

The RYD rate for all the different irrigation systems was significant ($P < 0.05$) (data not presented); the slopes indicated that it was higher in the centre pivot system (-0.349 TSHA), followed by the furrow (-0.186 TSHA) and the sprinkler systems (-0.08 TSHA). The highest y-intercept was recorded for centre pivot irrigation (16.35 TSHA), followed by furrow (15.13) and sprinkler irrigation (13.73).

Discussion

The slopes computed from the three irrigation systems showed significant differences, which indicated a marked decline in sucrose production over 10 years. This decline occurred, regardless of the irrigation system that was used. The higher rate of RYD in centre pivots implies that if the yield has reached a certain threshold, it would be better to start replanting on the centre pivots if a choice had to be made between systems compared to the furrow and sprinklers. The high initial returns on the TSHA will justify the high cost of replanting. The good part is that this is where the y-intercept is the highest, which implies that the starting point at ratoon zero is higher in this system than in the others. The sprinkler irrigation system was the least in both the RYD rate and the y-intercept, while the furrow system was intermediate to the two systems in both the RYD rate and Y-intercept.

The phenomenon of RYD has been investigated and reported by other researchers. Dlamini and Zhou (2022) reported that the influence of the soil type and the different seasons were highly influential on the rate of RYD across the ESI. These authors reported a higher rate of RYD in the early (-0.33 TSHA) and late (-0.32 TSHA) cuts than in the mid-season cuts (-0.26 TSHA). Poor-draining soils were reported to have higher (-0.38 TSHA) RYD rates than well-drained soils (-0.25 TSHA).

Conclusion

The study aimed to determine the rate of RYD of sugarcane grown under three irrigation systems. Overall, the RYD rate is higher under centre pivot irrigation, followed by the furrow and sprinkler irrigation systems. The findings of this study are crucial for cost-benefit projections, while choosing an irrigation system, and for forecasting sugarcane replant programmes.

References

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