

ASSESSMENT OF PERFORMANCE OF ADOPTING AUTOMATED POLYTUNNEL SYSTEM FOR BELL PEPPER (*Capsicum annuum* L.)

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Agricultural production in Sri Lanka faces challenges due to economic depression and climate change, especially impacting vulnerable socio-economic and environmental scenarios. To address these challenges, adopting climate-smart strategies is crucial for sustainable livelihoods among farmers. Thus, this study aimed to evaluate the performance and benefits of an automated polytunnel system for bell peppers in the Uva province of Sri Lanka to move farmers towards climate-smart strategies through comprehensive analysis. The automation aimed to sustain optimal air temperature (T), relative humidity (RH) and soil moisture content (MC) for bell peppers using the SenzAgro Agricore platform while facilitating real-time information access for farmers. Additionally, the automation was powered by solar panels. During the study period from November 2023 to January 2024, the soil moisture content, air temperature, and relative humidity within the automated polytunnel remained steady at 46.08% (wb), 21.88°C, and 88.93%, respectively, all of which were deemed ideal for the cultivation of bell peppers. In the performance evaluation, both yield and economic performance were compared between automated and non-automated tunnels. The automated polytunnel demonstrated a significantly higher total yield ($0.501 \text{ kg m}^{-2} \text{ w}^{-1}$), and supermarket yield ($0.448 \text{ kg m}^{-2} \text{ w}^{-1}$) compared to the non-automated polytunnel ($p \leq 0.05$). Moreover, the automated polytunnel showed a significantly lower percentage of rejected yield percentage (10.47%) from the supermarket ($p \leq 0.05$). Economic performance evaluation revealed no significant differences in input costs between the two tunnels ($p \geq 0.05$). Furthermore, no pests or diseases were observed during the study period. In conclusion, adopting an automated polytunnel can be recommended as a sustainable solution to enhance the yield and income of bell peppers. For a comprehensive analysis, further studies are required.

Keywords: Automated polytunnel, Bell pepper, Climate-smart agriculture, Crop production