

Cost-effectiveness of different irrigation approaches for producing sweetpotato vines in net tunnels compared to open nurseries

This study was conducted under researcher-management to compare different irrigation approaches for producing sweetpotato planting material in low-cost net tunnels and open nurseries. Preliminary results show that producing vines using net tunnels with access to irrigation (drip and furrow) is more cost-effective than producing vines in open field nurseries with access to irrigation.



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Fig. 1 A female farmer sorting out sweetpotato vines produced in net tunnels under drip irrigation. Nyakasanga village, Mwanza Region, Tanzania. K. Ogero.

► What was the problem?

On-farm piloting of the use of insect-proof net tunnels in Tanzania to protect planting material from virus vectors showed that irrigation was among the key challenges. Farmer-multipliers would use buckets to directly apply water on the net tunnels, a practice they found cumbersome, especially if the farmer had more than two net tunnels. A study was conducted to explore alternative approaches for irrigation that are simple to use and affordable (Fig. 1). Results on vine yields showed higher yields under scheduled irrigation regimes compared to common farmer-practice. However, it is also necessary to determine cost-effectiveness of the various irrigation approaches.

► What did we want to achieve?

The objective of this activity was to evaluate cost-effectiveness (Tanzanian shillings (TZS)/cutting/area) of producing sweetpotato vines in net tunnels (NT) and open fields (OF) under drip and furrow irrigation when watering at 10, 40 and 70 kPa of soil water tension¹.

► Where and with whom did we work?

The experiment was conducted in partnership with the Lake Zone Agricultural Research and Development Institute (LZARDI). The Institute provided land where the trial was established at Nyakasanga village, Misungwi district, Mwanza region, Tanzania.

Partners

- Lake Zone Agricultural Research and Development
- Institute (LZARDI)
- International Potato Center (CIP)

¹ kPa refers to kilopascal which is a unit of measurement, in this case for soil water content; 0 kPa = very wet and 100 kPa = very dry.

➤ How did we make it happen?

We assessed the cost of producing vines under three watering schedules and two irrigation technologies. The watering schedules were based on 10 kPa, 40 kPa and 70 kPa of soil water tension (SWT) with three replications. The control was common farmer-practice and irrigation was done using watering cans. SWT was measured using tensiometers under two irrigation technologies (i.e., drip and furrow irrigation). The amount of water utilized per irrigation criterion was measured and compared vis-a-vis vine production and costs associated with the various irrigation technologies.

➤ What did we learn?

Irrigated production of sweetpotato vines was more cost-effective in net tunnels compared to open fields. Drip irrigation was more cost-effective compared to furrow irrigation. The average costs of production per cutting for drip and furrow irrigation in net tunnels were TZS. 81.5 (USD 0.039) and TZS. 97.0 (USD 0.046) respectively, whereas for farmer-practice (control) it was TZS. 106.5 (USD 0.051) (Fig. 2).

Vine production under 10 kPa was more cost-effective compared to 40 kPa, 70 kPa and farmer-practice (Fig. 3). This is because significantly higher number of cuttings were produced under 10 kPa compared to the other watering schedules (Fig. 4).

➤ Conclusion

This study has shown that use of modern irrigation techniques such as drip irrigation can boost production of sweetpotato planting material in net tunnels. This can make irrigation in net tunnels less tedious, especially when the scale of production increases. Based on the findings of this study, drip irrigation is more cost-effective compared to furrow and farmer-practice. However, this should be adopted when the scale of production increases significantly given that the smallest drip irrigation kit covers 500 m² and costs about USD 250 in Tanzania whereas a single net tunnel is only 5.1 m². The study also confirmed the contribution of net tunnels towards moisture retention which reduces the amount of water used for irrigation. The net tunnels have proven to be effective not only in reduction of virus infection but also in vine conservation during the dry periods.

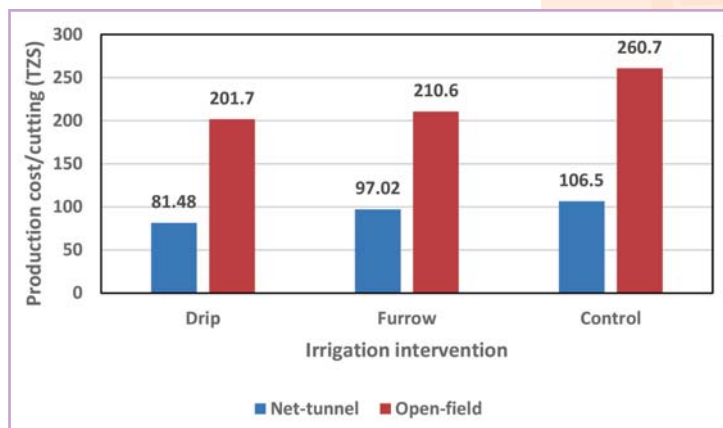


Fig. 2 Cost of production per cutting by type of irrigation and management.

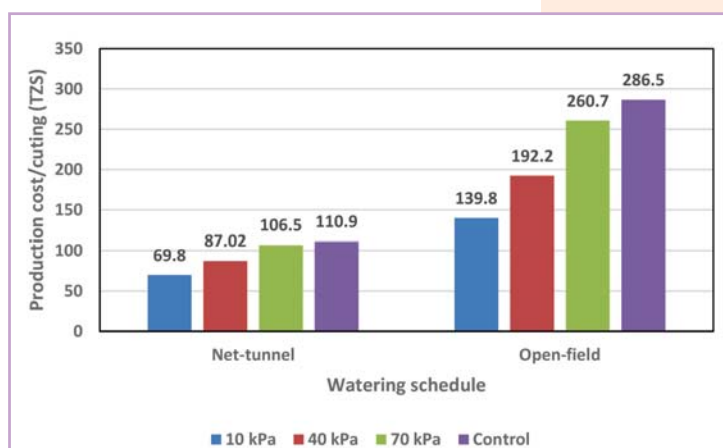


Fig. 3 Cost of production per cutting by Soil Water Tension (SWT) in net tunnels and open field.

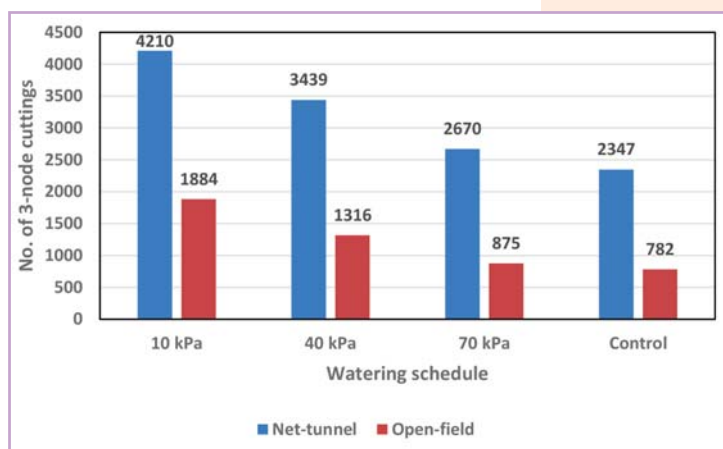


Fig. 4 Number of 3-node cuttings under various watering schedules in net tunnels and open fields.

² USD 1 = TZS. 2100 as of November 2016. A cutting from a sweetpotato vine has 3-nodes, and is 20-30 cm in length.

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