Daytime irrigation significantly reduces air and surface temperatures in backyards

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Backyards are an important space for physical and social activities because they are private, easily accessible and secure. Australia's climate is becoming warmer because of global climate change. People's willingness to use backyards will decrease when air temperatures increase. It is important to reduce human heat stress in backyards in summer to encourage their use for exercise, play, social cohesion and nature connection. Daytime irrigation offers an opportunity to cool backyards because the direct evaporation of water during irrigation can increase latent heat and reduce sensible heat.

In this study, we aimed to measure the cooling effect of daytime irrigation in a simulated turf-covered backyard environment. Four 6 m × 6 m plots were set up at the Burnley Campus of the University of Melbourne. Each plot was enclosed by 1.8-m tall 70% shade cloth to simulate a backyard environment (Fig. 1). The surface of the plot was grassed and the dominant species was Kikuyu (*Pennisetum clandestinum*). One plot was unirrigated and the remaining three plots were irrigated at 1 pm local time

every day at: 2, 4 and 7 mm. Key climate and soil variables, such as air temperature, relative humidity, turf surface temperature and soil moisture, were measured at the centre of each plot. The plots were irrigated continuously for seven weeks from 2021-01-20 to 2021-03-02.

The cooling effects of the three daily irrigation amounts were similar and therefore the results from the 4-mm plot are presented. In Week 7, irrigation reduced daytime (10:00 – 16:59) mean soil temperature, turf surface temperature, air temperature and universal thermal climate index by 1.7, 2.3, 0.6 and 0.4 ◦C, respectively. All the reductions were statistically significant (p<0.05, t-test). The air temperature reduction was significantly correlated (R = –0.7, p<0.05, t-test) with the differences in soil moisture content between the irrigated and the unirrigated plots.

Fig. 1. Experimental set-up of the simulated backyard.