

Combined Glyphosate-Ripener and Residue Blanket Stresses Reduce Ratoon Yields in Louisiana

Louisiana's seven- to nine-month growing season is the shortest sugarcane growing season in the world. In tropical climates, crop stresses imposed during the tillering/ establishment stage, have little impact on final yield because of the ability of the cane crop to compensate over the longer growing season. In more temperate (cooler) climates where frost and freezes can occur, such as Louisiana, the ability for a cane crop to overcome similar early-season stresses to stand establishment and growth is limited by the short growing season. Furthermore, sugarcane emergence and growth can be inhibited by low soil temperature, so the crop is often dormant or semi-dormant for part of the production year and only reemerges once soil temperatures exceed 64.4°C.

The majority of the Louisiana cane crop is chemically ripened with glyphosate and harvested green. Failure to remove the blanket of post-harvest residue prior to the crop's emergence from winter dormancy and certain glyphosate ripener application regimes have independently been shown to reduce yields of the subsequent ratoon crop of LCP 85-384, Louisiana's predominant variety. With the introduction of several new sugarcane varieties (HoCP 95-988, HoCP 96-540, and L 97-128), the Louisiana industry is moving away from LCP 85-384 because of its severe brown-rust susceptibility and declining yields. The objectives of this experiment were to determine if these newer varieties differ from LCP 85-384, in their susceptibility to residual ripener applications of glyphosate in ratoon crops following an application the previous year and to investigate if the residual stress from the ripener application is compounded by the presence of post-harvest residue. Glyphosate was applied on November 1 to first-ratoon crops of the various varieties at a rate of 0.45 ae kg/ha to one half of the experimental plots and the others were left as non-treated controls. The first-ratoon cane was mechanically harvested with a chopper harvester 49 days after glyphosate application. Two weeks after harvest, residue was

removed by burning one-half of the glyphosate-treated plots and one half of the non-treated plots. All treatments were replicated four times, and this experiment was conducted twice from 2003-2007. The subsequent second-ratoon crop was mechanically harvested with a chopper harvester, and a modified high-dump field transportation wagon equipped with electronic load cells was used to determine gross cane yields from each plot. Billet samples were randomly collected during the harvesting operation from each plot for juice and fiber analysis using the core press method.

Data analysis revealed that all varieties responded similarly to both stresses. Analysis also showed that the combination of ripener applications of glyphosate and residue stresses resulted in reductions greater than the additive effects of the two stresses. Where ripener was applied, and the post-harvest residue blanket not removed, sugar yields were lowered by 21% (3150 kg ha⁻¹) compared to treatments where no ripener was applied and the residue was not removed. On the other hand, where glyphosate was not used and the residue blanket not removed, sugar yields were reduced by 6% (920 kg ha⁻¹) compared to the treatment where glyphosate was not applied and the residue was removed. This sugar yield loss was primarily due to lower cane tonnage (103.3 Mg ha⁻¹) where both ripener and residue stresses were imposed versus just the residue stress (116.3 Mg ha⁻¹). Where residue was removed by burning, ripener application did not reduce sugar yields compared to where ripener was not used.

Other production areas have reported negative effects of post-harvest residue blankets on early cane growth, but the growth suppression was generally overcome after six months of growth. Six months of growth in Louisiana can be the entire growing season, so Louisiana farmers are advised to remove residue blankets generated during green-cane harvesting by either burning or mechanical means as soon after harvesting as possible especially if a glyphosate ripener

was applied the previous season. In areas where residue cannot be removed by any means, farmers should consider delaying the harvest of that field and not using a ripening application of glyphosate because of the compounded effects of these two stresses. As the use of glyphosate as a ripening agent is gaining popularity in more tropical sugarcane production areas, the compounded effects of both residue retention and the use of ripeners on subsequent ratoon crops of a crop cycle should be considered.

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