EVALUATION OF EPTAM (EPTC) IN SUGARCANE

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EPTC herbicide, trade name Eptam, was used extensively at one time in corn. Its strength is control of nutsedge and suppression of rhizome johnsongrass and bermudagrass, but its weakness is that immediate incorporation into the soil is required to prevent loss from volatility. In sugarcane in Louisiana, the most prevalent weeds are johnsongrass, bermudagrass, and nutsedges. During the fallow year when fields are prepared for replanting, efforts are made to reduce populations of troublesome weeds. Glyphosate is used extensively in fallowed fields but is not highly effective on bermudagrass and nutsedges. In 2008, Eptam was labeled for use in fallow ground when applied at least 45 days before planting.

In 2008, Eptam was evaluated at 2, 3, 4, and 5 pt/A incorporated on pre-formed sugarcane beds using a hipper/bedder and a Lilliston® rolling cultivator. Bermudagrass control at 30 and 45 days after treatment (DAT) did not differ among Eptam rates or between application methods (Table 1). A reduction in ground cover between Eptam and the nontreated control was observed at 30 DAT for 5 pt/A incorporated with a hipper/bedder and for 4 and 5 pt/A incorporated with the rolling cultivator. These differences, however, were not observed at 45 DAT. Because Eptam suppressed bermudagrass growth, the follow up application of glyphosate was delayed 14 days compared with a glyphosate alone treatment. Johnsongrass control with Eptam was not affected by rate or application method (Table 2). Eptam controlled johnsongrass an average of 82% 30 DAT and 68% 45 DAT. An Eptam rate of 2 pt/A at a cost of around $10/A could be an economical component of a fallow program utilizing glyphosate products. The two-week delay in the initial glyphosate application when Eptam was used would allow more flexibility in making applications. Eptam is also effective on vining weeds. Eptam applied in fallow did not negatively affect stand establishment of sugarcane. Eptam was also evaluated for sugarcane tolerance and weed control when applied at planting at 3, 5, and 7 pt/A. After sugarcane was planted and covered with 3 to 4 inches of soil, Eptam was incorporated with a rolling cultivator. Initial sugarcane shoot population was not negatively affected by Eptam. Assessment of crop injury will be determined when sugarcane emerges from the winter dormant period.

Table 1. Bermudagrass control 30 and 45 days after treatment (DAT) with Eptam as affected by incorporation using a hipper/bedder and a Lilliston® rolling cultivator at St. Gabriel, LA in 2008.

	Bermudagrass ground cover and control vs. nontreated (%)			
	30 DAT		45 DAT	
Eptam rate pt/A	Hipper/bedder incorporation	Lilliston cultivator incorporation	Hipper/bedder incorporation	Lilliston cultivator incorporation
2	23 abc (40%)[1]	22 abc (42%)	36 a (25%)	29 ab (40%)
3	23 abc (40%)	24 abc (37%)	40 a (17%)	34 a (29%)
4	22 abc (42%)	16 bc (58%)	36 a (25%)	26 ab (46%)
5	15 bc (61%)	10 c (74%)	24 ab (50%)	21 ab (56%)
None	38 a	38 a	48 a	48 a

[1]For each rating date means followed by the same letter are not significantly different ($P \leq 0.05$).

Table 2. Johnsongrass control 30 and 45 days after treatment (DAT) with Eptam as affected by incorporation using a hipper/bedder and a Lilliston® rolling cultivator at St. Gabriel, LA in 2008.

	Johnsongrass control (%)			
	30 DAT		45 DAT	
Eptam rate pt/A	Hipper/bedder incorporation	Lilliston cultivator incorporation	Hipper/bedder incorporation	Lilliston cultivator incorporation
2	79 ab[1]	73 b	59 bc	46 c
3	75 ab	83 ab	60 bc	66 bc
4	88 ab	87 ab	73 abc	81 ab
5	81 ab	93 a	74 abc	84 ab
None	-	-	-	-

[1]For each rating date means followed by the same letter are not significantly different ($P \leq 0.05$).

COMPARISONS OF SUGARCANE VARIETIES FOR GROWTH AND SHADING POTENTIAL

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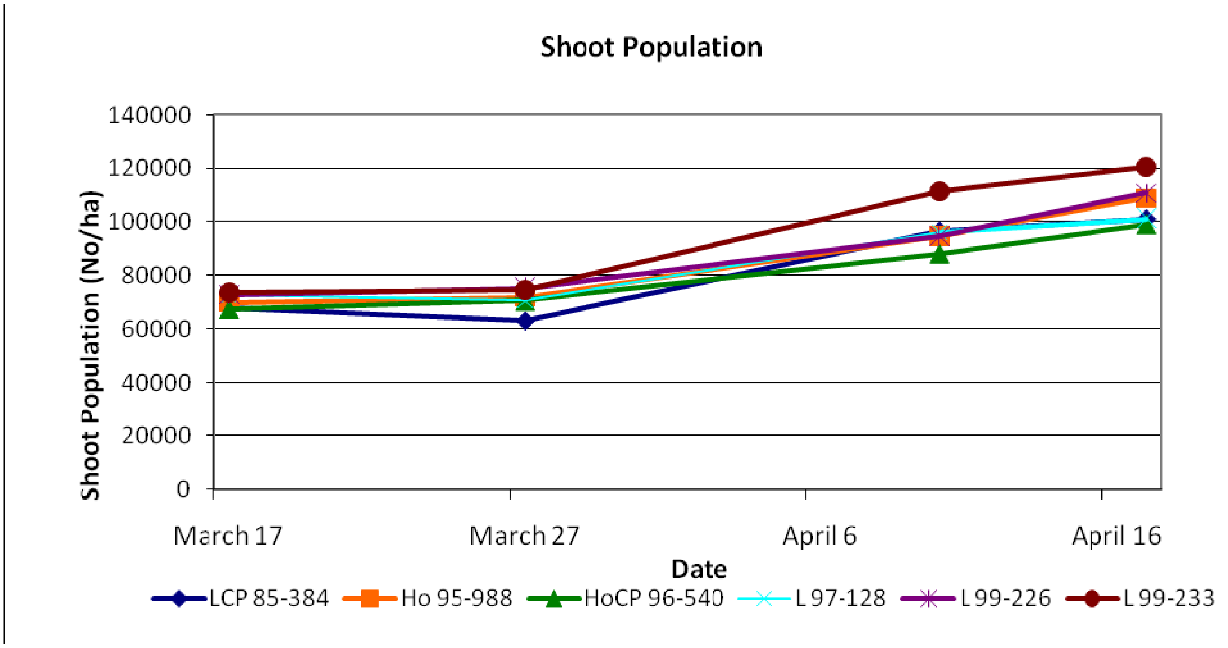
Sugarcane variety recommendations are based primarily on yield (tonnage and sugar), stubble longevity, disease/insect reaction, cold tolerance and herbicide tolerance. Varieties can vary in regard to growth characteristics which can affect their ability to compete with weeds. Research was conducted to compare seasonal growth characteristics and shading ability of the sugarcane varieties LCP 85-384, Ho 95-988, HoCP 96-540, L 97-128, L 99-226, and L 99-233 during the second production year.

Data collected across the growing season in 2008 for sugarcane shoot population, height, ground cover, and reduction in photosynthetically active radiation (PAR) showed significant variety by date interactions. Data were analyzed for each variety over time using trend analysis and for all growth parameters, a linear trend was observed. Shoot population from March through April tended to be lowest for LCP 85-384 and HoCP 96-540 and greatest for L 99-233 (Figure 1). Differences in emergence of shoots among the varieties were observed beginning in early April and as the season progressed shoot production and height increased for Ho 95-988, L 97-128, L 99-226, and L 99-233 but lagged for LCP 85-384 and HoCP 96-540 (Figure 2). Differences in overall canopy development among the varieties were observed into late May. Sugarcane ground cover, a reflection of shoot population and biomass accumulation for the varieties, from March through May was consistently less for LCP 85-384 and HoCP 96-540 compared with the other varieties (Figure 3). Beginning in mid-April, ground cover increased most rapidly for L 99-233. In late May, ground cover was around 60% for LCP 85-384 and HoCP 96-540, around 70% for Ho 95-988, L 97-128, and L 99-233, and was approaching 90% for L 99-226. Based on PAR data collected in the bottom of the row middles, sunlight in the sugarcane canopy was reduced an average of 61% in early June for L 97-128 and L 99-226 compared with 29% for LCP 85-384 and HoCP 96-540 (Figure 4). By late July, PAR reduction was equal and averaged 90% for Ho 95-988, L 97-128, L 99-226, and L 99-233 compared with 78% for LCP 85-384 and HoCP 96-540.

A significant variety effect was observed for shoot population, canopy width, ground cover, and canopy height data collected from March through July (Table 1). Average shoot population and ground cover were highest for L 99-233 and equivalent to that for L 99-226. Average canopy width was greatest for L 99-226 and equivalent to that for L 97-128 and L 99-233. Average canopy height was greatest for L 97-128 and L 99-233. For canopy width and ground cover, values were lowest for LCP 85-384 and HoCP 96-540. Differences observed among the six sugarcane varieties suggest that variety selection could play an important role in weed management. A significant variety effect was also observed for uppermost collar height and PAR reduction data collected from June through August (Table 1). Average uppermost collar height was greatest for L 97-128 and L 99-233. Differences in growth habit among the varieties in the present study were reflected in light interception within the sugarcane canopy. Reduction in PAR averaged around 80% for L 97-128 and L 99-226. For comparison, PAR was reduced 58% for LCP 85-384 and HoCP 96-540 and around 74% for Ho 95-988 and L 99-233.

In 2008, stalk population in August and stalk weight and TRS did not differ among the sugarcane varieties (data not shown). Sugarcane yield was equivalent for Ho 95-988, HoCP 96-540, L 97-128, L 99-226, and L 99-233. Sugarcane yield for LCP 85-384 averaged 30% less compared with that for Ho 95-988, HoCP 96-540, and L 99-226. This research shows that sugarcane varieties vary in regard to growth characteristics and shading potential, which can affect their ability to compete with weeds. Weed control measures represent a major investment in a sugarcane production system. Findings could be applicable to the development of effective and season long weed control programs that consider specific characteristics of sugarcane varieties, and their impact on weed competition. It may be possible for growers to select varieties that would that would be most productive where specific weed problems exist and to customize weed control programs based on variety selection.

Figure 1. Changes in shoot population for six sugarcane varieties from March through April, 2008.[1]

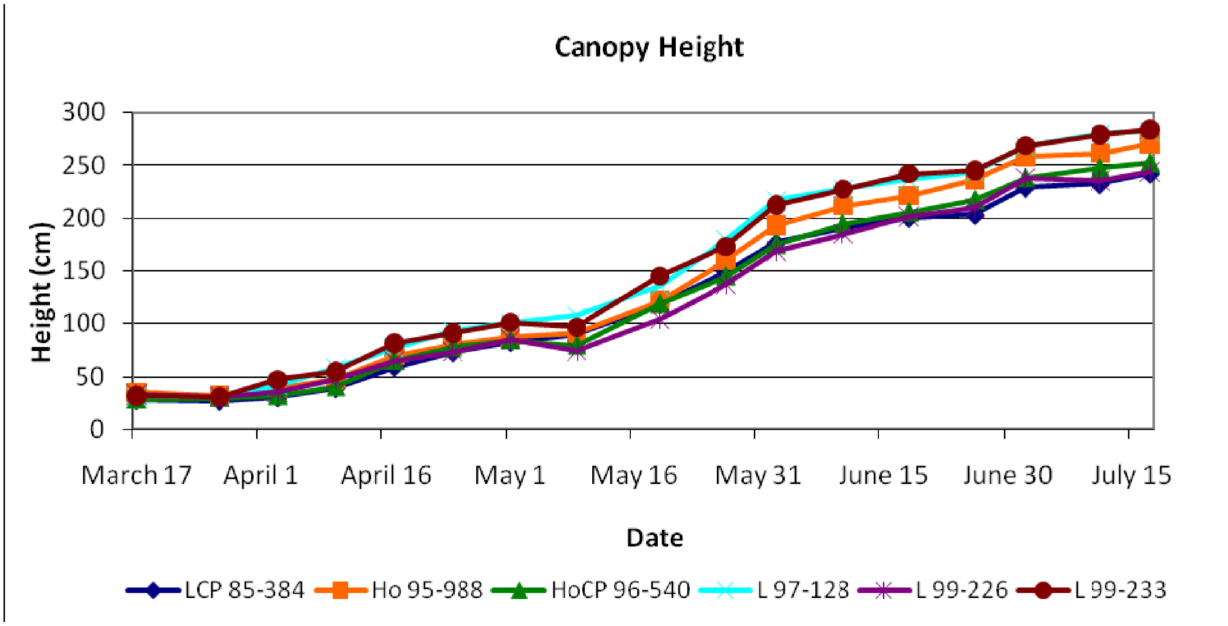


Trend Analysis results for six sugarcane varieties in 2008.

Trend Analysis with P values	Variety					
	LCP 85-384	Ho 95-988	HoCP 96-540	L 97-128	L 99-226	L 99-233
Linear	0.0001	0.0001	0.0001	0.0003	0.0001	0.0001
Quadratic	NS	NS	NS	NS	NS	NS

[1]Significant variety by date interactions were not observed. Data for each variety over time were analyzed using Trend Analysis to evaluate significance of linear and quadratic responses.

Figure 2. Changes in canopy height for six sugarcane varieties from March through July, 2008.[1]

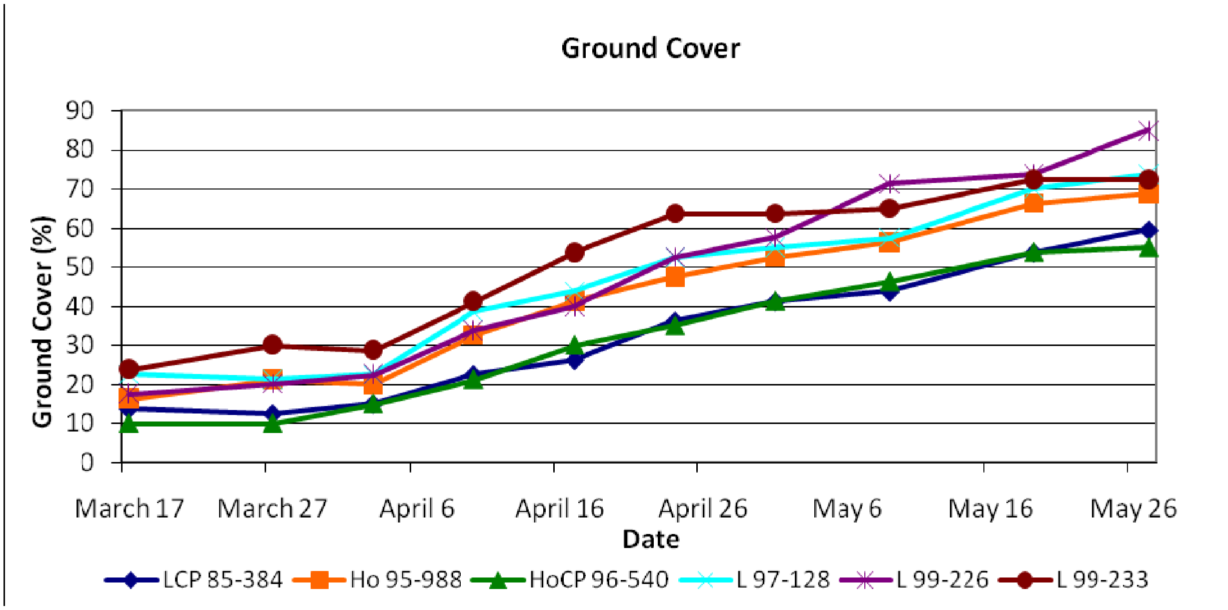


Trend Analysis results for six sugarcane varieties in 2008.

Trend Analysis with P values	Variety					
	LCP 85-384	Ho 95-988	HoCP 96-540	L 97-128	L 99-226	L 99-233
Linear	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Quadratic	0.0006	0.0001	0.0001	NS	0.0001	0.0017

[1]Significant variety by date interactions were observed. Data for each variety over time were analyzed using Trend Analysis to evaluate significance of linear and quadratic responses.

Figure 3. Changes in ground cover for six sugarcane varieties from March through May, 2008.[1]

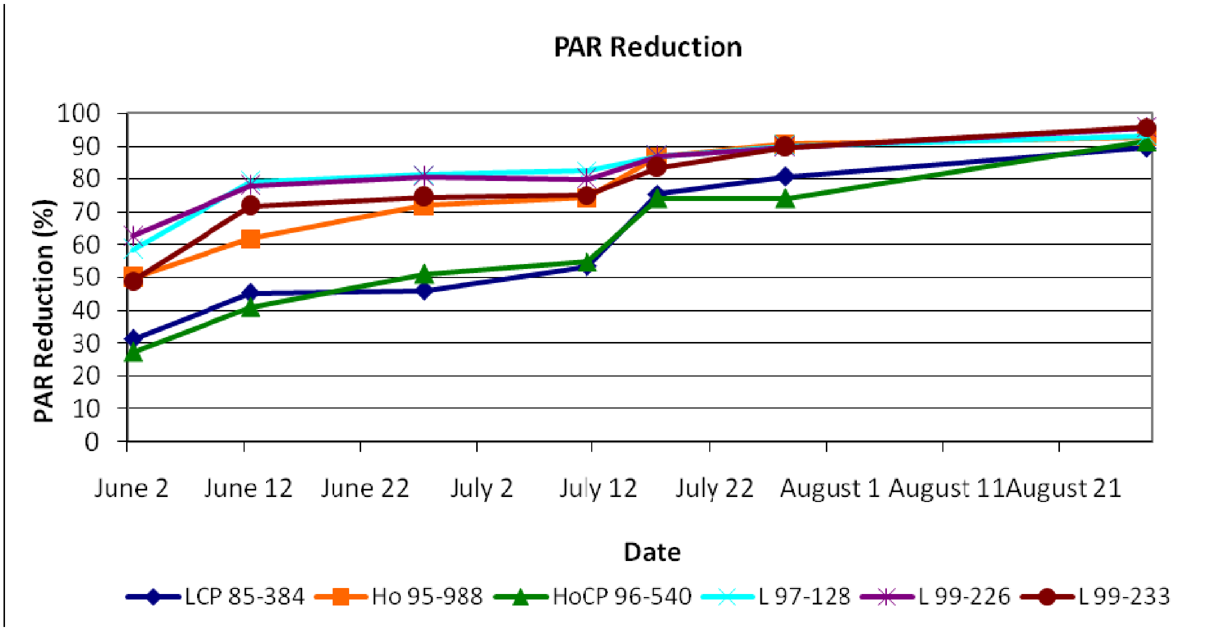


Trend Analysis results for six sugarcane varieties in 2008.

Trend Analysis with P values	Variety LCP 85-384	Ho 95-988	HoCP 96-540	L 97-128	L 99-226	L 99-233
Linear	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Quadratic	0.0008	NS	NS	NS	0.0109	0.0015

[1]Significant variety by date interactions were observed. Data for each variety over time were analyzed using Trend Analysis to evaluate significance of linear and quadratic responses.

Figure 4. Changes in percentage PAR (phostosynthetically active radiation) reduction for six sugarcane varieties from June through August, 2008.[1]



Trend Analysis results for six sugarcane varieties in 2008.

Trend Analysis with P values	Variety					
	LCP 85-384	Ho 95-988	HoCP 96-540	L 97-128	L 99-226	L 99-233
Linear	0.0001	0.0001	0.0001	0.001	0.0001	0.0001
Quadratic	NS	NS	NS	NS	NS	NS

[1]Significant variety by date interactions were observed. Data for each variety over time were analyzed using Trend Analysis to evaluate significance of linear and quadratic responses.

Table 1. Average shoot population, canopy width, ground cover, canopy height, uppermost collar height and percentage PAR (photosynthetically active radiation) reduction for six sugarcane varieties during the 2008 growing season.[1]

Varieties	Shoot population	Canopy width	Ground cover	Canopy height	Uppermost collar height	Reduction in PAR
	no./ha	cm	%	cm	cm	%
LCP 85-384	86,710 bc[b]	77.3 c	33 d	127.7 c	174.8 bc	58 c
Ho 95-988	89,430 bc	82.8 b	42 c	141.8 b	180.0 bc	73 b
HoCP 96-540	83,440 c	74.1 c	32 d	131.3 c	184.3 b	58 c
L 97-128	88,140 bc	84.9 ab	46 bc	152.9 a	213.1 a	80 a
L 99-226	94,580 ab	87.2a	47 ab	127.5 c	172.9 c	81 a
L 99-233	100,620 a	85.6 ab	51 a	153.7 a	203.9 a	74 b

[1]Data represent averages for data collected every 7 to 10 days for shoot population (March-April), canopy width and ground cover (March-May), canopy height (March-July), and uppermost collar height and reduction in PAR (June – August).

[b]Means within a column followed by the same letter are not significantly different ($P \leq 0.05$).

JOHNSONGRASS AND BERMUDAGRASS GROWTH RESPONSE TO SHADE

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Sugarcane varieties grown in Louisiana differ in regard to growth characteristics and shading ability which can affect weed competition. Research was conducted to evaluate the influence of shade on growth and development of the perennial weeds johnsongrass and bermudagrass, both major problems in sugarcane. Fields with natural weed infestations were tilled and enclosures (0.61 x 0.61 x 0.61m) covered with shade cloth providing 30, 50, 70 and 90% shade were placed in the field. Weed growth in the enclosures was compared to that of full sunlight (no shade treatment). A significant linear trend was observed for all johnsongrass growth parameters in response to shade level. Comparing full sunlight to 90% shade 35 days after the study was initiated, plant population decreased 86%, plant height increased 77%, total above ground biomass decreased 90%, and above ground biomass per plant decreased 74%. For bermudagrass a significant linear trend in response to shade was observed for ground cover and above ground biomass. For full sunlight, ground cover at 35, 45, and 55 days was 58, 74, and 88%, respectively, compared with 13, 12, and 10%, respectively, for 90% shade. Biomass 55 days after the study was initiated was 177 g per enclosure for full sunlight and decreased to 9 g per enclosure for 90% shade, a 95% decrease. Johnsongrass appears more tolerant to shade than bermudagrass which is not unexpected since johnsongrass has an upright growth habit compared with prostrate growth habit for bermudagrass.

Sugarcane varieties that emerge early in the spring following the winter dormant period and that produce a high population of stalks per hectare with leaves less upright in growth habit would be expected to be more competitive with weeds because of shading. Variety selection could play an important role in the management of problematic weeds, especially bermudagrass where control measures are not effective. Findings also point to the need to implement the most effective chemical and cultural control measures for bermudagrass both at planting and in the crop season long to help prevent reestablishment of bermudagrass over time.

Table 1. Johnsongrass growth response to shade.[1]

Shade level	Plant population	Average plant height	Above ground biomass	Biomass per plant
%	no./0.37m^2	cm	g/0.37m^2	g/plant
0	76	23.0	20.5	0.70
30	56	28.3	12.1	0.48
50	38	31.5	8.8	0.47
70	12	37.3	1.5	0.16
90	11	40.8	2.1	0.18
Trend Analysis results[2]				
Linear	0.0001	0.0004	0.0001	0.0002
Quadratic	NS	NS	NS	NS

[1]Shade enclosures (0.61 x 0.61 x 0.61m) were constructed of wood and wrapped in polypropylene fabric shading material on four sides and top. Shade enclosures were placed on the soil after the experimental area was tilled to a depth of 10.2 cm. Data were collected 35 days after placement of shade enclosures and represent an average across two experiments.

[2]Significance level indicated by p values for linear and quadratic responses using Trend Analysis for each parameter. NS = not significant.

Table 2. Bermudagrass growth response to shade. [1]

Shade level	Average plant height 35 days	45 days	55 days	Ground cover 35 days	45 days	55 days	Above ground biomass
%	---------------cm------------			------------%-------------			g/0.37m^2
0	13.8	20.8	25.4	58	74	88	177
30	21.1	26.1	31.0	38	44	63	104
50	25.9	28.3	32.9	32	39	50	74
70	24.7	25.7	30.7	19	18	21	17
90	18.4	20.9	24.9	13	12	10	9
Trend Analysis results [2]							
Linear	0.0305	NS	NS	0.0001	0.0001	0.0001	0.0001
Quadratic	0.0001	0.0012	0.0001	NS	NS	NS	NS

[1]Shade enclosures (0.61 x 0.61 x 0.61m) were constructed of wood and wrapped in polypropylene fabric shading material on four sides and top. Shade enclosures were placed on the soil after the experimental area was tilled to a depth of 10.2 cm. Plant height and ground cover data were collected 35, 45, and 55 days after placement of shade enclosures and biomass data were collected at 55 days. Data represent an average across two experiments.

[2]Significance level indicated by p values for linear and quadratic responses using Trend Analysis for each parameter. NS = not significant.