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# **Effects of ripeners on early season sugar production in sugar cane**

Thesis submitted by

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in March 2003

Thesis submitted for the research Degree of Masters of Science  
in Tropical Plant Sciences  
within the School of Tropical Biology  
at James Cook University

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# Abstract

Ripening in sugar cane refers to an increase in sugar content on a fresh weight basis prior to commercial harvest. Certain chemicals are applied to cane in commercial fields in some countries to accelerate ripening and improve profitability of sugar production. However, responses have usually been reported to be variety and environment specific. We examined changes in the sucrose content in the juice extracted from 43 Australian sugar cane (*Saccharum* spp. hybrid) varieties in response to four chemicals in the Burdekin region in north Queensland over two years. The four chemicals used were ethephon (as Ethrel<sup>®</sup>) + fluazifop-P butyl (as Fusilade<sup>®</sup>), glyphosate (as Weedmaster<sup>®</sup> Duo) and haloxyfop-R methyl (as Verdict<sup>®</sup>). These chemicals were applied in March/April each year. Of particular interest was to determine if economic responses are possible for Australian varieties harvested in the May and June period when sugar content in cane is usually low. Increases in sucrose (measured by pol) levels in cane juice were observed after combined application of Ethrel<sup>®</sup> + Fusilade<sup>®</sup> (E+F) and after application of glyphosate. These results suggest opportunities exist in the Australian industry to improve the profitability of early-harvested sugar cane crops, but further research is required to quantify effects on cane yield and responses in diverse environments.

A second component of this study looked at physiological traits associated with responsiveness of varieties to be chemically ripened. Three highly responsive (Q113, Q135 and Tellus<sup>A</sup>) and 3 non-responsive varieties (Q167<sup>A</sup>, Q179<sup>A</sup> and Q186<sup>A</sup>) were selected from 42 varieties tested to glyphosate in April 2000. These varieties were treated again in April 2001 and changes in brix, pol, fibre and dry matter were monitored in bottom, middle and top stem sections at T<sub>0</sub> (time of application), T<sub>4</sub> and T<sub>8</sub> weeks after application. Fresh weight pol results show that both response-type groups responded similarly to glyphosate at T<sub>4</sub> weeks but at T<sub>8</sub> weeks the responsive group had significant higher pol ( $P \leq 0.01$ ) relative to the non-responsive group. A pooled analysis of variance for all varieties showed glyphosate had not significantly affected either dry or fresh stalk weights by T<sub>8</sub> weeks.

Differences between the response-type groups were then examined at T<sub>0</sub> and it was found that the responsive type group had higher fibre ( $P \leq 0.01$ ) and less pol ( $P \leq 0.05$ ) in the bottom stem sections compared to the non-responsive group. It is speculated that the pol/DM ratio in the bottom stem sections is a useful measure for prioritising which early-harvested crops are suited to chemical ripening. It is suggested that potential to chemically ripen early

harvested crops diminishes as this ratio increases in the bottom stem section. In this study, the pol/DM ratios in the bottom stem sections were 3.7 % higher in the non-responsive group at T<sub>0</sub>. The responsive group also had on average more than eight green leaves at T<sub>0</sub>. This confirms South African recommendations on the usefulness of this trait to predict the potential of early harvested crops for ripening.

Future research is required to confirm these results, particularly with other types of ripeners since glyphosate is known to adversely affect the yields of some varieties in the following ratoon crops.

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# Statement of Sources Declaration

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