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[\[PDF \(692K\)\]](#) [\[References\]](#)**Effects of the Temperature Lowered in the Daytime and Night-time on Sugar Accumulation in Sugarcane**[Naoko Uehara](#)¹⁾, [Haruto Sasaki](#)²⁾, [Naohiro Aoki](#)¹⁾ and [Ryu Ohsugi](#)¹⁾

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Abstract: Sugarcane (*Saccharum* spp.) is a major crop grown for sucrose production. In Japan, its sucrose concentration is highest in winter. We examined the effects of the temperature lowered in the daytime and night-time (LDT and LNT, respectively) on sugar assimilation. Since photosynthetic and respiration rates change with temperature, we assumed that plants under LNT (LNT plants) would have low respiration rates and thus high sugar yields, whereas those under LDT (LDT plants) would have low rates of photosynthesis and thus low sugar yields. However, because of their acclimatisation to the reduced temperatures, LNT and LDT plants had sugar yields that were similar, or superior, to those of control plants. Sugar yield depends on biomass and sugar concentration; the stems of LNT and LDT plants did not grow as tall as those of the controls, but the sucrose concentrations in their stems were higher than in the controls. ¹³C analysis revealed no difference in the partitioning of photosynthates to the soluble sugar fraction between control plants and those treated with low temperature. Control plants had higher glucose concentrations in the stem than treated plants, in which new photosynthates appeared to be partitioned preferentially into sucrose. Low temperature enhanced the sucrose concentration in the sugarcane stem not by improving the carbon budget, but by promoting the partitioning of carbon to stored sucrose.

Keywords: [¹³C](#), [Internode](#), [Photosynthesis](#), [Respiration](#), [Sucrose](#), [Translocation](#)

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