Early Season Variety Response to Glyphosate.

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Utilization of glyphosate to increase early season sucrose has proven to a valuable tool for both sugarcane producers and factories. Factors such as crop erectness at the time of ripener application, available soil moisture, plant stress, ripener rate, treatment to harvest interval, and sugarcane variety have a compounded effect on the efficacy of glyphosate ripener within a given year.

A fundamental component of the successfulness and endurance of the Louisiana Sugarcane Industry has been variety development. Variety development has been utilized to manage diseases, increase sucrose and sugar per acre yield, and improve stubble longevity. Several commercial varieties are currently being grown throughout the industry; however, there is a lack of information about their responsiveness to glyphosate.

A replicated field experiment was conducted at the Sugar Research Station to measure early season variety response to glyphosate. On September 5, 2013, Roundup PowerMax (5.3 oz/A) was applied to the designated second stubble field plots at St. Gabriel, LA. Sugarcane plots were hand-sampled, harvested, and weighted 28 days after glyphosate application on October 3, 2013.
Glyphosate statistically increased theoretical recoverable sugar per ton of cane (TRS) for all varieties except HoCP 00-950 (Table 1). Glyphosate significantly increased TRS levels by 18 to 25% as compared to the corresponding nontreated control for the varieties HoCP 96-540, L 99-226, L 01-299, and L 03-371. Glyphosate moderately increased (12 to 14%) TRS in L 99-233 and HoCP 04-838, and minimally increased (4 to 8%) TRS in HoCP 00-950 and L 01-283. Averaged across all varieties, glyphosate reduced sugarcane yield 2.1 tons per acre, but increased over all sugar yield by 746 pounds of sugar per acre (Table 2).

Table 1. Second stubble theoretical recoverable sugar (TRS) means of eight commercial sugarcane cultivars 28 days after ripener application at St. Gabriel, Louisiana in 2013.

Cultivar	Glyphosate TRS lb/ton	Nontreated TRS lb/ton	% TRS Increase
HoCP 96-540	222 bcd	188 f	18.2
L 99-226	239 a	190 f	25.3
L 99-233	212 de	186 f	14.0
HoCP 00-950	227 abcd	218 cd	4.3
L 01-283	236 ab	219 cd	7.8
L 01-299	231 abc	187 f	23.3
L 03-371	230 abc	192 f	19.8
HoCP 04-838	223 bcd	199 ef	12.0

Table 2. Ripener treatment means for sugarcane sugarcane yield and sugar yield averaged across eight commercial cultivars for the second stubble crop 28 days after ripener application at St. Gabriel, Louisiana in 2013.

Ripener Treatment	Sugarcane Yield Tons/A	Sugar Yield lb/A
Glyphosate (5.3 oz./ac)	37.7 b	8595 a
Nontreated	39.8 a	7849 b

LARGE SCALE RIPENER EVALUATION

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At the onset of the sugarcane harvest season in mid-September in Louisiana, sugarcane maturity in terms of sucrose accumulation is at its lowest and increases as the season progresses through natural ripening. Application of ripening agents target biochemical processes within the sugarcane plant, resulting in a redistribution of fixed carbon and a shifting of resources into sucrose storage. Use of chemical ripening agents to improve early season sucrose concentration is of critical importance to Louisiana sugarcane processors through improve efficiency and increased daily mill capacity.

Glyphosate has been used as a ripener in Louisiana since 1980 and has become a valuable component of sugarcane production systems. In recent years, however, sugarcane producers have become increasingly concerned with the possible deleterious effects of glyphosate ripener on subsequent ratoon crops; mainly, retardation of regrowth, leaf chlorosis, and reduced shoot population. Furthermore, there is interest in evaluating alternatives to glyphosate for use in sugarcane production programs.

In 2012, the United States Environmental Protection Agency (EPA) granted registration of trinexapac-ethyl (Moddus 2EC®) as a sugarcane ripener. The label states that sugarcane should be harvested 28 to 60 days after trinexapac-ethyl application. For glyphosate sugarcane should be harvested 21 to 49 days after application. Trinexapac-ethyl has been an effective ripener in Brazil and Australia. Unlike glyphosate, trinexapac-ethyl is classified as a plant growth regulator targeting gibberellin biosynthesis.

A replicated, large scale study was conducted on a second stubble field of HoCP 96-540 at Blackberry Farms in Vacherie. Aerial application of Moddus (19 oz/A) was applied on August 19, 2013, and Roundup PowerMax (5.3 oz/A) on September 17, 2013. Plots were harvested October 15, 2013, resulting in a ripener treatment duration of 57 days for Moddus and 28 days for Roundup PowerMax. Cane was harvested by combine and scale weights were obtained from Lafourche Sugar Factory. Core sample analyses for obtaining the yield of theoretical recoverable sugar per ton of cane (TRS) were obtained from both front and rear compartments of all trucks that were part of the experiment. Moddus minimally increased TRS by 4.5% above the nontreated control, whereas, a moderate increase of 10.0 % in TRS was observed for sugarcane treated Roundup PowerMax (Table 1). The 2013, TRS findings are consistent with the 2012 large scale ripener study, where Moddus increased TRS by 4.9 % and Roundup PowerMax increased TRS by 10.2%. In 2013, sugarcane yield and sugar yield was not statically impacted regardless of ripener treatment. This greatly differs from the 2012 report in which cane treated Moddus had higher sugarcane and sugar yields than the control.

Table 1. Large scale field experiment means comparing the efficacy of the ripeners Roundup PowerMax and Moddus to nontreated second stubble HoCP 96-540 at Blackberry Farms, Vacherie, LA in 2013.

Ripener Treatment	TRS lb/ton	% TRS Increase	Sugarcane Yield Tons/A	Sugar Yield lb/A	% Fiber
Nontreated	172.0 b		35.1 a	6036 a	18.9 a
Moddus (19 oz./ac)	179.8 ab	4.5	33.4 a	5989 a	20.6 a
PowerMax (5.3 oz./ac)	189.2 a	10.0	33.6 a	6349 a	20.5 a