The dynamics of sugarcane ratoon decline in southern Africa

RAMBURAN S[1,2]

[1]South African Sugarcane Research Institute, Private Bag X02, Mount Edgecombe 4300, South Africa; [2]University of KwaZulu-Natal, Private Bag X01, Scottsville 3209, Pietermaritzburg, South Africa

E-mail: Sanesh.Ramburan@sugar.org.za

Abstract

Ratoon decline (RD) is a common feature of sugarcane cropping systems worldwide, and is a key economic consideration in decision-making on replanting. Historically, longer ratoon cycles (>9 crops) were thought appropriate for maximising profitability in southern Africa. However, recent developments have prompted a re-evaluation of the economic viability of long ratoon cycles. As a starting point for this assessment, commercial production data from various sugarcane estates in southern Africa were interrogated to: i) compare RD trends between broad regional cropping systems; ii) identify key factors affecting RD; and iii) explore likely economic impacts of varying ratoon longevity within cropping systems.

Ten independent datasets from irrigated and rainfed estates in South Africa, Tanzania, Zambia and Mozambique were analysed. Mean cane yields and sucrose % were calculated per crop class (ratoon) averaged over all available production years. Where available, effects of factors such as irrigation system, variety and time of harvest (early vs. late) were examined for differential RD trends. Using the production data from each estate, the accumulated profitability of a conventional long (plant + 9 ratoons) ratoon cycle was compared to that of two short (plant + 4 ratoons) ratoon cycles in a 10-year period.

All datasets indicated that quadratic relationships existed between cane yield RD and ratoon number, with R^2 values ranging from 0.54 to 0.96. In most cases, stabilisation of yields occurred around the 3rd ratoon crop. Differences in RD between irrigation systems were evident on some estates, but not consistent across estates. Except for one irrigated estate, varietal effects on RD were generally negligible. Late season harvesting, in general, exhibited sharper RD rates than early harvesting, particularly under irrigated conditions. In high potential irrigated systems (cane yield >100 tonnes/ha) with slow rates of RD, the longer ratoon cycle (plant + 9 ratoons) was generally more profitable than the shorter. With faster RD rates, the shorter ratoon cycle (plant + 4 ratoons) became more profitable. In low potential rainfed conditions, the shorter cycle was only marginally better than the longer cycle. However, in both water regimes, when the practicalities of implementing a shorter cycle were considered (inclusion of additional fallow and/or reducing harvest age to replant within the same season), this strategy became less economical than the longer cycle. The profitability of the shorter ratooning cycle was inversely related to the rate of RD.

Efforts to minimise crop turn-around time (plough-out to replant) or sustain cash flow with break crops may be alternatives to improve profitability of the shorter ratooning strategy. Exceptions to the general findings are presented and practicalities discussed to illustrate the dynamics of decisions relating to ratoon cycle.

This analysis has revealed strong dependencies of profitability on the overall RD rate and suggests that site-specific decisions, aided by a decision support system, would be most appropriate.

Keywords: ratooning ability, ratoon decline, replant