> Planted on September 25, 2003 in Blairsville; on October 1, 2003 in Athens, and on November 9, 2006 in Athens (2007-2009 trial). Stand deterioration at the Blairsville location led to the termination of the trial at that location in the spring of 2006.

<sup>§</sup> Experimental variety (not available).

## Stand Assessments – Athens

**Table 2.** Percent basal cover of chicory varieties in the yield trial located at Athens, GA. 2007-2009.<sup>†</sup>

Variety	Percent basal cover within row		
	Jan. 31, 2008	Jan. 15, 2009	Dec. 14, 2009
Oasis	<b>79</b> ab <sup>‡</sup>	<b>73</b> a	<b>64</b> a
Forage Feast	<b>86</b> a	<b>73</b> a	<b>63</b> a
Commander	75 b	<b>76</b> a	30 b
Puna	74 b	47 b	30 b
CV %		22	21
LSD <sub>α=0.05</sub>	NS (.08)	20.5	13.5

<sup>†</sup> Planted: November 9, 2006. Trial ended in October 2010 because of poor stands (<50% cover) in all varieties.

<sup>‡</sup> Values within a column that are labeled with the same letter were not significantly different ( $\alpha=0.05$ ) from one another. Values that are in **bold** font are not significantly different from the best variety at that time.

## Yield by Harvest Date – Blairsville

Table 3. Forage yield of chicory varieties at Blairsville, GA. 2004- 2006.<sup>†</sup>

Year	Variety	Dry Matter Yield					Total
		----- dry lbs/acre-----					
		Harvest Date					
<b>2004</b>		<b>May 4</b>	<b>June 7</b>	<b>July 13</b>	<b>Sept. 23</b>	<b>Nov. 17</b>	
	Oasis	2722	2113	2091	3655	1780	12361
	Puna	1996	1826	1855	3385	1961	11023
	AGR CL 102 <sup>§</sup>	2561	2243	1607	2648	1781	10840
	CV %	-	-	-	-	-	-
	LSD <sub>α=0.05</sub>	NS(.06)	NS	NS	NS	NS	NS
<b>2005</b>		<b>April 28</b>	<b>June 8</b>	<b>July 20</b>	<b>Oct. 10</b>		<b>Total</b>
	Oasis	1004 b <sup>‡</sup>	3735	880	1258		6877
	Puna	1944 a	3847	1363	767		7921
	AGR CL 102 <sup>§</sup>	1172 b	4101	1333	512		7118
	CV %	36	-	-	-	-	-
	LSD <sub>α=0.05</sub>	672	NS	NS	NS	NS	NS

<sup>†</sup> Planted on September 25, 2003 in Blairsville. Stand deterioration at the Blairsville location led to the termination of the trial at that location in the spring of 2006.

<sup>‡</sup> Values within a column that are labeled with the same letter were not significantly different ( $\alpha=0.05$ ) from one another. Yields that are in **bold** font are not significantly different from the highest yielding variety.

<sup>§</sup> Experimental variety (not available).

## Yield by Harvest Date – Athens

Table 4. Forage yield of chicory varieties at Athens, GA. 2004- 2006.<sup>†</sup>

Year	Variety	Dry Matter Yield					Total
		----- lbs/acre-----					
		Harvest Date					
<b>2004</b>		<b>April 25</b>	<b>May 26</b>	<b>July 21</b>	<b>Sept. 13</b>	<b>Nov. 17</b>	
	Puna	1192	2280	2499	2148	1938 a	10057
	AGR CI 102 <sup>§</sup>	1324	2657	2408	2192	1202 b	9783
	Oasis	1294	2265	2204	1892	1398 b	9053
	CV %	-	-	-	-	20	-
	LSD <sub>α=0.05</sub>	NS	NS	NS	NS	451	NS
<b>2005</b>		<b>April 22</b>	<b>June 10</b>	<b>July 27</b>	<b>Oct. 10</b>	<b>Dec. 12</b>	<b>Total</b>
	AGR CI 102 <sup>§</sup>	1351	<b>2310 a<sup>‡</sup></b>	1160	800	862	<b>6483 a</b>
	Puna	1580	2002 b	1003	634	804	6023 b
	Oasis	1197	1966 b	1130	645	820	5758 b
	CV %	-	9	-	-	-	5
	LSD <sub>α=0.05</sub>	NS(.06)	254	NS	NS	NS	451
<b>2006</b>		<b>April 19</b>	<b>June 13</b>		<b>Sept. 8</b>	<b>Dec. 18</b>	<b>Total</b>
	Puna	1524	1406		1372	2233	6535
	AGR CI 102 <sup>§</sup>	1480	1403		887	1391	5161
	Oasis	1900	1164	1067	1759	5890	
	CV %	-	-		-	-	-
	LSD <sub>α=0.05</sub>	NS	NS		NS	NS	NS

<sup>†</sup> Planted: October 1, 2003.

<sup>‡</sup> Values within a column that are labeled with the same letter were not significantly different ( $\alpha=0.05$ ) from one another. Values that are in **bold** font are not significantly different from the best variety at that time.

<sup>§</sup> Experimental variety (not available).

**Table 5.** Forage yield of chicory varieties at Athens, GA. 2007- 2010.<sup>†</sup>

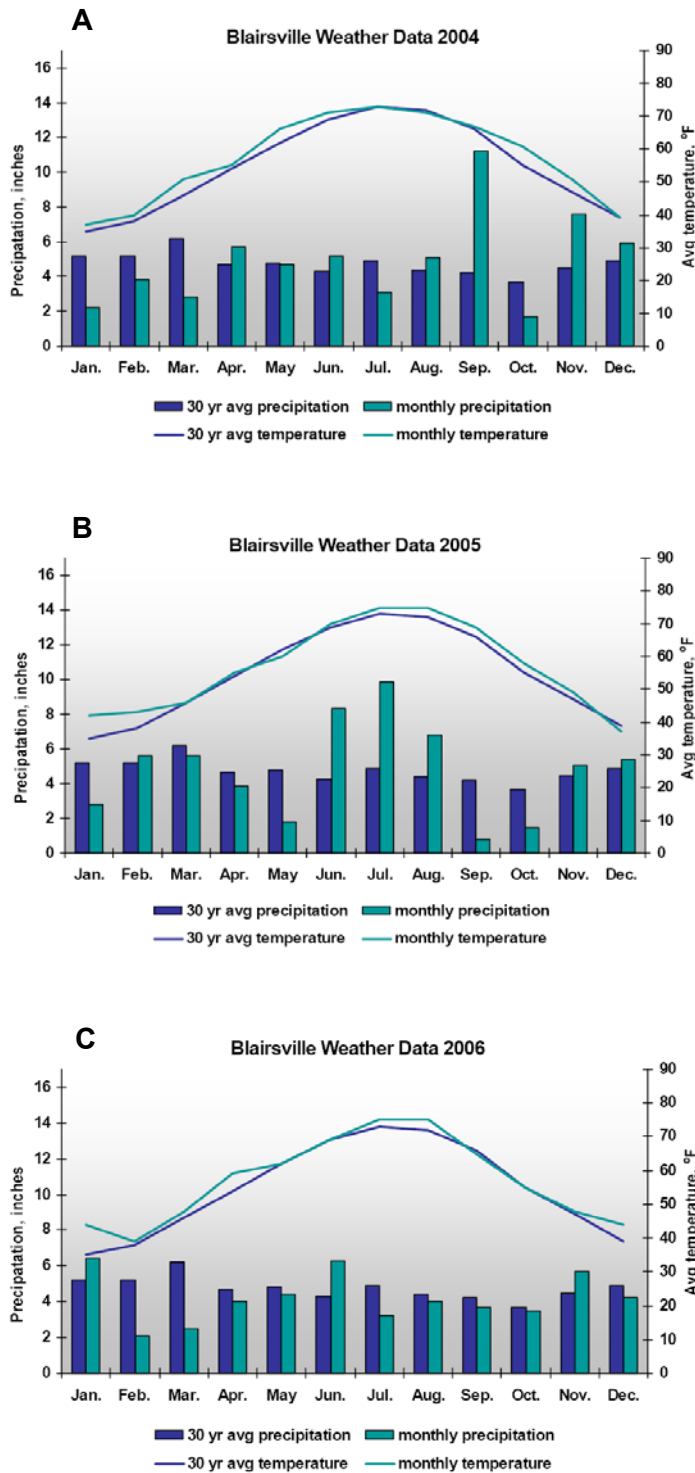
Year	Variety	Dry Matter Yield					Total
		----- lbs/acre-----					
		Harvest Date					
<b>2007</b>		<b>May 18</b>	<b>June 26</b>	<b>Sept.6</b>	<b>Nov.15</b>		
	Puna	<b>1623</b> ab <sup>‡</sup>	<b>2367</b> ab	1595	1688	<b>7273</b> a	
	Commander	<b>1921</b> a	<b>2519</b> a	1236	1542	<b>7218</b> a	
	Oasis	1128 bc	2058 bc	1207	1581	5974 b	
	Forage Feast	972 c	1857 c	1115	1406	5350 b	
	CV %	31	10			11	
	LSD <sub>α=0.05</sub>	600	309	NS (.09)	NS	936	
<b>2008</b>		<b>April 16</b>	<b>May 15</b>	<b>July 9</b>	<b>Aug.28</b>	<b>Nov.12</b>	<b>Total</b>
	Puna	<b>1418</b> a	1232	<b>1394</b> a	270	1368	<b>5682</b> a
	Commander	<b>1264</b> ab	1151	<b>1388</b> a	339	1502	<b>5644</b> a
	Oasis	865 b	1022	855 b	240	1582	<b>4564</b> a
	Forage Feast	622 b	994	742 b	334	1538	4230 b
	CV %	19		21			10
	LSD <sub>α=0.05</sub>	274	NS	322	NS	NS	725
<b>2009</b>		<b>May 8</b>	<b>June 17</b>	<b>Aug 4</b>	<b>Sept 8</b>	<b>Oct 21</b>	<b>Total</b>
	Oasis	2582	1252	1775	1940	1195 b	8744
	Forage Feast	2208	1250	1358	1921	<b>1840</b> a	8577
	Commander	2485	1299	1403	1749	1273 b	8209
	Puna	2341	1304	1474	1505	1306 b	7930
	CV %					15	
	LSD <sub>α=0.05</sub>	NS	NS	NS	NS	291	NS
<b>2010</b>		<b>May 18</b>	<b>June 23</b>	<b>Aug 13</b>	<b>Oct 18</b>		<b>Total</b>
	Oasis	2194 b*	<b>1348</b> a	<b>1021</b> a	<b>1711</b> a		<b>6274</b> a
	Forage Feast	<b>2809</b> a	<b>1292</b> a	<b>824</b> a	<b>1439</b> a		<b>6364</b> a
	Commander	278 c	148 b	120 b	0 b		546 b
	Puna	248 c	163 b	148 b	0 b		559 b
	CV %	14	25	43	29		15
	LSD <sub>α=0.05</sub>	265	251	311	320		720

<sup>†</sup> Planted: November 9, 2006.

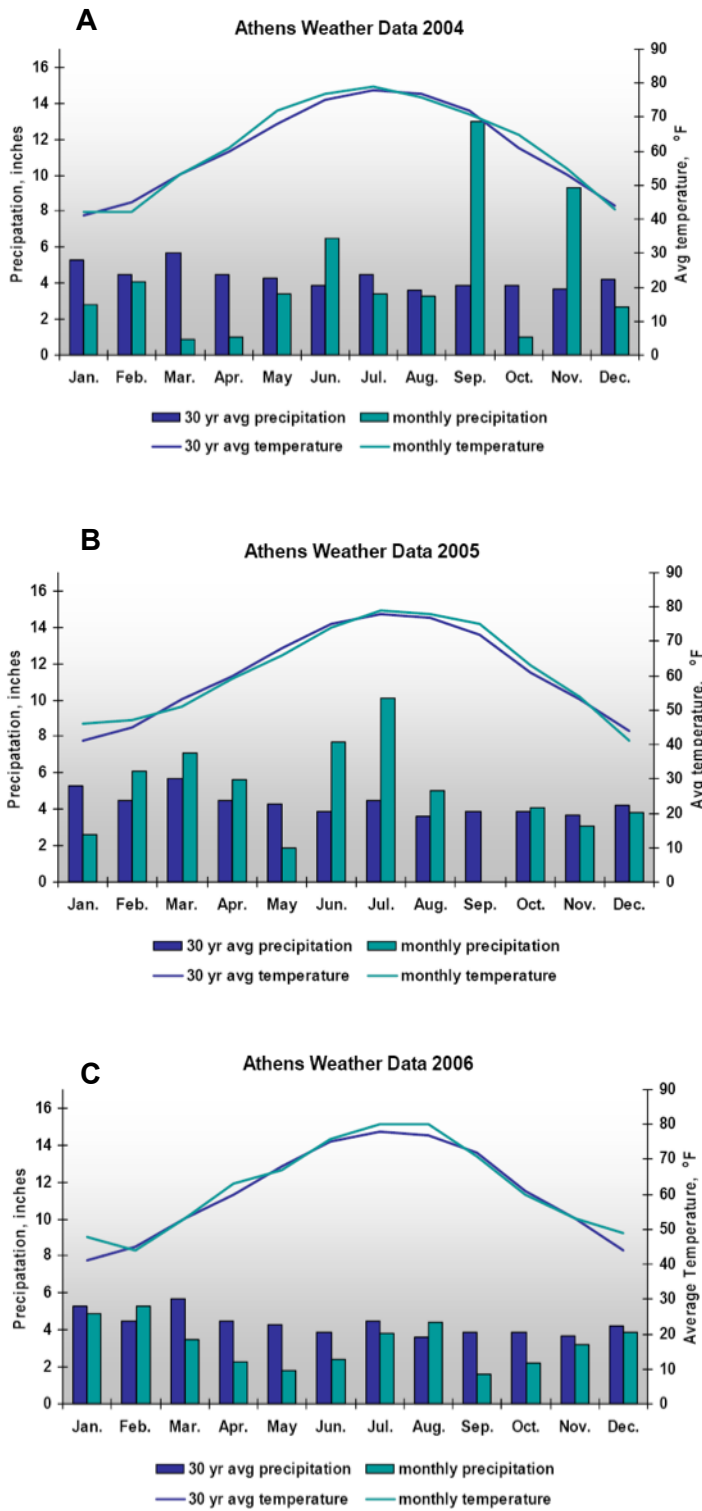
<sup>‡</sup> Values within a column that are labeled with the same letter were not significantly different ( $\alpha=0.05$ ) from one another. Values that are in **bold** font are not significantly different from the best variety at that time.

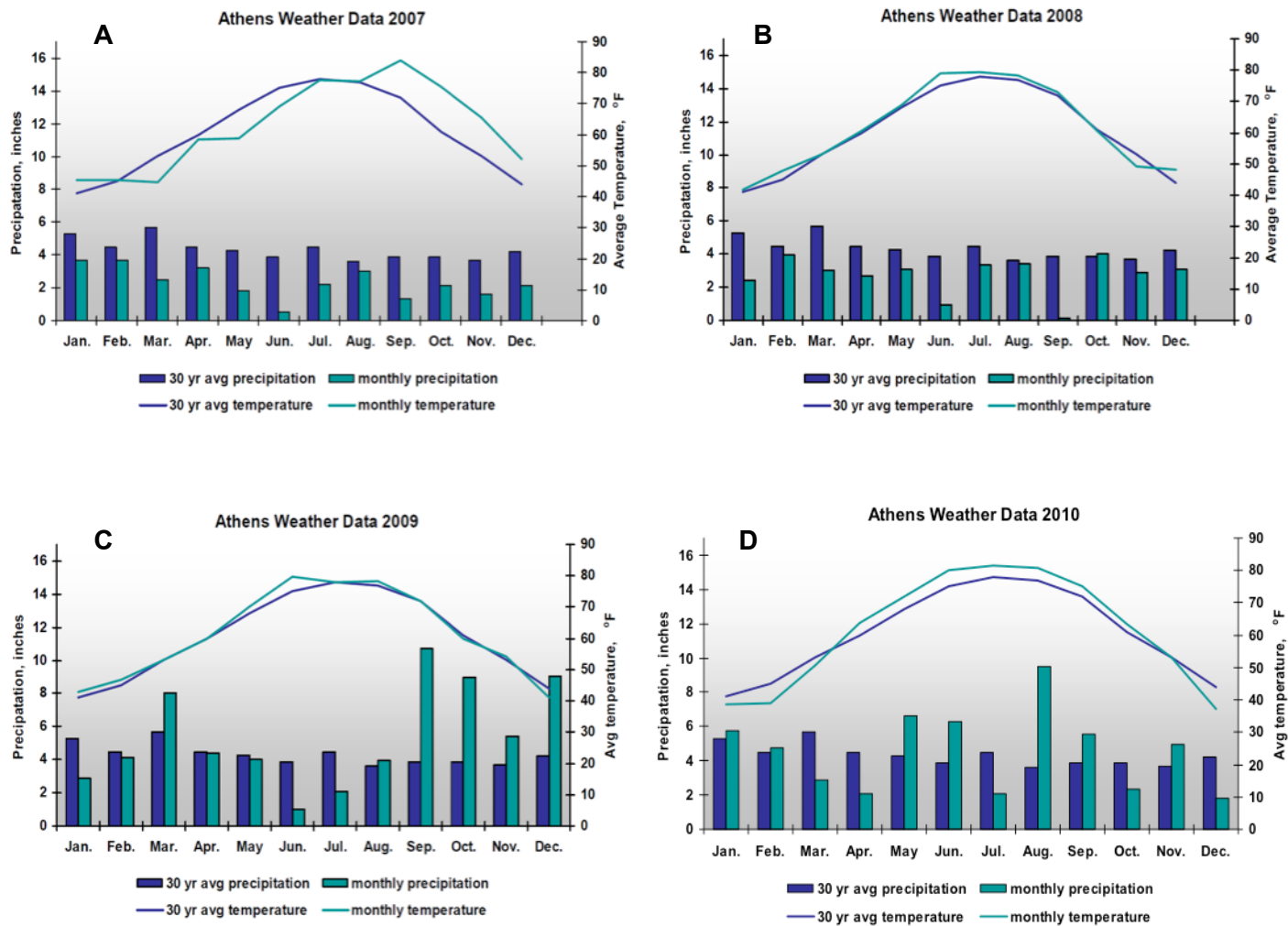
# Weather Data during Trials:

**Figure 1.** Weather data during the 2004 (A), 2005 (B), and 2006 (C) growing seasons in Blairsville.



**Figure 2.** Weather data during the 2004 (A), 2005 (B), and 2006 (C) growing seasons in Athens.





**Figure 3.** Weather data during the 2007 (A), 2008 (B), 2009 (C), and 2010 (D) growing seasons in Athens.



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