

Fig. 1. (a) Shawan County in Xinjiang, northwest China. (b) Study Site location in Shawan County, where subsurface pipe drainage was crucial to desert-oasis agroecosystems. (c) Field experiments were conducted in a cotton field ($44^{\circ} 36' N$, $85^{\circ} 21' E$; 412 m above sea level) in Shawan where MDI-SPD has been implemented since 2016.

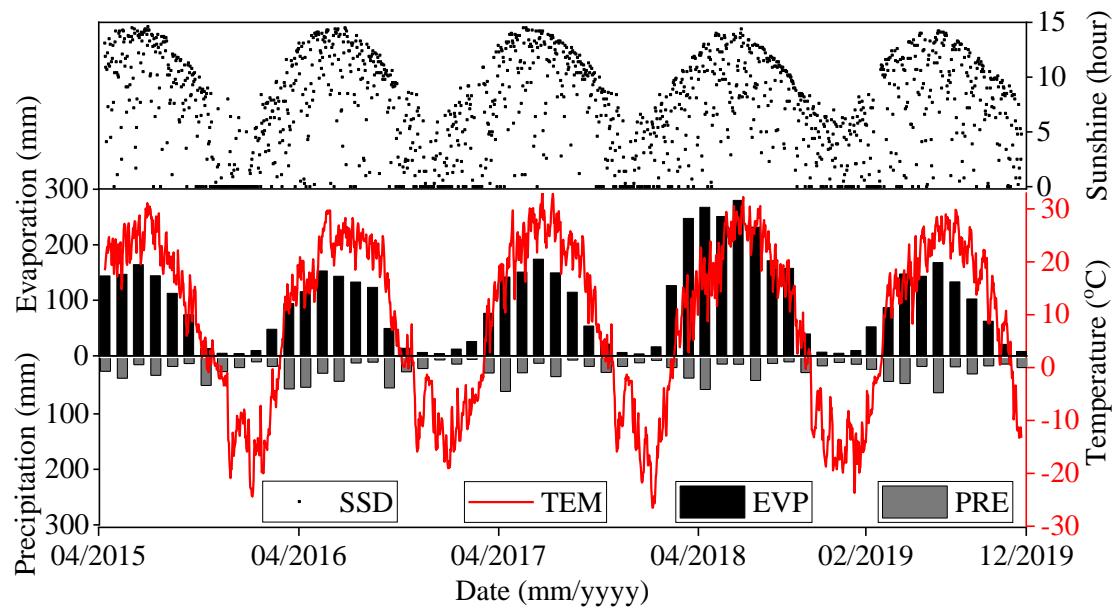


Fig. 2. Meteorological data for the study area in 2015 and 2019 (including sunshine, temperature, precipitation and evaporation)

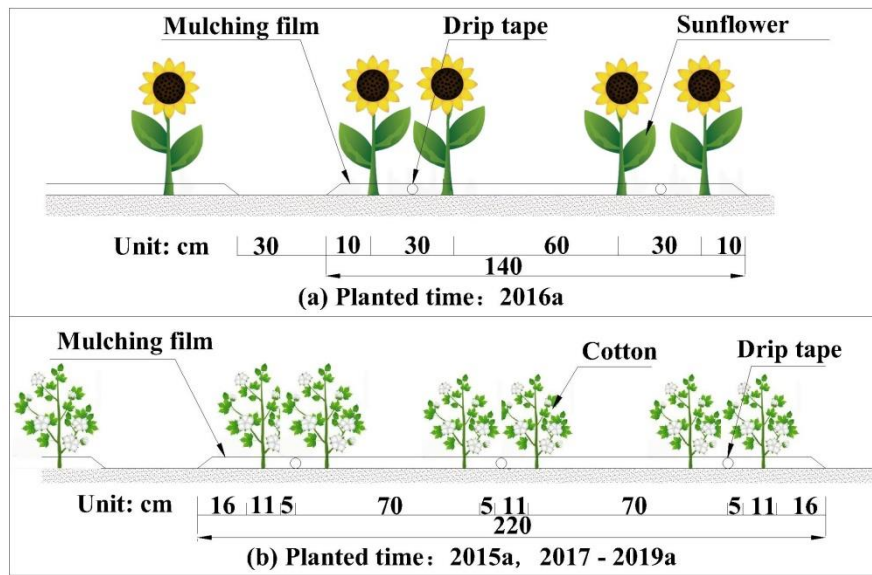


Fig. 3 Layout of the planting pattern under drip irrigation

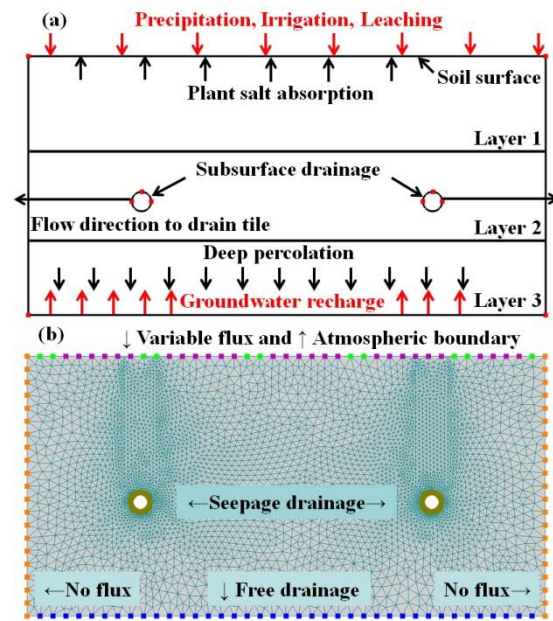


Fig. 4. Schematic of (a) typical flow to drain tile and (b) boundary conditions used in the model domain to mimic the field condition (not drawn to scale).

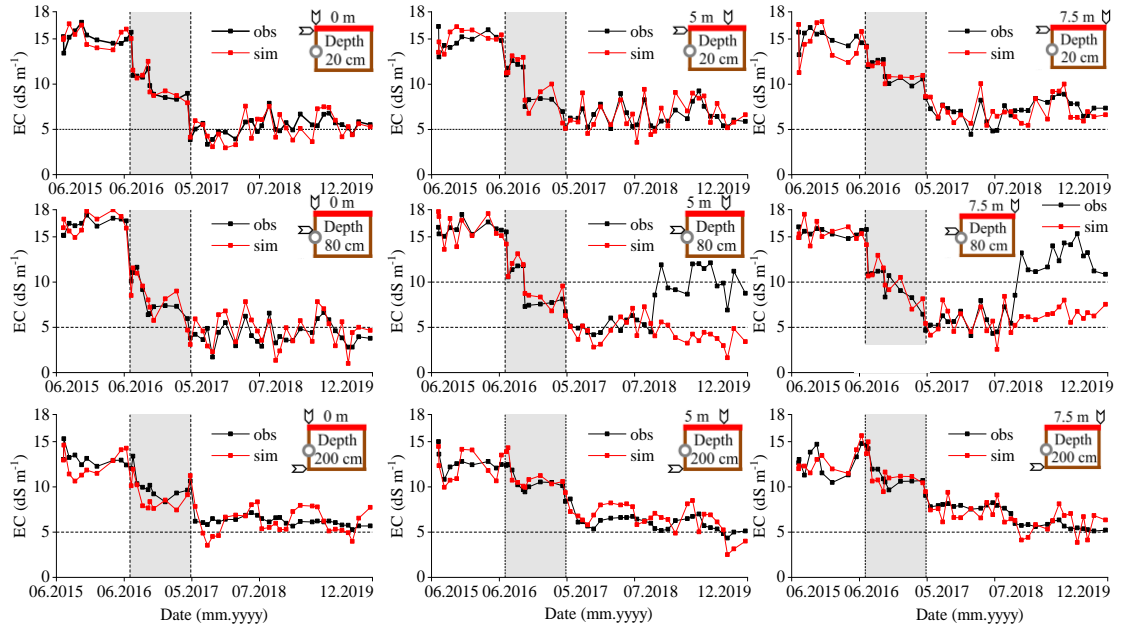


Fig. 5. Simulated and observed trends in soil salt content. The mild and moderate salinisation level represent soil salt content of 5 and around 5–10 dS m^{-1} , respectively (Ramoliya, 2004).

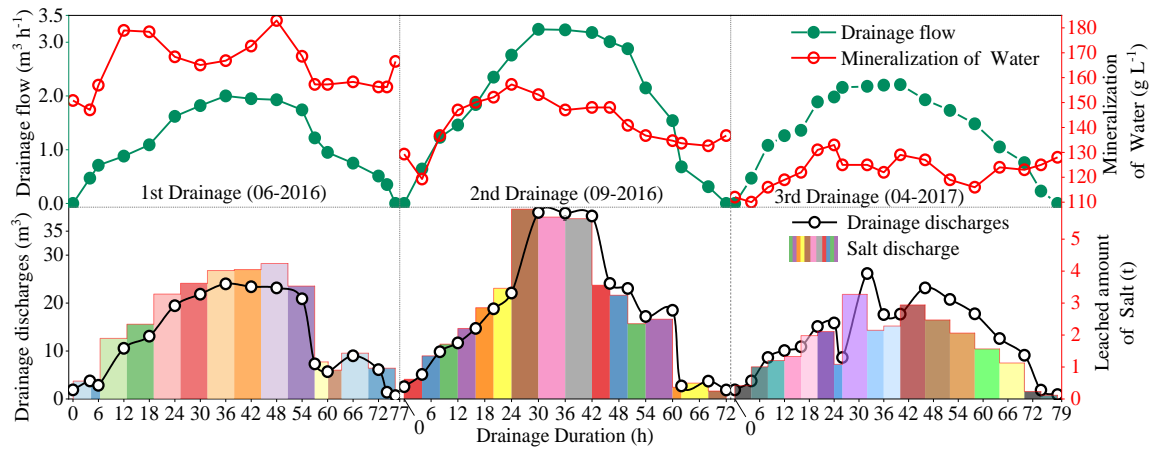


Fig. 6. Dynamic variation of drainage and the salt content (mineralisation) of the drainage water, including drainage flow, mineralisation, drainage discharge, and salt discharge of subsurface pipe drainage. Different colours above the histogram bars represent the total salt discharged during 4–6 hours (sampling interval 4–6 h updates).

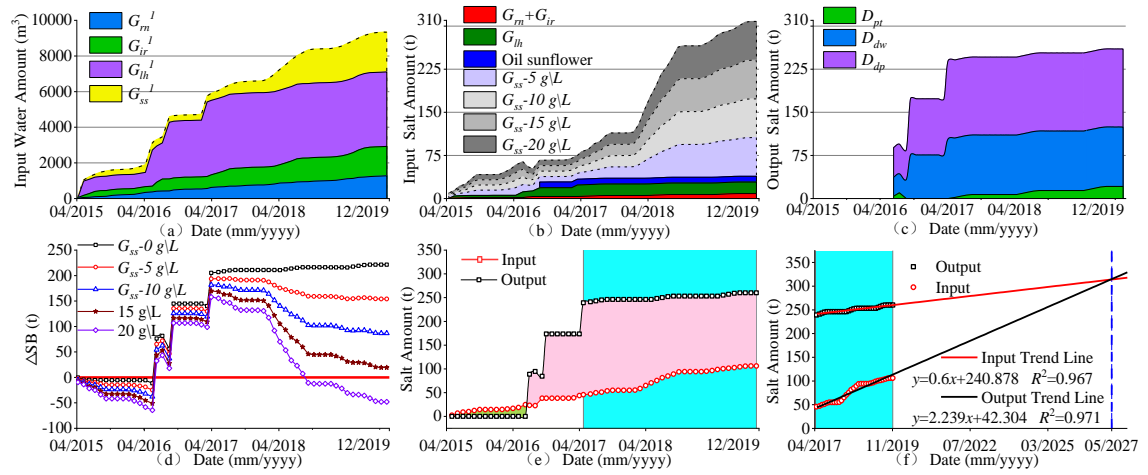


Fig. 7. The feature maps of salt balance. (a) Total field water input, G_m^l , G_{ir}^l , G_{ih}^l , and G_{ss}^l represent the water amount of precipitation, irrigation, leaching, and groundwater evaporation, respectively. (b) Total field salt input, where G_m , G_{ir} , G_{ih} , and G_{ss} represent the salt amount of precipitation, irrigation, leaching, and groundwater evaporation, respectively. (c) Total field salt output, where D_{pt} , D_{dw} , and D_{dp} represent the salt amount of subsurface pipe drainage, deep seepage, and plants, respectively. (e) Comparison between salt field input and output. (f) Salt balance trend prediction.

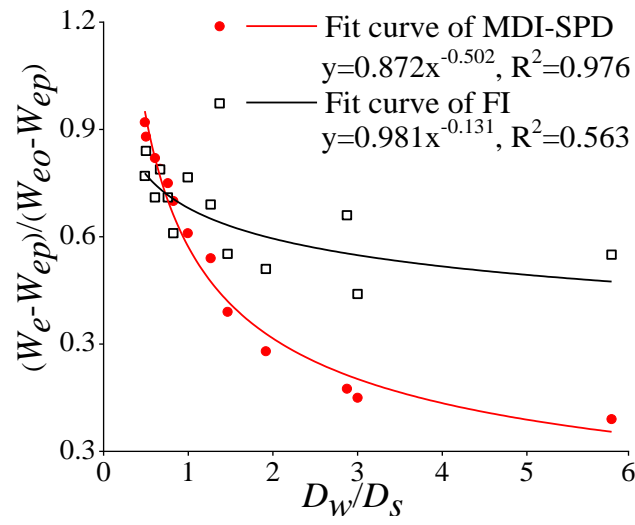


Fig. 8. Soil salt leaching curves under different irrigation methods. MDI-SPD represent mulched drip irrigation and subsurface pipe drainage system. FI, flooding irrigation; W_{eo} , soil salt content at a certain depth before leaching (dS m^{-1}); W_e , soil salt content at a certain depth after leaching (dS m^{-1}); W_{ep} , soil salt content leaching balance, as indicated by the soil salt content at 0–5 cm after leaching (dS m^{-1}); D_w , irrigation and drainage water (mm); D_s , Leaching soil depth (cm).