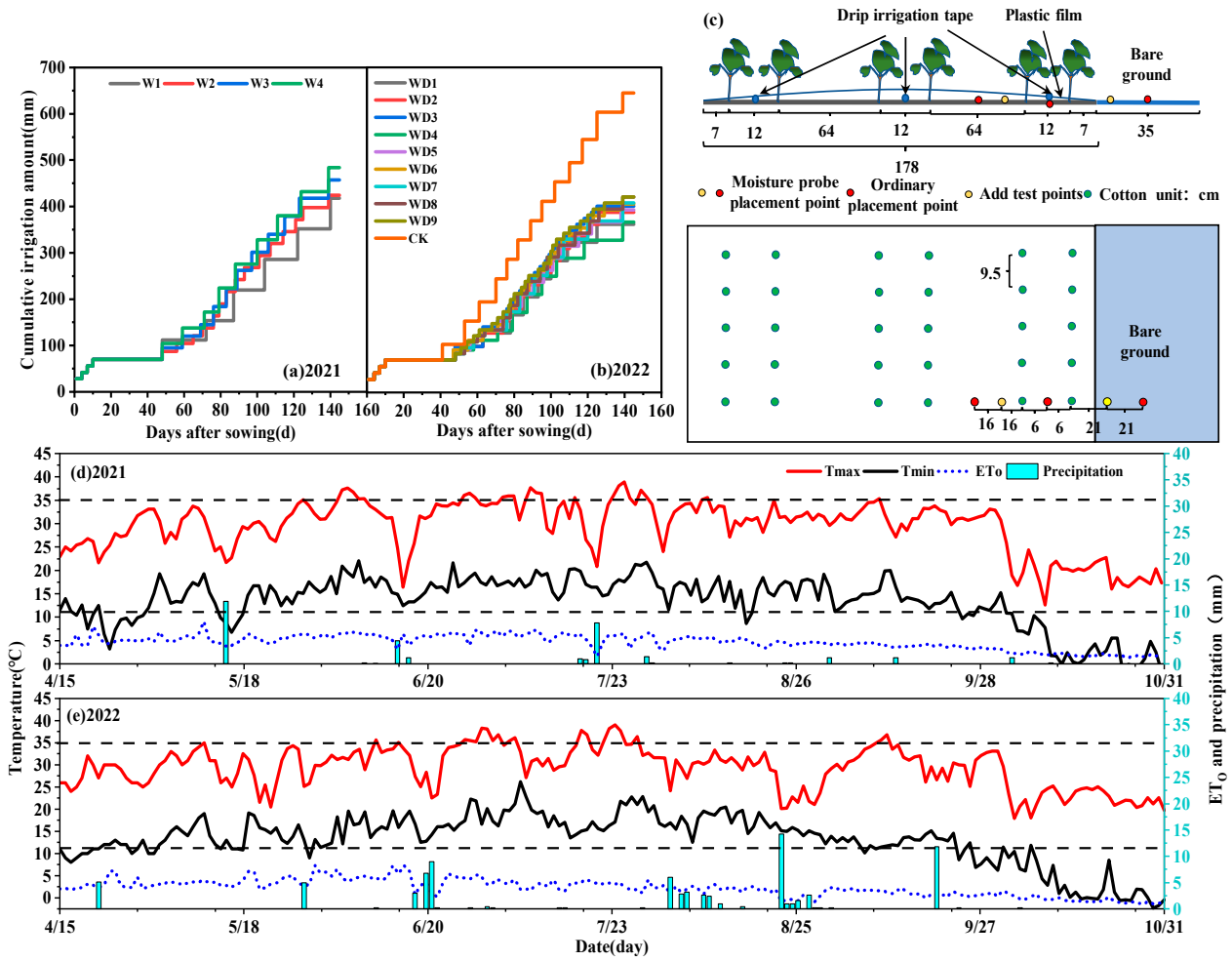


## Supplementary figures Captions

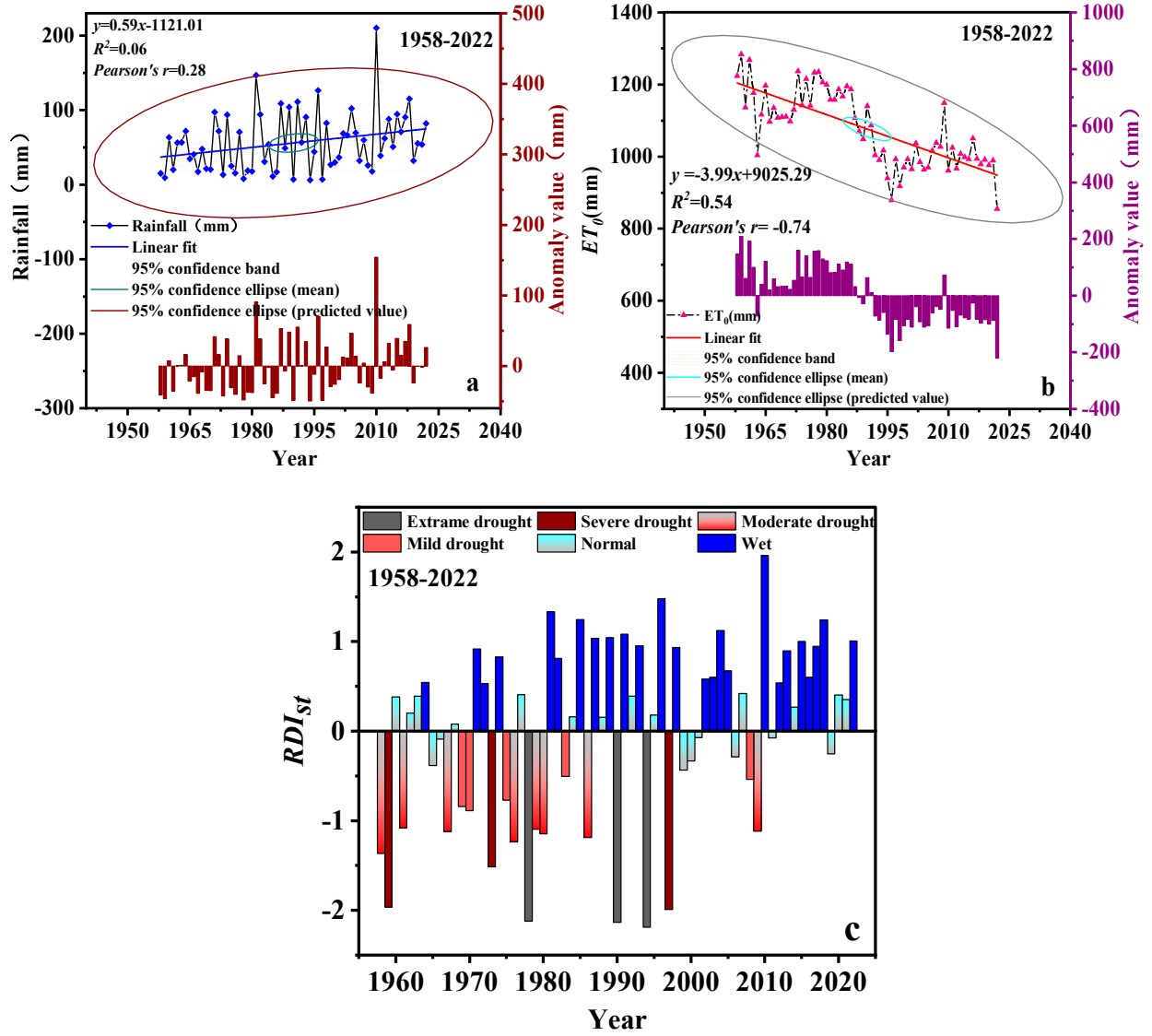
**Figure. S1.** This experiment has irrigation treatment schedules for 2021 and 2022 (S1-a, S1-b). The cultivation method of cotton is the most widely used drip irrigation under film in Xinjiang (S1-c). This is the temperature,  $ET_0$  and rainfall (d) for two years during the trial.

**Figure.S2** Changes of precipitation(S2-a), reference crop evapotranspiration ( $ET_0$ ) (S2-b), drought index and drought severity(S2-c) in the growing season of cotton in Yuepuhu County, Kashgar from 1958 to 2022 Precipitation the designed frequency of 25%,50%, and 75% was 76.87 mm, 48.05 mm, 26.19 mm, respectively. The severity of drought can be divided into wet, normal, mild drought, moderate drought, severe drought and extreme drought levels, and the corresponding boundary values are  $RDI_{st}$  ( $>0.5$ ) ( $-0.5 - 0.5$ ), ( $-0.5 - -1.0$ ), ( $-1.0 - -1.5$ ), ( $-1.5 - -2.0$ ) and ( $<-2.0$ ).

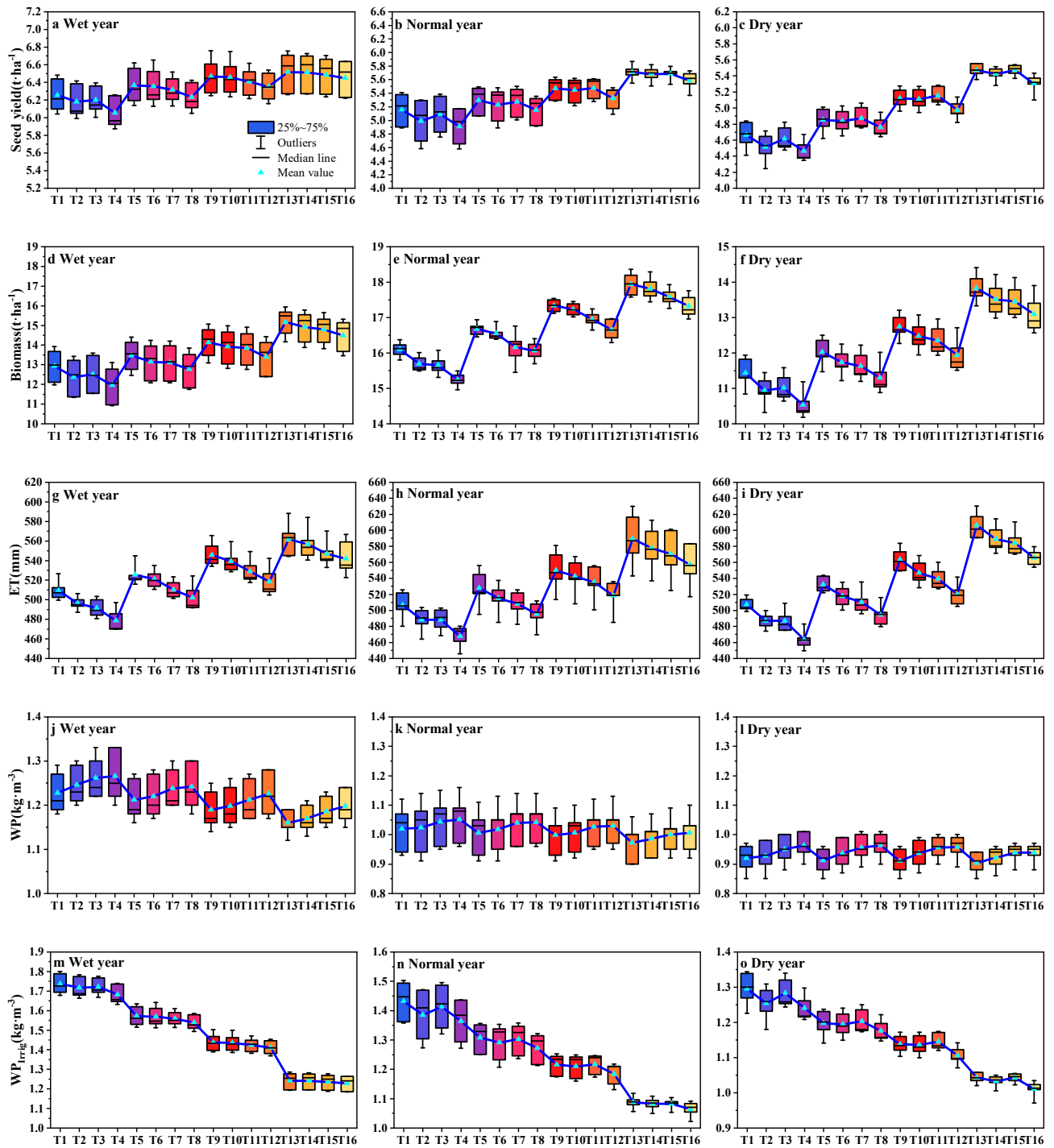
**Figure.S3** Comparison of final yield, biomass, ET, WP, and  $WP_{Irrig}$  of cotton under different comprehensive scenarios in wet year, normal year and dry year. The yield trend of seed cotton in wet year, normal year and dry year (a-c); The trend of final above-ground dry matter quality in wet, normal and dry years (d-f); Evapotranspiration trends of each treatment in wet year, normal year and dry year (g-i); The trend of WP in wet year, normal year and dry year (J-L); Trend of  $WP_{Irrig}$  in wet, normal and dry years (m-o).



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**Figure S3.** Comparison of final yield, biomass, Bio, ET, WP, and  $WP_{irrig}$  of cotton under different comprehensive scenarios in wet year, normal year and dry year. The yield trend of seed cotton in wet year, normal year and dry year (a-c); The trend of final above-ground dry matter quality in wet, normal and dry years (d-f); Evapotranspiration trends of each treatment in wet year, normal year and dry year (g-i); The trend of WP in wet year, normal year and dry year (j-l); Trend of  $WP_{irrig}$  in wet, normal and dry years (m-o).