

TRICKLE IRRIGATION OF BANANAS
IN MAHAWELE SYSTEMS B AND C

By

MOLAFFER FAZAL MOHAMED

Thesis

Submitted in partial fulfilment of the requirements

for the degree of

MASTER OF PHILOSOPHY

in the

POSTGRADUATE INSTITUTE OF AGRICULTURE

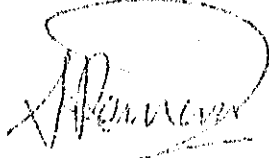
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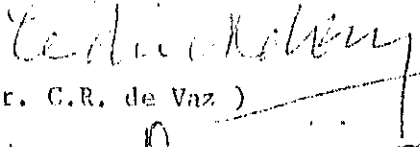
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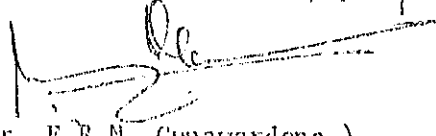
Supervisor


(Dr. K.P. Premaratne)

Examiner


(Dr. C.R. de Vaz)

Examiner


(Dr. E.R.N. Gunawardena)

October 1989.

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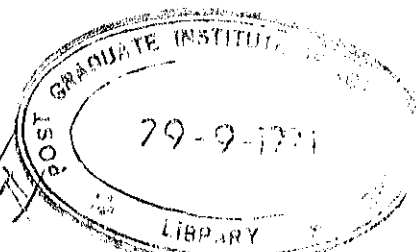
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ABSTRACT

Experiments were conducted in Aralaganwila (Mahaweli system B) and Girandurukotte (Mahaweli system C) from February 1987 to December 1988, to ascertain the performance of four drip irrigation systems (Key, Button, In-line emitters and Viallo) in terms of banana production and to determine the actual crop water requirements for maximum yield. Kolikutta, Embul and Alukasal were the three varieties used in common on both sites while Diyamandan at Girandurukotte was substituted by Etamuru at Aralaganwila. Four banana varieties and seven drip irrigation treatments with the rainfed control were arranged in two replicates in a split plot design at both sites. Drip methods at two rates of water applications and the rainfed control were randomly allocated to the main plots and the varieties were rerandomised within each mainplot.

Key emitter had the tallest plants (259 and 266 cm) and the maximum plant girth (67 and 69 cm) at bunch emergence and harvesting respectively, and the average leaf number per plant at bunch emergence was also highest for the Key emitter (10.3), at Aralaganwila. The best recorded bunch yields were 12.0 and 11.8 t ha⁻¹ with 95 and 100% plant survival and irrigation water use efficiencies of 15.4 and 13.5 kg m⁻³ for Aralaganwila and Girandurukotte, respectively. The crop water use efficiencies were 7.0 and 10.0 kg m⁻³ for the two sites. In the two experiments, the highest incremental Benefit-Cost ratios (5.0 and 3.9) and Net Present Values (Rs 40,511 and 24,564) were also obtained with Key emitters.

Button emitter produced 9.43 and 11.50 t ha⁻¹ of fruits, irrigation water use efficiencies were 12.2 and 12.9 kg m⁻³ and crop water use efficiencies of 5.5 and 10.0 kg m⁻³ with plant survival of 95 and 98% for the trials at Aralaganwila and Girandurukotte respectively. At both sites the Benefit-Cost ratios (3.0 and 2.7) and Net Present Values (Rs 21,995 and 16,685) were less than those of Key emitter.

In-line emitter had banana yields of 9.56 and 10.40 t ha⁻¹ and irrigation water use efficiencies of 14.2 and 11.6 kg m⁻³ for the two sites, which were comparable to those for the Button emitter. Crop water use efficiencies for Aralaganwila and Girandurukotte were 5.5 and 9.0 kg m⁻³ respectively. However, the Benefit-Cost ratios were as low

as 2.7 for the two sites while the Net Present Values were Rs 19,746 and 17,173, which are again comparable to those for Button emitters.

Viofle had the estimated bunch yields of 9.57 and 8.6 t ha⁻¹ for Aralaganwila and Girandurukotte respectively, with equal plant survival (86 - 87%) at both sites. Benefit-Cost ratios were 1.5 and 1.1, which were lower than for In-line emitters. Irrigation and crop water use efficiencies were 14.5 and 5.7 versus 10.41 and 8.49 kg m⁻³ for Aralaganwila and Girandurukotte.

Rainfed banana had only 6.0 and 7.0 t ha⁻¹ of estimated bunch yield, which was only 40 - 60% of drip irrigated banana yields, at both sites. Plant survival was as low as 43 and 53% for the two sites. The wetter irrigation treatment with 33 - 40% more water applied had up to only 22% yield increment over the drier treatment.

Banana crop water requirements (daily average) between January and December 1988 were 4.26 mm d⁻¹ at Aralaganwila (planted 15-02-87) and 3.24 mm d⁻¹ at Girandurukotte (planted 11-02-87). FAO crop coefficient (K_c) values for banana, determined under tropical climate were not appropriate for the study areas. Therefore, the crop water requirements calculated using the FAO K_c values under estimated demand in some months yet equalled or over estimated in others, at both experimental sites.

Banana varieties. All banana varieties used on the two sites (Kolikattu, Ebul, Etamuru, Diyamondan and Alakesel) performed better under drip irrigation, with 100% higher yields when compared with the rainfed. The yield for the three common varieties tested both at Girandurukotte and Aralaganwila were of the same order. However, the cooking type bananas had yield increases up to 18 and 30% when drip irrigated and rainfed respectively, over the dessert types at Aralaganwila, whereas at Girandurukotte, they were only 8 and 10%.